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HANDBOOK ON CLIMATE JUSTICE

Project "Climate Justice Living Lab"

JUAN-RAMON FALLADA-GARCÍA-VALLE, NICOLA GULLO (EDS.)
BEATRIZ FELIPE-PÉREZ, MARICA DI PIERRI, YULIYA KOVEINO (COORDS.)

Studi e ricerche



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Juan-Ramon Fallada-García-Valle, Nicola Gullo (eds.)
Beatriz Felipe-Pérez, Marica di Pierri, Yuliia Koveino
(coords.)

Università degli studi di Palermo – Universitat Rovira i Virgili – Mariupol
State University – A SUD Ecologia e Cooperazione Onlus



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Studi e Ricerche - 14

Handbook on Climate Justice. Project “Climate Justice Living Lab”, a cura di Juan-Ramon Fallada-García-Valle, Nicola Gullo, Beatriz Felipe-Pérez, Marica di Pierri, Yuliia Koveino

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Introduction

JUAN RAMON FALLADA-GARCÍA-VALLE*, NICOLA GULLO**

Climate change has evolved from a primarily environmental concern into one of the defining legal, political, economic, and social challenges of our time. As its impacts become increasingly evident across the globe, climate justice has emerged as one of the most dynamic fields of contemporary legal scholarship and practice, fostering new forms of dialogue between science, law, public policy, and human rights.

The *Climate Justice Handbook* is one of the main scientific and educational outputs of the *Climate Justice Living Lab* project, funded under the European Union Erasmus+ Programme (Action KA220-HED – Cooperation Partnerships in Higher Education, Call 2023). The project is coordinated by the University of Palermo (Italy), as the applicant institution, in partnership with the Universitat Rovira i Virgili (Spain), Mariupol State University (Ukraine), the non-governmental organisation *A Sud Ecologia e Cooperazione Onlus* (Italy), and CM Skoulidi & SIA EE (Greece). This consortium brings together academic expertise, civil society engagement, and technological innovation, reflecting the interdisciplinary nature of climate justice itself.

The present Handbook is the result of the intellectual exchange, collaboration, and shared commitment of all project partners to develop high-quality learning materials aimed at fostering a comprehensive understanding of climate justice, with a specific focus on the role of climate litigation as one of the most significant and rapidly evolving legal phenomena of our time.

Rather than serving solely as a scholarly contribution, this volume is also conceived as a practical and accessible resource for understanding the foundations, development, and implications of climate justice. It combines theoretical

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reflection with practical analysis, facilitating access to the legal concepts and remedies through which States and private actors can be held accountable for complying with their international and European obligations to address climate change. It is intended for a broad audience, including scholars, legal practitioners, students, journalists, and anyone interested in understanding the extent to which climate justice can contribute to addressing the challenges posed by anthropogenic climate change.

Given the complexity of climate justice and, in particular, climate litigation, the publication adopts an interdisciplinary perspective and is organised into four parts, corresponding to the thematic clusters developed throughout the project.

Part One introduces the scientific foundations necessary to understand climate change. It examines the evolution of climate science, global emissions trends, and greenhouse gas reduction pathways developed by the scientific community. Particular attention is devoted to the importance of relying on authoritative scientific sources—including those produced by the Intergovernmental Panel on Climate Change (IPCC), the United Nations Environment Programme (UNEP), and the World Meteorological Organization (WMO)—as an essential basis for informed political, administrative, and judicial decision-making.

Part Two provides an overview of the legal framework governing climate change, with particular attention to international and European climate law. It explores the evolution of international climate governance and the role of legal sources in defining the climate-related responsibilities of both States and private actors. The analysis considers global developments, including the Conferences of the Parties (COPs), alongside regional initiatives, with particular emphasis on the European Green Deal and its transformative role within the European Union.

Part Three examines the relationship between climate change and human rights, analysing the implications of global warming for the effective enjoyment of fundamental rights and reviewing the wide range of rights threatened by the impacts of climate change. The discussion draws upon existing scientific literature, the work of United Nations human rights bodies, reports produced by UN agencies and major international non-governmental organisations, and leading decisions delivered by regional international courts. Particular attention is devoted to groups disproportionately affected by climate change—including women, children, and Indigenous Peoples—highlighting the importance of promoting equity, inclusion, and social justice within climate policies.

Part Four offers a comprehensive overview of climate litigation, examining its role as a strategic instrument for advancing climate action and strengthening climate justice. It analyses the principal categories of climate litigation and the

emerging legal challenges associated with this rapidly evolving field through an extensive review of relevant case law. The section also considers the broader implications of climate litigation for the development of climate policies and legal frameworks at both the international and national levels.

Published in open access, this volume is intended to ensure the widest possible dissemination of its contents and to encourage interdisciplinary learning across different academic and professional communities. By bringing together scientific knowledge, legal analysis, and practical experience, it seeks to contribute to a more informed, inclusive, and interdisciplinary understanding of climate justice, thereby supporting education, research, and professional practice in one of the most pressing areas of contemporary law.

Part 1

CLIMATE SCIENCE

Scientific bases of climate change

MARCO GAETANI*, LAURA MASSANO**

SUMMARY: I. Accredited scientific sources: UNEP, WMO, IPCC. II. Evolution of climate science. II.1. Definitions. II.2. Historical notes. II.3. Climate models. III. Scientific Bases of Climate Change. III.1. Radiative balance and greenhouse effect. III.2. Natural climate change. III.3. Evidence of anthropogenic climate change. IV. Emission trends and climate change scenarios. IV.1. Climate scenarios and projections. IV.2. Possible future climates. IV.3. Global warming impact. V. Research on disaster risk. V.1. What is disaster risk? V.2. Why climate change matter in the disaster risk framework. V.3. Disaster risk assessment, and disaster risk reduction. V.4. Useful websites. Glossary. Bibliography.

I. Accredited scientific sources: UNEP, WMO, IPCC

The issue of climate change and its present and future consequences has now become a daily topical issue in the physical, natural, economic and social sciences, as well as in the public debate. The news of recent years has now accustomed us to dealing with the reality of increasingly frequent and more intense extreme weather events globally, with increasingly significant impacts in socioeconomic terms, even in areas of the globe previously not affected by this type of phenomenon (IPCC, 2022). While it is true that the impact of extreme events is certainly exacerbated by the greater exposure of populations and infrastructures to weather and climate phenomena (for example, the growing urbanization of the population has inevitably increased the number of people exposed to heat waves, which are known to be more severe in urban areas; Tuholske et al., 2021), the evidence that a significant change in climate conditions at the global and local scales has been taking place for decades is now beyond question (IPCC, 2021). Every time

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an extreme event occurs, the scientific community, decision-makers and public opinion ask themselves the legitimate question: what, if any, is the link with climate change? To answer this question and, above all, to understand what the implications of a positive answer are, it is necessary to know the characteristics of the climate system and its functioning. This is the task of climate science (Section II). The collection, synthesis and dissemination of scientific knowledge outside the scientific community and in particular towards the subjects in charge of political decisions concerning the climate and the environment is instead the task of international organizations that report to the United Nations (UN).

The main international institution dealing with climate and meteorology is the World Meteorological Organization (WMO), an agency of the United Nations founded in 1951. The main missions of the WMO are:

1. The standardization of meteorological and climatological data;
2. To support research and training in meteorology and climatology;
3. The promotion of cooperation in the design and provision of meteorological and climatological services;
4. The promotion of the use of meteorology and climatology for the benefit of sectors such as aviation, navigation, agriculture and water management.

In 1972, the United Nations Environmental Programme (UNEP), was established, as the UN's main global authority on the environment. UNEP's mission is to coordinate UN Member States, civil society, the private sector and UN agencies in the challenge posed by the three environmental crises of the 20th century: climate change, loss of ecosystems and biodiversity, and pollution. In particular, through the promotion of science, UNEP supports Member States and society in achieving the Sustainable Development Goals (SDGs) adopted by all Member States in 2015 to end poverty, reduce inequalities and build more peaceful and prosperous societies by 2030.

The Intergovernmental Panel on Climate Change (IPCC), founded in 1988 by UNEP and WMO, is tasked with providing Member States' decision-makers with scientific reports on ongoing climate change, its implications and potential future risks, with the aim of envisaging options for climate change mitigation and adaptation. The IPCC's mission is carried out by internationally selected experts who, through the review of the scientific literature produced by independent research institutions, organize and synthesize in periodic reports the most up-to-date scientific knowledge on climate and climate variations. The latest IPCC report was published in 2023, and the Seventh Assessment Report is scheduled for release in 2027.

II. Evolution of climate science

II.1. Definitions of *weather*, *climate* and *climate change*

In the glossary of the American Meteorological Society, climate is defined as: *‘The slowly varying aspects of the atmosphere–hydrosphere–land surface system. It is typically characterized in terms of suitable averages of the climate system over periods of a month or more, taking into consideration the variability in time of these averaged quantities. Climatic classifications include the spatial variation of these time-averaged variables. Beginning with the view of local climate as little more than the annual course of long-term averages of surface temperature and precipitation, the concept of climate has broadened and evolved in recent decades in response to the increased understanding of the underlying processes that determine climate and its variability’*. In the same glossary the definition of meteorological weather is provided: *‘The state of the atmosphere, mainly with respect to its effects upon life and human activities. As distinguished from climate, weather consists of the short-term (minutes to days) variations in the atmosphere. Popularly, weather is thought of in terms of temperature, humidity, precipitation, cloudiness, visibility, and wind’*. In summary, climate can be defined in statistical terms, i.e., as the probability distribution associated with the variables used to describe meteorological phenomena (precipitation, temperature, pressure, humidity, wind, etc.). The need to refer to a sufficiently long period of time therefore derives from the need to collect enough observations to be able to define a statistic. Similarly, climate change can be defined in statistical terms, i.e., as a statistically significant change in these probabilities, compared to a reference period.

In the Encyclopaedia Britannica, etymological and semantic notes can also be found: *“From the ancient Greek origins of the word (klíma, “an inclination or slope”—e.g., of the Sun’s rays; a latitude zone of Earth; a clime) and from its earliest usage in English, climate has been understood to mean the atmospheric conditions that prevail in a given region or zone. In the older form, clime, it was sometimes taken to include all aspects of the environment, including the natural vegetation”* (Hayden, 2026). The close link between climate and environmental conditions suggests a definition that goes beyond just statistical aspects and also includes physical aspects. The modern concept of climate refers to a complex physical system, the climate system, consisting of five main components: the atmosphere, the hydrosphere (ocean, lakes and rivers), the cryosphere (glaciers, sea ice, snow cover), the soil and the biosphere, which interact with each other.

II.2. Historical notes: from the first experiments to climate models

Although observing atmospheric phenomena is a very old activity, climate science is a relatively young discipline. The systematic observation and measurement of the physical quantities characteristic of the atmosphere began in the 17th century: Evangelista Torricelli invented in 1643 an instrument, the barometer, for measuring atmospheric pressure, while in 1659 the oldest, and still in progress, instrumental series of atmospheric temperature began to be recorded in the United Kingdom (the Central England Temperature). In 1735, George Hadley, observing the prevailing winds in the tropical belt, the trade winds, formulated the hypothesis that the global atmospheric circulation is the result of the combination of the forces that the temperature difference between the tropics and the mid-latitudes and the Earth's rotation apply to air masses. The first to understand the role of the atmosphere in retaining the heat transmitted by solar radiation was Jean Baptiste Joseph Fourier, who in 1837 suggested that the atmosphere acts like a greenhouse, transparent to sunlight but “impermeable” to heat. Fourier's intuitions are the basis of the works of Eunice Foote and John Tyndall who, between 1856 and 1861¹, presented evidence that some gases contained in the atmosphere, and in particular carbon dioxide (CO₂), are responsible for the greenhouse effect imagined by Fourier. The first quantitative estimate of temperature variations related to variations in the concentration of CO₂ in the atmosphere was presented in 1896 by Svante Arrhenius, who exploited the first knowledge about infrared radiation. The Arrhenius model can be considered the first climate model, i.e., a mathematical model capable of predicting the variation of a physical variable (global temperature) as an element of the physical system (the concentration of CO₂) changes. Since then, climate models have become increasingly complex, including an increasing number of physical and chemical processes characteristic of the atmosphere, ocean, ice and snow, soil and the biosphere.

¹ The controversy over who and how first came to the discovery of greenhouse gases is reported by Roland Jackson for the Royal Society: <https://royalsocietypublishing.org/doi/10.1098/rsnr.2018.0066>

II.3. Climate models: *characteristics, use and limitations*

Climate models are now fundamental tools for studying the dynamics of climate, past and present, and for predicting its future evolution. The observation of climate variables is fundamental for the knowledge of the state of the climate system. Unfortunately, due to the limited availability of data regarding past climate and the difficulty of effectively sampling the entire atmosphere, ocean and land surface, observations prove insufficient for a complete understanding of the physics of the climate system. Climate models allow, thanks to the knowledge of the physical processes that govern climate dynamics, to overcome the incompleteness, in time and space, intrinsic to observations. In practice, a climate model is the set of mathematical equations that describe the physical processes that regulate weather and climate, and the numerical solution of these equations make possible to determine the temporal evolution of the physical variables (e.g., temperature, pressure and wind speed) that represent the state of the climate system. The equations are solved by computers for each point of the Earth's surface, atmosphere and ocean, represented three-dimensionally as a series of contiguous cubes (Figure 1), thus allowing for a complete representation in time and space of the dynamics of the climate system.

Climate models are very powerful tools, which have allowed the scientific community to quickly acquire great knowledge on the dynamics of the climate system. Like all tools, however, they have limitations. As can be guessed from Figure 1, the volumes that are used to discretize atmosphere, ocean and land surface have a typical size between 50 and 100 km, dictated by the need to keep the computational cost of simulations within sustainable limits². This means that some physical processes characterized by space-time scales smaller than the resolution of the model (the so-called sub-grid processes; for example, the formation of clouds and rain) can only be described in an approximate way through parameterizations. These approximations introduce inevitable uncertainties in the representation of climate dynamics. The implications of uncertainties in climate simulation will be discussed in Section III.3.

² Consider this example: a simplified model of atmosphere needs at least 6 equations to describe the essential physical variables (two components of wind, temperature, pressure, humidity, and density) and returns the value of the variables for 30-minute time intervals. Considering a spatial resolution of 1° in latitude and longitude (about 100 km) and 10 vertical levels representing all the atmosphere, if for an equation N operations are needed to get the solution, the total number of operations required for a simulation of the atmosphere alone for 100 years will be: N operations $\times$ 6 equations $\times$ 1.8×10^6 time intervals $\times$ 360 points in longitude $\times$ 180 points in latitude $\times$ 10 vertical levels = $N \times 7 \times 10^{12}$ operations.

III. Scientific basis of climate change

III.1. Radiative balance and greenhouse effect

The climate system is a set of complex interactions between its components, and the “engine” of this system is the Sun which, through solar radiation, provides the energy necessary for its dynamics. The Earth’s surface is heated by solar radiation, which passes through the atmosphere in the form of visible light; the heated surface returns the received radiation to space in the form of infrared thermal radiation, a form of radiation invisible to the human eye³, so that received radiation is balanced by re-emitted radiation. The balance between visible light received from and thermal radiation released into space determines the average temperature of the Earth’s surface and is therefore defined as a climatic forcing, i.e., an element external to the climate system that determines its average state. The average temperature is also determined by the presence in the Earth’s atmosphere of some chemical compounds in the gaseous state that heat up when they interact with thermal radiation from the surface (Figure 2), as shown already in the 19th century by Foote (1856), Tyndall (1861) and Arrhenius (1896). In particular, the heating of water vapor, CO₂ and methane keeps the global temperature of the atmosphere close to the surface at an average of around 15°C, while in an atmosphere without these compounds the average temperature would be about -18°C. These compounds are called greenhouse gases because of their greenhouse-like effect, which lets light pass through while retaining heat, and for this reason the physical process that determines the Earth’s surface average temperature is named the greenhouse effect (Fourier, 1837). The comparison between the temperature observed on the Earth’s surface and that which would be expected in the presence of an atmosphere free of greenhouse gases highlights the importance of the greenhouse effect for the development of life and civilization on Earth. On the other hand, the greenhouse effect shows the key role that the concentration of greenhouse gases plays in regulating the temperature of the Earth’s surface, clearly indicating that an increase in this concentration would inevitably lead to an increase in global temperature (Arrhenius, 1896) and inscribing the concentration of greenhouse gases in the list of climate forcings.

³ Solar radiation is the result of the composition of electromagnetic waves of different wavelengths and covers a spectrum ranging from about 200 to over 2000 nm. About 44% of solar radiation is between about 380 to 750 nm and is visible to the human eye (visible light). Wavelengths below 380 nm (ultraviolet light) and above 750 nm (infrared light) are not visible.

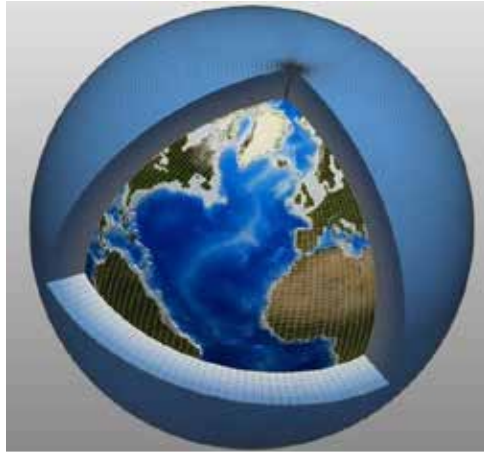


Figure 1. Example of discretization of the climate system: within finite volumes representing atmosphere, ocean and land surface, the fundamental equations used in climate models are solved (source: Encyclopaedia of the Environment).

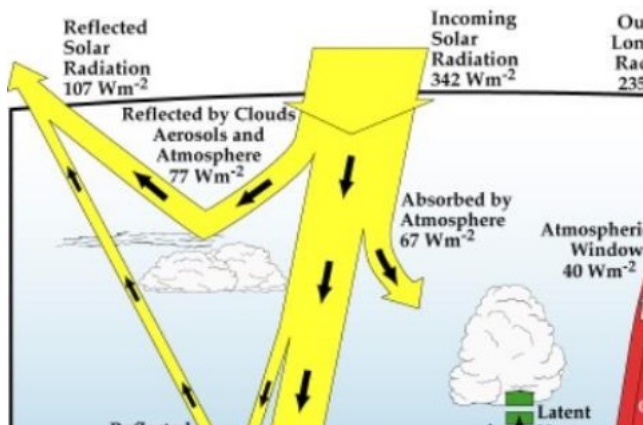


Figure 2. Earth's radiative budget (source: Kiehl and Trenberth, 1997). Solar radiation is represented in yellow, thermal radiation is represented in red. Latent and sensible heat transfers associated with evaporation and turbulence, respectively, are also represented. The numerical values represent radiative fluxes, i.e., the energy associated with each component of the budget. The summation of the different components at the edge of the atmosphere shows a net-zero balance.

III.2. Natural climate change

Before delving into the causes of the climate change observed in recent decades, it is certainly useful to reconstruct the evolution of the Earth's climate back in time, to find the differences with the climate changes of the past. Climatic reconstructions of the last million years show evidence of periods of intense cooling of the Earth's surface that have produced a decrease in global temperature of up to 8 degrees compared to the current climate (Jouzel et al., 2007) (Figure 3). Glaciations are periods lasting several tens of thousands of years characterized by the freezing of large masses of water, which causes the extension of polar ice up to the mid latitudes and the consequent lowering of sea level, offering a landscape and environmental conditions very different from those observed in this era (Figure 4). The regularity over time of the glaciations, which have occurred and will continue to occur about every 100 thousand years, suggests that there is an equally regular mechanism at work. In fact, these variations in global climate are driven by changes in the geometry of the Earth's orbit around the Sun, which can substantially change the solar radiation available to the "climate engine". The regular oscillation of the Earth's climate between warm phases, such as the one we have been experiencing in the historical period, and glacial phases is known as the Milanković cycles (Berger, 1988). The last glaciation ended about 15 thousand years ago and in the meantime the Earth has progressively warmed up to reach the average temperature of about 15°C that has characterized the last 6 thousand years (Marcott et al., 2013) (Figure 5). These conditions of relative climatic stability made possible the development of human civilization.

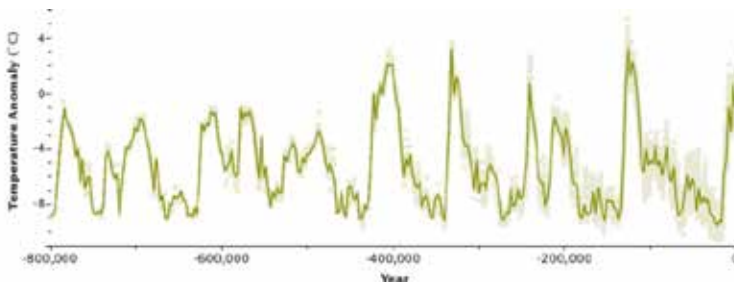


Figure 3. Trend of the global temperature of the Earth's surface over the last 800000 years, compared to the current temperature (source: National Aeronautics and Space Administration).



Figure 4. Map of Europe during the last Ice Age, between 70 and 20 thousand years ago (source: Becker et al., 2015). The distribution of ice (in white) and lakes and rivers (in blue) are represented, as well as the different types of climates (arid in brown, temperate in green, polar in grey). Note the difference in coastlines compared to the present, linked to the lowering of sea level due to the extension of the polar ice caps.

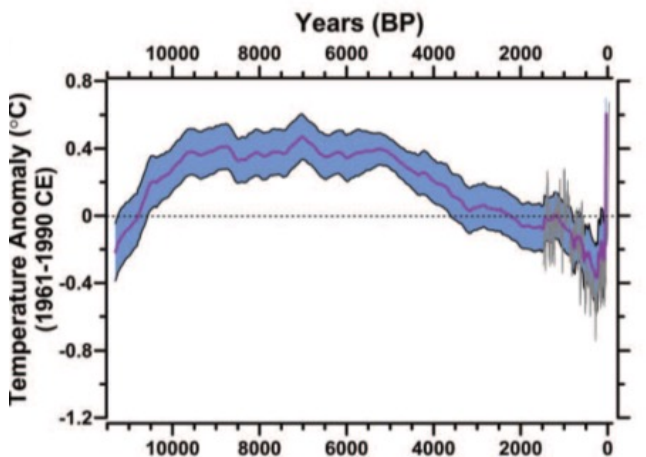


Figure 5. Trend of the global temperature of the Earth's surface in the last 11300 years, compared to the average of the period 1961-1990 (source: Marcott et al., 2013).

III.3. Evidence of anthropogenic climate change

In the graph in Figure 5, which represents the trend of global temperature during the Holocene⁴ compared to the average temperature of the second half of the 20th century, a maximum around 6000 years ago is clearly observed, followed by a progressive cooling. This trend can be explained by the variation in insolation due to changes in the Earth's orbit around the Sun (Davis & Brewer, 2009). About 150 years ago, the global temperature unexpectedly began to rise again, going beyond the natural fluctuations that have characterized its natural variability in the last millennia, to increase in the first decades of the 20th century by more than 1°C (Figure 6). This increase is too rapid to be compatible with the timing of climate change documented for the past, and there is no evidence that there is a natural mechanism at work. The increase in global temperature coincides with the development of the industrialization of the production and the economic system, which has been possible thanks to the availability of fossil fuels that provided an unprecedented source of energy. However, the combustion of coal, oil and natural gas has produced large quantities of CO₂ at such rates that cannot be efficiently absorbed by the climate system. This excess CO₂ has progressively been added to that already present in the atmosphere (about 280 parts per million, ppm, in 1850), reaching over 420 ppm in 2024 and intensifying the greenhouse effect, with the consequent warming of the Earth's surface, as already predicted by Arrhenius in 1896 (Figure 6).

Warming of the atmosphere is accompanied by changes throughout the climate system (Figure 7). In particular, a significant reduction in the mass of ice contained in the polar ice caps is observed, accompanied by a rise in sea level of more than 20 cm since the end of the 19th century, due to the thermal expansion of the ocean itself and the contribution of ice melting (Frederikse et al., 2020).

The scientific evidence supporting the anthropogenic explanation of global warming is now incontrovertible. In fact, the 2021 IPCC report states that the anthropogenic origin of global warming is 'virtually certain'. In addition to the knowledge of the physics of the greenhouse effect, a decisive contribution to the demonstration of anthropogenic origin comes from climate models and their ability to simulate all the complex interactions that characterize the climate system. In fact, only by adding the anthropogenic forcing (the increase in CO₂ concentration due to human activities) to the natural climate forcings (insolation, the natural concentration of CO₂ and volcanic eruptions) is it possible to correctly represent the increase in global temperature observed in the 20th century (Figure 8).

⁴ The Holocene is the name of the current geological era, which began at the end of the last ice age.

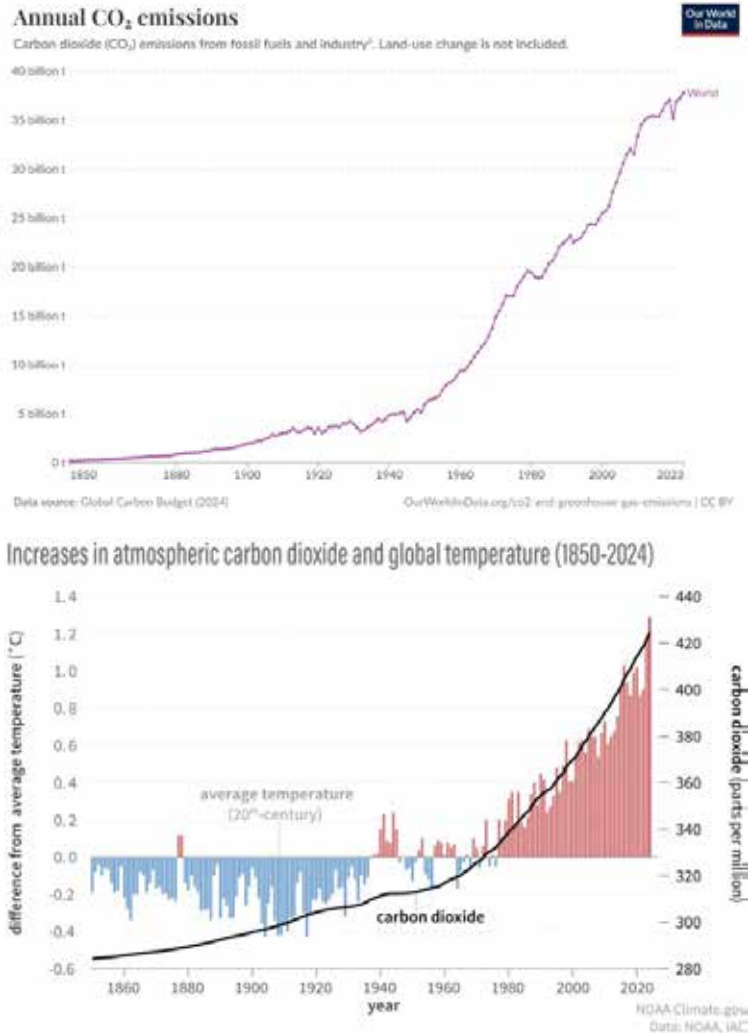
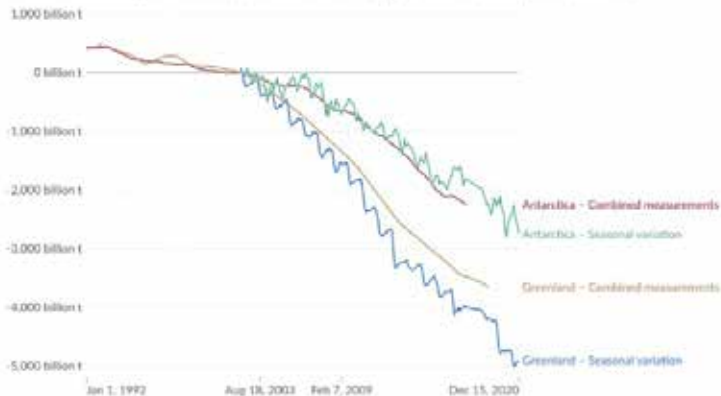


Figure 6. Anthropogenic global warming, from 1850 to 2024: above, global CO₂ emissions (source: Our World in Data); below, trends in global temperature, compared to the 20th century average, and CO₂ concentration (source: National Oceanic and Atmospheric Administration).

Climate change: change in mass of ice sheets

Cumulative change in mass of ice sheets, measured relative to a base year of 2002. For reference, 1,000 billion metric tons is equal to about 260 cubic miles of ice—enough to raise sea level by about 3 millimeters.



Data source: CPA based on various sources (2021)

Note: Combined measurements are based on more than 20 different studies that have been combined for each region

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Sea level rise

Global mean sea level rise is measured relative to the 1993 - 2008 average sea level. This is shown as three series: the widely-cited Church & White dataset; the University of Hawaii Sea Level Center (UHSLC); and the average of the two.



Data source: NOAA Climate.gov (2022)

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Figure 7. Climate change (source: Our World in Data): at the top, the cumulative change in the mass of the polar ice caps in the period 1992-2020, relative to 2002; at the bottom, the global average sea level rise from 1880 to 2020, measured relative to the 1993-2008 average.

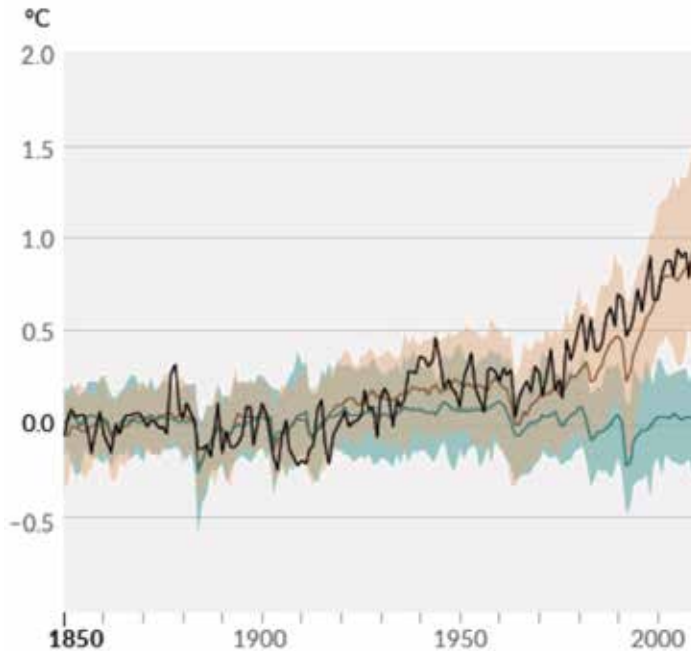


Figure 8. Attribution of climate change to human activities, starting in 1850 (source: IPCC, 2021). The black line represents the observed change in global temperature compared to the pre-industrial period; the green line represents the variation of the simulated global temperature considering only the natural forcings (insolation, natural concentration of CO_2 and volcanism); the orange line represents the variation of the simulated global temperature considering natural and anthropogenic forcings (greenhouse gas emissions). The coloured bands represent the variability of the responses of the different models used to the same climate forcing, i.e., the variability of climate sensitivity between models.

The magnitude of the climate system's response to increasing CO_2 concentrations remains an open question. Climate sensitivity is defined as the increase in temperature resulting from a doubling of the CO_2 concentration: the most recent estimate puts this warming at between 2.5 and 4°C (IPCC, 2021). This uncertainty is linked to the fact that the warming due to the increase in CO_2 triggers secondary phenomena, called climate feedbacks, which tend to amplify warming, but whose representation in climate models is still difficult. In particular, the main climate feedbacks are:

1. Sea ice feedback: the warming of the Earth's surface due to the increase in CO_2 leads to the melting of sea ice in the polar regions, i.e., to the reduction of a white and reflective surface and to the increase in absorbed solar radiation, with a consequent positive contribution to warming;
2. Water vapour feedback: a warmer atmosphere due to increased CO_2 can store more water vapour, which is a powerful greenhouse gas and contribute to amplify warming;
3. Cloud feedback: increased water vapor in the atmosphere can contribute to increase cloudiness and the associated reflective effect, resulting in a small negative contribution to warming.

The physical processes that govern the climate feedbacks are typically characterised by very small space-time scales and therefore fall into the category of the sub-grid processes (Section II.3). The uncertainty related to the parameterizations of these processes is therefore reflected in the simulation of climate sensitivity which, although always positive, can be larger or smaller depending on which parameterization scheme the different climate models are using.

IV. Emission trends and climate change scenarios

IV.1. Climate scenarios and projections

Climate models, introduced in Section II.3, can be used to understand the dynamics of past and present climate (Section III) and to predict the evolution of future climate, provided that the climate forcing is accurately represented. While the reconstruction of past climate forcing (insolation, volcanism, and greenhouse gas emissions) can be accomplished with good accuracy, its future evolution is more difficult to predict. In particular, if natural forcings can be predicted quite accurately (insolation can be estimated through the calculation of its characteristic cycles; volcanic activity can be estimated based on the probability of observing large eruptions), the future evolution of the anthropogenic forcing, i.e., the trend of greenhouse gas emissions, depends on the trajectories of global socioeconomic development. Simulations of the future climate are in fact carried out using as an anthropogenic forcing the greenhouse gas emissions associated with possible future socioeconomic scenarios. For example, in a 'business-as-usual' scenario in which economic and population growth is not accompanied by any measure for emission reduction, a further accumulation of CO_2 in the atmosphere is

expected, to reach concentrations between over 800 and almost 1200 ppm by the end of the 21st century. On the contrary, in a scenario in which it is possible to implement policies of reduction to zero of emissions ('net-zero'), a stabilization of the CO₂ concentration is expected around the current values, i.e., 430 ppm recorded in 2025 at Mauna Loa Observatory. These scenarios include the so-called 'middle-of-the-road' scenario, i.e., an intermediate scenario in which the reduction of emissions is gradual, reaching a CO₂ concentration of around 600 ppm. The future evolution of the climate will obviously be very different in different scenarios. The trends in emissions and CO₂ concentration projected in five possible socioeconomic pathways (SSPs) constructed by the IPCC (2021) are shown in Figure 9. Future climate simulations are carried out using as a climate forcing the emissions projected in each of the five emission scenarios and then compared with each other, to show the impact of different socio-economic development policies on the state of the climate and the environment in the coming decades of the 21st century.

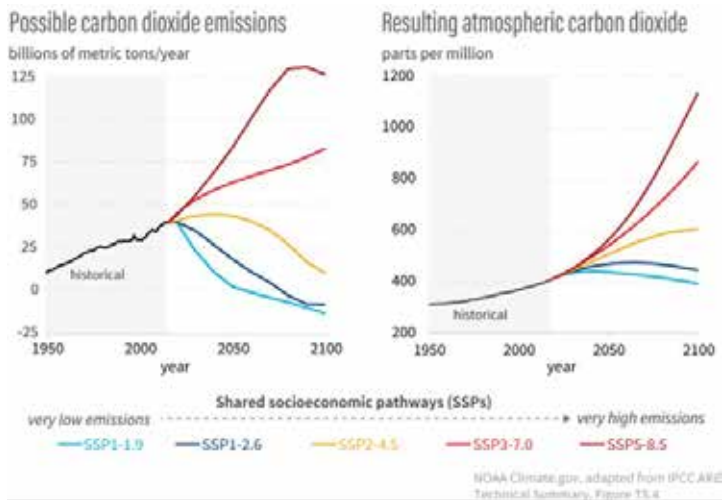


Figure 9. Trends in global emissions and atmospheric concentration of carbon dioxide in five emission scenarios (source: National Oceanic and Atmospheric Administration). In red, two scenarios in which no emission reduction measures are implemented ('business-as-usual'). In orange, a scenario in which emissions are progressively reduced, but not eliminated ('middle-of-the-road'). In blue, two scenarios in which emissions are reduced to zero in 2055 and 2075, respectively ('net-zero').

IV.2. Possible future climates

In this section, three emission scenarios will be discussed, with the aim of illustrating the effects on the 21st century climate of ‘business-as-usual’, ‘middle-of-the-road’ or ‘net-zero’ emission policies, respectively.

In the ‘business-as-usual’ SSP5-8.5 scenario, economic growth continues to be based on the use of fossil fuels without limitations. As a result, emissions continue to grow throughout the 21st century, and CO₂ concentration reaches nearly 1200 ppm (Figure 9) by the end of the century. Not surprisingly, the global temperature increases progressively throughout the 21st century, reaching a warming, compared to the pre-industrial period, of about 3 to 5°C at the end of the century (Figure 10a). It is reminded that the uncertainty of the forecast is linked to the different climate sensitivity of the models used to simulate the future climate. To get an idea of what a 3°C increase in global temperature means, consider that such a warm climate has never been observed in the last million years (Figure 3) and humanity will have to adapt to conditions it has never experienced during its existence.

As anticipated in Section III.3, the warming of the atmosphere is accompanied by an increase in water vapor and, consequently, precipitation, up to 10% compared to today (Figure 10b). In the case of precipitation, the uncertainty is greater than temperature, since precipitation is a physical quantity that is very dependent on physical parameterizations (Section II.3). The impact on sea ice extent appears significant, with an Arctic Ocean virtually ice-free as early as 2050 (Figure 10c). Again, the uncertainties are quite large, and some models simulate less severe impacts. The scenario of sea rise is dramatic, reaching 75 cm of rise at the end of the century (Figure 10d). Not to be overlooked is the least probable but most extreme trajectory, which projects the rise at the end of the century well over 1 m. The impact of an increase of this magnitude appears very severe, considering that already by 2060 more than 1 billion people are expected to live in coastal areas, i.e., below 10 m above sea level (Neumann et al., 2015).

In the SSP2-4.5 ‘middle-of-the-road’ scenario, current technological and policy solutions to support economic growth continue to be implemented during the 21st century in the context of a moderate reduction in the use of fossil fuels. In this scenario, emissions decrease without reaching ‘net-zero’ and the CO₂ concentration reaches about 600 ppm by the end of the century. As a result, the increase in global temperature continues to reach between 2.1 and 3.5°C above pre-industrial values by the end of the century (Figure 10a). Increasing trajectories are also

simulated for precipitation (about +5%) and sea level (between 44 and 76 cm of rise), while the Arctic Ocean could be ice-free in 2080 (Figure 10bcd).

In the SSP1-2.6 'net-zero' scenario, during the 21st century technological and political solutions ensure economic growth without the use of fossil fuels. In this scenario, emissions decrease to zero around 2070 and the CO₂ concentration stabilizes at around 450 ppm. As a result, global temperature growth continues until 'net-zero' is reached and stabilizes between 1.5 and 2.5°C above pre-industrial values by the end of the century (Figure 10a). It should be emphasized here that CO₂ has a very long life in the atmosphere, on the order of hundreds of years, and that emitted from the beginning of the industrial era until the achievement of 'net-zero' remains in suspension for a long time before it can be absorbed by the environment again. The consequence is that stopping emissions has the effect of stopping global warming but not returning pre-industrial temperatures in the short term. Similar trajectories are also simulated for the Arctic sea ice extent and precipitation, which stabilize at the end of the century as global temperature stabilizes (Figure 10bc). The same effect is not observed for sea level, which continues to rise even beyond temperature stabilization, reaching between 28 and 55 cm of rise by the end of the century (Figure 10d). Sea levels continue to rise by thermal expansion due to the greater thermal inertia of water, which warms and cools much more slowly than the atmosphere.

A comparison of the different socio-economic scenarios clearly illustrates that climate change stabilises in a 'net-zero' scenario only, while scenarios in which fossil fuels remain the basis of development are characterised by permanent climate change. In any case, sea level rise will be an unavoidable aspect of climate change in each of the scenarios considered.

IV.3. Impact of global warming

Climate change resulting from global warming manifests itself as a change not only in the average values, as illustrated in Section IV.2, but also in the extreme values of climate variables. In particular, the increase in average temperatures is reflected in the frequency and intensity of heat waves, i.e., those periods characterized by atmospheric temperature values beyond levels considered harmful to the human body and ecosystems. Figure 11 shows that extreme temperature events that occurred every 10 years at the end of the 19th century already tripled their frequency, with associated temperatures warmer than 1°C. This same type of event becomes practically the norm (between 6 and 9 years out of 10) for global warming between 2 and 4°C, with an associated temperature increase of 3 to 5°C. The same effect is observed for rarer and

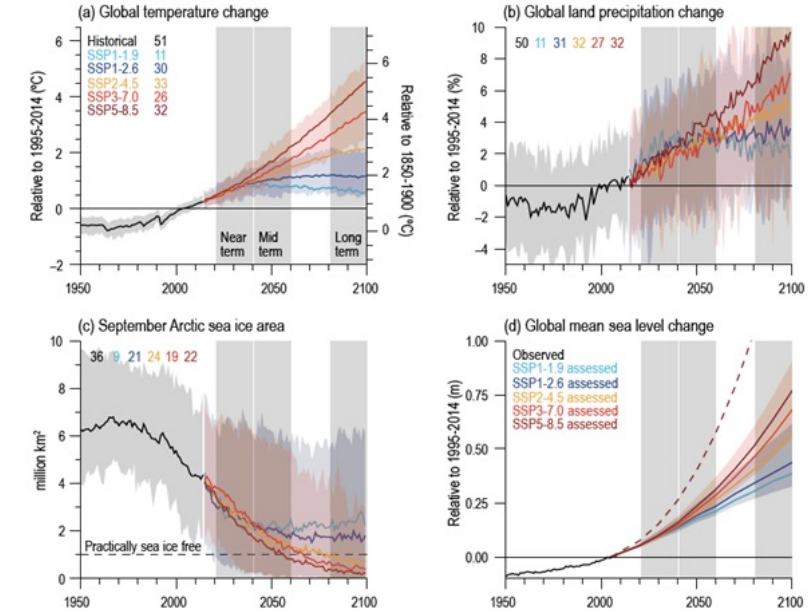


Figure 10. Climate projections, from 1950 to 2100 (source IPCC, 2021). Simulation of (a) global temperature, (b) precipitation on land, (c) sea ice extent in September in the Arctic and (d) sea level, in the past (black line) and in five SSPs (coloured lines). The number of simulations used for each scenario is shown in the graphs. The lines represent the average of the models, the coloured bands represent the dispersion of the different simulations around the average value. Temperature, precipitation and sea level are represented compared to a reference period. In (d), the dotted line indicates the most extreme trajectory of sea level rise simulated in the SSP5-8.5 scenario.

more intense extreme temperature events, i.e., events that occurred every 50 years at the end of the 19th century, which become the norm in a climate warmer than 4°C. The rise in the temperature of the atmosphere is accompanied by a greater availability of energy and water vapor for precipitation. This is reflected in the increase in frequency and intensity of intense precipitation events, already observable since the end of the 19th century (Figure 11). In a 2-4°C warmer atmosphere, the frequency of intense precipitation events increases 2-3 times, with an increase in associated precipitation of up to 30% (Figure 11). The warming of the atmosphere, which favours evaporation, and the change in precipitation regimes, with precipitation concentrated in more intense events separated by prolonged dry periods, has already materialized

in the doubling of the frequency of droughts in arid regions, which in a 4°C warmer climate becomes a structural phenomenon (Figure 11).

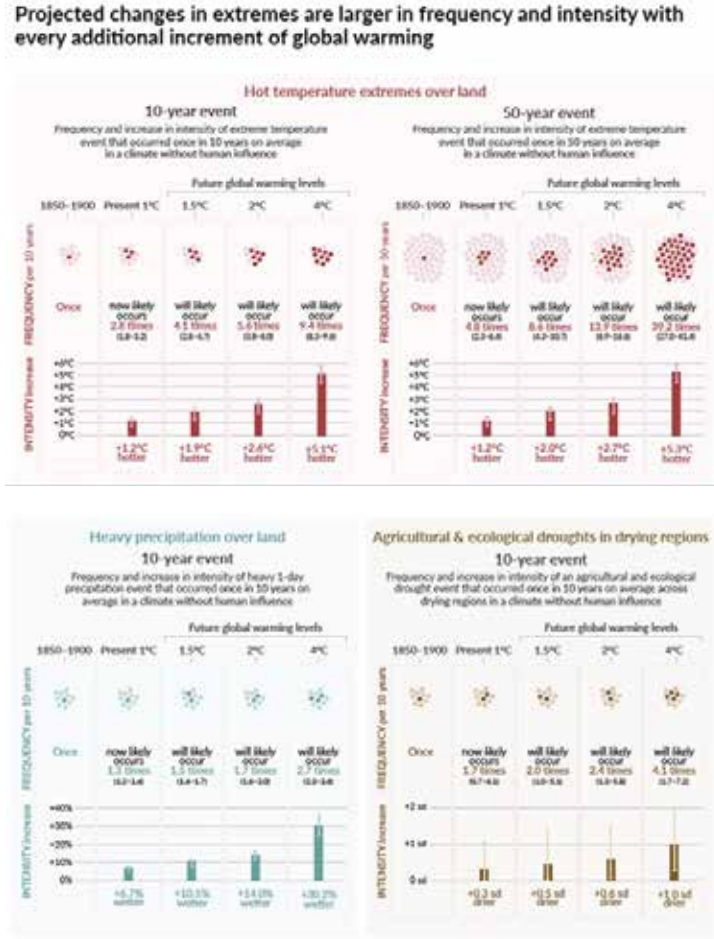


Figure 11. Impact of global warming on climate extremes, in terms of frequency and intensity, as a function of the level of warming (source: IPCC, 2021). Above, change in frequency and intensity of extreme temperature events that in the second half of the 19th century occurred every 10 and 50 years. Below, change in frequency and intensity of intense precipitation and drought events in arid regions that occurred every 10 years in the second half of the 19th century.

Global warming and associated climate change also directly affect human health. study comparing the decade 2015-2024 to 1991-2000 in Europe (Kriit et al., 2026) found that exposure to heat more than doubled (1.17 billion person-day increase) among infants and above 65-year-old persons, and the average annual number of hours when heat exposure made labor and light or moderate physical activity unsafe increased by 88%. In the same time span, increased numbers of deaths (43–59 per million inhabitants) attributable to heat have been detected. Environmental modifications driven by climate change made more likely outbreaks of infectious diseases, resulting from a geographical range expansion into Europe of some vectors (e.g. *Aedes*). Additionally, climate change has prolonged the pollen season by 1–2 weeks, increasing the duration of exposure for people with allergic rhinitis. With respect 1981-2010, increasing exposure to heatwaves and drought made low-income households 10.9% (more than 1 million additional people) more likely to experience moderate or severe food insecurity compared with middle-income households.

V. Research on disaster risk

V.1.What is disaster risk?

Disaster risk is the chance of loss of life, injury or destruction and damage from a disaster. In other words, disaster risk is the result of a hazard (something that causes danger) and the characteristics that make people and places vulnerable and exposed. A disaster is defined as an event that causes damage, loss of life and disruption to a vulnerable population. In their Global Assessment Report, the UN Office for Disaster Risk Reduction (UNDRR) refers to disaster risk as a combination of hazards, exposure, vulnerability and capacity (UNDRR Global Assessment Report, 2015). A representation of the concept is presented in Figure 1.

‘Hazard’ is something dangerous that can cause loss of life or harm. There are different types of hazard: natural, anthropogenic and socionatural. Natural hazards are associated with natural phenomena (e.g. earthquake, landslide, tsunami, cyclones, extreme temperatures, floods, or droughts). Anthropogenic hazard is human induced hazard (chemical and radiological agent release, explosions, and infrastructure failures), whilst socionatural hazard are a com-

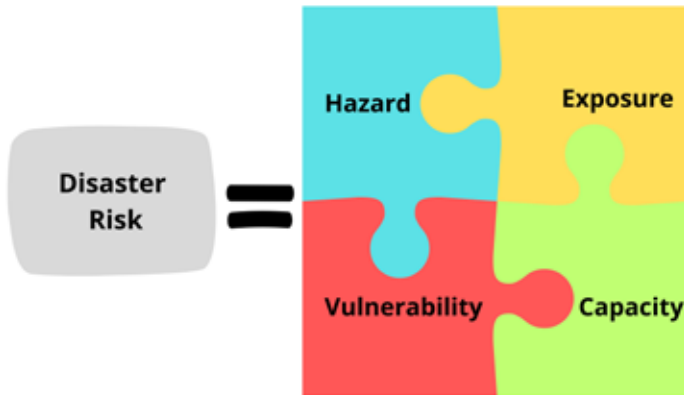


Figure 1. The component of Disaster Risk.

bination of natural and anthropogenic factors (conflict, stampedes, acts of terrorism, migration, and humanitarian emergencies) including environmental degradation and climate change (UNDRR The disaster risk reduction (DRR) glossary).

Hazard occurrence may be individual, sequential or a combination of these (multi-hazard). The severity of the hazard is dependent on various factors, including duration, location and timing.

The term ‘exposure’ refers to people, property, systems, or other elements in hazard zones that could be damaged or destroyed. People and communities suffer the effects of a hazard if they are exposed to it.

‘Vulnerability’ is the chance (or likelihood) that something will be damaged or destroyed if it is exposed to a hazard. To elaborate further, the term ‘vulnerability’ may be defined as the aggregate of conditions determined by physical, social, economic and environmental factors, which serve to increase the susceptibility of an individual or a community to the impacts of hazards.

‘Capacity’ refers to a system’s ability to respond after an event and mitigate losses. In more detail, it can be described as the resources and skills available within a community, society or organisation that can be used to reduce the risks or effects of a disaster. It is the ability to cope with and recover from a disaster.

These four components of disaster risk can assume different configuration and magnitude; the following example will help the reader to better understand the framework.

Scenario 1: An earthquake occurs in a semi-desert area

The earthquake itself is the hazard, characterized by its magnitude, depth, and location. In a desert, there are typically fewer buildings and infrastructure. The population density is low, meaning fewer people and structures are exposed to the hazard. Vulnerability in this case is relatively low due to the lack of infrastructure and population. On the other hand, the capacity to respond to an earthquake in a desert may be limited due to the remote location. Emergency services may be far away, and there might be insufficient resources for immediate response.

Scenario 2: An earthquake occurs in a city

The hazard is the same (magnitude, depth, and location), however in a city, there is high exposure due to the dense population and numerous structures (residential, commercial, industrial). Many people live and work near one another, increasing the potential for casualties and property damage. Urban areas often have varying levels of vulnerability. Older buildings may not adhere to modern seismic standards, making them more susceptible to collapse. Additionally, socioeconomic factors can increase vulnerability; for instance, lower-income populations may live in poorly constructed housing that cannot withstand earthquakes. Concerning capacity to respond, cities usually have better emergency services and resources compared to rural areas.

Scenario 3: A flash flood triggers a fire

More than one hazard can occur at the same time, or as in this scenario one can trigger the other increasing the complexity of the emergency management. In this scenario the flood itself is the hazard, the exposure is the population living there and the infrastructure. Vulnerability is heightened in urban settings where buildings are closely packed together. The risk of fire spreading from one structure to another is significant, particularly in older buildings that may not meet modern fire safety standards. Urban areas generally have more robust emergency response capabilities compared to rural areas. However, a large-scale disaster involving both flood and a resulting fire can overwhelm local resources and infrastructure.

V.2. Why climate change matter in the disaster risk framework

It is important to note that climate change will represent yet another challenge, it will have two effects on disaster risks. Firstly, it will lead to more dangerous natural events, or to say it using the risk vocabulary it will increase the levels of hazard. Secondly, the poorest community will become more vulnerable to weather hazards because of the environmental damage, reductions in water and food availability and other direct or indirect consequences of climate change (Figure 2).

Climate change is a global phenomenon, its effects are different in each area, but the poorest communities and countries are likely to suffer the most. Indeed, neglected communities frequently lack the capacity to cope with the increased risk of hazardous events. Moreover, the communities that will be affected the most are the one depending on sectors that are affected by the climate, such as farming.



Figure 2: the role of climate change in the disaster risk framework; Climate change will increase the frequency of hazard and it will decrease the capacity of the system to cope with disaster

V.3. Disaster risk assessment, and disaster risk reduction

The process of disaster risk assessment and reduction are linked. Disaster Risk Assessments start with a review of the hazards and their characteristics (location, intensity, frequency, and probability of occurrence). These are then analysed in conjunction with the exposure and the vulnerability (which may

be physical, social, health, economic and environmental dimensions). The final step in the process is the evaluation of the effectiveness of coping capacities, this is the capacity assessment, during which the community's resources are identified. The disaster risk assessment demands a transdisciplinary approach, encompassing physical, geographical, economic, social and political factors.

The result of the disaster risk assessment is a ranking of the disaster risks of the community. It serves as the foundation upon which risk reduction strategies can be formulated.

Disaster risk reduction is defined as the practice of mitigating disaster risks through systematic efforts. The endeavour focuses on analysing and managing the causal factors of disasters. These efforts include reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

The backbone of disaster risk research is synthesised in the "Sendai Framework for Disaster Risk Reduction 2015-2030". This is global agreement to reduce disaster risk and enhance resilience to natural, biological, and technological hazards, as well as climate change impacts. Adopted by UN Member States in 2015, the framework outlines seven global targets and four priorities for action, guiding efforts to achieve substantial reductions in disaster risk and losses.

The agreement defines priorities of action and global target. The priority is identified in the understanding of disaster risk followed by the strengthening of disaster risk governance. Investment in risk reduction is also required, as is enhancement of disaster preparedness for effective response. The global target is to reduce global disaster mortality and the number of people affected by disasters in a sustainable way by 2030. It is evident that there is a clear necessity to enhance international cooperation for developing countries, as well as to focus on improving the availability and accessibility of multi-hazard early warning systems.

V.4. Useful websites

This section provides a short list of useful websites. The sites mentioned here are official sources of information on disaster risk. At country level, there are specific civil protection services that provide information and disseminate knowledge regarding the typical hazards of the area. These services also provide early warning and real-time information in case of disasters.

UN Office for Disaster Risk Reduction (UNDRR): www.undrr.org
Prevention Web, UNDRR: www.preventionweb.net

International Federation of Red Cross and Red Crescent Societies:
<https://www.ifrc.org/our-work/disasters-climate-and-crises/climate-smart-disaster-risk-reduction/PAPE>
Union Civil Protection knowledge Network:
<https://civil-protection-knowledge-network.europa.eu/media/regional-disaster-risk-assessment-guidelines>
European Civil Protection and Humanitarian Aid Operations:
https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/eu-civil-protection-mechanism_en

Glossary

DRR: Disaster Risk Reduction
IPCC: Intergovernmental Panel on Climate Change
SDG: Sustainable Development Goal
SSP: Shared Socioeconomic Pathway
UN: United Nations
UNDRR: UN Office for Disaster Risk Reduction
UNEP: United Nations Environmental Program
WMO: World Meteorological Organisation

Bibliography

- Arrhenius, S. (1896). On the influence of carbonic acid in the air upon the temperature of the ground. *Philosophical Magazine and Journal of Science*, 41(251), 237–276.
- Becker, D., Verheul, J., Zickel, M., & Willmes, C. (2015). LGM palaeoenvironment of Europe – Map. *CRC806-Database*. <https://doi.org/10.5880/SFB806.15>
- Berger, A. (1988). Milankovitch theory and climate. *Reviews of Geophysics*, 26(4), 624–657. <https://doi.org/10.1029/RG026i004p00624>
- Cardona, O.D., M.K. van Aalst, J. Birkmann, M. Fordham, G. McGregor, R. Perez, R.S. Pulwarty, E.L.F. Schipper, and B.T. Sinh, 2012: *Determinants of risk: exposure and vulnerability*. In: *Managing the Risks*

- of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 65-108.
- Davis, B. A. S., & Brewer, S. (2009). Orbital forcing and role of the latitudinal insolation/temperature gradient. *Climate Dynamics*, 32, 143–165. <https://doi.org/10.1007/s00382-008-0480-9>
- Foote, E. (1856). Circumstances affecting the heat of the Sun's rays. *American Journal of Science and Arts*, 22, 382–383.
- Fourier, J.-B. J. (1837). General remarks on the temperature of the Earth and outer space. *American Journal of Science*, 32, 1–20.
- Frederikse, T., Landerer, F., Caron, L., & others. (2020). The causes of sea-level rise since 1900. *Nature*, 584, 393–397. <https://doi.org/10.1038/s41586-020-2591-3>
- Hadley, G. (1735). Concerning the cause of the general trade-winds. *Philosophical Transactions of the Royal Society*, 39, 58–62. <http://www.jstor.org/stable/103976>
- Hayden, B. P. (2026). Climate. In *Encyclopædia Britannica*. <https://www.britannica.com/science/climate-meteorology>
- IPCC. (2021). Summary for policymakers. In V. Masson-Delmotte et al. (Eds.), *Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 3–32). Cambridge University Press. <https://doi.org/10.1017/9781009157896.001>
- IPCC. (2022). Summary for policymakers. In H.-O. Pörtner et al. (Eds.), *Climate change 2022: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 3–33). Cambridge University Press. <https://doi.org/10.1017/9781009325844.001>

- IPCC. (2023). Summary for policymakers. In Core Writing Team, H. Lee & J. Romero (Eds.), *Climate change 2023: Synthesis report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 1–34). IPCC. <https://doi.org/10.59327/IPCC/AR6-9789291691647.001>
- Jouzel, J., et al. (2007). Orbital and millennial Antarctic climate variability over the past 800,000 years. *Science*, 317(5839), 793–796. <https://doi.org/10.1126/science.1141038>
- Kiehl, J. T., & Trenberth, K. E. (1997). Earth’s annual global mean energy budget. *Bulletin of the American Meteorological Society*, 78(2), 197–208. [https://doi.org/10.1175/1520-0477\(1997\)078](https://doi.org/10.1175/1520-0477(1997)078)
- Kriit, H., et al. (2026). The 2026 Europe report of the Lancet Countdown on health and climate change: narrowing window for decisive health action. *The Lancet Public Health*, 11, e386–e407. [https://doi.org/10.1016/S2468-2667\(26\)00025-3](https://doi.org/10.1016/S2468-2667(26)00025-3)
- Madu, Christian N., Chu-Hua Kuei, Ifeanyi E. Madu, Benjamin C. Ozumba, Valentine E. Nnadi, Ujunwa L. Odinkonigbo, and Ikenna C. Ezeasor. *Introduction to Disaster Risk Reduction and Management*. Handbook of Disaster Risk Reduction and Management. September 2017, 1-29
- Marcott, S. A., et al. (2013). A reconstruction of regional and global temperature for the past 11,300 years. *Science*, 339(6124), 1198–1201. <https://doi.org/10.1126/science.1228026>
- Neumann, B., Vafeidis, A. T., Zimmermann, J., & Nicholls, R. J. (2015). Future coastal population growth and exposure to sea-level rise and coastal flooding—a global assessment. *PLoS ONE*, 10(3), e0118571. <https://doi.org/10.1371/journal.pone.0118571>
- Shah, S. H. (n.d.). *Building resilience by learning. The disaster risk management handbook*
- Tuholske, C., Caylor, K., Funk, C., Verdin, A., Sweeney, S., Grace, K., Peterson, P., & Evans, T. (2021). Global urban population exposure to extreme heat. *Proceedings of the National Academy of Sciences*, 118(41). <https://doi.org/10.1073/pnas.2024792118>

Tyndall, J. (1861). The Bakerian Lecture: On the absorption and radiation of heat by gases and vapours, and on the physical connexion of radiation, absorption, and conduction. *Philosophical Transactions of the Royal Society of London*, 151, 1–36.

United Nations Office for Disaster Risk Reduction (UNDRR). (2015). *Sendai Framework for Disaster Risk Reduction 2015-2030*. Geneva. UNDRR

Expert advice for policy makers: new policies for climate change & the ecological transition

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SUMMARY: I. Introduction. I.1 Objectives of climate policies. I.2 State of the art & recent policy-oriented trends. I.3 Upheavals in climate policymaking. II. Mitigation measures. II.1 Fiscal and market Instruments. II.2 Technological and industrial transitions. II.3 Urban and energy systems. II.4 Nature based and ecosystem approaches. II.5 Governance integration and justice. III. Adaptation measures. III.1 Institutional and planning frameworks. III.2 Community and participatory approaches. III.3 Nature Based and hybrid strategies. III.4 Knowledge, data, and climate services. III.5 Equity and long-term resilience. IV. The Global Framework for Climate Services (GFCs): from data to decision. IV.1 Origins and rationale. IV.2 Architecture and core components. IV.3 Integration with policy cycles. IV.4 Sectoral applications. IV.5 Regional implementation and challenges. IV.6 The knowledge-policy interface. IV.7 The digital transition and outdoor. IV.8 Synthesis: from climate data to climate governance. V. Scientific, environmental and climate litigation communication. V.1. Words bridge the gaps... or not! V.2. Communicating science in a mediated (media) environment. V.3. Communication of climate litigation. V.4. Communication, conflict and the legitimisation of science. H2 as an example. V.5. From theory to (journalistic) practice. V.6. Conclusions. Bibliography.

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I. Introduction

I.1 Objectives of climate policies

The global ecological transition is unfolding amid a rapidly intensifying climate emergency, in which the governance of mitigation and adaptation policies has become one of the defining challenges of the 21st century. Governments, industries, and societies are increasingly compelled to rethink their policy architectures, not only to reduce greenhouse gas emissions but also to reconfigure energy systems, urban forms, food networks, and social protection mechanisms in ways that sustain both human well-being and ecological integrity (Muhammed et al., 2025; Nuta, 2025).

At the heart of these new trajectories lies the integration of climate science and public policy, an alliance that is now being reshaped by the Global Framework for Climate Services. Established under the World Meteorological Organization, the GFCS provides the operational backbone for climate-informed decision-making through its pillars of Observation & Monitoring, Climate Services Information Systems, Research & Modeling, User Interface Platforms, and Capacity Development (WMO, 2024). These elements enable governments and institutions to translate data into foresight, aligning short-term actions with long-term resilience goals. As global warming accelerates, the ability of states and institutions to access and apply these services has become a determinant of adaptive success (ECMWF, 2025).

In parallel, the evolution of environmental and climate policies has shifted from sector-specific interventions to integrated frameworks connecting mitigation, adaptation, biodiversity, and justice (Luo et al., 2025; Parviainen et al., 2025). The emphasis is no longer only on emission reduction but on building systems that can anticipate and absorb shocks, from extreme weather to market volatility in fact, scholars argue that such transformations require new governance models, characterized by flexibility, transparency, and cross-sectoral coordination (H. Zhang et al., 2025).

At the economic level, policy stringency and environmental taxation have emerged as key instruments for internalizing environmental externalities. Quantitative analyses across Organisation for Economic Co-operation and Development (OECD) countries demonstrate that well-calibrated fiscal mechanisms, such as carbon taxes and pollution levies, drive measurable declines in greenhouse gas emissions, while uncoordinated debt-financed spending can compromise fiscal sustainability (Nuta, 2025). Complementing these findings, technological innovation has proven critical: environment-related technologies significantly enhance renewable

energy adoption and energy efficiency, whereas adaptation technologies exhibit more context-dependent effects (Mohammed et al., 2025). Together, these studies illustrate that the ecological transition is not merely a technological shift but a policy-technology - governance nexus. However, progress remains uneven. Many regions experience asymmetries in adaptation capacity, limited access to financial tools, and fragmented governance structures that impede policy coherence (Parviainen et al., 2025). The intersection of social inequality and environmental risk amplifies these gaps: populations with limited access to climate information and financial resources face disproportionate exposure to hazards. In this context, climate services—if equitably deployed—become a foundation for justice-oriented climate governance (Alves Prado & Patricia Flauzino Pires, 2025). Finally, the ecological transition is deeply political. It redefines the roles of states, markets, and citizens in allocating responsibility for planetary stewardship. Emerging policy paradigms stress co-production, whereby local knowledge and scientific data are integrated to inform both strategic and operational decision-making. This dynamic, supported by frameworks like GFCS, anchors the transformation toward more adaptive, inclusive, and knowledge-driven policies capable of navigating an uncertain climate future.

I.2. State of the art & recent policy-oriented trends

Over the last decade, climate governance has advanced from reactive regulation to systemic transition management, connecting fiscal, technological, and social innovation policies. Performing a search on literature on Science Direct with a simple query like “*Climate AND Policy AND Framework AND Trends AND adaptation*”, analysing the first 100 results with “relevance” as selection criterion, the landscape of key-words we observe is shown in Figure 1 (see next page).

The growing interconnectedness of adaptation, mitigation, and governance (policies) within the broader discourse on climate change are evident in the network visualization, revealing “climate change” as the central hub linking multiple thematic clusters:

- The red cluster, centered on climate change adaptation, integrates concepts such as resilience, knowledge co-production, and local governance, reflecting the operational and place-based dimensions of adaptation policy;
- The blue cluster connects climate adaptation with climate governance, environmental justice, and social vulnerability, showing the institutional and equity-oriented turn of recent policy frameworks;

- The green cluster merges equity, gender, and smallholder perspectives, underscoring the social and ethical frontiers of climate policymaking and the influence of qualitative, reflexive methodologies;

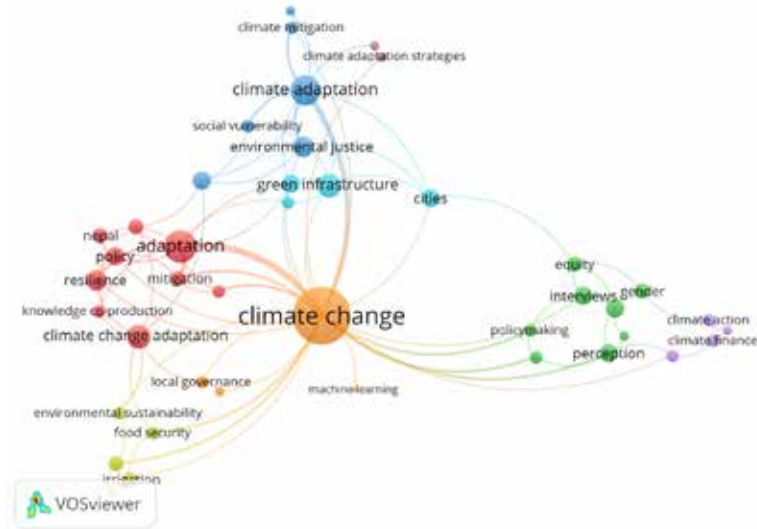


Figure 1. Keywords network map of first one-hundred articles published in 2025, selected on Science Direct by relevance as criterion (last access 10/16/2025).

Finally, smaller nodes such as food security, machine learning, and climate finance indicate the increasing role of cross-disciplinary tools that mediate between scientific evidence and governance outcomes.

The structure of the network suggests that climate policy has evolved into a multidimensional field, where adaptation, mitigation, and justice are no longer discrete agendas but mutually reinforcing domains. This is not purely conceptual or interpretative, in fact the empirical landscape provides unprecedented detail. For instance, Nuta (2025) analysed 16 OECD countries between 1995 and 2023 and found that a 1% increase in environmental policy stringency corresponds to a 0.4% reduction in total greenhouse gas emissions, while every additional unit of public debt-to-GDP ratio above 60% weakens that effect by nearly 0.2 percentage points. This quantifies a key tension: fiscal expansion can finance green inno-

vation, yet unchecked debt accumulation dilutes long-term sustainability. This underscores a central dilemma for policymakers: public borrowing is often used to finance environmental and climate-related expenditures, but excessive debt accumulation ultimately erodes fiscal space, constrains the state's ability to invest in future climate action, and may even incentivize the relaxation of environmental standards to spur short-term economic growth. Nuta's findings therefore reinforce the importance of a balanced approach – prioritizing targeted environmental taxation and robust regulatory frameworks over the unchecked expansion of public debt as a means of climate finance. The research also shows that public environmental spending, unlike environmental taxes, has only a marginal effect on reducing emissions, emphasizing the need for well-designed fiscal instruments and performance monitoring to ensure effective climate mitigation.

At the subnational level, urban climate action has emerged as a laboratory for policy experimentation. Other authors (X. Zhang et al., 2025) found that, among 85 surveyed cities worldwide, nearly 68% have adopted local climate action plans, and 52% have implemented measurable mitigation policies such as low-emission zones, municipal carbon budgets, or renewable procurement mandates. Yet, their analysis shows that Climate Policy Uncertainty (CPU) continues to reduce annual adaptation investment by approximately 0.8% for everyone standard deviation increases in uncertainty. This finding resonates with the conclusions of the Resilient Reserves study (Luo et al., 2025), where climate-adaptive pilot city policies improved local fiscal resilience by up to 12%, illustrating that cities with strong institutional continuity and predictable regulatory environments can translate policy into measurable environmental and economic returns.

In the technological domain, Muhammed et al. (2025) provide a quantitative global view of how innovation interacts with policy design. Their dynamic model, applied to 77 developed and developing economies from 1990 to 2021, demonstrates that environment-related technologies increase renewable energy consumption by 1.8 - 2.3% across lower quantiles, while reducing energy intensity by 1.4% on average. By contrast, adaptation technologies generate positive impacts primarily in low-income economies, suggesting that targeted innovation transfer remains essential for equitable decarbonization. Such granular econometric evidence substantiates the broader hypothesis that technological diffusion is conditioned by governance capacity and fiscal stability. In fact, as The Risk Tandem Framework proposed by Parviainen et al. (2025) advances (by analysing participatory co-design in three European coastal cities—Cascais, Malmö, and Thessaloniki) risk-informed policymaking grounded in Multi-Criteria Decision Analysis (MCDA) and Agent-Based Modeling (ABM)

increases the success rate of adaptation project implementation from 45% to nearly 70% within five years. These figures underscore the strategic advantage of co-production and iterative learning, echoing the GFCS principle that effective adaptation depends on two-way information flows between climate services providers and policy users. The Global Framework for Climate Services (GFCS) itself has achieved notable penetration in national systems. By 2024, over 70 countries had integrated at least one GFCS pillar—most commonly the Climate Services Information System—into their national adaptation strategies (WMO, 2024). For example, the implementation of seasonal rainfall forecasting under the GFCS in sub-Saharan Africa improved agricultural yield predictability by 15–20% in participating regions, providing quantitative evidence of the tangible socio-economic benefits of climate-informed decision-making.

Parallel to these developments, Nature-based Solutions (NbS) have emerged as a dominant paradigm in climate adaptation policy. Alves et al. (Alves Prado & Patricia Flauzino Pires, 2025) identify that over 45% of national adaptation plans (NAPs) approved since 2020 include NbS components, ranging from urban green corridors to watershed restoration. Their systematic meta-analysis of 220 peer-reviewed studies reveals that well-designed NbS projects can deliver 30–40% higher cost-efficiency than traditional grey infrastructure, while offering co-benefits for biodiversity and human health. These findings strengthen the rationale for hybrid adaptation strategies, where NbS complement engineering measures within multi-layered resilience frameworks. Financial instruments have also diversified. According to some research (Nuta, 2025), environmental taxation revenue in OECD economies rose by 18% between 2010 and 2020, reaching an average of 2.3% of GDP, yet distribution remains uneven: nordic countries collect nearly double the OECD mean, while southern European members lag behind. This uneven fiscal geography translates into differential capacities for investment in renewable infrastructure and research. Consequently, a coordinated approach combining taxation, subsidies, and innovation funds is advocated to maintain a balanced trajectory between competitiveness and ecological responsibility. Emerging data further illustrate the expanding global scope of municipal climate governance. The *Global Covenant of Mayors* reports that over 13,000 cities, representing more than one billion people, are now committed to net-zero or climate-neutrality pathways. Of these, roughly 4,800 municipalities have operational mitigation projects that collectively target an estimated 1.6 gigatonnes of CO₂ equivalent reduction by 2030 (Global Covenant of Mayors for climate and energy, 2023). These quantitative insights confirm that subnational entities are not marginal actors but

essential agents in fulfilling international agreements such as the Paris Accord. Bringing together these strands (fiscal responsibility, technological diffusion, participatory governance, and NbS mainstreaming), the state of the art converges on one principle: adaptive integration with the support of continual mitigation. The ecological transition relies on a networked architecture of policies informed by robust data, dynamic modelling, and equitable participation. Climate services under the GFCS serve as the connective infrastructure linking these domains, concluding that sustainability today is not merely a target, but it necessitates governance capability to coordinate fiscal, scientific, and social systems in real time, with an interdisciplinary and multicriterial approach.

I.3. Upheavals in climate policymaking

Over the past decade, climate policymaking has undergone a profound transformation that extends far beyond the drafting of new regulations. The upheaval is systemic (spanning institutional governance, political coordination, and epistemic frameworks) and reflects a shift from static, top-down management to dynamic, networked systems of decision-making. Across global, national, and local scales, the practice of governing climate action is being rewritten by the pressures of complexity, participation, and accountability.

Recent analyses highlight how transformational change in climate policy appraisal has redefined the logic of governance itself (Lynch et al., 2025). In fact, rather than measuring performance solely through carbon reduction targets, institutions are now assessed through their capacity for learning, integration, and anticipation. This is visible in both advanced and emerging economies: between 2015 and 2025, the number of countries implementing formal monitoring and learning systems within national adaptation frameworks has tripled, according to some authors (Hübner & Finkbeiner, 2025). The new generation of policies connects fiscal prudence with social legitimacy, moving away from technocratic command toward co-created governance cycles and solely looking at climate change effects mitigation not entailing social integration indicators.

At the institutional level, climate governance is being reshaped by the need to coordinate overlapping policy domains. In their comparative analysis, Ning et al. (2025) found that across 29 OECD and middle-income nations, 56% of adaptation and mitigation policies produced positive cross-sectoral synergies, while 18% generated measurable conflicts (typically between industrial competitiveness and energy pricing policies). This results, supports that governan-

ce complexity does not automatically produce coherence in fact, it demands deliberate structures for inter-ministerial collaboration and local feedback mechanisms. The European experience with the Green Deal Missions exemplifies this challenge: mission-oriented frameworks integrate research, innovation, and regional funding, yet their implementation requires constant negotiation across institutional hierarchies.

A second wave of reform involves the decentralization of authority and the empowerment of subnational entities. In their study, Soininen et al. (2025) identify local governments as pivotal intermediaries, translating national commitments into implementable projects. In 58 case studies in Europe and Latin America, cities adopting participatory budgeting and climate partnerships achieved 20-25% higher investment efficiency in adaptation programs compared with those operating under centralized mandates. In practice, decentralization enables agility, but it also multiplies the layers of accountability. Supporting this, the findings from Gupta & Vadlamudy (2025) demonstrate that local authorities with institutionalized learning networks (peer exchanges, academic partnerships, and digital data platform) are up to 40% more likely to maintain climate objectives during political transitions. Unsurprisingly, the inter-disciplinary practice shows to be the key for successful policy implementation, with the fast-paced increase in changes and in program introductions.

Justice and participation are increasingly recognized as the political foundation of effective policy. In fact, the “leave no-one behind” principle of sustainability is not rhetorical, and it has empirical backing. As a demonstration, Fontana et al. (2025) show that policies co-designed with civil-society organizations and marginalized communities enhance perceived fairness and policy compliance. In 11 European and Asian pilot regions, participatory frameworks increased public trust scores by 37% and reduced local resistance to low-carbon infrastructure by 22%. These findings are mirrored by Just Urban Greening for Climate Adaptation and Health Equity Planning (2025), which links participatory planning with tangible public-health outcomes. Cities that combined green-infrastructure programs with social inclusion metrics —like Milan, Rotterdam, and Singapore— recorded up to 15% improvements in heat-related morbidity indices between 2018 and 2023. These data illustrate that environmental policy, when built upon justice-oriented governance, yields compound benefits across sectors. Besides the fact that inclusivity is not rhetorical, the redefinition of knowledge authority implies policymaking is no longer a purely administrative process but a socio-technical negotiation between scientists, public servants, and

citizens. Co-produced risk mapping across 60 municipalities in the Global South resulted in a 25% improvement in early-warning dissemination and a 30% reduction in emergency response delays (Jessen et al., 2025). These outcomes align with the operational philosophy of the GFCS, whose User Interface Platforms (UIPs) connect local knowledge systems with national meteorological data. In 2024, WMO reported that 72 countries had operationalized at least one component of GFCS, marking a global shift toward science-policy integration as a governance norm.

Technological change adds a further layer of complexity to these institutional transitions with innovation ecosystems influencing policy effectiveness (Muhammed et al., 2025). Countries with robust technology-transfer networks, such as South Korea and Denmark, achieved 30% higher emissions-reduction efficiency per unit of green investment than those without. This reflects a feedback loop: effective governance attracts innovation, and innovation reinforces adaptive policy cycles. The same logic applies to the integration of climate services into national adaptation planning where, using a multi-criteria decision model across Mediterranean regions, optimized resource allocation by 18% was achieved while maintaining stakeholder satisfaction raised above 80%. Such evidence reaffirms that institutional learning and data-driven governance are inseparable (Teng et al., 2025).

This upheaval is also epistemic (it concerns the very process of knowing and legitimizing policy choices) since the “reflexive capacity” as the institutional ability to question its own assumptions and integrate uncertainty into decision structures has been investigated by some authors too (Lynch et al., 2025). Countries adopting this principle, like Finland and Costa Rica, embed feedback loops into law, requiring ministries to reassess climate targets every five years using updated socio-economic models. This mechanism has yielded demonstrable results: both nations report faster adaptation implementation rates ($\approx 30\%$) and improved cross-sectoral coordination and, even in resource-constrained settings, flexible data-sharing protocols can enhance planning accuracy without significant cost increases (Hübner & Finkbeiner, 2025).

The concept of transformational governance thus emerges as a synthesis of these trends: multilevel coordination, participatory design, open data, and iterative appraisal. It challenges traditional hierarchies by replacing rigid authority with networked accountability: remarkably, the 60% of surveyed policymakers now describe their institutions as “adaptive” rather than “directive,” a linguistic shift that mirrors practical reorientation toward collaboration. Moreover, transnational policy diffusion accelerates change. The replication of participatory

NbS standards in European cities has since expanded to Latin American contexts such as Bogotá and Buenos Aires, where standardized evaluation frameworks attract climate finance while ensuring social equity.

In summary (Table 1), the upheaval in climate policymaking is characterized by the dissolution of rigid administrative hierarchies and the rise of a reflexive, participatory, and knowledge-driven governance ecosystem. It is a landscape in which adaptation, mitigation, and justice interact through feedback loops informed by data and shaped by collective experience. Yet, as these innovations proliferate, they also generate new challenges of equity, inclusion, and legitimacy.

Table 1 Summary of the main findings in the policy trends and examples in metrics.

Type of upheaval	Description / Thematic focus	Examples of observed impact (%)
Adaptive Pathways	Shift from rigid planning to dynamic adaptive policy pathways (e.g., Netherlands, Japan, New Zealand)	≈35% reduction in adaptation costs; +40 national strategies referencing adaptive planning
Anticipatory Governance	Integration of forecasting and risk-based decision cycles; early warning and participatory modeling	20–25% reduction in flood-related losses; +45 days lead-time for drought response
Decentralization & Multi-Level Governance	Empowerment of local governments and city networks; enhanced fiscal and decision autonomy	20–25% higher investment efficiency; 12% fiscal resilience increase in pilot cities
Participatory & Justice-Oriented Frameworks	Inclusion of citizens, civil society, and marginalized groups in co-design of climate policies	+37% public trust; –22% resistance to low-carbon projects; 15% better health outcomes
Knowledge Co-production & Climate Services	Integration of GFCS user platforms linking scientific forecasts with policymaking	+30% uptake of forecasts; 25% faster response; 72 countries with GFCS components operational
Technological & Innovation Integration	Adoption of environment-related technologies and NbS standards in governance frameworks	+30% emission-reduction efficiency; 18% optimization of coastal resource allocation
Transformational & Reflexive Governance	Institutional learning, feedback loops, and open-data approaches enabling policy recalibration	+30% adaptation implementation rate; 60% of institutions describe themselves as adaptive

II. Mitigation measures

Efforts to mitigate climate change have diversified from narrow carbon reduction mandates into a broader web of fiscal, technological, and behavioural interventions. The most visible shift has been from isolated energy sector reforms to cross-sectoral strategies that combine taxation, innovation, and governance. Mitigation policy is no longer about emissions control alone; it is about systemic efficiency, social acceptance, and alignment with long-term development goals (United Nations Framework Convention On Climate Change, 2016; European Commission, 2023).

II.1 Fiscal and market Instruments

Carbon pricing and environmental taxation remain the pillars of mitigation governance (Zhao et al., 2025). However, the past decade has seen a gradual refinement of their design. Instead of uniform taxes, governments now favour progressive and hybrid mechanisms, such as partial rebates and sector specific levies that protect vulnerable groups. Successful schemes couple fiscal instruments with transparent communication and social dividend mechanisms (Ning et al., 2025). The emphasis on fairness reflects the recognition that policy endurance depends on public legitimacy as much as on technical precision. Complementary instruments (green bonds, emission trading adjustments, and carbon credit linkages) now serve to channel capital toward innovation rather than merely penalize emissions (ISPRA, 2024). As reference policies can be acknowledged the EU Emissions Trading System (EU ETS, Directive 2003/87/EC – Fit for 55 revision 2023), the Carbon Border Adjustment Mechanism (CBAM Reg. 2023/956) which ensures that goods face equivalent carbon costs for imported products outside the EU, the Energy Taxation Directive (recast 2024) which remark the fiscal differentiation and social-dividend use and the EU Green Bond Standard (2024) to finance low-carbon investments (Sagone & Cellura, 2025).

II.2 Technological and industrial transitions

Mitigation increasingly relies on technology diffusion and industrial innovation rather than command and control regulation. Research on environment related technologies shows that digitalization, electrification of mobility, and

decarbonization of manufacturing supply chains have become the new frontiers of policy intervention (Seidu et al., 2025). Governments use incentive portfolios like grants, tax credits, and public private partnerships, to accelerate uptake. Yet, the challenge lies in balancing rapid innovation with institutional oversight. The most effective systems integrate monitoring frameworks that evolve alongside technologies, ensuring that policy keeps pace with innovation rather than lagging it (Soininen et al., 2025). As supporting policies for technological and industrial transition there is the Net Zero Industry Act (EU, 2024) to regulate the battery, heat pumps and solar PV manufacturing and the REPowerEU Plan (2022) to accelerate the renewable sources and hydrogen to replace fossil fuels.

II.3 Urban and energy systems

Cities are central laboratories for mitigation actions, and they are the experimental and practical field for authorities and the impact of the used renewable procurement mandates, district heating modernization (as for Positive Energy Districts – PEDs) and low emission mobility plans (15 mins cities) by aligning to local infrastructure with national targets. In many European and Asian contexts, this results in the coevolution of urban energy systems where waste heat (tele-heating is one of these applications), renewable supply, and storage are governed through integrated planning. The intersection of urban governance and energy policy exemplifies the broader logic of mitigation today: solutions are hybrid, place based, and deeply dependent on cross institutional cooperation. Among the different policies in this specific area there is the EU Missions “100 Climate-Neutral and Smart Cities by 2030” to implement PEDs and integrate mobility, Energy Efficiency Directive (EU 2023/1791) and the renewable directive (EU 2023/2413) to mandate local energy planning and district heating decarbonisation. In addition to these, the Sustainable Urban Mobility Plans (SUMP, EU guidelines 2019) link transport electrification with air quality and emission goals.

II.4 Nature based and ecosystem approaches

Mitigation policies now recognize the carbon sequestration potential of ecosystems as part of national climate accounts. Some authors’ works expand this view by framing nature based solutions not only as adaptation tools but as credible mitigation mechanisms (Marino et al., 2025; Sahay, 2025). Reforestation, Reducing

Emissions from Deforestation and Forest Degradation (REDD+) coastal wetland restoration, and soil carbon programs deliver co-benefits that integrate climate, biodiversity, and social inclusion; thus, the emerging concept of “nature positive mitigation” joins ecological restoration and emission control, encouraging policies that generate both ecological and economic value. The policies related to these mitigation actions are, among the others, the EU Nature Restoration Law (2024) and the Land Use, Land-Use Change, and Forestry (LULUCF) Regulation (EU, 2023/839), which sets binding carbon-sink targets for land-use and forestry and the United Nations Decade on Ecosystem Restoration (2021-2030) reference as the global coordination of restoration-based mitigation.

II.5. Governance integration and justice

Underlying these measures is a new understanding of governance. Mitigation strategies increasingly incorporate social dialogue, transparency, and data openness as integral components of design. Studies show that where equity is embedded early (through participatory planning and fair fiscal design) mitigation achieves higher persistence and lower backlash (Fontana et al., 2025).

Together, these strands reveal that contemporary mitigation is multidimensional: fiscal prudence, technological innovation, and social legitimacy form a single architecture. Recent scholarship emphasises policy integration across energy, transport, land use, and industrial systems. Integrated pathways combine mitigation and adaptation co-benefits, embedding resilience within decarbonisation plans (Ou & Song, 2025).

For instance, urban greening and nature-based solutions simultaneously sequester carbon and reduce heat-island effects, while electrified public transport mitigates emissions and improves air quality. The alignment of fiscal, technological, and behavioural levers requires robust monitoring, reporting and verification (MRV) systems and cross-sectoral data platforms (Tuğaç, 2025). As reference policies, there is the European Climate Law (Reg. 2021/1119) binding the European Union to climate neutrality by 2050, the Just Transition Mechanism (EU, 2020) and Social Climate Fund (2024) supporting equitable decarbonisation and the Long-TERM Low-Emission Development Strategies (LT-LEDS, United Nations Framework Convention for Control on Climate Change – UNFCCC – Art. 4.19), anchoring justice and participation in national planning.

Equity considerations are increasingly mainstreamed through just-transition policies, ensuring that workers and regions dependent on fossil-fuel in-

dustries are supported through retraining and targeted investment (Reinwald et al., 2025). Such multi-dimensional integration links mitigation with social justice and economic diversification.

III. Adaptation measures

While mitigation seeks to limit the magnitude of climate change, adaptation addresses its inevitabilities. The shift from controlling emissions to managing impacts has produced a complementary policy architecture focused on resilience, justice, and long-term wellbeing. The initial literature analysis reflects a growing consensus that adaptation and mitigation are interdependent: effective governance links the two through shared data systems, participatory institutions, and continuous learning.

III.1 Institutional and planning frameworks

Adaptive planning requires flexible institutional design rather than large budgets and a slightly more adaptive bureaucracy. Governments, increasingly adopting iterative planning cycles, periodically review these policies against updated risk assessments. This mirrors the adaptive logic described earlier for mitigation but is oriented toward vulnerability reduction rather than emission control in the logic of the risk fundamental equation, where the exposed values and the vulnerability are factors strictly related to the human being in this context. Doing so, local governments have become critical actors, coordinating spatial planning, infrastructure, and social services under unified adaptation strategies.

III.2 Community and participatory approaches

Adaptation policies are most durable when rooted in community engagement. Participatory decision-making not only improves compliance but also strengthens local ownership and when communities define priorities implementation accelerates (Abikoye & Abikoye, 2025; Fassina et al., 2025). These insights reinforce the lessons from justice focused studies: participation is effective when it transfers knowledge and some degree of authority, not when it is symbolic.

III.3 Nature Based and hybrid strategies

Nature based Solutions (NbS) have become the centerpiece of adaptation with hybrid measures (combining grey infrastructure with ecological restoration like agrivoltaic) achieve greater long-term sustainability. Rehabilitated wetlands, green corridors, and vegetated urban surfaces reduce flood risks, cool microclimates and enhance biodiversity simultaneously. Standardization of NbS through shared criteria ensures comparability and attracts investment, integrating ecological performance into mainstream planning and interesting reputational return on the investment for reporting disclosure of companies.

III.4 Knowledge, data, and climate services

Information quality determines adaptive capacity, emphasizing how standardized data sharing reduces duplication and fosters coordination between ministries and municipalities, granting through its user interface platforms, an effective two-way communication between scientists and policymakers, allowing adjustments to adaptation actions as new data emerge (Wang et al., 2025).

III.5 Equity and long-term resilience

Finally, adaptation policies increasingly aim to integrate social equity as a measure of success, and show that gender, age, and income remain powerful determinants of exposure and capacity. Programs that target vulnerable groups (through insurance access, inclusive infrastructure, and representation in planning) create more stable resilience outcomes. The linkage with mitigation becomes evident here: both depend on justice, transparency, and coproduction to maintain legitimacy and endurance (Biswas & Barua, 2025; Jessen et al., 2025).

Adaptation, therefore, completes the architecture of the ecological transition. If mitigation defines the trajectory of emissions, adaptation defines the resilience of societies that live with them. Together, they form the twin pillars of a governance model that values not only carbon balance but also human security, biodiversity, and intergenerational justice: in Table 2, they are listed with their respective status of implementation as partial (barely received and not frequently perceived), emerging (received and moderately implemented), advanced (understood and received and largely recognised).

Table 2 describes the Summary of the main mitigation and adaptation measures with their status of implementation. The division between mitigation and adaptation measures is not deeply marked as emphasised by the dashed line. In fact, many mitigation and adaptation interventions naturally overlap, synergistically contributing to the common aim.

Measure Type	Policy Domain	Current Status / Progress	References
Mitigation	Carbon pricing & green taxation	<u>Emerging</u> + Widely adopted in OECD; - Fairness mechanisms improving; + Coordination gaps remain.	(Lynch et al., 2025; Ning et al., 2025)
Mitigation	Technology & industrial decarbonization	<u>Emerging</u> + Advanced in leaders; - Diffusion uneven across SMEs and regions.	(Muhammed et al., 2025; Soininen et al., 2025)
Mitigation	Urban energy & mobility (RE procurement, district heating, LEZ)	<u>Emerging</u> + Notable pilots; - Continuity and policy uncertainty still constrain scaling.	(Gupta & Vadlamudy, 2025; Xu et al., 2025))
Mitigation	Nature-based mitigation (forests, wetlands, soil carbon)	<u>Emerging</u> + Co-benefits recognized; + Standards improving comparability.	(Alves Prado & Patricia Flauzino Pires, 2025)
Mitigation	Finance instruments (green bonds, Emission Trading Scheme linkages)	<u>Partial</u> + Growing issuance; - Uneven access for low-capacity municipalities.	(Gupta & Vadlamudy, 2025; Ning et al., 2025)
Mitigation	Governance & justice integration (participatory design, transparency)	<u>Emerging</u> + higher legitimacy where redistribution accompanies taxation.	(Fontana et al., 2025; Lynch et al., 2025)
Adaptation	Institutional adaptive planning (iterative cycles, triggers)	<u>Emerging</u> + Advanced in select countries; + Learning systems expanding.	(Hübner & Finkbeiner, 2025)
Adaptation	Community/ participatory approaches (empowerment, co-design)	<u>Emerging</u> + Strong outcomes where power-sharing is real.	(Abikoye & Abikoye, 2025; Fassina et al., 2025)

Measure Type	Policy Domain	Current Status / Progress	References
Adaptation	Nature-based & hybrid solutions (NbS + grey)	<u>Advanced</u> + Implementation maturing with standards and monitoring. - Need improvements in communication	(Alves Prado & Patricia Flauzino Pires, 2025; Teng et al., 2025)
Adaptation	Climate services & data systems (GFCS integration)	<u>Advanced</u> + User platforms and CSIS increasingly operational.	(WMO, 2024)
Adaptation	Sectoral: Coastal resilience	<u>Emerging</u> + Stakeholder acceptance rising.	(Teng et al., 2025)
Adaptation	Sectoral: Agriculture & water (groundwater, irrigation, livelihoods)	<u>Emerging</u> + Scenario-based planning and agent-based modelling spreading.	(Jamali et al., 2025)
Adaptation	Sectoral: Buildings & heritage retrofits	<u>Emerging</u> + Building Performance Simulation + Machine Learning guiding retrofits; - Heritage cases show viable pathways.	(Xiao et al., 2025)
Adaptation	Health & heat (Heat Health Action Plans HHAPs, urban cooling)	<u>Partial</u> - Equity integration growing but uneven.	(OKA et al., 2025)

IV. The Global Framework for Climate Services (GFCS): from data to decision

In the context of a multidisciplinary approach embedding policy and actions at all levels, the Global Framework for Climate Services (GFCS) represents the institutional backbone of contemporary climate governance. Conceived under the auspices of the World Meteorological Organization (WMO) and endorsed by the United Nations System Chief Executives Board in 2009, GFCS was formally launched at the Extraordinary World Climate Conference-3 (WCC-3) in 2011. It emerged from a recognition that data and forecasts, however scientifically robust, remained underutilized in real-world decision-making. The framework thus redefined the purpose of climate information: not merely to observe and predict, but to serve societies in their adaptation, mitigation, and risk management.

IV.1. Origins and rationale

The early 21st century saw the proliferation of sophisticated climate models and vast observational datasets, yet the capacity to translate them into usable insights for policymakers, farmers, city planners, and healthcare systems lagged behind. This gap between climate knowledge and societal application (often referred to as the “last mile problem”), motivated the creation of GFCS. Its foundational vision is straightforward yet transformative: to enable all nations to access, understand, and apply tailored climate information in ways that reduce risk, enhance resilience, and promote sustainable development.

The GFCS operates in direct synergy with global policy frameworks such as the Paris Agreement, the Sendai Framework for Disaster Risk Reduction, and the Sustainable Development Goals (SDGs). It provides the operational mechanism through which climate knowledge is transformed into action, linking meteorological science with development planning and humanitarian response. By bridging technical and institutional silos, GFCS embodies the “science–policy–society nexus” that underpins modern climate governance.

IV.2. Architecture and core components

The GFCS rests on five interrelated pillars designed to ensure a complete chain from observation to impact:

1. **Observation and monitoring:** Establishes global standards for meteorological, hydrological, and environmental data collection. These include surface and satellite observations, cryospheric measurements, and oceanic monitoring systems. The emphasis on open data and quality assurance ensures that countries can share comparable, reliable datasets for long-term climate assessment.
2. **Climate Services Information System (CSIS):** The operational heart of GFCS, CSIS translates raw data into usable products—forecasts, projections, and tailored analyses. Through regional and national climate centers, CSIS delivers sector-specific information such as seasonal rainfall predictions, drought indices, or heatwave alerts. Its interoperability protocols link national meteorological services with regional climate outlook forums and the global WMO infrastructure.

3. Research, modelling, and prediction: This pillar integrates scientific advancements from the World Climate Research Programme (WCRP) and related initiatives to improve predictive skill and uncertainty quantification. It encourages co-production between climate scientists, social researchers, and decision-makers to align model outputs with user needs.
4. User Interface Platforms (UIP): Perhaps the most innovative element, UIPs enable two-way communication between data providers and end-users. They function as participatory spaces where policymakers, farmers, urban planners, and healthcare practitioners articulate their information needs, evaluate forecast performance, and contribute local knowledge to refine services.
5. Capacity development: Recognizing that data access without technical literacy leads to dependency rather than empowerment, GFCS invests heavily in training, institutional strengthening, and South–South cooperation. Regional Climate Centers (RCCs) and Climate Services Information Systems across Africa, Latin America, and Asia embody this principle, ensuring that capacity is distributed and durable.

IV.3. Integration with policy cycles

GFCS has become a cornerstone of climate-informed policy design, allowing governments to incorporate probabilistic information into planning and budgeting. National Adaptation Plans (NAPs) and sectoral policies—especially in agriculture, health, and water—now routinely include climate service inputs as a prerequisite for funding. The framework’s iterative design mirrors the adaptive cycles described earlier in this handbook: observation informs planning; planning guides investment; investment generates feedback that improves observation.

For mitigation, GFCS supports emission monitoring and verification through improved atmospheric data, aiding compliance under the Paris Agreement’s Enhanced Transparency Framework. For adaptation, it provides early-warning systems and climate-risk dashboards that inform urban development, infrastructure design, and public health planning. The Global Framework thus operates as both a scientific network and a governance instrument, embedding evidence into the daily operations of institutions.

IV.4. Sectoral applications

The policies analysed can be applied in different fields and sectors. Hereby there is a list of possible application per field.

- **Agriculture and Food Security:** GFCS supports agrometeorological advisories that help farmers optimize planting schedules and water use. In East Africa, Regional Climate Outlook Forums provide seasonal forecasts that have reduced crop losses by aligning irrigation practices with rainfall variability.
- **Water Resource Management:** Through hydrological services and basin-level modelling, GFCS informs flood and drought management. Data integration between upstream and downstream countries supports transboundary cooperation—a critical feature in basins such as the Mekong and the Nile.
- **Health:** In partnership with the World Health Organization (WHO), GFCS delivers climate-informed health surveillance, particularly for vector-borne and heat-related diseases. Heat-Health Action Plans (HHAPs) are operational examples where climate data triggers early warnings and public health interventions.
- **Disaster Risk Reduction:** By integrating with the Sendai Framework, GFCS enhances multi-hazard early-warning systems. National Meteorological and Hydrological Services (NMHSs) use its guidance to issue timely alerts that save lives and reduce economic losses.
- **Energy and Infrastructure:** Seasonal forecasts support hydropower scheduling, renewable integration, and demand-side management. Cities leverage climate projections to design resilient grids, transport systems, and building codes.

IV.5. Regional implementation and challenges

GFCS is implemented through regional and national mechanisms that reflect diverse capacities. In Africa, the Regional Climate Centres (e.g., ACMAD, ICPAC) operationalize climate services for agriculture and disaster risk management. In Asia-Pacific, the framework supports early-warning systems for cyclones and droughts, integrating satellite data with community-based mon-

itoring. In Europe, the Copernicus Climate Change Service (C3S) aligns with GFCS principles, focusing on open-access datasets and cross-sectoral analytics. The Americas have developed Climate Services Partnerships linking meteorological agencies with private energy and insurance sectors.

However, disparities persist. Many developing countries face data gaps, limited ICT infrastructure, and insufficient institutional coordination. Sustaining long-term observation networks and ensuring open data policies remain pressing challenges. Additionally, integrating indigenous and local knowledge into GFCS workflows is still emergent, although recognized as essential for contextual accuracy and social legitimacy.

IV.6. The knowledge-policy interface

One of GFCS's greatest contributions lies in redefining how knowledge circulates between science and policy. Its co-production model encourages iterative dialogue rather than one-way communication. Climate scientists learn from local practitioners about the relevance of their outputs, while policymakers gain literacy in interpreting uncertainty and probability. This reciprocity not only improves forecast accuracy but also builds institutional trust, a vital currency in climate governance.

Equity considerations have also entered the GFCS agenda. Gender mainstreaming, youth inclusion, and capacity development for least developed countries are now embedded in its strategic plan (2023–2027). The framework acknowledges that information inequality mirrors social inequality—thus, democratizing access to climate knowledge becomes an act of justice as well as efficiency.

IV.7. The digital transition and outlook

As digital transformation accelerates, GFCS is evolving into a data ecosystem that interacts with artificial intelligence (AI), remote sensing, and citizen science. Machine learning models now assist in downscaling climate projections and detecting anomalies in observation networks. Open Application Programming Interfaces (APIs) enable integration of climate services into national data portals, while blockchain experiments explore traceability in climate-finance flows. The intersection of AI and GFCS offers new opportunities for predictive analytics, though it also raises questions about data sovereignty and ethics.

Looking ahead, GFCS's future hinges on three interdependent priorities:

- **Interoperability:** Ensuring that global, regional, and local data systems communicate seamlessly across sectors and borders.
- **Inclusivity:** Expanding participation beyond technical agencies to include civil society, private actors, and marginalized communities.
- **Integrity:** Maintaining scientific rigor and transparency amidst the proliferation of digital tools and private data providers.

IV.8. Synthesis: from climate data to climate governance

The Global Framework for Climate Services is more than a technical platform; it is a paradigm for adaptive governance. By institutionalizing feedback loops between knowledge and decision-making, it aspires to embody the very logic of transformation described throughout this handbook. Thus, GFCS would operationalize the principle that effective climate policy begins not with ideology, but with information – information that is timely, trusted, and tailored to human needs.

In linking observation to action, mitigation to adaptation, and science to society, GFCS represents the connective tissue of the ecological transition. It transforms data into foresight, foresight into planning, and planning into resilience. Its continued evolution will determine how humanity navigates the uncertain climate of the 21st century—not as passive recipients of information, but as informed co-creators of a sustainable future.

V. Scientific, environmental and climate litigation communication

V.1. Words bridge the gaps... or not!

The so-called “multiparty intractable conflicts” can be conceptualised as communicative meaning-making processes that persist over time and are particularly difficult to resolve when they affect ideological principles, although they share features that the involved parties in environmental conflicts can use to reach agreements (Campbell, 2003; Lewicki et al., 2003; Gray, 2004; Asha et al., 2012; Prades & De la Varga, 2016).

Communication is “pragmatic” and “constitutive” (Cox, 2006: 12). In its pragmatic version it is useful to solve environmental disputes but, beyond this instrumental view, in its constitutive version communication is at the origin of conflict too: through communication, the parties show their divergent points of view. Thus, the conflict becomes not only the object of communication but also its subject, since “the centrality of the communicative act is not to transmit information or knowledge about the object, but to keep the conflict going” (Castelló, 2012: 19). Moreover, conflict is a form of communication that fits perfectly the media logic (Altheide and Snow, 1979).

V.2. Communicating science in a mediatised (media) environment

The scientific literature on science communication is so prolific that communicating science can be considered a science in itself. Since the middle of the last century, different models of scientific communication have been developed (the deficit model in the 1960s, the dialogue model in the 1980s and the participatory model in the 1990s). In the 21st century, the evolution of the internet and the expansion of social networks have radically changed communication paradigms, evolving from mediation to mediatisation.

While mediation refers to how communication influences the meaning-making processes, mediatisation refers to change. Mediatisation shows social changes and changes in mediation processes, given that the media transform society at the same time as society transforms the media (Couldry & Hepp, 2013). In mediatised science, the media enter laboratories; at the same time, laboratories entered the media (Schäfer, 2014: 571). The question is no longer whether the media are independent of politics and society, but whether politics and society are independent of the media (Strömbäck, 2008). After all, “one cannot live a life apart from nature nor outside the media” (Berguillos, 2021: 2).

In the environmental conflicts the media, law professionals, political representatives and social movements interact in a continuous process of conflict (Harjuniemi et al., 2024). From a communicative point of view, the goal is to analyse the relationships between actors in a continuous process of meanings creation (Bogoch and Peleg, 2014; Mattoni & Treré, 2014; Strömbäck & Esser, 2014), as shown in Figure 2.

The production, circulation and reception of messages and meanings must be considered both individually at the media, legal, political and social levels and, as

a whole, in relation to the three spheres of sustainable development. The climate emergency is a matter for both climate science and social science (Borràs, 2016).

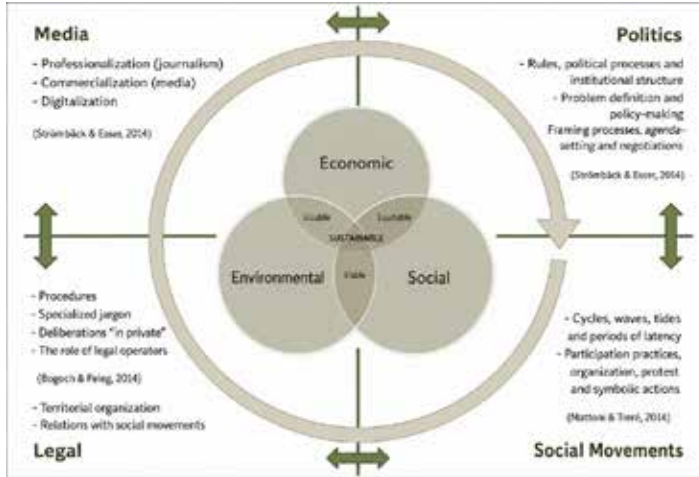


Figure 2. Logics and interactions in the process of meanings creations about environmental conflict.

V.3. Communication of climate litigation

On the one hand, regarding the media logic, until recently it was claimed that “the role of news media as an influential force in public opinion formation and mobilisation in the context of environmental litigation as an activist strategy remains less understood”. Also, that “the ‘mediatised visibility’ inherent in public interest litigation is an important, but mostly overlooked, element of mediatised environmental conflict” (Konkes, 2017: 191). But today we know that “litigation has been found to be an effective tool for increasing media attention and movement success”, so that “public attention for litigation can provide a vantage point for broader societal influences of a lawsuit” (Wonneberger & Vliegthart, 2021: 711).

On the other hand, as for the legal logic, until recently it was claimed too that “the story of climate change in the courts has not been one of forging a new jurisprudence, but rather one of operating under business as usual” (Mar-

kell and Ruhl, 2012: 15); although today we know that “a clear court decision on climate responsibilities reduces public controversy on this matter and gives room for a more focused debate on possible solutions. Hence, court success is a major factor for the effectiveness of CCL [Climate Change Litigation] as a public campaigning tool” (Wonneberger, 2024: 109).

Looking at the political logic communication shows its duality, the two sides of the same coin: both the risks and benefits. In fact, “conflicts play a crucial role in sustainability transitions and may act as catalysts or barriers” (Kalt, 2024: 9); “crises can catalyse the transition if short-term emergency policies are harmonised with long-term climate goals advocating for a coherent policy framework” (Hoffart et al., 2024).

Finally, for social movements “litigation creates visibility and resonance for the climate movement via media discourses with a specific focus on solutions and related responsibilities”. Beyond focusing criticism and responsibility for action on governments and corporations, “a separation of responsibility and solutions discourses may facilitate public legitimacy and hence benefit the goals of climate activists” (Wonneberger, 2024: 94-109).

V.4. Communication, conflict and the legitimisation of science. H2 as an example

The results of scientific research legitimise science within the scientific community, but science does not legitimise itself socially. Nowadays, when the authority of science is threatened by denialists trying to slow down the ecological transition, and when the media and institutions reinforce political polarisation (Besalú et al., 2025), the legitimisation of science needs scientific and environmental communication more than ever.

Weingart and Joubert (2019: 1) argue for “the restoration of a crucial distinction between two types of science communication — educational/dialogic vs promotional/persuasive” — for analytical, practical, legal/ethical and technical reasons, depending on the role (governmental, organisational, individual), functions (informative, promotional, advertising, legitimising, etc.), and motivations of editors, issuers, and messages senders. According to these roles, functions and motivations, media, legal, political and social movements discourses deal with stories, narratives, frames and metaphors surrounding ecological modernisation (Seippel, 2000) and political ecology (Zógrafos & Martínez Alier, 2009).

Let us consider green hydrogen (H₂) as a case study: In recent years it has been touted as a great ally for decarbonisation. As in previous cases emerged at the time (biotechnology, nanotechnology), and today (e.g., Artificial Intelligence), risks and benefits surrounding H₂ are once again emerging. (Vallejos-Romero et al., 2023)

Communication is imperative (Toubal, 2020). This is a not disputed fact. However, from a Eurocentric perspective several biases appear (Ghisellini et al., 2025). A critical analysis approaches the energy transition as a conflict between and among nature, society, power, and justice; this includes analysing how actors defend or do not defend fossil fuels, green capitalism, eco-authoritarianism or radical socio-ecological transformation (Kalt, 2024). Therefore, despite the potential that green hydrogen offers to mitigate the effects of climate change, net zero policies must “implement energy justice principles, encompassing distributive, procedural, and recognition justice throughout the hydrogen value chain to ensure an equitable transition” (Bindi et al., 2025). Otherwise, there is a risk of “perpetuating injustices and undermining the very sustainable goals that green hydrogen aims to achieve [...] This requires inclusive decision-making processes, equitable distribution of benefits and burdens, and respect for the rights, cultures and identities of all stakeholders” (Patonia, 2025: 9).

V.5. From theory to (journalistic) practice

Greenwashing, techno-optimism, realistic present or utopian/dystopian future? The debate is gaining momentum in the media-driven public sphere: Chwałczyk (2020) identifies up to 90 alternatives to the Anthropocene; Hubert (2022) approaches climate change as a class war in the “Proletarocene”; in turn, Hildebrand and Vacker (2018) explore the “Mediacene” ...

In journalistic practice, “compared to traditional science journalism, the media took an active role in scientific reporting as part of social and political struggles”; therefore, “a new form of reflexivity in scientific reporting” is needed (Välvärrönen, 2001: 28).

In this vein, Nisbet and Fahy (2015) draw attention to the need for knowledge-based journalism in politicised scientific debates and to the roles of journalists as dialogue brokers, knowledge brokers, and political brokers. Here, again, both challenges and risks as well as opportunities and benefits (Van Witsen and Takahashi, 2018) must be tackled. A promising alternative is proposed by the slow journalism: “To report on stories that are not dramatic or personality-driv-

en, but require a connection with communities at a more local level and over a longer period of time” (Guess, 2012: 54). Ultimately, the aim is to prevent “the gap between political rhetoric and the practice of science communication from threatening the credibility of science” (Weingart and Joubert, 2019: 1).

V.6. Conclusions

Neither science nor communication are neutral. Having science policies geared towards environmental protection and effective science-based communication strategies to achieve social acceptance of controversial projects is essential to implementing them and moving towards a just transition. Otherwise, there will be more litigation cases at courts and much more efforts, time and money will be lost. Or even worse, the outcome will be to waste these valuable resources instead of investing in them.

Bibliography

- Abikoye, O., & Abikoye, A. (2025). Marine policy and community engagement: rethinking the role of vulnerable groups in climate and ocean action on Lagos’ Atlantic Coast, Nigeria. *Marine Policy*, 182. <https://doi.org/10.1016/j.marpol.2025.106850>
- Altheide, D., & Snow, R. (1979). *Media logic*. Sage.
- Alves Prado, H., & Patricia Flauzino Pires, A. (2025). Revisiting the role of the Nature-based Solutions Standards to promote climate adaptation in cities. *Perspectives in Ecology and Conservation*. <https://doi.org/10.1016/j.pecon.2025.09.002>
- Asah, S., Bengston, D., Wendt, K., & Nelson, K. (2012). Diagnostic reframing of intractable environmental problems: case of a contested multiparty public land-use conflict. *Journal of environmental management*, 108, 108-119. <https://doi.org/10.1016/j.jenvman.2012.04.041>
- Bergillos, I. (2021). Approaches to the Anthropocene from Communication and Media Studies. *Social Sciences*, 10(10), 365. <https://doi.org/10.3390/socsci10100365>

- Besalú, R., Capdevila, A., & Moragas-Fernández, C. M. (2025). Ecological Transition in Spain: Political Polarization Through Institutions and Media. *Land*, 14(4), 866. <https://doi.org/10.3390/land14040866>
- Bindi, J., Bartolomei, F., Pellegrini-Masini, G., Agostini, A., & Padovan, D. (2025). Assessing social impacts and Energy Justice along green hydrogen supply chains: a capability-based framework, *Energy Research & Social Science*, 126, 104149. <https://doi.org/10.1016/j.erss.2025.104149>
- Biswas, D., & Barua, A. (2025). Neglect to recognition: Embracing women as key agents in climate solutions. *Environmental Science and Policy*, 172. <https://doi.org/10.1016/j.envsci.2025.104216>
- Bogoch, B., & Peleg, A. (2014). Law in the age of media logic. In Lundby, K. (ed.) *Mediatization of communication* (pp. 443-462). De Gruyter. <https://doi.org/10.1515/9783110272215>
- Borràs, S. (2016). Movimientos para la justicia climática global: Replanteando el escenario internacional del cambio climático. *Relaciones Internacionales*, 33, 97-119. <https://doi.org/10.15366/relacionesinternacionales2016.33.005>
- Campbell, M. (2003). Intractability in environmental disputes: Exploring a complex construct. *Journal of planning literature*, 17(3), 360-371. <https://doi.org/10.1177/0885412202239138>
- Castelló, E. (2012). Conflicto político y medios: marcos, narrativas y discursos. In E. Castelló (Ed.), *La mediatización del conflicto político. Discursos y narrativas en el contexto español* (pp. 9-38). Laertes. ISBN: 9788475848822
- Chwałczyk, F. (2020). Around the Anthropocene in Eighty Names—Considering the Urbanocene Proposition. *Sustainability*, 12 (11), 4458. <https://doi.org/10.3390/su12114458>
- Couldry, N., & Hepp, A. (2013). Conceptualizing mediatization: contexts, traditions, arguments. *Communication theory*, 23(3), 191-202. <https://doi.org/10.1111/comt.12019>
- Cox, R. (2006). *Environmental Communication and the Public Sphere*. SAGE
- ECMWF. (2025). *ECMWF*. <https://www.ecmwf.int/en/forecasts>

- European Commission. (2023). *Fit for 55: Delivering on the proposals*. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal/fit-55-delivering-proposals_en.
- Fassina, C. M., Almeida, L. R., Morris-Webb, E. S., Xavier, L. Y., Blanco, G. D., Diele-Viegas, L. M., & Gonçalves, L. R. (2025). Climate change adaptation: Raising fisherwomen's voices to policy making. *Marine Policy*, 181. <https://doi.org/10.1016/j.marpol.2025.106828>
- Fontana, C., Testi, A., Allegretti, G., Zetti, I., & Rossi, M. (2025). Embedding justice into climate policies through participatory approaches: prospects and pitfalls toward community-based adaptation pathways in Bologna, Italy. *Cities*, 163. <https://doi.org/10.1016/j.cities.2025.105998>
- Gess, H. (2012). Climate change and the possibility of 'slow journalism.' *Ecquid Novi: African Journalism Studies*, 33(1), 54–65. <https://doi.org/10.1080/02560054.2011.636828>
- Ghisellini, P., Passaro, R., & Ulgiati, S. (2025). Is Green Hydrogen an Environmentally and Socially Sound Solution for Decarbonizing Energy Systems Within a Circular Economy Transition? *Energies*, 18(11), 2769. <https://doi.org/10.3390/en18112769>
- Global Covenant of Mayors for climate and energy. (2023). *Global Covenant of Mayors Common Reporting Framework*.
- Gray, B. (2004). Strong Opposition: Frame-based resistance to collaboration. *Journal of community & applied social psychology*, 14(3), 166-176. <https://doi.org/10.1002/casp.773>
- Gupta, H., & Vadlamudy, R. S. (2025). From policy to practice: What drives climate orientation in development finance flows? *Journal of Policy Modeling*. <https://doi.org/10.1016/j.jpolmod.2025.09.008>
- Harjuniemi, T., Dahlberg, M., & Kantola, A. (2024). When the Logics of Media, Law, and Politics Collide: The Mediatization of Finnish Constitutional Review. *The International Journal of Press/Politics*, 30(4), 1136-1155. <https://doi.org/10.1177/19401612241263303>

- Hildebrand, J., & Vacker, B. (2018, January 28). Hot and Cool in the MediaScene. *Medium*. <https://medium.com/mediascene/hot-and-cool-in-the-mediascene-a-mcluhan-style-art-and-theory-project-658ce02a6af8>
- Hoffart, F.M., D’Orazio, P., Holz, F., & Kemfert, C. (2024). Exploring the interdependence of climate, finance, energy, and geopolitics: A conceptual framework for systemic risks amidst multiple crises, *Applied Energy*, 361 (2024) 122885. <https://doi.org/10.1016/j.apenergy.2024.122885>
- Huber, M.T. (2022). *Climate Change as Class War. Building socialism in a warming planet*. Verso.
- Hübner, N., & Finkbeiner, M. (2025). Enhancing climate adaptation planning with limited resources: A streamlined framework for municipal climate risk assessments. *Climate Risk Management*, 49. <https://doi.org/10.1016/j.crm.2025.100723>
- ISPRA. (2024). *Le emissioni di CO2 nel settore elettrico nazionale e regionale*. https://emissioni.sina.isprambiente.it/wp-content/uploads/2025/05/Le-emissioni-di-CO2-nel-settore-elettrico_r413-2025_def.pdf
- Jamali, S., Punthakey, J. F., Ahmed, W., Qureshi, A. L., Raheem, A., Mitchell, M., & Ahmed, M. (2025). Groundwater modelling assessment of a coastal agriculture climate change adaptation strategy incorporating green infrastructure: An Indus Delta case study. *Groundwater for Sustainable Development*, 30. <https://doi.org/10.1016/j.gsd.2025.101484>
- Jessen, M. J., Fertner, C., & Fryd, O. (2025). Social vulnerability in regional climate adaptation planning in Europe – Conceptions, operationalisations and shared challenges. *Environmental Science and Policy*, 171. <https://doi.org/10.1016/j.envsci.2025.104161>
- Kalt, T. (2024). Transition conflicts: A Gramscian political ecology perspective on the contested nature of sustainability transitions. *Environmental Innovation and Societal Transitions*, 50, 100812. <https://doi.org/10.1016/j.eist.2024.100812>
- Konkes, C. (2017). Green Lawfare: Environmental Public Interest Litigation and Mediatized Environmental Conflict. *Environmental Communication*, 12(2), 191–203. <https://doi.org/10.1080/17524032.2017.1371054>

- Lewicki, R., Gray, B., & Elliott, M. (Eds.). (2003). Making sense of intractable environmental conflicts: Concepts and cases. Island Press. ISBN: 9781559639316
- Luo, C., Cai, D., & Xu, J. (2025). Resilient reserves: Climate adaptive pilot cities policy and firms' cash holdings. *Economic Analysis and Policy*, 86, 510–527. <https://doi.org/10.1016/j.eap.2025.03.045>
- Lynch, C., Barbrook-Johnson, P., Salas Bravo, P., Mercure, J. F., Nijse, F., Qin, J., & Pasqualino, R. (2025). Tackling transformational change in climate policy appraisal: experiences and perceptions of United Kingdom policy analysts. *Energy Research and Social Science*, 127. <https://doi.org/10.1016/j.erss.2025.104190>
- Marino, M. D., Furuseth, I. S., Enge, C., Solli, G. S., & Barkved, L. J. (2025). Nature-based solutions for climate change adaptation in urban areas: A Norwegian planning perspective. *Land Use Policy*, 157. <https://doi.org/10.1016/j.landusepol.2025.107678>
- Markell, D., & Ruhl, J.B. (2012). An Empirical Assessment of Climate Change in the Courts: A New Jurisprudence or Business as Usual? *Florida Law Review*, 64, 15-86. <https://ir.law.fsu.edu/articles/62>
- Mattoni, A., & Treré, E. (2014). Media practices, mediation processes and mediatization in the study of social movements. *Communication theory*, 24(3), 252-271. <https://doi.org/10.1111/comt.12038>
- Mohammed, S., Raihan, A., Arshad, S., Ata, B., Ocwa, A., Al-Dalahmeh, M., & Harsanyi, E. (2025). European Union agro-climate policies toward sustainability: Analyzing emission trends and land use dynamics (1990–2021). *Resources, Environment and Sustainability*, 21. <https://doi.org/10.1016/j.resenv.2025.100239>
- Muhammed, I. A., Premaratne, G., Omar, N. H., & Khalid, A. M. (2025). The role of environment-related and climate adaptation technologies in sustainable energy use: a dynamic quantile regression approach. *Sustainable Futures*, 10. <https://doi.org/10.1016/j.sftr.2025.100998>
- Ning, X., An, Y., Li, H., Menadue, V., & Skitmore, M. (2025). Synergy or conflict? Identification of coordination effects in the framework of cli-

- mate adaptation and mitigation strategies. *Environmental Impact Assessment Review*, 110. <https://doi.org/10.1016/j.eiar.2024.107694>
- Nisbet, M. C., & Fahy, D. (2015). The Need for Knowledge-Based Journalism in Politicized Science Debates. *The ANNALS of the American Academy of Political and Social Science*, 658(1), 223-234. <https://doi.org/10.1177/0002716214559887>
- Nuta, F. M. (2025). The significance of climate policy stringency, environmental taxation, and public debt in addressing climate change challenges. *Journal of Environmental Management*, 392. <https://doi.org/10.1016/j.jenvman.2025.126924>
- OKA, K., PHUNG, V. L. H., HE, J., HONDA, Y., HASHIZUME, M., & HIJIOKA, Y. (2025). Future heatstroke mortality in Japan: Impacts of climate, demographic changes, and long-term heat adaptation. *Environmental Research*, 123012. <https://doi.org/10.1016/j.envres.2025.123012>
- Ou, L., & Song, M. (2025). Climate adaptation and response: Progress of research and planning strategies in China. *Sustainable Futures*, 10. <https://doi.org/10.1016/j.sftr.2025.101245>
- Parviainen, J., Hochrainer-Stigler, S., Cumiskey, L., Bharwani, S., Schweizer, P. J., Hofbauer, B., & Cubie, D. (2025). The Risk-Tandem Framework: An iterative framework for combining risk governance and knowledge co-production toward integrated disaster risk management and climate change adaptation. *International Journal of Disaster Risk Reduction*, 116. <https://doi.org/10.1016/j.ijdrr.2024.105070>
- Patonia, A. (2025). Green hydrogen and its unspoken challenges for energy justice. *Applied Energy*, 377(C), 124674. <https://doi.org/10.1016/j.apenergy.2024.124674>
- Prades, J., & De la Varga, A. (2016). Framing New Environmental Cultures for Sustainability. Communication and Sensemaking in Three Intractable Multiparty Conflicts in the EbreBiosfera, Spain. In Mauerhofer, V. (Ed.) *Legal Aspects of Sustainable Development*. Springer, Cham. https://doi.org/10.1007/978-3-319-26021-1_8
- Sagone, S., & Cellura, M. (2025). The Carbon Border Adjustment Mechanism from developing countries' perspective: a systematic literature re-

- view on challenges and opportunities for the Mediterranean basin. In *Energy Strategy Reviews* (Vol. 62). Elsevier Ltd. <https://doi.org/10.1016/j.esr.2025.101884>
- Sahay, S. (2025). Nature-based solutions as urban adaptation to climate risk: Framework for economic evaluation as decision support tool. *Sustainable Cities and Society*, 118. <https://doi.org/10.1016/j.scs.2024.106037>
- Schäfer, M. (2014). The Media in the Labs, and the Labs in the Media: What We Know about the Mediatization of Science. In Lundby, K. (Ed.), *Handbooks of Communication Science* (pp. 571-594). De Gruyter. <https://doi.org/10.1515/9783110272215.571>
- Seidu, S., Chan, D. W. M., & Kuoribo, E. (2025). Building capacity for climate change mitigation and adaptation in the construction industry: A structural equation modelling approach. *Building and Environment*, 285. <https://doi.org/10.1016/j.buildenv.2025.113598>
- Seippel, Ø. (2000). Ecological modernization as a theoretical device: strengths and weaknesses. *Journal of Environmental Policy & Planning*, 2(4), 287-302. [https://doi.org/10.1002/1522-7200\(200010/12\)2:4<287::AID-JEPP59>3.0.CO;2-V](https://doi.org/10.1002/1522-7200(200010/12)2:4<287::AID-JEPP59>3.0.CO;2-V)
- Soininen, N., Ruhl, J. B., Cosens, B., & Gunderson, L. (2025). Governing complexity: A comparative assessment of four governance models with applications to climate change mitigation and adaptation. *Environmental Innovation and Societal Transitions*, 57. <https://doi.org/10.1016/j.eist.2025.101020>
- Strömbäck, J., & Esser, F. (2014). Mediatization of politics: transforming democracies and reshaping politics. In Lundby, K. (ed.) *Mediatization of communication* (pp. 375-403). De Gruyter. <https://doi.org/10.1515/9783110272215>
- Strömbäck, J. (2008). Four Phases of Mediatization: An Analysis of the Mediatization of Politics. *The International Journal of Press/Politics*, 13(3), 228-246. <https://doi.org/10.1177/1940161208319097>
- Teng, M., Zhang, F., Gong, Z., & Park, J. H. (2025). Evaluating climate adaptation strategies for coastal resilience using multi-criteria decision-making

- ing framework. *Marine Pollution Bulletin*, 217. <https://doi.org/10.1016/j.marpolbul.2025.118060>
- Toubal, N. (2020). *Towards improved green hydrogen communication strategies in the Mediterranean: bridging north-south cooperation dynamics*. <https://south.euneighbours.eu/wp-content/uploads/2024/06/Policy-Brief-No147.pdf>
- Tuğaç, Ç. (2025). Climate change adaptation: The missing component in the local climate change action plans of Turkish metropolitan municipalities. *Urban Climate*, 61. <https://doi.org/10.1016/j.uclim.2025.102396>
- United Nations Framework Convention On Climate Change. (2016). *The Paris Agreement*. https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-
- Väliveronnen, E. (2001). Popularisers, Interpreters, Advocates, Managers and Critics. *Nordicom Review*, 22(2), 39-47. <https://doi.org/10.1515/nor-2017-0353>
- Vallejos-Romero, A., Cordoves-Sánchez, M., Cisternas, C., Sáez-Ardura, F., Rodríguez, I., Aledo, A., Boso, Á., Prades, J., & Álvarez, B. (2023). Green Hydrogen and Social Sciences: Issues, Problems, and Future Challenges. *Sustainability*, 15(1), 303. <https://doi.org/10.3390/su15010303>
- Van Witsen, A., & Takahashi, B. (2018). Knowledge-based Journalism in Science and Environmental Reporting: Opportunities and Obstacles, *Environmental Communication*, 12(6), 717-730. <https://doi.org/10.1080/17524032.2018.1455723>
- Wang, Q., Zhang, X., Bai, J., Wu, J., & Chang, I. S. (2025). Practice of the integration of climate change considerations into environmental impact assessment for policy in China. *Environmental Impact Assessment Review*, 115. <https://doi.org/10.1016/j.eiar.2025.108011>
- Weingart, P., & Joubert, M. (2019). The conflation of motives of science communication — causes, consequences, remedies, *JCOM* 18(03), Y01. <https://doi.org/10.22323/2.18030401>
- WMO. (2024). *GFCS*. <https://gfcs.wmo.int/site/global-framework-climate-services-gfcs>

- Wonneberger, A., & Vliegthart, R. (2021). Agenda-Setting Effects on Climate Change Litigation: Interrelations Across Issue Levels, Media, and Politics in the Case of Urgenda Against the Dutch Government. *Environmental Communication*, 15(5), 699–714. <https://doi.org/10.1080/17524032.2021.1889633>
- Wonneberger, A. (2024). Climate change litigation in the news: litigation as public campaigning tool to legitimize climate-related responsibilities and solutions. *Social Movement Studies*, 23(1), 94–112. <https://doi.org/10.1080/14742837.2023.2270919>
- Xiao, Z., Tian, Z., Chen, T., Ouyang, C., Zhou, Y., Heng, C. K., & Lucchi, E. (2025). Sustainable adaptation of heritage buildings in tropical rainforest climates: The innovative practice of Tanjong Pagar Railway Station in Singapore. *Energy and Buildings*, 335. <https://doi.org/10.1016/j.enbuild.2025.115560>
- Xu, J., Cai, D., & Zhu, J. (2025). Navigating the green wave: Urban climate adaptation and firms' investment decisions-evidence from China. *Energy Economics*, 141. <https://doi.org/10.1016/j.eneco.2024.108087>
- Zhang, H., Liu, J., Guo, Q., Zhang, X., & Hu, X. (2025). The impact of climate policy uncertainty on urban climate risk: Evidence from 274 cities in China. *Sustainable Cities and Society*, 119. <https://doi.org/10.1016/j.scs.2024.106097>
- Zhang, X., Deng, G., Chen, L., & Abbass, K. (2025). Sustainable development and climate action: The role of tax policy and innovation. *Journal of Environmental Management*, 389. <https://doi.org/10.1016/j.jenvman.2025.126091>
- Zhao, L., Liu, Z., Xie, C., & Chen, X. (Michael). (2025). Climate policy uncertainty and corporate carbon performance: Evidence from transportation enterprises. *Journal of Environmental Management*, 390. <https://doi.org/10.1016/j.jenvman.2025.126346>
- Zografos, C., & Martínez-Alier, J. (2009). The Politics of Landscape Value: A Case Study of Wind Farm Conflict in Rural Catalonia. *Environment and Planning A: Economy and Space*, 41(7), 1726–1744. <https://doi.org/10.1068/a41208>

Part 2

ENVIRONMENTAL AND CLIMATE LAW GOVERNANCE

General overview

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Climate change and its disruptive effects have been extensively studied and documented by universities and research institutions worldwide, as well as by international scientific bodies such as the Intergovernmental Panel on Climate Change (IPCC), which provides the scientific basis for international climate action under the auspices of the United Nations. The growing body of scientific evidence on climate change has prompted the international community and individual States to adopt increasingly specific and far-reaching measures aimed at reducing greenhouse gas emissions from industrial installations and other human activities that contribute to global warming.

In response to the challenges posed by the climate emergency, a comprehensive and multilevel political strategy has gradually been developed and implemented. This process has nevertheless proved highly complex from both a political and legal perspective, requiring successive phases of international negotiation, policy coordination, and regulatory development.

The need to address the rise in global temperatures caused by increasing concentrations of greenhouse gases in the atmosphere has fostered a progressive coordination of national environmental and climate policies at the international level. This process has developed along three main lines of action which, taken together, contribute to the emergence of an integrated and multilevel system of climate governance.

At the international level, climate objectives, implementation timelines, and the main measures required to achieve them are defined primarily through international agreements. From the 1992 United Nations Framework Convention on Climate Change to the 2015 Paris Agreement, the international climate regime has progressively established a common framework for action and de-

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fined the commitments undertaken by States within an increasingly structured system of global climate governance.

Within the European context, the European Union has played a particularly significant role in strengthening governmental commitments to combating climate change and in establishing increasingly ambitious intermediate targets. At the same time, climate change mitigation has been incorporated into a broader strategy aimed at the ecological transformation of the European economy and society.

Finally, States – and, to an even greater extent, Member States of the European Union – are required to exercise their regulatory and supervisory powers over economic activities by adopting the legislative and administrative instruments necessary to achieve climate objectives defined at the international and supranational levels. Such measures are intended to improve environmental quality and reduce emissions from industrial installations, residential and public buildings, agricultural activities, and the transport sector, all of which contribute to changes in the Earth's climate system.

Against this background, it may be argued that a form of “global climate law” has emerged which, in a certain sense, represents one of the most advanced and developed expressions of environmental law. It constitutes a complex legal framework comprising emission-reduction targets, guiding principles, and regulatory models designed to shape implementation at the national level. This framework increasingly constrains and directs State discretion and operates through a system of multilevel climate governance responsible for monitoring the overall state of the climate and periodically updating national commitments, under the coordination of the United Nations and within regional supranational organisations such as the European Union.

It should also be stressed that legal obligations relating to climate protection do not concern public authorities alone. National and transnational companies are increasingly called upon to integrate environmental and climate sustainability requirements into their economic activities, in accordance with the obligations and regulatory frameworks applicable to them.

At the same time, “global climate law” is characterised by a particularly controversial feature arising from its international foundations. The international climate regime does not provide for a fully developed system of enforcement capable of effectively addressing delays or failures by States to comply with their climate commitments. It is precisely within this context that climate litigation has emerged and progressively expanded, partly as a response to the perceived limitations and shortcomings of climate policies.

Moreover, participation in international climate agreements and the degree of commitment to their implementation may be affected by changes in the political and ideological orientation of national governments, as the experience of the United States of America has demonstrated. The withdrawal or disengagement of States responsible for a significant share of global greenhouse gas emissions may therefore weaken the overall effectiveness of international efforts to combat climate change.

Nevertheless, where regional supranational legal systems such as the European Union are in place, additional political and legal mechanisms may strengthen the implementation of climate obligations. In the EU legal order, the European Commission's supervisory powers and the judicial review exercised by the Court of Justice of the European Union provide significant mechanisms for overseeing Member States' compliance with the obligations arising from Union climate law.

International climate change governance: a legal perspective

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SUMMARY: I. Introduction. II. Mapping international climate change governance from a legal perspective. *II.1 International law and international climate change governance. II.2 The areas of international climate change governance.* III. Global institutions of international climate change governance and law-making. *III.1. The Conference of the Parties: Law-making under the climate treaties. III.2. UNEP* IV. Toward Judicial Climate Governance: Courts as Catalysts in the Enforcement of Climate Obligations. *IV.1. Courts as Climate Regulators: From Gap-Filling to Norm-Making. IV.2. Global Trends in Judicial Climate Governance.* V. Linkages and fragmentation. *V.1. Linkages and fragmentation Problems that international law face. V.2 Trade and Investment.* VI. Conclusions. Bibliography.

I. Introduction

The idea of an ‘international governance’ dedicated to climate change might evoke the image of a comprehensive and coherent institutional and regulatory machinery that deals with this fundamental challenge and crisis of our times. Instead, after more than thirty years since the adoption of the first climate-related treaty, this issue area of governance has evolved and expanded in fragmented and, at times, contradictory ways.

International climate change governance is, at its core, a legal problem. Regulating human activities to address the causes and consequences of anthropogenic climate change requires coordinating the behaviour of sovereign states, mobilising international institutions, and managing the interactions between a

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growing number of legal regimes that intersect with the international climate change regime in different manners. Law provides the language, structures, and mechanisms through which this coordination is attempted. Understanding international climate change governance from a legal perspective therefore means examining not only the treaties, institutions, and principles that compose the climate regime proper, but also the broader legal landscape in which that regime operates and to which it is increasingly connected.

This chapter examines international climate change governance from that legal perspective. It does so through four main sections, each addressing a distinct but interrelated dimension of the topic. The first section maps the legal and institutional landscape of international climate change governance, tracing the role of international law, the key areas of regulatory activity under the climate regime, including mitigation, adaptation, finance, loss and damage, and transparency. It includes, also, the growing importance of judicial activity as an emerging area of governance. The second section focuses on two central institutional actors in international climate change governance: the Conference of the Parties (COP) as the principal law-making body under the climate treaties, and the United Nations Environment Programme (UNEP) with its governing body, the UN Environment Assembly, as a broader coordinating and normative force in global environmental governance. The third section analyses the rise of judicial climate governance, examining how national and international courts and tribunals have become increasingly central actors in interpreting and enforcing climate obligations, with particular attention to landmark cases and the emergence of new legal doctrines in climate litigation. The final section turns to the problem of fragmentation and linkages, exploring how international climate change governance intersects with other areas of international regulation, notably international trade and investment law, and with questions of human mobility and displacement, including the situation of climate refugees.

Two overarching themes run through the chapter. The first is fragmentation. International climate change governance does not take place within a single, coherent legal order. Rather, it unfolds across a multiplicity of regimes, institutions, and actors that are formally independent but materially interrelated. The absence of a central authority capable of resolving conflicts between norms and institutions means that fragmentation is not merely a descriptive feature of the landscape, but a structural challenge for the governance itself. The second theme is transformation. The legal architecture of international climate change governance has been undergoing significant change. The Paris Agreement has reoriented the climate regime around a system of nationally determined contributions, transpar-

ency obligations, and collective stocktaking. International courts and tribunals, from the International Court of Justice to the European Court of Human Rights, have begun to clarify and in some cases expand the legal obligations of states in respect of climate change. And growing pressures from civil society, Indigenous peoples, and climate-vulnerable communities are reshaping the normative expectations that surround the regime from within and from without.

Together, these themes suggest that international climate change governance is best understood not as a settled system, but as an evolving field of law and practice in which the stakes for current and future generations, for the global climate system, and for the rule of law in international affairs could not be higher.

II. Mapping international climate change governance from a legal perspective

This section aim is to present an overview of the climate change governance from a legal perspective. In that sense, the first section develops the main institutions regarding this governance in order to present, in the following section, the main areas of the climate change governance within the international law framework.

II.1 International law and international climate change governance

When discussing international climate change governance, legal scholars often refer to the various legal regimes and institutions that are active in regulating aspects of state activities and coordination on climate change (Bodansky et al., 2017; Carlarne et al., 2016; Mayer, 2018; Yamin & Depledge, 2004). Usually, the very term ‘international governance’ indicates realities where law- and decision-making, regulation, as well as processes of accountability, adjudication and even enforcement happen ‘beyond the state’ and its jurisdictional boundaries (Birnie et al., 2009, pp. 43–48; Klabbers & Piiparinen, 2013). Regulating human activities to deal with climate change is inherently linked with the question of its international governance, since the cause of recent anthropogenic global heating lies in the permanence in the atmosphere of greenhouse gas (GHG) particles coming from a wide range of industrial activities, in particular from farming regarding methane production, and thus the production, movement and consumption of goods and services around the world (IPCC WGIII AR6).

As a collective action problem (Ostrom, 2010) and a unique challenge for societies, the climate crisis to be ‘governed’ is characterised by historical responsibilities, inequalities, urgency, and the need for a long-term institutional structure to ‘manage’ our global thermostat (Wainwright & Mann, 2018, p. 129).

Under an international legal lens, the international governance of climate change can be intended as an exercise of coordination among states as sovereign entities which have jurisdiction over the polluting activities carried on in their own territories. Thus, the solutions and approaches to the question of governance are based on the means that public international law can offer, as the only valid legal system ‘beyond the state’ that would formally apply. As governance is essentially about exercising disparate forms of authority (Roughan, 2013), international law is key in shaping its structures and directing approaches. It does so with its legal sources (treaties, customary international and general principles) and international organisations and institutions (Bogdandy et al., 2010; Klabbers, 2009; Schermers & Blokker, 2018). The latter are the quintessential entities of international climate change governance: as the quest to reduce collective GHG emissions and adapt to climate adversities requires inter-state coordination, states have created independent entities with certain climate-related functions. This has mainly happened under what is often referred to as the ‘international climate change regime’, that is the institutional and regulatory regime under the UN Framework Convention on Climate Change, the Kyoto Protocol and the Paris Agreement. Its *international* character comes from the fact that such regime is created and governed by states; the term *regime* defines that its norms do not only stem from the treaty rules, but also from the conspicuous number of decisions and other legal instruments adopted by the treaties’ supreme bodies called Conference of the Parties (Churchill & Ulfstein, 2000). Notably, these instruments are *not* international legal sources *per se*, and thus there are different theories about how these formally ‘non-legal’ instruments at times gain a *de facto* legal significance in practice (Boyle & Chinkin, 2007, pp. 210–220).

Regardless of the legal nature of international regimes, the question of organising an international governance for climate change cannot be resolved by the international climate change regime only. The core reason is that anthropogenic climate change comes from activities that are also directly or indirectly regulated by other entities and regimes at the international level (van Asselt & Zelli, 2018). International trade is a good example. Despite the recent backlash, since after WWII, international law has essentially promoted the liberalisation of trade among states, especially after the creation of the World Trade Organiza-

tion in 1994. The various rules that limit or exclude the possibility for states to adopt restrictive trade measures to the entrance or exit of goods from their own domestic markets have contributed to the production and circulation of goods around the world under growing consumption demands. Notably, this phenomenon is a core cause of GHG emissions and appears to go against the aims of the international climate change regime (IPCC WGIII). At the same time, however, renewable energy products also circulate more easily across countries as well due to the same rules, and they could do this even more with the elimination of further trade barriers on environmental products (Gehring & Morison, 2024, p. 60). This simplified example illustrates how other international regimes *interact with* and are *linked to* the international climate change regime. The issue of regime linkages is an extremely important feature of international climate change governance, and it is difficult to deal with because of the absence of a central authority that would solve the possible conflicts and tensions between the norms and institutions of regimes (Pulkowski, 2014).

The institutional landscape of international climate change governance is also not confined to international organizations and institutions with regulatory and administrative functions such as the Conferences of the Parties (COP) of the climate treaties or UN agencies like the UN Environmental Programme (UNEP). Especially over the last decade, also international judicial bodies have entered the field of governance by clarifying the rules related to climate change. As to be seen below, the decisions of human rights courts, bodies, and the recent advisory opinions by the International Tribunal for the Law of the Sea, the Inter-American Court of Human Rights, and —most notably—the International Court of Justice, are offering significant clarifications on States' obligations concerning the protection of the climate system and human rights. Other types of international institutions also participate in this complex governance landscape. For instance, the Intergovernmental Panel on Climate Change has covered a crucial function for decades in clarifying the state-of-the-art in climate science, indicate potential policy pathways for the future, and even setting GHG accounting standards (Ghaleigh, 2016). Multilateral development banks and other specialized international entities like the Green Climate Fund or the Global Environment Facility (GEF) work as catalysts of international finance transfers from developed to developing countries to implement climate-related projects according to treaty obligations (Rossati & Zahar, 2024).

This broad brush in depicting the institutional landscape of climate governance could give the idea of a spontaneous but somewhat coherent form of cooperation among international institutions in the absence of a central author-

ity apportioning different competences and functions. Yet this is not so. International climate change governance is as messy and fragmented affair it tries to deal with (Biermann et al., 2009) because it reflects the struggle to identify and implement meaningful solutions to the climate crisis. What is more, there are also international institutions which willingly or *de facto* seem to obstruct States' climate action with their idleness, or by actively disregarding and overlooking the climate-related impacts of their activities. A notable critique here goes to the international legal regime of investor-state dispute settlement, which has so far been *de facto* working as a tool for fossil fuel corporations to shield their polluting businesses against current and potential climate-related policies from host States (Tienhaara, 2018). By exercising their own judicial function, international investment tribunals with their varied approach to taking into account environmental considerations in their awards, have somehow gone counter the emerging and growing realities of climate litigation.

A final element to consider for this brief outline of legal and institutional landscape of *international* climate change governance is that the map becomes even more complex once the interactions between international, national and sub-national entities, as well as between public and private entities, are included in the picture (Abbott, 2012). For instance, global industry organisations often develop their own technical standards to mitigate climate change; non-profit organisations have developed methodologies to account for and certify GHG emission reductions from projects in the form of offset credits. It would be difficult not to include these realities in the picture of global climate governance, since they do have significant and material effects in dealing with the problem. Here the concept (and related practices) of transnational law and governance become relevant. At its core, the idea of transnational law works less as a theory of law, and more as a descriptive framework of legal practices that address "universal" issues across humanity. As Phillip C. Jessup, the father of the concept, put it: "[t]ransnational law [...] includes both civil and criminal aspects, it includes what we know as public and private international law, and it includes national law, both public and private." (Philip C. Jessup, 1956, p. 106). Natasha Affolder (Affolder, 2021) extends this notion to the dynamic field of climate law by showing three properties of a transnational approach. First, she shows how principles and structures developed under international climate change law 'migrate' from their systemic boundaries into the discourses and practices of non-state actors, such as the climate activism movement. This migration also manifests in the transboundary effects of national climate regulations. The second property pertains to the different legal sources and instruments, which

interact and apply in the context of material activities that promote mitigation, such as offset carbon projects under the treaties. Finally, a transnational legal lens is also able to reveal the assumptions and limitations of the Western-based legal approach in dealing with such a global problem. The one by Affolder is an initial attempt at demarcating a role for law in the realm of transnational climate governance and it is not the only one. For instance, Laura Mai also relies on the pragmatism of Jessup's notion of transnational law to support new and adapting legal practices emerging from a process of 'defamiliarisation' with the more established structures of international and national laws (Mai, 2020).

II.2 The areas of international climate change governance

While the previous section sketched the legal and institutional landscape of international climate change governance, another important lens sees the question of 'governing' climate change in policy areas as they have been first identified under the international climate change regime. The issue is that throughout the years these areas have developed as sub-fields of international governance with their own principles, obligations and institutional fields. Thus, it is worth offering an outline of their aims and core aspects related to governance.

a) Mitigation

Given the nature of anthropogenic climate change, the first and primary area of climate governance is the one of mitigation, defined by the IPCC as "a human intervention to reduce emissions or enhance the sinks of greenhouse gases" (IPCC 2026). Mitigation is also the core regulatory aim of the international climate change regime: the UN Framework Convention on Climate Change, the Kyoto Protocol and the Paris Agreement, have all dealt in different ways with the question of 'governing' a coordinated form of inter-State action on mitigation. Most climate law scholars distinguish between a top-down and a bottom-up approach to the legal nature and approach to the matter. For instance, Bodansky deems the binding mitigation targets that each State had under the Kyoto Protocol as a top-down approach, while the Paris Agreement with its collective process of ambition in mitigation based non-legally binding targets resembles more a bottom-up approach, since every State can set an ambitious goal for itself hoping that collective trust and ambition would raise the stakes in action and implementation (Bodansky, 2016). Note that this distinction is not entirely clear and might not be that useful: as Joanne Depledge noted,

the Kyoto Protocol was never really a top-down treaty. In fact, there was no central authority that determined how much each country Party had to reduce its emissions, and the binding emission targets were negotiated and agreed in a rather chaotic way, instead of relying on science-based or somewhat objective criteria (Depledge, 2022). Overall, as Alexander Zahar (Zahar, 2018) puts it, the core legal question of international mitigation governance under a legal lens is determining the specific burden sharing of each country in light of the ‘polluter pays’ principle which has some relevance under international environmental law. Countries are elusive on this question, since the identification of an individual sharing would demand the implementation of radical environmental policies. The governance question of mitigation is also crucially linked to the one of transparency and compliance below.

b) Adaptation

Since the inception of the international climate change regime with the UNFCCC, adaptation has worked as the second pillar aside the issue of mitigation (UNFCCC 1992, art. 4(1)(b)). This issue area is intrinsically related with the branch of climate science dealing with the projected impacts and risks from anthropogenic climate, which understandably spans across other physical, biological and societal systems. Adaptation as an issue area of governance has mostly to do with human systems and concentrates on the capacity of planning in the context of ‘iterative risk management’ (Pörtner, H.-O et al 2022, p.43). As defined by the IPCC Sixth report, adaptation is “the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities” (Pörtner, H.-O et al 2022, p.43). This area of international climate governance has developed under the climate treaties mainly through transparency processes, such as the development of National Adaptation Plans and Adaption Communications, as well as an area of financial support for developing and least developed countries. The Paris Agreement lists adaptation as a key area of action to achieve its aim of strengthening the global response to climate change (Paris Agreement 2015, art 2(b)), and requires countries to ‘engage in adaptation planning processes and the implementation of actions’ (Paris Agreement 2015, art 7(9)). However, these and other treaty provisions related to adaptation have either a general or nugatory character, and adaptation-related governance under the climate treaties does not go beyond transparency and ‘soft review’ processes, including through the collective Global Stocktake under the Paris Agreement (art 14). Adaptation governance not only interacts with mitigation, but also with Disa-

ster Risk Reduction as another emerging international governance framework outside the climate treaties, which nonetheless requires countries to reduce climate change-related disaster risk (Luporini, 2025, p. 36).

Overall, adaptation is hardly a discrete area of regulation like mitigation is (Mayer, 2021). This is mainly because the reach of adaptation activities is as broad as the range of climate impacts, and that these are dealt with under the law by mainstreaming adaptation considerations in the already established areas of the law that deal with impacted activities (Verschuuren, 2013). For instance, there is no uniform adaptation law of construction for climate resilient buildings, but construction law is increasingly taking in consideration climate impacts when setting standards for new and existing buildings (Hirokawa & Pohrib, 2013).

c) Finance, technology transfer and capacity building

Finance has been a core pillar of international climate governance since the UNFCCC, which establishes that developed country Parties must provide financial resources to developing countries to support both mitigation and adaptation (UNFCCC 1992, arts 4(3)–(5)). This commitment was later operationalized through a dedicated financial mechanism under the Convention and a range of institutions, including the GEF, the Adaptation Fund under the Kyoto Protocol, and the Green Climate Fund. The Paris Agreement reaffirms that “developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation” (art 9(1)) and calls for a “progression” in support over time (art 9(3)). In this regard, the International Court of Justice (ICJ) in its Advisory Opinion (AO) on State obligations on climate change has clarified how such treaty provisions on finance consist of obligations reflecting the duty of co-operation among States to protect the common environment (ICJ AO, para 261).

Throughout more than thirty years of regulation and implementation, international climate finance governance has evolved as a field concerned with mobilising and tracking flows of public and private finance, setting principles for access and allocation (such as country ownership, direct access and balanced support between mitigation and adaptation), and reviewing the adequacy and predictability of contributions (Rossati & Zahar, 2024). A central objective has been the long-standing collective goal that developed countries mobilise USD 100 billion annually, originally set in 2009, later embedded in COP decisions, and now succeeded by negotiations on a ‘new collective quantified goal’ under the Paris Agreement (UNFCCC 2026) which has raised to 300 USD billion a year as a floor —still well below the

estimated needs of recipient countries. Yet, treaty obligations remain largely procedural and collective, and the regime lacks binding burden-sharing rules for individual contributors. As a result, climate finance governance relies heavily on transparency arrangements, such as the Biennial Transparency Reports and the multilateral consideration of progress (Paris Agreement, arts 9(7) and 13(11)), and on complex institutional landscape, made of multilateral trust funds, multilateral development banks, and a wide number of international and national ‘implementing agencies’ that can access such funds to finance their own mitigation and adaptation projects (Rossati & Zahar, 2024). In this sense, the regulatory activities of the GCF Board and the COP’s finance agenda operate as hybrid intergovernmental–technical arenas shaping priorities and norms for global climate finance.

Another field of cooperation strictly linked with finance is technology transfer and capacity building, which have been present as treaty commitments since the UNFCCC but have not generated a similarly elaborate governance architecture. The Convention requires developed countries to promote and facilitate the transfer of environmentally sound technologies and to support capacity-building in developing countries (UNFCCC 1992, arts 4(3), 4(5) and 4(7)). These commitments were reiterated in the Paris Agreement, which establishes a Technology Framework and a Technology Mechanism—comprising the Technology Executive Committee and the Climate Technology Centre and Network—tasked with providing guidance, knowledge-sharing, and technical assistance rather than binding rules or structured allocation mechanisms (Paris Agreement 2015, art 10). Capacity-building is similarly governed through soft processes, such as the Paris Committee on Capacity-building and the Capacity-building Initiative for Transparency, which focus on coordination, needs assessments, and facilitation. Compared to climate finance, however, both technology transfer and capacity building lack robust collective obligations, quantifiable targets, or strong oversight mechanisms, and implementation relies largely on voluntary support, technical cooperation, and integration into project-based finance under multilateral climate funds.

d) Loss and Damage

Loss and Damage has emerged only gradually as a distinct area of international climate governance, despite its early conceptual presence in the climate regime. Although the UNFCCC recognised the particular vulnerabilities of developing countries (UNFCCC 1992, art 4(8)), the issue did not develop institutional contours until the establishment of the Warsaw International Me-

chanism for Loss and Damage (WIM) in 2013, tasked with enhancing understanding, coordination, and support related to climate impacts that would generally exceed the limits of adaptation (UNFCCC 2014). Despite that the conceptual boundary between Loss and Damage, adaptation and finance are not entirely clear, the Paris Agreement elevated Loss and Damage by dedicating a stand-alone provision to it (art 8). The accompanying COP decision also clarified that it “does not involve or provide a basis for liability or compensation” (UNFCCC 2016), which has significantly constrained its normative development (Mace & Verheyen, 2016). As a field of governance, Loss and Damage thus remained for several years primarily a soft regime centred on technical workstreams under the WIM and its Executive Committee.

More recently, however, political momentum and pressure from vulnerable countries have expanded this governance space. The decisions adopted at COP27 and COP28 created new “funding arrangements” and established the Loss and Damage Fund as part of a broader set of institutions intended to channel resources to countries already suffering severe climate impacts (UNFCCC 2023a and UNFCCC 2023b para 87). While still in its early stages, this institutionalisation marks a significant shift toward more structured international cooperation on Loss and Damage, with new avenues for resource mobilisation, coordination, and strategic planning. Yet the contours of this area remain fluid: neither the WIM nor the new Fund constitute a reparations framework (ICJ AO, paras 414–415) nor treaty provisions impose liability or compensation duties on particular countries. Instead, Loss and Damage governance currently sits at the intersection of solidarity-based cooperation, technical support, and emerging financial, an evolving field whose normative and institutional boundaries remain open to future negotiation, contestation or –as it has happened in other areas of international governance– even inaction.

e) Transparency and compliance

Transparency and compliance processes have long been recognised as essential components of international environmental governance, and climate change is no exception. Influential theories such as the managerial school (Chayes & Chayes, 1993) and later interactional approaches (Brunnée & Toope, 2010) have shaped this field and helped understanding transparency as a key instrument for guiding and coordinating state behaviour in multilateral settings. Within these accounts, transparency is supposed to work as both a catalyst for cooperation and a means of generating a ‘compliance pull’ (Rouxel, 2020), while also distributing epistemic authority over how legal norms are generated,

interpreted and applied. Reflecting these intellectual foundations, the climate regime has progressively developed transparency and compliance governance structures that aim less at enforcement and more at enabling collective learning, reassurance against ‘free riders’, and peer pressure. Overall, as international climate governance is built on its core on State consent, and enforcement mechanisms depends on it, as States are unwilling to commit to binding targets and ambitious standards, transparency and compliance are regarded as the main tools to achieve international cooperation on collective action problems, such as protecting the climate system.

Under the Paris Agreement, this governance area has taken an especially prominent form (Doelle, 2016) as the whole treaty is built on the ‘spirit’ of collective cooperation (Rajamani & Brunnée, 2017) and scaled up ambition (Duvic-Paoli, 2023). The Enhanced Transparency Framework (ETF), applicable to all Parties but with flexibility for developing countries, requires regular national reports on greenhouse gas inventories, progress toward NDCs, adaptation actions, and finance provided and received (Paris Agreement 2015, art 13;(Mayer, 2019). These data and information feed into a multilateral consideration of progress and ultimately into the Global Stocktake under Article 14, which evaluates collective efforts toward achieving the Agreement’s long-term goals. Compliance, in turn, is addressed through a facilitative, non-adversarial mechanism: the Implementation and Compliance Committee established under Article 15, which prioritises dialogue, technical advice, and problem-solving, and cannot adopt legal consequences from repeated or systemic instances of non-compliance (UNFCCC 2021). As such, transparency and compliance constitute a distinctive area of international climate governance centred on information, peer processes, and normative expectations. Its effectiveness ultimately depends on whether these soft mechanisms can meaningfully steer national behaviour over time and much depend on the way State efforts are actually accounted for, since the regulations on accounting reporting on mitigation and finance leave discretion on States on how set their own goals and report on them (Rouxel, 2020).

f) Climate-related international judicial activity

Another area of emerging importance for international climate change governance is the one brought forward by international courts and tribunals. Despite working on the principle of State consent, and thus, on different premises than those of domestic legal systems, the international judicial function has raised into prominence over the last decades, with prominent decisions of regional human rights courts, as well as the influential advisory opinions of regional and

global international courts, such as the International Court of Justice and the International Tribunal of the Law of the Sea. While section III below will cover further this growing legal phenomenon, suffice here to remark that the role of the judicial function in international climate governance goes beyond the one of adjudicating inter-state disputes based on State responsibility claims for harm caused to the climate system or to injured States (ICJ AO 2025) or on human rights claims. Indeed, as the recent non-legally binding advisory opinions of three international courts show, their judicial statements can serve as the basis for future domestic court cases against States and big polluter corporations (ICJ AO 2025, International Tribunal for the Law of the Sea (ITLOS) AO and Inter-American Court of Human Rights (IACtHR) AO). Moreover, they work as crucial fora for shaping global public consciousness about climate change, including by ascertaining the complex factual realities as based on the latest available science (Sands, 2016).

III. Global institutions of international climate change governance and law-making

This section introduces two central institutions active in coordinating and law-making on international climate change governance. They are the Conference of the Parties of the climate treaties and the UNEP, respectively. While the first has a unique mandate to manage the implementation of the climate treaties, UNEP has a broader mandate over the environment under the UN framework.

III.1. The Conference of the Parties: Law-making under the climate treaties

Following the institutional model of other multilateral environmental treaties, the UNFCCC established in 1992 a Conference of the Parties as the ‘supreme body’ under the Convention (UNFCCC, art 7). The Kyoto Protocol and the Paris Agreement each established their own supreme bodies following the same institutional model, though with distinct names and compositions that reflect the respective membership of their Parties. The body serving under the Kyoto Protocol is the Conference of the Parties serving as the Meeting of the Parties (CMP), while the Paris Agreement is overseen by the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA).

What is commonly referred to as the annual ‘COP’ therefore encompasses several parallel meetings convened simultaneously under the same institutional umbrella. COP membership follows the logic of sovereign equality under public international law: each State Party holds one seat, and the meetings are formally convened once per year, typically towards the end of the calendar year. What began as a relatively contained diplomatic gathering has expanded dramatically over the decades, to the point where the COP has become one of the most-attended international conferences in the world. COP28, held in Dubai in 2023, set a record with approximately 85,000 participants, including over 150 Heads of State and Government, as well as negotiators, technical experts, civil society representatives, and business actors (UNFCCC, 2023).

In governance terms, the general function of the COP is to “keep under regular review the implementation of the Convention and any related legal instruments that the Conference of the Parties may adopt, and shall make, within its mandate, the decisions necessary to promote the effective implementation of the Convention” (UNFCCC, art. 7(2)). The decisions adopted at the conclusion of each COP meeting accordingly constitute the central legal output of the climate regime. The legal nature of COP decisions has attracted considerable scholarly attention (Brunnée, 2002; Churchill & Ulfstein, 2000), not least because they do not qualify as formal sources of international law within the meaning of Article 38 of the Statute of the International Court of Justice, and thus do not produce direct legal effects on States as a matter of principle. However, this formal characterisation does not fully capture their normative significance in practice. As the ICJ clarified in its Advisory Opinion on obligations of States in respect of climate change, COP decisions may constitute ‘subsequent agreements’ or ‘subsequent practice’ within the meaning of Article 31(3) of the Vienna Convention on the Law of Treaties, and thereby bear directly on the interpretation of treaty provisions (ICJ AO, para 184). This is one reason why the precise wording of each decision is the object of intense diplomatic negotiation. Beyond interpretive effects, certain COP decisions may also carry more direct legal consequences where treaty provisions expressly delegate regulatory authority to the COP. A clear example is the Enhanced Transparency Framework under the Paris Agreement, whose detailed modalities, procedures, and guidelines were adopted by the CMA and now govern the reporting and review obligations of all Parties (UNFCCC, 2021).

Decisions at the COP are taken by consensus. Under international law, consensus takes several forms but can be generally understood as the absence of a formal objection at the moment of decision’s adoption (Sabel, 2006, p. 336). In practice, however, the history of COPs records several instances in which the pre-

siding COP President declared a decision adopted despite explicit objections from one or more delegations at the final plenary. The pressure to preserve agreements reached after prolonged and often exhausting negotiations creates strong institutional incentives not to allow a strict minority to defeat an outcome accepted by many others. Yet this practice introduces a degree of legal uncertainty around the validity and legitimacy of affected decisions, and such questions do not disappear once the conference has closed. Their long-term effects on the credibility and authority of the COP as a law-making forum deserve close scrutiny.

Finally, the governance role of the COP cannot be understood solely within its formal legal contours. COP meetings have become forums of massive participation by non-State actors, ranging from civil society organisations and indigenous peoples' groups to private sector representatives. The UNFCCC Secretariat, the administrative body supporting the COP, has actively 'orchestrated' this participation over the years (Abbott, 2015; Asselt, 2016), enabling non-State actors to submit technical input to negotiating bodies and to organise 'side-events' that have themselves become influential arenas for norm entrepreneurship and informal agenda-setting. Viewed in this light, the COP sits at the intersection of a formal intergovernmental treaty body and a wider transnational authority for global climate coordination. Yet the celebrated openness of the COP process also has its limits. The fact that several recent COPs have been hosted by States whose economies remain deeply dependent on fossil fuels, and that the fossil fuel industry has consistently sent some of the largest observer delegations to the negotiations, raises serious questions about whether institutional openness alone can serve the democratic aspirations that some theories of global governance attribute to it (Higham et al., 2024).

III.2. UNEP

In the evolving architecture of international climate governance, the United Nations Environment Programme (UNEP) plays a critical yet often underrecognized role. While it does not serve as the central negotiating forum for climate treaties—such as the UNFCCC—UNEP functions as a catalyst, scientific authority, and policy facilitator, helping shape the climate agenda through its expertise in knowledge production, technical support, and norm promotion. This positions UNEP at the heart of a shift away from a strictly state-centric, negotiation-heavy model toward a more integrated, science-informed, and justice-oriented global framework (Knox, 2020).

A key institutional mechanism through which UNEP exerts its influence is the United Nations Environment Assembly (UNEA), its highest decision-making body and the world's most inclusive multilateral forum on environmental matters. UNEA meets biennially and brings together all 193 UN Member States, as well as observers from civil society, science, and the private sector. Through this forum, UNEP's agenda is both guided and amplified, transforming it into a more politically visible and normatively robust actor in climate governance.

During its sixth session (UNEA-6), held in February–March 2024, UNEA adopted 15 resolutions and one Ministerial Declaration focused on advancing synergies between climate action, biodiversity protection, and pollution reduction (UNEP, 2024a). These resolutions, while not legally binding, are significant as soft law instruments: they shape international expectations, influence national policy directions, and help institutionalize emerging norms in environmental law (Desai, 2023). In this sense, UNEA functions as a norm-setting assembly, driving what some scholars refer to as the juridification of global environmental governance (Bodansky, 2016).

UNEP's most visible and influential contributions to climate governance arise from its role in knowledge and scientific production. As the co-founder of the Intergovernmental Panel on Climate Change (IPCC), alongside the World Meteorological Organization, UNEP has been central to building the scientific consensus that underpins the international climate regime. Since its establishment in 1988, the IPCC has provided authoritative assessments that inform both national policymaking and international negotiations (Bodansky, 2016).

Complementing this, UNEP publishes annual flagship reports, including the Emissions Gap Report and the Adaptation Gap Report, which track discrepancies between current trajectories and climate goals under the Paris Agreement. These reports serve as accountability tools for the global community, helping expose implementation gaps and highlight areas for urgent intervention (UNEP, 2023a).

Moreover, UNEP works with institutions such as the UNFCCC, UNDP, and the GEF, creating synergies across climate, development, and environmental protection agendas. This multilateral coordination helps reinforce UNEA's policy frameworks with operational follow-through on the ground.

UNEP also plays a pivotal role in supporting climate action at the national level, especially in the Global South. Through programs like the UNEP Copenhagen Climate Centre (formerly UNEP DTU Partnership), it provides technical assistance in the development and implementation of Nationally Determined Contributions (NDCs), climate modelling, and access to climate finance (UNEP DTU, 2022). UNEP further coordinates partnerships such as

the Climate and Clean Air Coalition (CCAC), targeting short-lived climate pollutants like methane and black carbon, whose reduction offers immediate climate and health co-benefits.

UNEP and UNEA have also been instrumental in advancing a rights-based approach to climate governance. UNEP supported the adoption of UN Human Rights Council Resolution 48/13 (2021) and UN General Assembly Resolution 76/300 (2022), which recognized the human right to a clean, healthy, and sustainable environment. At UNEA, this shift has been mirrored by increasing references to intergenerational equity, indigenous rights, and environmental justice in its resolutions and political declarations (UNEP, 2022).

In line with this, UNEP has aligned itself with global trends in climate litigation and the environmental rule of law, emphasizing that the climate crisis is no longer merely a scientific or economic problem, but a profound human rights challenge (Setzer & Vanhala, 2019; Knox, 2020). UNEA acts as a platform where these legal narratives gain traction, amplifying their impact across the UN system and national jurisdictions.

UNEP's Medium-Term Strategy (2026–2029) emphasizes the interconnectedness of climate change, biodiversity loss, and pollution, echoing the “triple planetary crisis” framework promoted at UNEA (UNEP, 2026). By embedding climate considerations into broader environmental regimes—from marine conservation to chemical safety—UNEP promotes policy coherence and systemic transformation (UNEP, 2023a).

At the institutional level, UNEA complements these efforts by endorsing cross-cutting, science-based mandates that help mainstream climate policy into a wider sustainability agenda. It serves as an integrative space where Member States, UN bodies, and civil society converge to align political will, financial mechanisms, and normative priorities.

In sum, UNEP, through its governing body UNEA, has become an indispensable component of the global response to climate change. UNEP's scientific authority, technical support, and justice advocacy find political expression and normative reinforcement through UNEA resolutions and declarations. Although UNEA's outputs are not legally binding, their soft-law character enables them to shape behaviour, guide policy, and establish new standards for accountability.

As UNEA's role expands and its normative impact deepens, it becomes evident that climate governance is no longer the exclusive domain of treaty negotiations. Institutions like UNEP and UNEA are helping to redefine the global climate order, bridging the gap between science, law, and policy.

IV. Toward Judicial Climate Governance: Courts as Catalysts in the Enforcement of Climate Obligations

Climate litigation has rapidly emerged as a relevant legal tool in the global effort to address climate change. It refers to judicial proceedings initiated by individuals, civil society organizations, and even governments to compel action on climate mitigation and adaptation, or to hold states and private actors accountable for greenhouse gas (GHG) emissions and related harm.

This area of law has expanded significantly in recent years, with courts assuming a pivotal role in interpreting constitutional provisions, statutory mandates, and international obligations through the lens of environmental protection and human rights. As Sindico (2024) notes, climate litigation is reshaping legal doctrine by framing climate change not only as an environmental issue but also as a rights-based challenge.

According to Setzer and Higham, in 2025, 249 new climate cases were filed, bringing the total since 1986 to more than 3600 cases across 62 countries (2026). While the United States still accounts for the majority of these cases, cases continue to be filed in new locations in 2025 as Grenada, Guatemala, Kazakhstan, Malaysia, Singapore and Zambia (Setzer & Higham, 2026). The geographical spread of cases remains uneven since the 81% of cases have been filed in the Global North, comparing with the 14% in the Global South or the 5% before international or regional courts (Setzer & Higham, 2026). The U.S. leads, accounting for roughly 70% of cases (~1,522 by end 2022; 1,745 by May 2024). Other prolific jurisdictions include Australia (132–127), the UK (79–139), Brazil (~82), and Germany (~60). Notably, climate suits have surfaced for the first time in Panama, Portugal, Bulgaria, Finland, Romania, Russia, Thailand, Turkey, among others. In the Global South, strategic cases are surging, 60% filed since 2020, with governments now launching 56% of these cases compared to 5% in the Global North (Setzer & Higham, 2026).

As the global climate crisis intensifies, judicial bodies are increasingly stepping into roles once occupied solely by legislators, diplomats, and environmental agencies. Courts are no longer passive observers of climate policy. Increasingly, they are called upon to interpret constitutions, human rights frameworks, environmental statutes, and international agreements in ways that meaningfully address climate harms. This evolution marks the rise of judicial climate governance, a mode of environmental stewardship where courts are not only interpreting but actively shaping the architecture of international and domestic

climate law. Through doctrinal innovation, rights-based reasoning, and enforcement mechanisms, courts have begun to operationalize climate obligations and embed them within binding legal norms.

This section examines this global trend, focusing on how judicial institutions are transforming soft climate commitments into enforceable rights and duties, particularly in the context of human rights law, international legal obligations, and constitutional environmental protections.

IV.1. Courts as Climate Regulators: From Gap-Filling to Norm-Making

Traditionally, international climate governance has been state-driven and often characterized by voluntarism, fragmented legal frameworks, and limited enforcement mechanisms. However, faced with government inaction and escalating environmental degradation, litigants, especially youth, indigenous groups, and NGOs, have increasingly turned to courts as agents of accountability.

Judicial bodies are responding by asserting jurisdiction over climate-related disputes, interpreting existing legal instruments in novel ways, and recognizing climate inaction as a rights violation. As Peel and Osofsky (2018) argue, courts are not merely adjudicating climate issues, they are “governing” through adjudication, establishing legal thresholds for mitigation, adaptation, and protection of vulnerable groups.

Several landmark cases have reshaped how we understand the role of law in climate governance.

IV.2. Global Trends in Judicial Climate Governance

In the face of mounting ecological collapse and the persistent failure of political actors to deliver on climate promises, the judiciary has emerged as a vital actor in the global climate governance architecture. Climate litigation, once viewed as a predominantly domestic strategy, has evolved into a transnational instrument of accountability, enforcement, and systemic transformation. Courts, both national and international, now occupy a central role in responding to the climate crisis, enforcing legal obligations, and reshaping the normative foundations of climate justice.

This phenomenon, often termed judicial climate governance, marks a decisive shift from a predominantly diplomatic and state-centric regime toward

a juridified system where legal norms and adjudicative mechanisms are increasingly central. As Peel and Lin (2020) observe, judicial intervention in climate matters is “no longer exceptional but essential” in confronting the governance deficits left by underperforming political processes.

a) International Courts: Elevating Climate Obligations to Legal Duties

International courts and tribunals are playing a pivotal role in transforming the climate regime from a framework of political commitments into one of legally binding rules. However, it is important to bear in mind that, whilst case law and international courts is central in this regard, as will be seen below, not all rulings by international courts are legally enforceable. Given the large number of judicial rulings on this matter, the aim of this section is only to give an overview of the major judicial interventions.

On 23 July 2025, the ICJ delivered its Advisory Opinion on the Obligations of States in Respect of Climate Change. In this ruling, which by its very nature is not legally enforceable, the ICJ determined for the first time that there are legally binding and enforceable international obligations relating to the fight against climate change. Following the request by the UN General Assembly through its resolution A/RES/77/276, the Court has determined that all States have a duty, under customary international law, to avoid significant harm to the climate system, based on the duty of due diligence and the principle of non-harm; that, beyond treaty-based norms such as the UNFCCC or the Paris Agreement, these obligations arise from general international law, meaning that, in the event of a breach, international liability may be incurred. Among the consequences, it is worth noting the cessation of the unlawful conduct, guarantees of non-repetition and full reparation for the damage (ICJ AO, 2025, para. 444-455). In doing so, the ICJ interpreted instruments like the International Covenant on Civil and Political Rights (ICCPR), International Covenant on Civil and Political Rights (ICCPR), the United Nations Convention on the Law of the Seas (UNCLOS), and the Paris Agreement as legal sources of enforceable climate duties (ICJ, 2023). As the ICJ confirmed that exist legal duties over the protection of the climate system, this marks a paradigm shift in global judicial governance, setting a precedent for future litigation and national court interpretation (Green Diplomacy, 2025).

The ITLOS is also engaged in climate governance. Within this international court, the Commission of Small Island States on Climate Change and International Law (COSIS)’s advisory request seeks to determine whether climate change constitutes marine pollution under UNCLOS Articles 192 and 194,

thus obligating states to act. A favourable ruling could expand the definition of environmental harm and integrate climate mitigation into the broader legal regime governing the oceans (Sindico, 2024).

The Inter-American Court of Human Rights (IACtHR) has been invited to issue its own advisory opinion on states' climate responsibilities under the American Convention on Human Rights. Building on landmark cases such as *Lhaka Honhat v. Argentina* (2020), the Court is expected to underscore how environmental degradation violates collective and cultural rights, especially of indigenous and marginalized groups.

These tribunals are not merely clarifying state duties, they are anchoring climate governance in the rule of law, thereby internationalizing domestic accountability mechanisms.

b) The Role of the Human Rights Committee (HRC) in Climate Litigation

One of the most significant developments in the evolution of judicial climate governance has come from the United Nations Human Rights Committee (HRC), the treaty body tasked with monitoring the implementation of the International Covenant on Civil and Political Rights (ICCPR). The Committee has begun to recognize that climate change is not only an environmental or political issue, but also a matter of enforceable legal rights. In particular, it has acknowledged that states may be legally responsible for failing to prevent foreseeable harms caused by climate change, especially where such failures violate the fundamental rights protected by the ICCPR.

Two pioneering cases, *Teitiota v. New Zealand* and *Billy et al. v. Australia*, have defined the contours of this emerging jurisprudence.

In the case *Teitiota v. New Zealand* (CCPR/C/127/D/2728/2016), a landmark decision issued in 2020, the HRC addressed the complaint of Ioane Teitiota, a national of Kiribati who sought protection in New Zealand on the grounds that the rising sea levels, freshwater salinization, and general environmental degradation in his home country posed a direct threat to his life, thus engaging Article 6 of the ICCPR (right to life). While the Committee ultimately rejected the communication, concluding that the threat was not imminent enough to bar deportation, it made a historic recognition: it held that climate change-induced displacement could, in principle, give rise to non-refoulement obligations under international human rights law. The Committee affirmed that, in the future, returning individuals to climate-vulnerable regions could constitute a violation of the right to life, particularly where state failure to protect against climate impacts results in serious and foreseeable harm (HRC,

2020). According to the HRC: “Without robust national and international efforts, the effects of climate change in receiving states may expose individuals to a violation of their rights under Articles 6 or 7 of the Covenant, thereby triggering the non-refoulement obligations of sending states.” (para. 9.11).

This decision has been widely interpreted as opening a legal pathway for climate-related asylum and protection claims, positioning climate change within the broader framework of human rights-based migration jurisprudence (McAdam, 2021; Wewerinke-Singh & Salili, 2020).

In 2022, the HRC went further in the case of *Billy et al. v. Australia* (CCPR/C/135/D/3624/2019), brought by eight Indigenous Torres Strait Islanders. The plaintiffs argued that Australia’s failure to take timely and adequate measures to adapt to climate change, including sea wall construction, protection of sacred sites, and preservation of traditional culture, constituted violations of: article 6 (right to life), article 17 (right to privacy, family, and home), and article 27 (right of minorities to enjoy their culture).

In a ground-breaking ruling, the Committee held that Australia had breached its positive obligations under the ICCPR by failing to implement effective adaptation measures in a timely manner. This was the first time an international human rights tribunal held a state accountable for its climate inaction in relation to Indigenous peoples’ rights (HRC, 2022). The HRC stated that: “The State party failed to adopt timely adequate adaptation measures to protect the authors’ collective way of life from reasonably foreseeable climate change impacts.” (para. 8.13).

Legal scholars, as Knox (2022) or Boyle (2023) have praised the decision as a “judicial turning point in global environmental justice”, particularly for its recognition of cultural rights and collective identity as central components of climate protection. The case also illustrates the principle that state omissions, not only direct actions, can constitute violations of international law when those omissions contribute to climate-related harm.

These two cases reflect a growing doctrinal shift toward applying traditional civil and political rights, long associated with political freedoms and due process protections, to environmental and climate contexts. In doing so, the HRC has contributed to a broader trend in international law: the juridification of climate governance, where climate inaction becomes legally contestable rather than merely politically negotiable (Peel & Lin, 2020; Borràs & Jaria, 2019).

The Committee’s willingness to interpret the ICCPR as a living instrument, capable of evolving in response to new global threats, demonstrates a dynamic, rights-based approach to climate justice, one that places the dignity and survival of vulnerable populations at the center of legal reasoning.

As Lewis (2019) argues, “climate change has become the defining human rights challenge of our time,” and these decisions show that international law is beginning to adapt accordingly.

c) Regional and National Courts: From Declaratory Rulings to Binding Mandates

The impact of judicial climate governance is perhaps most visible in the work of regional courts and national constitutional courts, where litigants are increasingly invoking human rights frameworks to compel action.

In *KlimaSeniorinnen v. Switzerland* (2024), the European Court of Human Rights (ECtHR) held that insufficient climate mitigation violated Article 8 (right to private and family life) of the European Convention. This groundbreaking decision created a binding precedent, recognizing that climate inaction can amount to a breach of positive obligations under human rights law (ECtHR, 2024). The Committee of Ministers has since urged full compliance, demonstrating that judicial enforcement extends beyond the courtroom into political governance (Green Diplomacy, 2025).

At the national level, courts in the Netherlands (*Urgenda Foundation v. State*, 2019), Germany (BVerfG, 2021), and Colombia (STC4360-2018) have mandated governments to revise climate policies to ensure intergenerational equity and safeguard constitutional rights. In a watershed case, the Dutch NGO Urgenda sued the State of the Netherlands for failing to adequately reduce greenhouse gas emissions. In 2015, the Hague District Court ruled in Urgenda’s favor, ordering a 25% emission reduction by 2020. The decision was upheld by the Dutch Supreme Court in 2019, citing Articles 2 and 8 of the European Convention on Human Rights — the right to life and private life (*Urgenda v. Netherlands*, 2019). This marked the first time a government was held accountable by a court to reduce emissions based on human rights law (Wewerinke-Singh & Mead, 2025).

Following Urgenda, Dutch courts made history again when environmental groups and Dutch citizens sued oil giant Shell. The Hague District Court ruled in 2021 that Shell must reduce its global CO₂ emissions by 45% by 2030, including Scope 3 emissions, those produced by customers using Shell’s products. This was the first time a private corporation was held legally accountable for its role in climate change, based on its duty of care and human rights obligations (Sindico, 2024).

In the U.S., 21 young plaintiffs filed a groundbreaking case against the federal government, arguing that the promotion of fossil fuel energy systems violates their constitutional rights to life, liberty, and property. While the case has faced

procedural setbacks, particularly around standing, it remains pivotal in framing the notion of a “constitutional right to a stable climate system” (*Juliana v. United States*, 2015 – present).

In the Global South, courts in countries such as Pakistan, India, and South Africa are incorporating socioeconomic rights and the public trust doctrine to advance climate justice, emphasizing the vulnerability of marginalized populations and the duty of the state to act as steward of natural resources (Peel & Lin, 2020). One of the most cited cases is *Leghari v. Federation of Pakistan*: a farmer sued the government for failing to implement national climate policy. The Lahore High Court ruled that this inaction violated fundamental constitutional rights, particularly the right to life, dignity, and information. The court established a Climate Change Commission to oversee implementation, one of the first examples of judicial climate governance in a developing country (Sindico, 2024).

d) Emerging Doctrines and Principles in Judicial Climate Governance

Judicial climate governance is also characterized by the elaboration of new legal doctrines and principles.

The “Intergenerational Equity” doctrine, recognized by the German Constitutional Court and anticipated in the ICJ’s advisory opinion, asserts that present generations owe a duty to future ones — a moral and legal claim that is gaining normative traction.

Another doctrine is based on the “Extraterritorial Obligations”. Courts and treaty bodies, such as in *Sacchi et al. v. Argentina and Others* (2021), are increasingly recognizing that states can be held responsible for transboundary environmental harm, especially where emissions affect children outside their territory.

The “Climate Due Diligence” principle indicates that states must take reasonable, proportionate, and science-based measures to reduce emissions is becoming embedded in judicial reasoning, echoing obligations under the no-harm rule and precautionary principle.

e) Courts as Engines of Accountability, Enforcement, and Global Climate Order

Climate litigation has transcended national boundaries and it has become a forum where scientific urgency intersects with legal enforceability, compelling both states and corporations to reckon not only with their obligations under national law, but also with their ethical and international responsibilities. This shift reflects the transformation of climate change from a predominantly scientific or economic concern into a fundamental matter of legal justice and human rights.

International courts are no longer passive observers of environmental degradation. They are now active arenas where climate rights, duties, and risks are deliberated and defined, thereby reshaping the legal infrastructure of global climate governance. Landmark developments, such as the European Court of Human Rights' judgments in climate-related human rights cases, the UN Human Rights Council Resolution 56/8 recognizing the right to a clean, healthy, and sustainable environment, and the pending advisory opinion by the International Court of Justice on state responsibilities regarding climate change — demonstrate this evolution.

As Borrás and Jaria (2019) argue, these developments signal the emergence of a global constitutional order in which environmental protection is no longer an aspirational goal, but a binding legal and moral imperative grounded in principles of human dignity, intergenerational equity, and ecological integrity.

What we are witnessing is not merely an increase in the volume of climate litigation, but a structural transformation in global climate governance, with courts asserting themselves as: custodians of intergenerational equity, adjudicators of transboundary environmental harm, and defenders of marginalized and climate-vulnerable populations.

These roles reflect a deepening legal consciousness, wherein climate change is understood not just as an environmental or scientific issue, but as a defining human rights challenge of the 21st century (Lewis, 2019). This paradigm shift aligns with the growing body of international jurisprudence that frames climate harms within the language of rights, particularly the rights to life, health, food, water, and a healthy environment.

Through litigation, civil society actors, especially youth, indigenous communities, and Global South litigants, are holding powerful actors to account, while simultaneously constructing new norms and doctrines that elevate climate action from a political choice to a legal duty.

Judicial bodies are increasingly interpreting human rights and environmental law expansively, contributing to the formation of transnational legal standards and principles. This includes: the enforcement of the minimum thresholds for climate mitigation and adaptation; the establishment of precedent-based duties of care by both states and corporations, and the amplification of voices and interests of future generations.

As noted by Hunter and Salzman (2007), courts are uniquely positioned to act as “norm entrepreneurs” in global environmental governance, defining, disseminating, and legitimizing new legal standards that respond to emerging crises. In this sense, judicial climate governance is not a substitute for political

action, but rather an indispensable complementary mechanism that ensures accountability, fosters legal innovation, and catalyzes deeper transformations in global environmental law.

The landscape of climate litigation illustrates a pivotal transition: from voluntary political pledges to enforceable legal obligations. Courts are becoming the architects of a new global climate order, one grounded in rights, responsibilities, and the rule of law. Their interventions are redefining climate governance not only by adjudicating disputes but also by shaping the normative architecture that will guide the world through an era of ecological uncertainty.

In sum, the judicialization of climate governance represents a profound shift in how humanity confronts the existential challenge of climate change. Courts are not merely interpreters of law; they are now vital agents of transformation and accountability.

V. Linkages and fragmentation

V.1. Linkages and fragmentation Problems that international law face

International climate change governance cannot be reduced to the work of the COP, UNEP and international courts, but it extends to the authority and functions of other international regimes interacting with these ones.

International legal scholars have been preoccupied with issues of fragmentation of international law into somewhat separated regimes, each one having its own principles and institutions.

On the issue of climate change, scholars have been occupied with the question of linkages, particularly between climate change and economic affairs.

From theory, issues have become more concrete as international disputes had to do with the protection of fossil fuel assets, or the impairment of subsidies towards renewable energy production, or the question of forced movement of climate-displaced people and refugee laws.

General international law has only general principles that help lawyers interpret the primacy of certain rules and obligations (ILC), while modern treaties have attempted to better define the relationships between economic development within the constraints of ambitious mitigation actions mandated under the Paris Agreement (Vidigal 2025 ed). Yet, every issue of linkage needs to be looked at more closely in order to appreciate its concrete effects on governance.

V.2 Trade and Investment

Trade and investment are two major areas of scholarly focus on linkage issues in international climate change governance.

On one side, the World Trade Organization (WTO) has a material function the one promote the production and consumption of goods. And this is at the core of the raising of GHG emissions.

On the other, international investment law has developed through time a set of standards of protection for foreign investors from the regulatory action of host States.

Both limit the discretion of states in adopting and implementing ambitious if not even radical actions that would be needed, according to best available science, to stay within the raising of the temperature under the 1.5°C limit, as confirmed by the ICJ AO.

While the WTO is currently in a crisis, its disputes over subsidy programmes over renewable energy showcase the limitations that states hold in trying to promote local manufacturing also in the context of energy security and net-zero pledges (*Canada-Renewables*, *US-Certain Measures*, *India-Solar Panels*). International investment tribunals have also proved recalcitrant to interpret investment treaty provisions in light of the mitigation ambitions which States have under the Paris Agreement (*Rockhopper v. Italy*). The principle of systemic integration seems to have difficulties in being applied.

As the urgency of the climate crisis poses pressures of all kinds on States, and as the whole international legal and geoeconomic order appears in turmoil, this crucial areas of linkages in international climate change governance will likely face transformations as they currently do not seem to serve a universal aspiration tied to the concept of humanity which stands at the core of international law and governance.

VI. Conclusions

This chapter has mapped international climate change governance from a legal perspective, tracing its institutional architecture, its core regulatory areas, the growing role of courts and tribunals, and the persistent challenges of fragmentation and linkages with other international regimes. Taken together, the picture that emerges is one of a governance system under structural strain.

Thus, one that has expanded in scope and complexity without developing the coherence or enforcement capacity that the scale of the climate crisis demands. Yet, the analysis also reveals something more: the contours of a possible, and perhaps necessary, shift in the very nature of the enterprise.

International climate change governance, as it has developed since the adoption of the UNFCCC in 1992, has been premised on a specific logic: that states, as sovereign entities with jurisdiction over the activities generating greenhouse gas emissions, must coordinate their behaviour through negotiated legal commitments in order to address a collective action problem of global scope. This logic has produced an international climate change regime overly broad. In particular, treaties, institutions, and decisions that constitute its core, as well as the wider constellation of regimes, bodies, and actors examined throughout this chapter. It has also produced the tensions and failures that have accompanied the regime since its inception: the elusive burden-sharing of mitigation, the underfunded promises of climate finance, the soft and largely unenforceable character of adaptation governance, and the persistent obstruction posed by international investment law and other regimes whose primary mandates are structured around different priorities.

The question arises, then, whether the accumulated legal developments surveyed in this chapter are producing something qualitatively different from what has come before. The suggestion, implicit in the question that organises these conclusions, is that they might be witnessing, or at least approaching, a transition from ‘international climate change governance’ to something that might be called ‘international governance over the climate’.

The distinction is more than semantic. International climate change governance, as the concept has been used throughout this chapter, designates the ensemble of legal rules, institutions, and processes through which states and other actors attempt to coordinate their responses to climate change. It is an object-centred notion: governance ‘of’ a specific issue area, structured around the treaty regime and its extensions. International governance ‘over’ the climate, by contrast, would suggest something different in kind: a form of authority that is not merely responsive to climate change as a problem to be managed, but that treats the stability of the global climate system itself as a legal and governance objective of the highest order. Specifically, one capable of constraining, reconfiguring, or overriding other international legal regimes where necessary. In this vision, the climate system would function less as the subject-matter of a specialised regulatory regime and more as a constitutional referent for the international legal order as a whole.

There are reasons to treat this prospect with both seriousness and caution. On the one hand, the legal developments documented in this chapter provide genuine grounds for thinking that the trajectory of international climate law is moving in this direction. The ICJ's Advisory Opinion on obligations of States in respect of climate change, together with those of the ITLOS and the Inter-American Court of Human Rights, has begun to anchor climate obligations in the foundational principles of general international law rather than treating them as the exclusive province of the climate treaty regime. Courts are not merely applying existing climate commitments; they are constructing new legal standards, recognising the intergenerational dimension of climate obligations, and holding both states and corporations accountable in ways that the negotiated regime has been unable or unwilling to do. The emergence of loss and damage as a field of international governance, the consolidation of transparency and compliance architecture under the Paris Agreement, and the rights-based turn in climate litigation all point toward a deepening of the legal infrastructure surrounding the climate system.

On the other hand, the obstacles are formidable. The principle of state sovereignty remains the foundational premise of public international law, and neither the climate regime nor any other body of international law currently possesses a mechanism capable of imposing binding climate obligations on unwilling states, resolving conflicts between the climate regime and other international regimes in a hierarchically authoritative way, or ensuring that the commitments made under the Paris Agreement translate into the drastic emissions reductions that the best available science demands. The fragmentation of international climate change governance is not merely a technical problem amenable to legal coordination. It reflects deeper political disagreements about the distribution of responsibilities, the pace and nature of the transition away from fossil fuels, and the relationship between climate action and other objects of international law and policy.

The transition from governance of climate change to governance 'over' the climate is therefore better understood as a horizon than as a destination already reached. It names a direction of travel that is visible in the legal developments of recent years, a gathering normative ambition that the climate system should be treated as something akin to global commons deserving of its own overarching legal protection, rather than merely as one issue among many in an otherwise fragmented international legal order. Whether international law can travel far enough in that direction, and fast enough to matter, remains the central question confronting international climate change governance today.

Bibliography

- Abbott, K. W. (2015). *International Organizations as Orchestrators*. Cambridge University Press.
- Abbott, K. W. (2012). The Transnational Regime Complex for Climate Change. *Environment and Planning C: Government and Policy*, 30(4), 571–590.
- Affolder, N. (2021). Transnational Climate Law. In P. Zumbansen (Ed.), *The Oxford Handbook of Transnational Law* (pp. 274–268). <https://doi.org/10.1093/oxfordhb/9780197547410.013.11>
- Biermann, F., Pattberg, P., Van Asselt, H., & Zelli, F. (2009). The fragmentation of global governance architectures: A framework for analysis. *Global Environmental Politics*, 9(4), 14–40.
- Birnie, P., Boyle, A., & Redgwell, C. (2009). *International Law and the Environment* (3rd ed.). OUP Oxford.
- Bodansky, D. (2016). *The art and craft of international environmental law*. Harvard University Press.
- Bodansky, D., Brunnée, J., & Rajamani, L. (2017). *International Climate Change Law*. Oxford University Press.
- Bogdandy, A., Dann, P., & Goldmann, M. (Eds.). (2010). *The Exercise of Public Authority by International Institutions*. Springer.
- Borràs, S., & Jaria, J. (2019). *Research Handbook on Global Climate Constitutionalism*. Cheltenham: Edward Elgar Publishing.
- Boyle, A. (2023). *Climate Change, Human Rights and the Environment: The Role of International Law*. Oxford University Press.
- Boyle, A. E., & Chinkin, C. M. (2007). *The Making of International Law*. Oxford University Press.
- Brunnée, J. (2002). COPing with Consent: Law-Making Under Multilateral Environmental Agreements. *Leiden Journal of International Law*, 15(01), 1–52. <https://doi.org/10.1017/S0922156502000018>
- Brunnée, J., & Toope, S. J. (2010). *Legitimacy and Legality in International Law: An Interactional Account*. Cambridge University Press.

- Carlarne, C. P., Gray, K. R., & Tarasofsky, R. (2016). International Climate Change Law: Mapping The Field. In K. R. Gray, R. Tarasofsky, & C. P. Carlarne (Eds.), *The Oxford Handbook of International Climate Change Law* (p. 0). Oxford University Press. <https://doi.org/10.1093/law/9780199684601.003.0001>
- Chayes, A., & Chayes, A. H. (1993). On Compliance. *International Organization*, 47(2), 175–205.
- Churchill, R. R., & Ulfstein, G. (2000). Autonomous Institutional Arrangements in Multilateral Environmental Agreements: A Little-Noticed Phenomenon in International Law. *The American Journal of International Law*, 94(4), 623–659. <https://doi.org/10.2307/2589775>
- Depledge, J. (2022). The “top-down” Kyoto Protocol? Exploring caricature and misrepresentation in literature on global climate change governance. *International Environmental Agreements: Politics, Law and Economics*, 22(4), 673–692. <https://doi.org/10.1007/s10784-022-09580-9>.
- Desai, B. H. (2022). *Regulating Global Climate Change: From Common Concern to Planetary Concern. Environmental Policy and Law*, 52(5-6), 337–347. <https://doi.org/10.3233/EPL-219050>.
- Doelle, M. (2016). The Paris Agreement: Historic Breakthrough or High Stakes Experiment? *Climate Law*, 6(1–2), 1–20. <https://doi.org/10.1163/18786561-00601001>
- Duvic-Paoli, L.-A. (2023). International law: A discipline of ambition. *Leiden Journal of International Law*, 36(2), 233–249. <https://doi.org/10.1017/S0922156522000711>
- ECtHR. (2024). *KlimaSeniorinnen v. Switzerland*. App No. 53600/20.
- Gehring, M. W., & Morison, E. (2024). Advancing Climate Action in Trade, Investment and Financial Agreements. In M.-C. C. Segger & C. Voigt, *Routledge Handbook of Climate Law and Governance* (1st ed., pp. 57–70). Routledge. <https://doi.org/10.4324/9781003276678-7>
- Ghaleigh, N. S. (2016). Science and Climate Change Law—The Role of the IPCC in International Decision-Making. In K. R. Gray, R. Tarasofsky, & C. P. Carlarne (Eds.), *The Oxford Handbook of International Climate*

- Change Law* (p. 0). Oxford University Press. <https://doi.org/10.1093/law/9780199684601.003.0003>
- Green Diplomacy. (2025). *Awaiting Wisdom of the World Court: Obligations of States in Respect of Climate Change*. Paris.
- Green Diplomacy. (2025). *Global Climate Law and Policy Brief*. Institute for International Law & Sustainability.
- Higham, I., Bäckstrand, K., Fritzsche, F., & Koliev, F. (2024). Multistakeholder Partnerships for Sustainable Development: Promises and Pitfalls. *Annual Review of Environment and Resources*, 49(Volume 49, 2024), 475–500. <https://doi.org/10.1146/annurev-environ-051823-115857>
- Hirokawa, K. H., & Pohrib, A. M. (2013). Climate Change Adaptation and Green Building. In J. Verschuuren (Ed.), *Research Handbook on Climate Change Adaptation Law* (pp. 355–382). Edward Elgar Publishing. <https://www-elgaronline-com.vu-nl.idm.oclc.org/edcollchap/edcoll/9781781000076/9781781000076.00018.xml>
- Human Rights Committee. (2020). *Teitiota v. New Zealand*, CCPR/C/127/D/2728/2016.
- Human Rights Committee. (2022). *Billy et al. v. Australia*, CCPR/C/135/D/3624/2019.
- Hunter, D., & Salzman, J. (2007). *Negligence in the Air: The Duty of Care in Climate Change Litigation*. University of Pennsylvania Law Review.
- Intergovernmental Panel on Climate Change (2026) 'IPCC Glossary'. <https://apps.ipcc.ch/glossary/>
- International Court of Justice. (2023). Order of 20 April 2023. Retrieved from <https://www.icj-cij.org/case/187>.
- International Court of Justice. (2025). Advisory opinion No. 187 of 23 July 2025, Obligations of States in Respect of Climate Change. <https://www.icj-cij.org/case/187>.
- International Union for Conservation of Nature (IUCN). (2024). The International Court of Justice considers climate change. Retrieved from <https://www.iucn.org>

- Desai, B. H. (2023). The Essentiality of Human Rights for the Sustainable Environment.” *Environmental Policy and Law*, 53(2), 95–96.
- Desai, B. H. (2022). *Regulating Global Climate Change: From Common Concern to Planetary Concern*. *Environmental Policy and Law*, 52(5-6), 337–347. <https://doi.org/10.3233/EPL-219050>.
- Klabbers, J. (2009). *An Introduction to International Institutional Law* (2nd ed.). Cambridge University Press.
- Klabbers, J., & Piiparinen, T. (Eds.). (2013). *Normative Pluralism and International Law: Exploring Global Governance*. Cambridge University Press.
- Knox, J. (2022). *Climate Change and Human Rights Law*. In I. Alogna, C. Bakker & J. Cournil (Eds.), *Climate Change Litigation: Global Perspectives* (pp. 65–80). Springer.
- Knox, J. H. (2020). Climate change and human rights law. *Annual Review of Law and Social Science*, 16, 45–63. <https://doi.org/10.1146/annurev-lawsocsci-031720-074856>
- Lewis, B. (2019). *Environmental Human Rights and Climate Change*. Springer.
- Lewis, B. (2019). Human Rights and Climate Change: Building Synergies for Future Governance. *Environmental Law Review*, 21(3), 177–193.
- Luporini, R. (2025). *Climate Change Adaptation, Disaster Risk Reduction and Human Rights in International Law*. Springer. <https://doi.org/10.1007/978-3-031-94596-0>
- Mace, M. J., & Verheyen, R. (2016). Loss, Damage and Responsibility after COP21: All Options Open for the Paris Agreement. *Review of European, Comparative & International Environmental Law*, 25(2), 197–214. <https://doi.org/10.1111/reel.12172>
- Mai, L. (2020). (Transnational) law for the Anthropocene: Revisiting Jessup’s move from ‘what?’ to ‘how?’ *Transnational Legal Theory*, 11(1–2), 105–120. <https://doi.org/10.1080/20414005.2020.1776551>
- Mayer, B. (2019). Transparency Under the Paris Rulebook: Is the Transparency Framework Truly Enhanced? *Climate Law*, 9(1–2), 40–64. <https://doi.org/10.1163/18786561-00901004>

- Mayer, B. (2018). *The International Law on Climate Change*. Cambridge University Press.
- McAdam, J. (2021). Climate Change, Displacement and International Law: Complementary Protection Standards. UNHCR Legal and Protection Policy Series.
- Najam, A., Huq, S., & Sokona, Y. (2003). Climate negotiations beyond Kyoto: Developing countries' concerns and interests. *Climate Policy*, 3(3), 221–231. [https://doi.org/10.1016/S1469-3062\(03\)00063-3](https://doi.org/10.1016/S1469-3062(03)00063-3)
- Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change*, 20(4), 550–557. <https://doi.org/10.1016/j.gloenvcha.2010.07.004>
- Peel, J., & Lin, J. (2020). *Transnational Climate Litigation: The Contribution of the Global South*. American Journal of International Law, 114(4), 679–706.
- Peel, J., & Osofsky, H. M. (2018). *Climate Change Litigation: Regulatory Pathways to Cleaner Energy*. Cambridge University Press.
- Philip C. Jessup. (1956). *Transnational Law*. Yale University Press.
- Pulkowski, D. (2014). *The Law and Politics of International Regime Conflict*. Oxford University Press.
- Rajamani, L., & Brunnée, J. (2017). The Legality of Downgrading Nationally Determined Contributions under the Paris Agreement: Lessons from the US Disengagement. *Journal of Environmental Law*, 29(3), 537–551. <https://doi.org/10.1093/jel/eqx024>
- Rossati, D., & Zahar, A. (2024). Governing International Climate Finance and Investment: The Paris Agreement and Related International and Transnational Mechanism. In A. Zahar (Ed.), *Research Handbook on the Law of the Paris Agreement* (pp. 296–322). Edward Elgar Publishing.
- Pörtner, H.-O et al. (2022) *Climate Change 2022: Impacts, Adaptation and Vulnerability - Technical Summary*. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 37–118, doi:10.1017/9781009325844.002
- Roughan, N. (2013). *Authorities: Conflicts, Cooperation, and Transnational Legal Theory*. OUP Oxford.

- Rouxel, M. (2020). The Paris Rulebook's Rules on Transparency: A Compliance Pull? *Carbon & Climate Law Review*, 14(1), 18–39. <https://doi.org/10.21552/cclr/2020/1/5>
- Sabel, R. (2006). *Procedure at International Conferences: A Study of the Rules of Procedure at the UN and at Inter-governmental Conferences* (2nd ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9780511494444>
- Sands, P. (2016). Climate Change and the Rule of Law: Adjudicating the Future in International Law. *Journal of Environmental Law*, 28(1), 19–35. <https://doi.org/10.1093/jel/eqw005>
- Schermers, H. G., & Blokker, N. M. (2018). *International Institutional Law: Sixth Revised Edition*. Brill Nijhoff. <https://brill.com/view/title/36421>
- Setzer, J., & Higham, C. (2024). *Global Trends in Climate Change Litigation: 2024 Snapshot*. Grantham Research Institute on Climate Change and the Environment, London School of Economics.
- Setzer, J., & Higham, C. (2026). *Global Trends in Climate Change Litigation: 2026 Snapshot*. Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. DOI: 10.21953/researchonline.lse.ac.uk.00138625.
- Setzer, J., & Vanhala, L. (2019). Climate litigation: A review of scholarly research. *WIREs Climate Change*, 10(3), e580. <https://doi.org/10.1002/wcc.580>
- Sindico, F. (2024). *Research Handbook on Climate Change Litigation*. Edward Elgar.
- Tienhaara, K. (2018). Regulatory Chill in a Warming World: The Threat to Climate Policy Posed by Investor-State Dispute Settlement. *Transnational Environmental Law*, 7(2), 229–250. <https://doi.org/10.1017/S2047102517000309>
- UNFCCC (2026) Decision 1/CMA.7, UN Doc. FCCC/PA/CMA/2025/19/Add.1
- UNFCCC (2014) Decision 2/CP.19 UN Doc. FCCC/CP/2013/10/Add.1
- UNFCCC (2016) Decision 1/CP.21, UN Doc. FCCC/CP/2015/10/Add.1 para 52

- UNFCCC (2023a) Decision 2/CP.27, UN Doc. FCCC/CP/2022/10/Add.1
- UNFCCC (2023b) Decision 1/CMA.5, UN Doc. FCCC/PA/CMA/2023/16/Add.1
- UNFCCC (2021), Decision 24/CMA.3, UN Doc. FCCC/PA/CMA/2021/10/Add.3
- UNFCCC (2023). COP28 UN Climate Change Conference. United Nations. <https://unfccc.int/cop28>
- UN Human Rights Council (UNHRC). (2024). Resolution A/HRC/RES/56/8: Human Rights and Climate Change.
- UNEP DTU. (2022). *Supporting NDC implementation in developing countries*. UNEP Copenhagen Climate Centre. <https://unepccc.org/>
- United Nations Environment Programme (UNEP). (2022). *Environmental rule of law: Tracking progress and charting future directions*. <https://www.unep.org/resources/report/environmental-rule-law-2022>
- United Nations Environment Programme (UNEP). (2023). *Global Climate Litigation Report: 2023 Status Review*. United Nations Environment Programme.
- United Nations Environment Programme (UNEP). (2023a). *UNEP in climate action: Annual report 2023*. <https://www.unep.org/resources/unep-climate-action-annual-report>
- United Nations Environment Programme (UNEP). (2023b). *Emissions gap report 2023*. <https://www.unep.org/resources/emissions-gap-report-2023>
- United Nations Environment Programme (UNEP). (2024a). *UNEA-6 Resolutions and Ministerial Declaration*. Retrieved from <https://www.unep.org/environmentassembly/unea-6>
- United Nations Environment Programme (UNEP). (2024). 6th UN Environment Assembly: Ministerial Declaration and Resolutions. Retrieved from <https://www.unep.org>
- United Nations Environment Programme (UNEP). (2026). *Solutions for a healthy, prosperous and resilient people and planet: The UNEP Medium-Term Strategy for 2026–2029*. United Nations Environment Programme.

- <https://www.unep.org/resources/solutions-healthy-prosperous-and-resilient-people-and-planet-unep-medium-term-strategy>
- UNHRC. (2024). *Resolution A/HRC/RES/56/8*.
- United Nations General Assembly. (2023). *Request for Advisory Opinion of the International Court of Justice on Climate Change and Human Rights*, A/77/L.58.
- van Asselt, H. (2016). The Role of Non-State Actors in Reviewing Ambition, Implementation, and Compliance under the Paris Agreement. *Climate Law*, 6(1–2), 91–108. <https://doi.org/10.1163/18786561-00601006>
- van Asselt, H., & Zelli, F. (2018). International Governance: Polycentric Governing by and beyond the UNFCCC. In A. Jordan, D. Huitema, H. van Asselt, & J. Forster (Eds.), *Governing Climate Change: Polycentricity in Action?* (pp. 29–46). Cambridge University Press. <https://doi.org/10.1017/9781108284646.003>
- Verschuuren, J. (2013). *Research Handbook on Climate Change Adaptation Law*. Edward Elgar Publishing.
- Wainwright, J., & Mann, G. (2018). *Climate Leviathan: A Political Theory of Our Planetary Future*. Verso.
- Wewerinke-Singh, M., & Mead, S. (2025). *The Cambridge Handbook on Climate Litigation*. Cambridge University Press.
- Wewerinke-Singh, M., & Salili, J. (2020). Between Negotiations and Litigation: Vanuatu's Perspective on Loss and Damage from Climate Change. *Climate Law*, 10(1–2), 70–85.
- Yamin, F., & Depledge, J. (2004). *The International Climate Change Regime*. Cambridge University Press. <http://dx.doi.org/10.1017/CBO9780511494659>
- Zahar, A. (2018). The Contested Core of Climate Law. *Climate Law*, 8(3–4), 244–260. <https://doi.org/10.1163/18786561-00803009>

The European Union's climate policy

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SUMMARY: I. Introduction: The EU as a laboratory for climate governance. I.1. From economic integration to ecological governance. I.2. The EU between sustainability, ecological transition, and climate justice. II. Institutional framework and EU environmental competences. III. Fundamental principles of European environmental law. IV. EU climate policy: instruments and strategies. V. Climate justice and just transition in Europe. V.1. The Just Transition Mechanism and the Social Climate Fund. V.2. Vulnerable regions and workers' inclusion. V.3. Solidarity and territorial cohesion in the transition. VI. Rights, participation, and climate citizenship. VII. The EU as a global actor in climate justice. VIII. Conclusions: towards multi-level climate justice. Bibliography.

I. Introduction: The EU as a laboratory for climate governance

Since the 1990s, with the ratification of the United Nations Framework Convention on Climate Change, the European Union has assumed a leading role in the global fight against climate change. In recent years, European institutions have agreed to achieve an ambitious goal: to make Europe a climate-neutral continent by 2050, in line with the Paris Agreement, by minimizing greenhouse gas emissions and taking the necessary measures to offset remaining emissions (Ferrero, 2022).

This change of perspective is the result of a long political and legal process, which culminated in the inclusion of the principle of sustainable development (Fracchia, 2010) among the fundamental principles of the European Union

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(Article 2 TEU) and in the attribution to the European institutions of competence in the fields of both the environment (Title XX, Articles 191–193 TFEU) and energy (Title XXI, Article 194) (Amedeo, 2014).

The European Union, however, does not act in isolation and entirely independently to address the challenge of climate change. Instead, it coordinates with international institutions and supports the efforts of the international community to identify priorities and select the economic sectors requiring intervention (Pineschi, 2014). This connection with international law stems from the European Union's direct accession to the main international treaties concerning climate protection, as well as other international treaties regulating specific aspects of environmental protection.

The connection between European Union law and international law can also be seen from another perspective, which concerns the inclusion in European Union primary law — namely, in the Treaties on European Union and on the Functioning of the European Union — of the general principles of international environmental law. These principles have thus been fully Europeanized and are capable of guiding the development of European institutions' environmental and climate policies and also influencing the implementation of European Union law by Member States (Ferraro, 2023).

When analyzing the European Union's climate strategy, and more generally the environment, in relation to the guidelines and constraints of international law, it must be borne in mind that European policy is not limited to simply implementing international commitments. Environmental and climate needs are tailored to the specific characteristics of the European continent and the leadership role the European Union intends to assume globally. Therefore, European legislation contains highly innovative elements and aspects, demonstrating the political will to reverse the growth of climate-altering emissions and to encourage and stimulate similar initiatives by other states (Porchia, 2014).

From the perspective of European Union law, then, the involvement required of the national authorities of the Member States is certainly broader and more complex than that which could arise solely from fulfilling purely international obligations: the undoubtedly more demanding indications that have been progressively imposed on the Member States are based on the fundamental rule contained in Article 2 of the Treaty on European Union, which defines sustainable development as that which is based on “a high level of environmental protection and improvement of the quality of the environment” (van Hees, 2014).

The legislation adopted by the European institutions can now be considered broad, transversal, and sophisticated, as it aims to intervene in various sectors

of the economy, indeed to promote a profound transformation of the European economic system with a view to environmental sustainability and climate neutrality (Rossi, 2026).

I.1. From economic integration to ecological governance

The overall trajectory followed by the European Union in its political and institutional evolution can be described, with regard to the place given to environmental protection and subsequently to the preservation of climate stability, as a transition from a position of indifference towards the ecological question to a position of recognition of the centrality of environmental concerns with respect to the other public interests that the European Union must pursue.

In the early stages of the European Economic Community's existence, the original treaty did not provide for any Community competence in the environmental field, given that the powers of the Community institutions were essentially aimed at pursuing purely economic objectives, such as the establishment of the internal market or the coordination of national economic policies, with the consequence that environmental protection fell within the exclusive competence of the Member States.

With the progressive recognition of the gravity of the environmental crisis and the launch of the UN initiative to promote international cooperation in the 1970s, the European Community, despite the lack of adequate legislation to explicitly legitimize a common environmental policy, began to approve environmental action programs to support environmentally friendly activities and, above all, to adopt environmental directives, taking advantage of the protection afforded by Article 100 of the Treaty on European Union (TEC). This provision allowed for the approval of directives for the approximation of national laws if such regulatory disparities were likely to jeopardize the establishment or functioning of the common market. In this way, the foundations for nascent European environmental law were laid, but environmental protection assumed an instrumental dimension to European economic integration.

Furthermore, a further legal basis has been found in Article 235 of the EC Treaty, according to which if Community action was necessary to achieve one of the Community's objectives, the provision in question could be used by exercising the necessary powers of action, even if not expressly provided for.

With the revision of the Treaty of Rome and the expansion of the European Community's tasks and powers, initiated by the Single European Act of 1987,

the new European legal framework finally provides for formal Community competence in environmental policies, which, however, must be coordinated with the competences of the Member States. This choice was confirmed by the 2009 Treaty of Lisbon and now consolidates the European Union's central role in environmental protection, to the point that most environmental legislation implements European Union directives or European regulations.

I.2. The EU between sustainability, ecological transition, and climate justice

The core content and priority objectives of EU climate policy have been clarified by European legislation, in light of the principles enshrined in the Treaties, and have built a model of environmental regulation that goes beyond ensuring the protection of individual environmental assets or specific ecosystems exposed to a significant risk of degradation or alteration due to the impact of human activities, but also aims to achieve an ecological transition. This term refers to the process of transforming production, economic, and social systems towards sustainable models, aimed at combatting climate change, reducing pollution, and preserving natural resources.

This shift aims for climate neutrality by 2050 through the massive use of renewable energy, the introduction of the circular economy model, and the spread of sustainable mobility, radically rethinking the relationship between humanity and nature (De Leonardis, 2023).

The vision outlined by European law, however, not only calls for the introduction of regulations aimed at increasing environmental protection and combating global warming, but also focuses on managing and containing the social costs associated with abandoning fossil fuels, adopting new production systems, and changing consumption patterns (Kenehan, 2023). Environmental and climate policy alike must address the demands for environmental justice emanating from European society and, therefore, must place the decisions required to respond to the climate crisis within a complex, multi-level intervention and regulatory strategy (Somosi, Megyeri, 2022).

The most relevant aspects of the European strategy, which revolves around the European Green Deal, are the following (Vetrò, 2022):

- climate neutrality (net zero emissions), to be achieved by 2050;

- decarbonisation, which requires replacing fossil fuels with renewable energy sources (solar, wind, hydro, geothermal and biomass), also supported by improving energy efficiency;
- sustainable mobility, to be promoted by encouraging the electrification of transport, strengthening public transport, and promoting soft mobility;
- the protection of biodiversity, which is based on the restoration of ecosystems and the safeguarding of natural resources, in their variety;
- the social transition, which calls for a change in individual and collective lifestyles, ensuring a “fair and inclusive” process.

II. Institutional framework and EU environmental competences

The legal basis for the implementation of the EU's climate policy is the attribution of dual competence in the fields of environment (Title XX TFEU) and energy (Title XXI TFEU), which allows for the adoption of a legal framework to introduce both measures of environmental protection in the strict sense, and therefore to combat climate change, and new rules to promote the energy transition in the economies of the Member States, necessary for the replacement of fossil fuels and the transition to renewable energy (Marletta, 2014).

In both cases, EU competence is classified as concurrent, pursuant to Article 4 TFEU, giving rise to an overlap between the legislative power of the EU and that of the Member States.

With reference to environmental policy, Articles 191-192 TFEU provide the framework for the action of the European institutions.

First of all, it must be remembered that, pursuant to Article 191(3), the EU, in identifying the objectives to be achieved and the principles to be applied in environmental policy, must evaluate available scientific and technical data, environmental conditions in the various regions of the Union, the potential benefits and costs of action or lack thereof, socioeconomic development, and the “balanced development of its individual regions.” This guidance reveals not only the importance of scientific considerations in the approval of sectoral acts, but also the desire to ensure, in accordance with the principle of integration, a fair balance between environmental protection requirements and economic growth, even for individual territorial entities (Porchia, 2014).

Furthermore, Article 191, paragraph 1 TFEU identifies four objectives that must guide the European Union's strategy: safeguarding, protecting, and improving

the quality of the environment, with interventions aimed not only at maintaining the *status quo* but also at progressively improving ecological quality; protecting human health, especially from the negative effects of pollution; the prudent and rational use of natural resources, taking into account the needs of future generations; and promoting international measures externally, precisely in light of the consideration that, however broad the Union's scope for action from a territorial perspective, it cannot be considered sufficient given the global nature of certain phenomena, first and foremost that linked to global warming and climate change.

Furthermore, Article 191, paragraph 2 TFEU also lists the general principles that the European Union must undoubtedly observe, but which Member States must also respect when implementing European law: the precautionary and prevention principles, rectification at source, environmental damage, and the "polluter pays" principle (Dell'Anno, 2014).

To understand the European Union's overall strategy on the international stage, Article 191, paragraph 4, is particularly relevant. This article recognizes the Union's competence, while respecting the similar competences of the Member States, to cooperate with third countries and international organizations, including the related possibility of concluding international agreements on global issues such as climate change, sustainable development, and environmental quality.

Regarding the legislative process for the adoption of binding environmental acts, Article 192 TFEU provides for the ordinary procedure. Therefore, it is up to the Commission to formulate a proposal, which the European Parliament and the Council must then decide on, after consulting the Economic and Social Committee and the Committee of the Regions.

With reference to energy policy, Article 194 TFEU, when granting the European Union competence in the field of energy, requires that it takes into account "the need to preserve and improve the environment," thereby generally ensuring the integration of the environment into a policy with a high economic impact (Schubert, Pollak, Kreutler, 2016).

However, the importance of environmental protection – and therefore also action to combat climate change – can be deduced from the fact that, in addition to the provisions contained in the Title specifically dedicated to the environment (Title XX TFEU), the Treaties contain other provisions that place pollution protection at the heart of the activities of European institutions in the implementation of other policies:

Article 3, paragraph 3, TEU, identifies among the principles of the European Union not only sustainable development and balanced growth, but also the achievement of a high level of protection and improvement of environmental quality;

Article 11 TFEU, which establishes the principle of integration, according to which ecological requirements must be taken into account in all environmental policies;

Article 21, letter b), which establishes the principle of environmental protection (f) TEU, which, with regard to the Union's external action, provides for the adoption of international measures "aimed at preserving and improving the quality of the environment and the sustainable management of global natural resources in order to ensure sustainable development", which has a legal value functional to reconciling environmental protection with economic growth; finally, Article 114 which, with regard to measures for the approximation of laws, provides that the Commission shall submit proposals based on a "high level of protection" in environmental matters.

These multiple regulatory provisions in the Treaties concerning the European Union demonstrate not only the broad foundation for the EU's environmental policy, but also the centrality of environmental protection and the commitment to fighting climate change (Giordano, 2024).

However, the relationship between the EU and the Member States regarding the exercise of shared competence in environmental matters is governed by the principle of the primacy of European law, which also derives from Article 2 TFEU. Consequently, where the European Union has exercised its legislative competence by introducing environmental legislation, Member States are subject to an obligation to implement it (Article 192(3) – (4) TFEU). On the other hand, precisely to avoid excessive intrusiveness of European legislation, the EU must respect the principles of subsidiarity and proportionality when developing environmental policy, intervening only when Community action is more effective than national action and imposing regulations strictly proportionate to the objective pursued.

Furthermore, with a view to preventive action, individual Member States retain the right to take appropriate measures to ensure even greater protection. Should Member States claim the need to ensure broader environmental protection, they are required to notify the European Commission of these national measures—which must be compatible with the Treaties (Article 193) (Bonomo, 2023).

To ensure optimal achievement of the general objectives set out in the Treaties and the more specific objectives established in the sectoral programmes and acts, the European Commission is supported by the *European Environment Agency*, established by Regulation No. 1210/90/EEC, amended several times, and codified in Regulation No. 401/2009/EC of 23 April 2009. Among its many tasks, this institution must adopt a five-yearly assessment of the state

of the environment in Europe. Furthermore, the *European Union Network for the Implementation and Enforcement of Environmental Law* (IMPEL) has been established within the Directorate-General for the Environment. Law, with the task of monitoring the level of implementation of secondary environmental legislation by Member States.

III. Fundamental principles of European environmental law

As legal scholarship has highlighted, the set of general principles that form the substantial foundation of EU environmental and climate policy is now very broad and can be deduced not only from Article 191, paragraph 2 TFEU, but also from provisions contained in other articles of the EU and TFEU Treaties or in international treaties to which the EU is a party. The convergence of these principles has a significant shaping effect on the discretion of the European legislator and guides EU interventions and action lines in a decidedly ecological direction, even by scaling down or reshaping the other objectives that distinguish the legal model of European integration (Dell'Anno, 2014).

First of all, as highlighted in the previous paragraph, Article 191, paragraph 2 TFEU lists principles already present in previous treaties and correspond to some principles enshrined in international law, particularly in the 1992 Rio de Janeiro Declaration on Environment and Development.

The *prevention principle* (Article 191, paragraph 2, TFEU) requires advance environmental protection to manage environmental risks and prevent environmental damage that will be difficult, if not impossible, to remedy. This principle is based on the existence of scientific evidence capable of highlighting the degree of danger posed by elements, products, or processes used in or resulting from economic activities, and justifies the introduction of preventive rules capable of influencing or imposing environmental safety standards on public institutions, businesses, and citizens (Corso, 2026).

The *precautionary principle* (Article 191, paragraph 2 TFEU) allows for further anticipation of environmental protection measures, as it establishes that, “in all cases where a preliminary objective scientific assessment indicates that there are reasonable grounds for concern about possible harmful effects on the environment”, it is necessary to act to protect the environment. Therefore, even in the presence of uncertainty regarding the existence and significance of potential risks, “protective measures may be adopted without having to wait until the actual existence and severity of such risks have been fully demonstrated”

(COM(2000)1, 2.2.2000). As a consequence, if the European institutions verify the likelihood of damage to public health, even if it is impossible to determine with certainty the existence or severity of the risks, the precautionary principle legitimises the application of restrictive measures (ECJ 17.12.2015, C 157/14, *Neptune Distribution*, paragraph 81) (Savona, 2013).

To implement the principles of preventive and precautionary action, the EU has developed a sophisticated model of supervision of economic activities that can be considered a complex and cross-cutting “command and control” system. This involves the wide-ranging application of environmental assessments (the environmental impact assessment (EIA), the strategic environmental assessment (SEA), and the environmental incidence assessment for areas belonging to the Natura 2000 network, or authorization procedures, as integrated environmental authorization), which collectively aim to verify in advance the significant environmental impact of private and public plans, programs, or projects (Designore, 2022).

The *principle of rectifying environmental damage at source* (Article 191, paragraph 2, TFEU) is a cornerstone of EU environmental law and requires European institutions — and therefore Member States — to repair environmental damage by eliminating its cause directly at the source. Therefore, it aims to regulate ex post, priority-based intervention where the pollution originates, to halt it and remediate its effects, prioritizing structural solutions for environmental restoration.

Finally, in the context of Title XX, the “*polluter pays*” principle (PPP - (Article 191, paragraph 2 TFEU) requires those who cause pollution to bear the costs of prevention, cleanup, and environmental restoration. It aims to internalize environmental costs, preventing them from falling on society, so as to align economic activity with environmental protection and the principle of sustainable development (Lo Schiavo, 2011).

Furthermore, we can indicate the *principle of integration* (Article 11 TFEU) and the *principle of sustainable development* (Article 2 TEU), which represent the fundamental legal paradigm (the second principle is a specification of the first) for harmonizing the economic policy of the EU and its member states with ecological needs (Chiti, 2021).

In addition to this set of principles expressly incorporated into the treaties, the *principle of climate neutrality* can be considered to be now fully present and operational in European law (Pesce, 2023). This principle requires the progressive reduction of emissions that alter the Earth's climate and compromise the planet's ecological balance. This principle can be deduced from the international treaties that have addressed the climate issue, and especially from the 2015

Paris Agreement, given the EU's accession to these international conventions. It is precisely in light of this principle that the EU's actions over the last decade, coordinated and promoted within the framework of the European Green Deal, can be explained and understood.

If anything, a critical point can be made about the wording of Article 37 of the Charter of Fundamental Rights, adopted in Nice on 7 December 2000 and proclaimed in Strasbourg on 12 December 2007 (binding under Article 6 TEU): this provision states, drawing inspiration from the provisions of some national constitutions, that a high level of environmental protection and the improvement of its quality must be integrated into Union policies and guaranteed in accordance with the principle of sustainable development. This is a restrictive provision, as it fails to recognize a subjective right to a healthy environment, while continuing to consider environmental health as the objective of environmental policies (Durán, Morgera, 2013).

IV. EU climate policy: instruments and strategies

The climate policy of the European Union has developed progressively as an integral part of EU environmental law, founded on the principles established by Articles 191 – 193 TFEU and geared towards achieving a climate-neutral economy. Since its inception, European environmental action has had a composite nature, based on direct regulatory instruments and economic mechanisms aimed at internalising environmental costs. The evolution of this field displays a well-defined logical and regulatory sequence: firstly, the construction of market-based instruments for emission reduction; subsequently, the definition of a comprehensive strategic and legal framework through the European Green Deal and the European Climate Law; and finally, the introduction of corrective and complementary mechanisms, such as the Carbon Border Adjustment Mechanism (CBAM), designed to ensure its external coherence.

The first pillar of European climate policy is represented by the Emissions Trading System (ETS), established by Directive 2003/87/EC and operational since 2005. This system, based on the “polluter pays” principle and the “cap and trade” logic, introduced a European greenhouse gas emissions market for the first time, establishing itself as the foundational instrument of EU climate law (Carbon Markets, 2025). The ETS establishes an overall maximum cap on permitted emissions for energy-intensive and industrial sectors, dividing this limit into tradable emission allowances. Each allowance permits the emission of

one tonne of CO₂ equivalent; companies that emit less than their allocated allowances can sell the surplus, whereas those that exceed their amount must purchase additional allowances on the market. Emission reduction is thus pursued through a pricing mechanism that economically incentivises decarbonisation and technological innovation.

From a legal perspective, the ETS represents a hybrid between administrative and economic law. Emission allowances possess the nature of intangible public-origin assets, granted on the basis of an authorisation, yet they are subject to free negotiation on the market (Amici, 2025). This dual character – public in creation and private in circulation – makes the ETS a model of a “regulated pollution market” wherein the function of the law is to define the perimeter and rules of economic activity without relinquishing the protection of the general interest. Subsequent reforms have progressively refined the system: Directive 2009/29/EC expanded the number of covered sectors and introduced auctioning mechanisms for allowances; Directive (EU) 2018/410 established the Market Stability Reserve (MSR), aimed at managing the quantity of allowances in circulation to stabilise prices. The most recent reform, introduced by Directive (EU) 2023/959, has raised the climate ambition of the ETS by setting an emission reduction target of 62% by 2030 compared to 2005 levels, extending the scope to maritime transport sectors and, from 2027, to fuels for heating and road transport (ETS 2), as well as providing for the gradual phasing out of free allowances and the obligation for Member States to allocate 100% of auction revenues to climate-related measures.

The effectiveness of the system is corroborated by data: between 2005 and 2022, emissions from regulated sectors fell by more than 40%, while the average price of CO₂ increased, indicating the market's enhanced capacity to incorporate environmental costs. The ETS therefore constituted the necessary prerequisite for the subsequent development of more ambitious policies: only thanks to the experience gained in managing a European emissions market was it possible to conceive the European Green Deal as a political project of economic transformation.

The European Green Deal, announced by the Commission in December 2019, is not a single legislative measure, but a coherent set of sectoral strategies, regulations, and financial programmes geared towards the objective of climate neutrality by 2050. It aims to integrate environmental policies with industrial, energy, and social ones, acting as a sustainable development strategy based on technological innovation, energy efficiency, and social inclusion. Among its most significant components are the Biodiversity Strategy for 2030, the “Farm

to Fork” Strategy, the Circular Economy Action Plan (COM(2020) 98), the Chemicals Strategy for Sustainability, and the Hydrogen Strategy and Energy System Integration Strategy. The logic underpinning the Green Deal is that of systemic coherence: each measure contributes to the same objective of reducing emissions and transforming the European economy.

The legal framework for these strategies is provided by the European Climate Law (Regulation (EU) 2021/1119), which makes the targets of reducing emissions by at least 55% by 2030 and achieving climate neutrality by 2050 legally binding. It provides for a multi-level governance system, based on cycles of monitoring and periodic review, through which the Commission assesses the consistency of Member States’ policies with the European emission reduction trajectory. Furthermore, the law establishes that European and national institutions must adopt measures consistent with the long-term objective and defines a “right to climate consistency” that binds public action in all its components (Delle Cave, 2025). The principal innovation introduced by this legislation is the juridification of the political objective: climate neutrality is no longer a programmatic commitment, but an obligation of result that binds the institutions to keep the Union on a trajectory compatible with the Paris Agreement.

Within the context of this new regulatory architecture, the ETS continues to represent the main operational instrument for reducing internal emissions, whilst the Carbon Border Adjustment Mechanism (CBAM), established by Regulation (EU) 2023/956, constitutes its external complement. The CBAM was created to prevent emission reductions achieved within the Union from being offset by the relocation of production to third countries with less stringent environmental standards – a phenomenon known as carbon leakage. It aims to ensure that products imported into the European market incur a carbon cost equivalent to that imposed on European producers, thereby preserving the competitiveness of EU industry and the overall effectiveness of climate policy (Amici, 2025).

The operation of the CBAM is divided into two phases: a transitional phase (from 1 October 2023 to 31 December 2025), during which importers of goods in the sectors concerned – steel, cement, aluminium, fertilisers, electricity, and hydrogen – are required to submit quarterly reports on embedded emissions without direct financial obligations; and a definitive phase, starting from 1 January 2026, which introduces the obligation of an annual declaration and the surrender of CBAM certificates in a number proportional to the tonnes of CO₂ equivalent embedded in the imported products. Each CBAM certificate corresponds to one tonne of CO₂ equivalent, and its price is aligned with the weekly average price of ETS allowances, thus ensuring consistency between the

two systems. If a carbon price is already applied in the country of origin of the imported goods, the value of that price is deducted to avoid double pricing. Importers will have to register with a competent national authority and purchase the certificates through an electronic registry, submitting their verified emissions declaration by 31 May each year.

The CBAM is not protectionist in nature, but corrective: its purpose is to maintain the environmental effectiveness of the ETS system whilst simultaneously incentivising third countries to adopt comparable carbon pricing policies (Vivoli, 2025; Fidato, 2024). However, its introduction raises complex issues in terms of international law and global climate justice. From the perspective of compatibility with the WTO rules, the Union maintains that the CBAM complies with Article III of the GATT 1994, as it does not discriminate between domestic and imported products, treating differently only goods with varying carbon content, and that, in any case, it could be justified under the environmental exceptions of Article XX, letters (b) and (g). Nevertheless, several developing countries perceive it as a unilateral instrument that could penalise their exports.

On a substantive level, the most significant debate concerns the compatibility of the CBAM with the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC), enshrined in Article 3 of the United Nations Framework Convention on Climate Change and reaffirmed by the 2015 Paris Agreement. This principle recognises that the historical responsibilities and economic capabilities of States are not uniform, and that therefore emission reduction obligations must be modulated in a differentiated manner. By applying a uniform carbon price to all imports, the CBAM risks failing to account for this diversity (Vivoli, 2025; Fidato, 2024). The *de minimis* clause provided for in the regulation mitigates, but does not resolve, this critical issue, as it merely excludes low-value imports without introducing differentiation criteria based on the level of development of exporting countries.

From a systemic perspective, the CBAM and the ETS operate in a complementary manner: the former regulates internal emissions, while the latter extends the logic of carbon pricing to the borders. The Green Deal, for its part, provides the political and legal framework that integrates them. This multi-level articulation constitutes one of the distinctive features of European climate governance, in which the economic and environmental dimensions converge.

It should also be noted that, alongside these market-based instruments, European climate policy encompasses complementary strategies for adaptation, biodiversity protection, and the circular economy. The EU Strategy on Adaptation to Climate Change (2021), for instance, aims to build a climate-resilient society by 2050,

promoting the dissemination of climate data, the integration of adaptation into public policies, and the use of nature-based solutions. The Biodiversity Strategy for 2030 aims to protect at least 30% of Europe's land and seas and to restore degraded ecosystems, recognising biodiversity as an essential component of climate resilience (Delle Cave, 2025). Finally, the Circular Economy Action Plan (COM(2020) 98) proposes to reduce the EU's dependence on primary resources and to promote sustainable production and consumption models, strengthening industrial competitiveness through innovation and waste reduction (Delle Cave, 2025).

Together, these policies outline a coherent system in which emissions mitigation (ETS and CBAM), climate change adaptation, biodiversity protection, and the circular economy combine to build a more sustainable, resilient, and socially equitable European economy. The Union has, therefore, progressively transformed its environmental policy into a comprehensive climate policy, where economic instruments serve an objective of environmental justice.

This evolution bears witness to the consolidation of a regulatory trend in which climate protection is elevated to an ordering principle of public action and a limit to institutional discretion.

V. Climate justice and just transition in Europe

The European transition to climate neutrality is not only a technological and economic transformation, but also a distributive challenge and a question of fairness. Policies that mandate changes in energy systems, industrial structures, and consumption patterns inevitably generate a reallocation of costs and benefits across households, workers, firms, and territories. In this sense, "climate justice" in the European context can be read as the political demand that decarbonisation be pursued fairly, by preventing disproportionate burdens on those who are least able to adapt, and ensuring meaningful participation and recognition of groups whose livelihoods and identities are dependent on carbon-intensive activities.

This is highlighted in the 2019 communication from the European Commission widely known as the "European Green Deal" (COM(2019) 640), in which it is pointed out that the transition will be a successful one only if it is conducted in a "fair and inclusive way".

Against this background, the EU's concept of "just transition" can be understood as a set of principles and instruments aimed at ensuring that Europe's ambitious climate policy does not erode social inclusion and regional development. Thus,

the EU integrates the commitments stated in the Preamble of the Paris Agreement, which posits a transition that takes into account “the imperatives of a just transition of the workforce and the creation of decent work and quality jobs”. In the EU context, that framing – emphasized in the “European Climate Law” (Regulation (EU) 2021/1119), which mandates “the need to ensure a just and socially fair transition for all” - has been translated into concrete financial mechanisms.

V.1. The Just Transition Mechanism and the Social Climate Fund

The EU's Green Deal main investment programme for the implementation of “place-based” transition support is the Just Transition Mechanism (JTM). Designed to reduce the socio-economic disruptions of decarbonisation in the most affected regions, the JTM is expressly framed as a fairness tool – ensuring that the transition towards a climate-neutral economy “happens in a fair way, leaving no one behind”.

The mechanism aims to provide financial support to i) people that are most vulnerable to the transition; ii) sectors and firms operating in carbon-intensive industries; iii) Member States and regions that are still dependent on fossil fuels (such as coal, lignite, peat, oil shale, and certain heavy industrial clusters) and carbon-intensive industries (Colli, 2020).

The JTM is built on three pillars.

The first one is the Just Transition Fund (JTF), established by Regulation (EU) 2021/1056. The Fund provides grants to support territories facing “serious socio-economic challenges” deriving from the transition to the EU's 2030 targets for energy and climate, and climate neutrality by 2050. The Regulation requires Member States to submit “territorial just transition plans”, that identify the regions affected by the transition and propose measures to mitigate adverse effects.

The second one is a dedicated Just Transition scheme under InvestEU, that aims to leverage public funding to attract private investments for projects planned in regions with approved transition plans, with the aim of decarbonising energy infrastructures and diversify the production of clean energy.

Lastly, the third one is The Public Sector Loan Facility (PSLF), created by Regulation (EU) 2021/1229, which combines EU budget grants with loans from financing partners to support public investments in territories that may lack bankable revenue streams (Terrana et al., 2025).

This three-pillar structure is designed to reflect and tackle the plurality of transition needs. For certain regions and industrial sectors, a just transition requires

systemic restructuring of local economic ecosystems: public infrastructure (e.g., district heating retrofits, brownfield remediation, public transport), SME support and innovation ecosystems, skills and employment measures, and social services.

At present, the core of the Just Transition Mechanism is the Just Transition Fund. JTF's resources are linked to the preparation of territorial transition strategies, known as Territorial Just Transition Plans (TJTPs). These plans identify the territories that – being dependent on carbon-intensive industries - are most negatively impacted by the transition (for example, in terms of job losses and depopulation risks), and describe the activities aimed at mitigating the negative effects, such as reskilling of workers or economic diversification.

It is important to highlight that the JTF Regulation, with the aim to ensure the participation of all the relevant stakeholders and actors - both public and from civil society - in the drafting of the TJTPs, refers to the rules established for the multi-level governance in the so called Common Provisions Regulation (Regulation on Common rules on EU funds 2021/1060, art. 8). This means that Member States, in the preparation and implementation of the TJTPs, must involve public authorities on the regional and local level, economic and social partners, all relevant civil society stakeholders (such as environmental partners, NGOs, etc.), and research entities and universities.

This provision aims to ensure procedural participation through consultation and social dialogue, to include all relevant actors of the affected communities, therefore strengthening legitimacy.

While the JTM is predominantly a structural, place-based instrument, the Social Climate Fund (SCF) aims to prevent increases in energy costs as an effect of carbon pricing policies regarding buildings and road transport sectors.

The SCF was established by Regulation (EU) 2023/955 for the period 2026–2032 and entered into force in June 2023. It is closely linked to the creation of a new emissions trading system —often referred to as ETS2, introduced by amending Directive 2003/87/EC through Directive (EU) 2023/959 — covering emissions in buildings and road transport. The European Commission explains that ETS2 is designed as a “cap and trade” system that becomes fully operational in 2027.

Precisely because ETS2 is expected to raise end-user prices indirectly, the SCF functions as a counter-regressive instrument. Specifically, it supports Member States in assisting vulnerable households, micro-enterprises and transport users, through three main lines of intervention: i) temporary direct income support; ii) measures and investments aimed at increasing energy efficiency and the decarbonisation of heating and cooling of buildings; iii) measures and investments targeted at improving access to low-emission mobility and transport.

The Regulation provides that each Member State must submit a Social Climate Plan (SCP) to access funding. The plans detail measures and investments, with milestones and targets that condition disbursements (Jüngling et al., 2025). This planning approach is significant, because it is focused not only on temporary income support for vulnerable groups, but also on structural intervention, by financing medium-to-long-term measures (e.g., building renovation, clean heating, low-emission mobility, improved public transport) that help reduce vulnerability over time.

SCPs must also consider territorial vulnerabilities (e.g., rural, insular, peripheral, mountainous, and less developed areas), to develop measures that are geographically targeted.

Both the JTF and the SCF aim to provide support for a just transition in the EU, by offering financial support to regions in the EU undergoing significant socio-economic challenges due to decarbonisation. JTF is more focused on providing place-based structural aid, by addressing regional economic restructuring, employment impacts, and local development challenges in carbon-dependent territories. SCF, on its part, is focused on counteracting the regressive effects of carbon pricing, thus focusing more on Small and Medium-sized Enterprises (SMEs) and households, by addressing the day-to-day cost impacts of decarbonisation policies, especially those linked to carbon pricing for buildings and mobility. The main difference lies in the reimbursement process and the territorial level of intervention. Where the JTF is subject to the Common Provision Regulation (thus following the same rules applicable to European Regional Development Fund (ERDF), the European Social Fund Plus (ESF+), and the Cohesion Fund), following a cost-based reimbursement approach, for the SCF (similarly to the Recovery and Resilience Facility system) expenditures are reimbursed upon the achievement of milestones and targets. For the level of the intervention, while the JTF provides support to eligible Nomenclature of Territorial Units for Statistics (NUTS)-3 areas (which correspond to small regions, such as provinces), the SCF allocates funding to Member State level (Rubio et al., 2024).

V.2. Vulnerable regions and workers' inclusion

In European climate governance, “vulnerability” in the transition context is multi-dimensional. It includes exposure to industrial decline, labour market fragility, energy poverty, transport poverty, and demographic or territorial disadvantages (e.g., rurality, peripherality, ageing). The EU's focus on coal and

carbon-intensive regions is targeted to territories where decarbonisation policies can generate job losses and fiscal shocks. The Commission's "Coal Regions in Transition" workstream explicitly frames its mission as supporting a just transition in coal and carbon-intensive regions.

However, transition vulnerability extends beyond coal regions. The shift to electrification, clean hydrogen, and circular industrial processes can reshape competitiveness across many industrial clusters. Regions dependent on energy-intensive manufacturing, long-distance commuting, or poorly insulated housing stock may face significant transition costs even without a coal legacy. This helps explain why the SCF targets not only households, but also micro-enterprises and transport users who are vulnerable to the indirect price impacts of ETS2.

Regarding jobs and workers, three dimensions are particularly important.

First, transition policies must address skills and employability, to avoid wage scarring, skill mismatch, and long-term exclusion, that can occur if reskilling pathways are not accessible and aligned with real labour demand. The JTF's mandate therefore logically includes support for people and economies facing transition challenges, which encompasses training, reskilling, job-search support, and entrepreneurship measures.

Second, transition strategies should safeguard decent work. The International Labour Organization's guidelines on just transition emphasise that transition strategies should promote decent jobs, social protection, and social dialogue (ILO, 2015). If new "green jobs" are precarious, low-paid, or unsafe, the transition may reproduce inequality under a different label.

Third, a just transition requires procedural inclusion through social dialogue. Workers and unions are not to be intended merely as beneficiaries. It is, therefore, important to adopt a participatory approach to reduce the risk that transition plans turn out as top-down and disconnected from the territorial needs. Under the cohesion policy framework, multi-level governance principles – such as those provided in the Common Provision Regulation, that apply to the preparation of the Territorial Just Transition Plans - provide a procedural channel for such inclusion, but effectiveness varies depending on national context and administrative capacity.

Beyond employment, the concept of vulnerability is increasingly discussed through the prism of energy poverty and access to essential services. The European Pillar of Social Rights (Principle 20) explicitly recognises a right to access essential services of good quality, including energy and transport, with support available for those in need. This "social rights" framing positions energy and mobility as prerequisites for dignity, social inclusion, and the exercise of other fundamental rights, such as the right to health, education, participation in social life.

In 2023, the Commission adopted a Recommendation on energy poverty, and related guidance highlights the multi-causal character of energy poverty — typically combining low income, high energy bills, and low energy efficiency — and encourages action across governance levels (Recommendation (EU) 2023/2407). The document highlights that National Energy and Climate Plans (NECPs) and Social Climate Plans offer important opportunities to integrate energy poverty measures systematically into climate governance.

In this context, measures financed by the SCF — such as targeted renovation support, clean heating deployment, and affordable mobility alternatives — are aimed at safeguarding fundamental rights of vulnerable subjects, such as families in conditions of energy poverty, micro-enterprises, vulnerable users of transport. It is also significant that Recital n. 24 of the Regulation explicitly refers to groups such as persons with disabilities, women, single mothers, people at risk of child poverty, elderly people, etc. (Mezei, 2024).

V.3. Solidarity and territorial cohesion in the transition

Academic legal analysis highlights that Article 194(1) frames solidarity as a guiding principle in EU energy policy (Kaschny, 2023). EU case law has further strengthened the concept of energy solidarity, as a principle relevant to decision-making in the energy field, signalling that solidarity can have legal substance beyond purely political declarations (Case C-848/19).

Energy solidarity helps frame the transition as a shared European undertaking rather than a mere aggregation of national strategies. In parallel, the EU's ability to pursue ambitious climate policy must account for territorial cohesion and the reduction of regional disparities. Territorial cohesion is, in fact, embedded in EU primary law. Article 174 TFEU commits the Union to promote harmonious development, strengthen economic, social and territorial cohesion, reduce disparities between regions, and address the challenges of regions with specific disadvantages.

Climate and energy policy affects territorial cohesion in two directions. On the one hand, decarbonisation can exacerbate regional inequality if high-carbon regions lose jobs and fiscal bases faster than they can diversify. On the other hand, the transition can become a cohesion opportunity when public investment supports new infrastructures, skills, and industries in lagging regions. The JTF's integration within the cohesion policy framework, and its coordination with other funds such as the ERDF, ESF+ and Cohesion Fund, reflects the EU's effort to embed the just transition principle into its cohesion policy (Arabadjieva et al., 2024).

A key point is that solidarity and territorial cohesion rely on multi-level governance capacity. Cohesion policy rules emphasise partnership and multi-level governance as implementation principles, which – when effectively applied – can translate solidarity into locally accepted solutions. This is particularly relevant for a “just transition”, because local conditions vary widely: the needs of a former coal-mining region differ from those of a remote rural area struggling with transport poverty, even if both face vulnerability to transition costs.

The Commission’s Recommendation on energy poverty (EU) 2023/2407 therefore stresses the importance of identifying and tackling energy poverty through planning instruments, including National Energy and Climate Plans (NECPs – provided in Regulation (EU) 2018/1999, so called “Governance of the energy union”) and Social Climate Plans (SCPs). Both the SCF and Governance of the energy union Regulations lay down rules to ensure public participation, by requiring Member States to provide the public with early and effective opportunities to participate in the preparation of the draft plans, to inform the public and set reasonable timeframes for participation, and – specifically for SCPs – to conduct a public consultation with local and regional authorities, economic and social partners, civil society and youth organisations, and to include a summary of the consultation explaining how stakeholders’ input is reflected in the Plan.

In conclusion, the EU’s climate ambition – from 2030 targets to the emerging 2040 framework – will have a significant social impact across regions, activities and people. The EU’s legal and financial architecture attempts to pre-empt and cushion such conflicts through a layered system. Alongside primary-law commitments to territorial cohesion (Article 174 TFEU) and solidarity as a guiding principle in energy policy, key financial mechanisms support the “just transition”. These include the three pillars of the Just Transition Mechanism (JTF, InvestEU, PSLF), which provide structural support to affected territories through planning-based implementation; and the Social Climate Fund, which aims to prevent increases in transport and energy costs – and absorb potential price shocks – linked to ETS2.

From a climate justice perspective, these instruments should be assessed not only in terms of budgets or formal compliance but also by outcomes: whether they reduce inequalities, enable dignified livelihoods, and ensure that those most affected by the transition can participate in shaping it. The EU approach is thus best understood as a developing constitutional practice: embedding climate ambition in law while simultaneously constructing solidarity-based safeguards to sustain democratic legitimacy and social cohesion.

VI. Rights, participation, and climate citizenship

An important aspect of the EU's environmental and climate policies is the introduction of environmental democracy tools that must allow citizens, both as individuals and as organized groups, to intervene in the processes of developing environmental legislation and administrative acts that manage environmental risks.

These institutions were established in general terms by the 1998 Aarhus Convention, which regulated the so-called procedural rights: the right of access to environmental information, which guarantees the right of citizens to receive environmental information held by public authorities; the right of citizens to participate in proceedings leading to the adoption of binding environmental decisions; and the right of access to justice, which guarantees interested parties or environmental NGOs the right to appeal to judicial or administrative bodies if the first two rights are violated or if environmental regulations are not correctly applied (Gullo, 2021).

These important indications have found a particularly open context in European law, where the need for implementation has also emerged due to the EU's accession to the Aarhus Convention.

The prospect of broad citizen and government involvement in European policies is strongly guaranteed by Article 41 of the Charter of Fundamental Rights, which recognizes the right to good administration and establishes the legal conditions for the impartial and fair exercise of European administrative functions, drawing on various instruments of national administrative law.

As regards the right of access to environmental information, which is a prerequisite for any informed participation, the Union has adopted Directive 2003/4/EC of 28.1.2003 on public access to environmental information and repealing Council Directive 90/313/EEC, the provisions of which, as clarified by the Court of Justice, must be interpreted in such a way as not to produce "a dissuasive effect on persons seeking to obtain information" and do not limit the right of access (C. giust. ., 6.10.2015, C-71/14, *East Sussex County Council c. Information Commissioner and Others*).

For Union institutions (such as the Commission or the Council), the obligations of the Convention are implemented through Regulation (EC) No. 1367/2006, recently updated to further facilitate access to justice for environmental NGOs.

This discipline lays the foundation for recognizing a strategic role for citizens and NGOs as guardians of environmental legality, which also impacts climate litigation, which responds to the need to ascertain the responsibilities of the state or large economic companies, in light of the value of climate justice.

VII. The EU as a global actor in climate justice

Over recent decades, the increasingly severe consequences of climate change have made global-scale responses necessary.

This has generated progressively more complex challenges that, stemming from the environmental transition, have come to affect the balance of international relations and the dynamics of geopolitical competition. Within this context, the EU has been gradually developing models of action through which it seeks to assume a leading role in addressing the critical issues posed by the ongoing climate crisis, drawing on multilateralism and on sustainable development paradigms grounded in advanced rules and standards. These objectives, however, encounter structural constraints and growing tensions, particularly in relations with countries of the Global South, where European and international policies are at times perceived as asymmetrical, conditional, and potentially neo-protectionist.

A pressing need therefore emerges – one which the EU itself must also confront – to develop strategies, negotiations and foreign policy instruments which, taken together, constitute so-called “climate diplomacy” or “green diplomacy”, and which can shape global climate governance. This is necessary to align the ambitions of the *Green Deal* with international economic and geopolitical dynamics.

In this sense, European climate diplomacy is not confined to a purely “values-based” dimension inspired by sustainability. It also takes the form of a genuine strategy for international positioning. Climate thus becomes a space of both competition and cooperation, in which economic interests (industrial competitiveness, innovation and technological leadership), security concerns (including the need to reduce forms of energy dependence), and regulatory objectives of global scope become intertwined.

For the sake of analytical clarity, the discussion will be confined to two distinct instruments, whose operation is, in practice, closely interlinked. These are: the role played by the international dissemination of European environmental regulatory models; and the use of financial leverage.

One of the most distinctive aspects of the EU’s external action is its ability to exert influence through norms and regulation.

This phenomenon is often referred to as the “*Brussels Effect*”: by virtue of the weight of the single market in international trade, the Union is able to export global standards without resorting to traditional coercive instruments, which would be difficult to implement in this context. It is clear, for instance, that

multinational companies seeking access to the European market tend to comply with EU rules, creating a cascading effect, as it is often economically more efficient for firms to standardise production according to a single set of rules rather than manage different regimes for different markets.

In this way, the EU effectively shapes the behaviour of external economic actors, turning its internal policies into instruments of global governance. Indeed, European rules on supply chain sustainability, deforestation, industrial emissions, and energy products directly influence global value chains, imposing specific requirements for transparency and decarbonisation.

These dynamics, however, are not without problematic implications. They may limit the effectiveness of the mechanisms outlined above and bring their more controversial features into sharper relief. Legal instruments such as the *Green Taxonomy* – the classification system through which the EU determines which economic activities may be regarded as environmentally sustainable – or the *Carbon Border Adjustment Mechanism* (CBAM) – which seeks to impose a “carbon cost” on imports of certain emissions-intensive products in order to prevent so-called “carbon leakage” – are certainly intended, inter alia, to incentivise decarbonisation also among actors outside the European market.

But these measures may be perceived as forms of “green protectionism”, particularly in countries of the Global South. This is due both to the high costs associated with the technologies required to comply with European standards and to the fact that European policy choices may not be fully aligned with the environmental, political, economic and social conditions of other contexts. Moreover, such instruments may carry the risk of triggering dynamics akin to neo-colonialism, whereby European rules come to shape – if not effectively determine – the development strategies of poorer countries.

The EU's green diplomacy also rests on the strategic use of financial leverage.

It is worth recalling that all Parties to the Paris Agreement have undertaken to align their financial flows with pathways towards reducing greenhouse gas emissions and fostering climate-resilient development. In this context, the EU, its Member States and the European Investment Bank (EIB) have operationalised these commitments, and today stand among the world's leading providers of public climate finance for developing economies.

These initiatives are intended to help narrow the divide between the Global North and the Global South, a divide that is not only economic, but also deeply rooted in history and politics. The bulk of the cumulative emissions that have driven the current climate crisis originates from industrialised countries, while many of the regions most exposed to climate impacts are located in the Global South.

This is precisely the rationale underpinning the notion of “climate justice”, according to which the responsibility to act – and to bear the costs of the transition – should be commensurate with historical responsibility and economic capacity. It should also be acknowledged that, in many countries, the climate imperative coexists with other equally urgent priorities, such as economic development, poverty reduction, access to energy, and socio-political stability.

In this context, the EU’s approach is broadly twofold. First, it delivers grant-based support directly to the poorest and most climate-vulnerable countries. Secondly, it deploys public funding in order to crowd in private capital.

This strategy is clearly reflected in a range of concrete initiatives.

For instance, the EU and its Member States have established blending instruments that combine grants with loans, covering multiple regions.

Within this framework, the “*European Fund for Sustainable Development*” (EFSD) plays a central role as one of the EU’s main external financial instruments. It supports international partnerships and mobilises both public and private investment in the EU’s neighbouring countries as well as in African states.

As previously noted, the EFSD encompasses grants provided through blending instruments, as well as technical assistance designed to help partner countries improve project quality, implement reforms, and provide guarantees to both European and non-European financial institutions, as well as to the local private sector.

There are also instances in which the EU works with other international partners in order to advance the development of sustainable finance.

A particularly illustrative example is the “*International Platform on Sustainable Finance*” (IPSF), established in 2019 with the aim of strengthening the mobilisation of private capital towards sustainable investments. The IPSF – which includes, inter alia, Argentina, Canada, Chile, China, India, Kenya, Morocco and Japan – provides a multilateral forum for dialogue among policymakers responsible for developing regulatory frameworks on sustainable finance. Its purpose is to assist investors in identifying and seizing investment opportunities capable of making a tangible contribution to climate and environmental objectives.

The EU also makes a direct contribution to other international climate funds aimed at channelling financial resources to developing countries in support of climate action.

As early as 2010, the “*Green Climate Fund*” was established to assist developing economies in reducing greenhouse gas emissions and adapting to the impacts of climate change. By 31 May 2024, EU Member States had contributed nearly USD 8.95 billion to the Fund.

Another notable example is the “*Fund for Responding to Loss and Damage*”, established in 2022 to support particularly vulnerable developing countries in addressing losses and damages resulting from the impacts of climate change. The EU and its Member States led the initial capitalisation of this Fund, contributing over €400 million, more than two-thirds of the initial funding commitments.

Finally, the “*Adaptation Fund*” supports developing countries in adapting to climate change. It is largely financed through voluntary contributions from certain EU Member States and regions, which together account for approximately 95% of the Fund. At COP26 in 2021, the European Commission announced a €100 million contribution to the Adaptation Fund, of which €50 million has already been disbursed to date.

VIII. Conclusions: towards multi-level climate justice

The European Union's experience in the field of climate governance represents, within the contemporary architecture of supranational public law, one of the most significant expressions of normative and social integration known to the supranational legal order. The progressive transformation of the European project from an initial economic community into a political and legal construct oriented towards sustainability marks, indeed, an epochal shift in the very conception of integration: from mere economic cooperation to a legal order endowed with its own objectives and an axiological corpus centred, *inter alia*, upon environmental protection, climate justice, and intergenerational solidarity.

Indeed, the environmental dimension, initially subsidiary to market objectives, has progressively established itself as an ordering criterion of the Union's action, permeating every sector of governance. This is by virtue of the environmental integration principle enshrined in Articles 11 and 191 of the Treaty on the Functioning of the European Union, according to which environmental protection requirements must be integrated into the definition and implementation of the Union's policies, with a view to promoting sustainable development. This principle, far from constituting a mere stylistic clause, has progressively acquired systemic significance within the Union's legal order, becoming a guiding parameter for normative and political action and contributing to the gradual evolution of EU law towards a more coherently ecological and sustainable dimension.

The case law of the Court of Justice has played a decisively consolidating role in this evolution, enhancing the binding nature of the principles of prevention, precaution, and the “polluter pays”, whilst recognising the environment as

a fundamental public interest of the Union. In effect, jurisprudential development has progressively clarified that environmental protection does not constitute a derogation from economic freedoms, but rather an intrinsic component of their legitimate exercise. In this way, EU law has successfully combined the promotion of the internal market with the need for environmental protection, achieving a dynamic equilibrium between economic competitiveness, social cohesion, and the safeguarding of the common natural heritage.

In this regard, the European Union constitutes a peculiar model of normative and social integration. The legal dimension intersects with the political and solidaristic ones, giving rise to a governance system that, whilst founded on uniform rules, allows margins for adaptation to territorial specificities. The combination of uniformity and differentiation, as expression of the principle of subsidiarity, allows unity of direction to be balanced with the plurality of national experiences, thereby strengthening the overall legitimacy of the integration process.

Furthermore, the Union does not limit itself to regulating environmental protection in a technical sense, but makes it the linchpin of a policy of social transformation, aimed at ensuring that the transition towards climate neutrality occurs in accordance with equity and territorial cohesion. Instruments such as the *Just Transition Mechanism* and the *Social Climate Fund* translate the principle of solidarity into legal terms, ensuring that the burdens of the transition are distributed proportionately and that the most exposed regions and workers receive adequate support.

In this context, the *European Green Deal* and the *European Climate Law* constitute the foundation of a renewed regulatory architecture, conferring binding status upon the objective of climate neutrality by 2050. These are instruments that do not merely serve a policy-guiding function, but rather outline a veritable legal framework for the transition, binding European institutions and Member States to a gradual and verifiable decarbonisation pathway. What ensues is a legal order in which climate policy is configured as a cross-cutting policy, destined to permeate all areas of intervention, from energy to transport, and from agriculture to sustainable finance, following a logic of horizontal integration aimed at ensuring regulatory coherence and socio-economic cohesion (De Vincenti, Macchiati, Ranci, 2025).

Nevertheless, the full implementation of this legal framework encounters challenges of considerable complexity. Economic and structural divergences between Member States, varying administrative capacities, and territorial asymmetries affect the concrete effectiveness of European policies. Therefore, the coming decade will be crucial in verifying the Union's capacity to translate its

normative ambition into measurable results, ensuring an equitable distribution of the costs and benefits of the ecological transition.

From another perspective, the achievement of climate objectives will need to be reconciled with the necessity of safeguarding the competitiveness of the European economy and the social sustainability of the measures adopted. In this sense, the effectiveness of EU law will depend upon its suitability to maintain an equilibrium between the binding nature of its rules and their adaptability to differing national conditions, whilst simultaneously preventing fragmentation from compromising the uniformity of the common legal framework.

Even in its external projection, the Union is called upon to perform a delicate balancing act. Its international climate leadership, recognised in multilateral fora and confirmed by the commitments undertaken under the Paris Agreement, demands coherence between internal objectives and external policies. Instruments such as the *Carbon Border Adjustment Mechanism*, although geared towards preventing carbon leakage and promoting fair competition, must be managed carefully to avoid discriminatory effects or perceptions of green protectionism. To maintain its credibility, the Union must continue to promote equitable partnerships with third countries, particularly those in the Global South, by enhancing technical and financial cooperation and fostering a genuinely multilateral approach to climate justice.

In close connection with these aspects, the participatory dimension is of growing importance. Climate justice, in fact, cannot be realised without the effective inclusion of citizens and civil society in decision-making processes. The European legal order recognises and protects the right of access to environmental information, public participation in decision-making, and access to justice, in implementation of the principles enshrined in the Aarhus Convention (Gullo, 2021). These instruments, if effectively implemented, contribute to strengthening the democratic legitimacy of climate policies and to consolidating European climate citizenship, founded upon an awareness of rights and co-responsibility in protecting the common environmental good. Participation, therefore, does not assume a merely procedural value, but is configured as a substantive condition for the effectiveness of climate justice, as it allows the technical requirements of governance to be balanced with grassroots social demands.

Moreover, these elements enable the delineation of a conception of European climate justice as a multi-level process, wherein different levels of government (local, national, supranational, and global) cooperate within a logic of progressive integration. The Union, owing to its institutional structure and capacity for regulatory coordination, stands at the crossroads of these interactions, serving as

a connecting point between internal policies and international commitments. Multi-level climate justice is not, therefore, configured as an abstract category, but rather as a concrete modality of exercising governance, which reflects the very essence of the European integration method: a method founded upon co-operation, solidarity, and the balance between unity and diversity (Contaldi, Cossiri, Feliziani, Gambino, Marongiu Bonaiuti, 2025).

In conclusion, the European Union today faces a decisive phase in its institutional evolution. The realisation of climate neutrality and the effectiveness of climate justice represent not only environmental objectives, but also criteria for the political and legal legitimation of the entire integration project. The Union's capacity to maintain coherence between normative ambition and practical implementation will constitute the parameter by which to measure the maturity of its legal order and the solidity of its identity. European climate justice, understood as a synthesis of equity, sustainability, and participation, is therefore configured as a qualifying element of EU law, destined to have a lasting impact upon its material structure and future development, orienting European construction towards a model of legal civilisation founded on shared responsibility and the effective protection of the common environmental good.

Bibliography

- Adam, R., Tizzano, A., *Manuale di diritto dell'Unione europea*, Torino, 2023, p. 755 ss.
- Axelrod, R.-Van Deveer, S., *The Global Environment: Institutions, Law and Policy*, Los Angeles, 2015
- Alessi, L., Battiston, S., Melo, A.S., & Roncoroni, A. (2019). The EU Sustainability Taxonomy: a Financial Impact Assessment. *Publications Office of the European Union*. <https://data.europa.eu/doi/10.2760/347810>
- Amadeo, S. (2014). Titolo XX Ambiente – Artt. 191-192-193, In Tizzano, A. (a cura di), *Trattati dell'Unione europea* (pp. 1616-1650). Editoriale Scientifica
- Amici, F. (2025). Carbon Markets, quote di emissione e Carbon Credit Derivative Contracts. *Rivista giuridica AmbienteDiritto.it*, 3, 1-16

- Arabadjieva, K., Galgoczi, B., & Melkebeke, T. V. (2024). Just Transition governance. *Boosting Participation in the Energy Transition*, 6
- Bonomo, A. (2023). *Il potere del clima*. Cacucci Editore
- Borghesi, G., Giudice, F., Imbriani, C., & Morone, P. (2022). The EU sustainable finance strategy: some perspectives on climate diplomacy. *La comunità internazionale*, 3, 465-492
- Born, A., Giuzio, M., Lambert, C., Salakhova, D., Schölermann, H., & Tamburrini, F. (2021). Towards a green capital markets union: developing sustainable, integrated and resilient European capital markets. *Macroeprudential Bulletin – ECB*, 15. https://www.ecb.europa.eu/press/financial-stability-publications/macprudential-bulletin/focus/2021/html/ecb.mpbu_focus202110_3.en.html
- Chiti, E. (2021). Verso una sostenibilità plurale? La forza trasformatrice del Green Deal e la direzione del cambiamento giuridico. *Rivista Quadrimestrale di diritto dell'ambiente*, n. 3, pp. 130-147
- Colli, F. (2020). The EU's Just Transition: three challenges and how to overcome them. *European Policy Brief*
- Contaldi, G., Cossiri, A., Feliziani, C., Gambino, F. Marongiu Bonaiuti, F. (a cura di) (2025). *Studi in tema di cambiamento climatico e giustizia climatica*. Editoriale Scientifica
- Corso, G. (2026). La valutazione del rischio ambientale, In Rossi, G., Fari, A. (a cura di), *Diritto dell'ambiente* (pp. 415-424). Giappichelli Editore
- de Leonardis, F. (2023). *Lo Stato Ecologico*. Giappichelli Editore
- De Vincenti, C., Macchiati, A., Ranci, P. (2025). Energia per l'Europa 2025. In *Astrid Rassegna*, n. 15, pp. 1-50
- Delle Cave, G. (2025). Il Carbon Border Adjustment Mechanism tra attuazione del Green Deal Europeo, mercato e (possibile?) nuova certificazione ambientale. *Rivista giuridica dell'edilizia*, 2, 75-128
- Dell'Anno, P. (2014). *I principi del diritto ambientale europeo e nazionale*. Giuffrè editore
- Delsignore, M. (2022). Codice dell'ambiente e VIA: una disciplina da ripensare? In *Rivista Quadrimestrale di diritto dell'ambiente*, n. 1, pp. 98-119

- Di Martino, C. (2025). Le esigenze di bilanciamento in materia di contrasto al cambiamento climatico: il caso del CBAM. *Sostenibilità transizione ecologica. Giovani ricercatori: innovazione e sostenibilità*, 1, 65-76
- Durán, G.M., Morgera, E. (2013). Commentary on Article 37 of the EU Charter of Fundamental Rights – Environmental Protection. In *Europa Working Papers*, no. 02, <https://doi.org/10.2139/ssrn.2267402>
- European Council (2024). *Council Conclusions on EU Green Diplomacy. EU diplomacy promoting the just and inclusive green transition and supporting the implementation of global commitments*. <https://data.consilium.europa.eu/doc/document/ST-7865-2024-INIT/en/pdf>
- Ferraro, F. (2022). L'evoluzione della politica ambientale dell'Unione: effetto Bruxelles, nuovi obiettivi e vecchi limiti. *AISDUE*, IV, *aisdue.eu*, Sezione "Atti convegni AISDUE", n. 9, 4 gennaio 2022, 170
- Ferraro F. (2023). I grandi principi del diritto dell'Unione europea in materia ambientale. *DPCE online*, Sp-2/2023 Convegno DPCE Caserta 2022, p. 41
- Fidato, C. (2024). Addressing carbon leakage: the Carbon Border Adjustment Mechanism and its challenges under WTO rules and the Paris Agreement. *Rivista giuridica dell'ambiente*, 4, 1197-1227
- Fracchia, F. (2010). *Lo sviluppo sostenibile*. Editoriale Scientifica
- Giordano, A. (2024). *Introduzione alla tutela del clima come bene comune*, Jovane Editore
- Gullo, N. (2021). Procedural Rights on Environmental Law. In Gullo, N. (ed.), *Human Rights and the Environment* (pp. 433-458)
- van Hees, S.R.W. (2014). Sustainable Development in the EU: Redefining and Operationalizing the Concept. *Utrecht Law Review*, <http://www.utrechtlawreview.org>, Volume 10, Issue 2 (May) 2014 | URN:NBN:N-L:UI:10-1-115828, pp. 60-76
- International Labour Organization (2015). Guidelines for a just transition towards environmentally sustainable economies and societies for all. Available at: <http://www.ilo.org/wcmsp5/groups/public/--->

- International Platform on Sustainable Finance (2025). *Annual report 2025*. https://finance.ec.europa.eu/publications/international-platform-sustainable-finance-2025-key-deliverables-including-annual-report_en
- Jacobs, F. *The Role of the European Court of Justice in the Protection for the Environment*, in *Journal of Environmental Law*, Cambridge, 2006, p. 185 ss.
- Jüngling, E., Sgaravatti, G., Tagliapietra, S., & Zachmann, G. (2025). *Making the best of the new EU Social Climate Fund* (No. 14/2025). Bruegel Policy Brief
- Kaschny, L. (2023). Energy justice and the principles of article 194 (1) TFEU governing EU energy policy. *Transnational Environmental Law*, 12(2), 270-294.
- Kenehan, S. (2023). Climate Change and Global Justice. In G. Pellegrino, M. Di Paola (eds.), *Handbook of Philosophy of Climate Change*, Springer Nature Switzerland, pp. 1-16
- Krämer, L., *The Environment and the Ten Commandments*, in *Journal of Environmental Law*, Cambridge, 2008.
- Lo Schiavo, G. (2011). La Corte di Giustizia e l'interpretazione della direttiva 35/2004 sulla responsabilità per danno ambientale; le nuove frontiere. In *Rivista Italiana di Diritto Pubblico Comunitario*, pp. 83-112
- Marletta, M. (2014). Titolo XXI Energia – Art. 194, In Tizzano, A. (a cura di), *Trattati dell'Unione europea* (pp. 1651-1659). Editoriale Scientifica
- Mezei, M. (2024). Transitional justice through the social fund for climate. *Juris Gradibus*, 4, 56-83.
- Pesce, C. (2023). La rilevanza giuridica dell'obiettivo della neutralità climatica nell'Unione europea. *IANUS*, <https://www.rivistaianus.it>, n. 28-2023, pp. 99-120
- Pineschi, L. (2014). I principi del diritto internazionale dell'ambiente: dal divieto di inquinamento transfrontaliero alla tutela dell'ambiente come *common concern*. In Ferrara, R., Sandulli, M.A., *Trattato di diritto dell'ambiente*. Ferrara, R., Gallo, C.E. (a cura di), Vol. I, *Le politiche ambientali, lo sviluppo sostenibile e il danno* (pp. 153-219). Giuffrè Editore

- Porchia, O. (2014). Le politiche dell'Unione europea in materia ambientale. In Ferrara, R., Sandulli, M.A., *Trattato di diritto dell'ambiente*. Ferrara, R., Gallo, C.E. (a cura di), Vol. I, *Le politiche ambientali, lo sviluppo sostenibile e il danno* (pp. 91-152). Giuffré Editore
- Rossi, G. (2026). Parte Generale. In Rossi, G., Fari, A. (a cura di), *Diritto dell'ambiente* (pp. 3-115). Giappichelli Editore
- Rubio, E., Alcidi, C., & Andersson, F. (2024). *EU Cohesion Policy Post-2027: Why and how to enhance flexibility*. CEPS.
- Sachs, J.D., Woo, W.T, Yoshino, N., & Taghizadeh-Hesary F. (2019). Why is green finance important?. *Asian Development Bank Institute*, 917, 1-9.
- Savona, P. (2013). *Il governo del rischio. Diritto dell'incertezza o diritto incerto?* Editoriale scientifica
- Schubert, S.R., Pollak, J., Kreutler, M. (2016). *Energy Policy of the European Union*. Palgrave
- Somosi, S., Megyeri, E. (2022). A Moving Target: Changing Priorities in the Energy Policy of the European Union. *International Journal of Energy Economics and Policy*, 12(4), pp. 542-552
- Terrana, I., De Falco, M., & Sarrica, M. (2025). Depoliticizing the Just Transition? A Discursive Analysis of EU Parliamentary Debates on the Just Transition Mechanism. *Social Sciences*, 14(12), 685.
- Vetrò, F. (2022). Sviluppo sostenibile, transizione energetica e neutralità climatica. *Rivista Italiana di Diritto Pubblico Comunitario*, Anno XXXII, n. 1, pp. 53-104
- Vivoli, G. (2025). Il regolamento CBAM e il principio CBDR-RC: può un meccanismo uniformante conciliarsi con un principio differenziante?. *Rivista giuridica AmbienteDiritto.it*, 4, 1-18.

Part 3

HUMAN RIGHTS AND CLIMATE CHANGE

Characterization of human rights

YULIIA KOVEINO*, YULIIA KAMARDINA*

SUMMARY: I. Evolution of Human Rights framework in the climate alterate contest. II. Evolution of human rights and new human rights of solidarity III. The right to a healthy environment IV. Right to a safe climate V. Intersectionality and climate vulnerability VI. Types of threatened human rights: case analysis and reporting. VI.1. The Right to Life VI.2. The Right to Health VI.3. The Right to Food VI.4. The Right to Water and Sanitation VI.5. The Right to Housing. VI.4. The Right to Water and Sanitation. VI.3. The Right to Food. VI.2. The Right to Health. VI.1. The Right to Life. Bibliography.

I. Evolution of Human Rights framework in the climate alterate contest

Climate change is one of the key global challenges of the 21st century, threatening not only the environment but also human rights. The deepening ecological crisis is transforming the classical concept of human rights, which increasingly integrates the ecological and intergenerational dimensions. In this context, it is important to analyze the evolution of the human rights system under the influence of climate change and identify new trends in the field of international and national law.

Human rights are fundamental entitlements that every individual possesses simply by virtue of being human. Unlike privileges granted by governments or institutions, these rights are inherent and universal, applying to all people regardless of nationality, sex, ethnicity, religion, language, or social status. They encompass both basic protections — such as the right to life, freedom, and security — and essential conditions that enable individuals to live with dignity, including the rights to food, education, health, and work.

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The evolution of the human rights framework in the context of climate change is a dynamic and growing area of international law and policy. It reflects increasing recognition that climate change poses severe and often disproportionate threats to the enjoyment of fundamental human rights, particularly for vulnerable populations. Rising sea levels, extreme weather events, droughts, and biodiversity loss threaten not just the environment, but also the rights to life, health, food, water, shelter, and cultural identity. This evolving nexus has catalyzed legal developments, institutional responses, and grassroots activism that are reshaping global climate governance (Knox, 2018).

The modern understanding of human rights is rooted in international frameworks such as the Universal Declaration of Human Rights (UDHR, 1948), which affirms that these rights are inherent, inalienable, and interdependent. This means they cannot be arbitrarily taken away, and the fulfillment of one right often depends on the realization of others. For example, the right to education supports the right to work, and the right to health is closely tied to the right to food and safe living conditions.

The adoption of the International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) in 1966 marked a pivotal advancement in the development of the modern human rights regime. Together, these instruments — often referred to as the International Bill of Human Rights — established a comprehensive normative framework for the protection of civil, political, economic, social, and cultural rights. The ICCPR safeguards the right to life under Article 6, while the ICESCR recognizes the rights to health (Article 12), adequate food, and an adequate standard of living (Article 11) (United Nations, 1966a; United Nations, 1966b). Although neither Covenant explicitly guarantees a right to a healthy environment, treaty bodies and subsequent jurisprudence have progressively interpreted the ICCPR and ICESCR as encompassing environmental dimensions, recognizing that the effective enjoyment of human rights is contingent upon a safe, clean, and sustainable environment.

The Human Rights Committee, in its General Comment No. 36 (2018) on the right to life, emphasized that environmental degradation, including climate change, poses a significant threat to the enjoyment of the right to life under the ICCPR. Similarly, the Committee on Economic, Social and Cultural Rights has highlighted the interdependence between the realization of economic, social, and cultural rights and the protection of the environment. These bodies have underscored that states' obligations under the ICESCR necessitate the adoption of measures to prevent environmental harm that could impede the enjoyment

of rights such as health, housing, and an adequate standard of living (Human Rights Committee, 2018, paras. 62–63). Accordingly, these Covenants serve as a foundational legal basis for linking human rights with environmental protection within the broader corpus of international environmental law.

Furthermore, the United Nations General Assembly, through Resolution 48/13 adopted by the Human Rights Council in 2021, formally recognized the human right to a clean, healthy, and sustainable environment. This recognition aligns with the evolving understanding that environmental protection is integral to the full realization of human rights.

These developments indicate a shift towards acknowledging environmental considerations as fundamental to the protection and fulfillment of human rights, even in the absence of explicit provisions within the ICCPR and ICESCR.

In research contexts, human rights are typically categorized into three generations: civil and political rights (e.g., freedom of speech, right to vote), economic, social, and cultural rights (e.g., right to education, work, and healthcare), and collective or solidarity rights (e.g., the right to self-determination and a healthy environment). Together, these rights form the foundation for justice, equality, and human dignity worldwide.

The connection between environmental protection and human rights began to take shape during the 1972 United Nations Conference on the Human Environment in Stockholm. The Stockholm Declaration was the first major international document to link environmental quality with the enjoyment of basic human rights. However, early environmental treaties and frameworks, including the 1992 United Nations Framework Convention on Climate Change (UNFCCC), largely sidelined explicit human rights language, focusing instead on economic and technical responses to environmental degradation (Bodansky, 2016).

The 1987 Brundtland Report introduced the concept of sustainable development, calling for intergenerational equity but without embedding human rights principles (World Commission on Environment and Development [WCED], 1987). The 1992 Rio Declaration on Environment and Development emphasized the role of public participation and access to information, subtly laying the groundwork for rights-based approaches without naming them as such (United Nations, 1992).

In the early 2000s, the discourse began to shift. The United Nations Human Rights Council (UNHRC, 2008) played a crucial role in this transformation. In 2008, the UNHRC adopted its first resolution on climate change and human rights, expressing concern about the impact of climate change on the realization of human rights. The UN Human Rights Council (HRC) Resolution 7/23

(2008) marked a significant shift, explicitly acknowledging that climate change threatens the enjoyment of human rights, including the rights to life, health, food, water, and housing (UNHRC, 2008).

A landmark 2009 report by the Office of the High Commissioner for Human Rights (OHCHR) outlined how climate change affects a broad spectrum of rights, including the right to life, health, housing, and food. The report emphasized the obligations of states to mitigate climate risks and to protect their populations, especially marginalized groups, from harm. The Office of the High Commissioner for Human Rights (OHCHR) further elaborated this connection in its 2009 analytical study, affirming that states have obligations under existing human rights treaties to mitigate and adapt to climate impacts (OHCHR, 2009).

A significant turning point came with the 2010 Cancun Agreements (COP16), which acknowledged the need to respect human rights when taking action to address climate change (UNFCCC, 2010). This marked the first time that a climate negotiation document under the UNFCCC framework included such language.

The 2015 Paris Agreement further embedded human rights into the climate discourse (UNFCCC, 2015). While the operational articles did not enshrine binding human rights obligations, the preamble states that Parties should, when taking action to address climate change, “respect, promote and consider their respective obligations on human rights.” It specifically mentions the rights of indigenous peoples, local communities, migrants, children, persons with disabilities, and people in vulnerable situations.

In 2021, the UN Human Rights Council adopted Resolution 48/13 (2021), which formally recognized the human right to a clean, healthy, and sustainable environment. This was followed by the 2022 UN General Assembly resolution that recognized this right universally, marking a symbolic victory for advocates of climate justice (United Nations, 2022).

This normative evolution has increasingly been tested and reinforced through judicial avenues. Courts worldwide have begun interpreting inadequate climate action as a breach of human rights obligations. In *Urgenda Foundation v. Netherlands* (2015), the Dutch Supreme Court found that insufficient emission reductions violated citizens’ rights to life and well-being under the European Convention on Human Rights (*Urgenda Foundation v. The State of the Netherlands*, 2019). Similarly, *Leghari v. Federation of Pakistan* (2015) recognized governmental inaction as infringing upon citizens’ fundamental rights, leading to the establishment of a Climate Change Commission. Most recently, in *Verein KlimaSeniorinnen Schweiz and Others v. Switzerland* (2024), the European Court of Human Rights ruled that inadequate climate policies violated the applicants’ rights to life and pri-

vate and family life. Collectively, these cases demonstrate a growing judicialization of climate governance and affirm that human rights frameworks serve as powerful tools for demanding climate accountability.

Despite the growing integration of human rights principles into climate governance, substantial implementation and accountability gaps persist. Many countries have yet to incorporate explicit human rights obligations into their Nationally Determined Contributions (NDCs) or domestic climate policies, creating a disjunction between international commitments and national action (Boyd et al., 2021). Moreover, enforcement mechanisms for addressing climate-related human rights violations remain weak, limiting the ability of affected communities to seek redress against governments and corporations (Knox & Pejan, 2018). Another critical challenge is climate-induced displacement: although millions are already being forced to migrate due to rising temperatures, sea-level rise, and extreme weather events, international law still lacks formal recognition and protection for people displaced solely by climate change (McAdam, 2020). Finally, the principle of intergenerational equity—central to sustainable development—remains largely aspirational, as future generations lack direct legal standing or representation in most jurisdictions (Setzer & Higham, 2022). Addressing these challenges requires not only embedding human rights norms in climate policy frameworks but also strengthening accountability, legal innovation, and participatory mechanisms to ensure that climate action is equitable and just across time and communities.

Further questions regarding human rights are increasingly linked to issues of justice, compensation and global fairness (e.g., Loss and Damage Fund under UNFCCC COP27).

Contemporary discourse emphasizes intergenerational and procedural justice, recognizing the rights of future generations and marginalized communities. Corporate accountability has gained prominence, particularly through the application of the UN Guiding Principles on Business and Human Rights to corporate climate responsibility (Ruggie, 2011). Additionally, indigenous knowledge systems and gender-responsive approaches are increasingly viewed as essential components of rights-based climate governance (Boyd, 2022).

Current and Emerging Challenges. Despite growing recognition, significant challenges remain:

- **Implementation Gap:** Many countries have not incorporated human rights into their Nationally Determined Contributions (NDCs) or climate strategies.

- **Lack of Accountability:** Mechanisms to hold governments and corporations accountable for climate-related human rights violations are still underdeveloped.
- **Climate Displacement:** International law does not currently provide legal status or protection for people displaced solely by climate change.
- **Intergenerational Equity:** Future generations are at risk, yet lack direct representation or legal standing in most jurisdictions.

Integrating Rights into Climate Governance. The future of climate governance must be rights-based. Integrating human rights into climate policies ensures that mitigation and adaptation efforts are equitable, inclusive, and just. This includes:

- Enhancing participation of marginalized groups in decision-making
- Strengthening legal accountability through international and domestic litigation
- Promoting climate justice through finance mechanisms that prioritize vulnerable communities
- Developing international legal frameworks for climate-induced displacement.

Thus, as climate impacts intensify, the human rights framework offers a vital tool for ensuring equity, accountability, and justice in climate policy. The evolution from environmental awareness to legally recognized human rights obligations marks a paradigm shift in climate governance. However, fully realizing this potential requires sustained advocacy, legal innovation, and political will. Only then can we ensure that the fight against climate change is also a fight for human dignity and global justice. The evolution of the human rights framework in the context of climate change reflects a progressive convergence between environmental governance and human rights law. Initially separate domains, they now form an integrated framework emphasizing accountability, equity, and sustainability. Future progress will depend on the extent to which states, corporations, and international institutions operationalize human rights obligations to prevent, mitigate, and redress climate-related harms.

II. Evolution of human rights and new human rights of solidarity

The concept of human rights has undergone profound transformation throughout history, evolving from a focus on individual liberties to encompass collective and global concerns. Human rights have evolved as a dynamic and progressive concept reflecting the moral and legal recognition of human dignity across historical epochs. Initially grounded in natural law and individual liberty, human rights have expanded to encompass collective and global dimensions,

illustrating humanity's growing interdependence. This traces the historical evolution of human rights through three stages of development: civil and political rights, economic and social rights, and solidarity or collective rights, and examines the emergence of new human rights based on solidarity in the context of globalization and global justice.

First Generation: Civil and Political Rights. The first generation of human rights emerged during the Enlightenment period in the eighteenth century, emphasizing liberty, individual autonomy, and protection from state interference. These rights are rooted in the philosophical writings of thinkers such as John Locke, Jean-Jacques Rousseau, and Montesquieu, who advocated for the inherent freedom and equality of individuals (Donnelly, 2013). The American Declaration of Independence (1776) and the French Declaration of the Rights of Man and of the Citizen (1789) exemplify this tradition by asserting rights such as life, liberty, property, and political participation.

Both the American Declaration of Independence (1776) and the French Declaration of the Rights of Man and of the Citizen (1789) represent foundational expressions of Enlightenment ideals concerning natural rights, liberty, and political legitimacy. Rooted in the intellectual traditions of John Locke, Jean-Jacques Rousseau, and Montesquieu, these documents articulate a shared belief in the universality and inalienability of human rights. The American Declaration, authored primarily by Thomas Jefferson, asserts that "all men are created equal" and "endowed by their Creator with certain unalienable Rights," among which are "Life, Liberty, and the pursuit of Happiness" (U.S. Declaration of Independence, 1776). This articulation reflects Locke's theory that governments are formed through the consent of the governed and exist to protect natural rights; when they fail to do so, citizens are justified in altering or abolishing them (Locke, 1690/1980). Similarly, the French Declaration of the Rights of Man and of the Citizen proclaims that "men are born and remain free and equal in rights," enumerating liberty, property, security, and resistance to oppression as essential principles of political order (Declaration of the Rights of Man and of the Citizen, 1789/2003).

These rights were codified in international law through instruments such as the International Covenant on Civil and Political Rights (ICCPR, 1966), guaranteeing freedoms of expression, religion, assembly, and the right to fair trial (United Nations, 1966a). Thus, first-generation rights are primarily "negative rights," obliging states to refrain from unjust interference.

They include the rights to life, liberty, freedom of speech and religion, and the right to a fair trial. The philosophical foundation was rooted in liberal in-

dividualism, emphasizing the autonomy of the individual against oppressive governance (Cranston, 1973).

Second Generation: Economic, Social, and Cultural Rights. The second generation of human rights developed during the nineteenth and twentieth centuries, largely as a response to the socioeconomic inequalities of the Industrial Revolution and the rise of socialist thought. These rights emphasize equality and the state's positive obligation to provide for the welfare of citizens (Ishay, 2008).

These rights concern how people live and work together and the basic necessities of life. They are based on the ideas of equality and guaranteed access to essential social and economic goods, services, and opportunities.

Recognized in the International Covenant on Economic, Social and Cultural Rights (ICESCR, 1966a), these rights include access to education, healthcare, work, social security, and participation in cultural life (United Nations, 1966b). They are essential for realizing substantive equality, complementing the civil and political rights of the first generation. Together, the ICCPR and ICESCR operationalize the vision of the Universal Declaration of Human Rights (UDHR, 1948), forming the cornerstone of the contemporary international human rights framework.

The underlying premise was that true freedom is unattainable without equitable access to material resources and opportunities (Sen, 1999).

Third Generation: Solidarity or Collective Rights. The third generation, or solidarity rights, emerged in the second half of the twentieth century, particularly after World War II, amid decolonization, globalization, and transnational challenges. These rights extend beyond the individual to encompass collective entitlements of peoples and humankind, reflecting the interconnectedness of modern societies (Vasak, 1977).

In the case of the specific new category of rights that have been proposed as third generation rights, these have been the consequence of a deeper understanding of the different types of obstacles that may stand in the way of realizing the first- and second-generation rights.

The idea at the basis of the third generation of rights is that of solidarity; and the rights embrace collective rights of society or peoples, such as the right to sustainable development, to peace or to a healthy environment. The specific rights that are most commonly included within the category of third generation rights are the rights to development, to peace, to a healthy environment, to share in the exploitation of the common heritage of mankind, to communication and humanitarian assistance.

Solidarity rights emphasize cooperation among states and peoples to achieve shared goals such as peace, development, and environmental protection. The

UN Declaration on the Right to Development (1986) and the Rio Declaration on Environment and Development (1992) embody this approach, recognizing that sustainable progress requires equitable participation and shared responsibility (United Nations, 1986, 1992). These rights thus mark a paradigm shift from individualistic to communal and global perspectives on human dignity.

New Human Rights of Solidarity. The concept of solidarity rights has expanded in the twenty-first century to include emerging global concerns such as environmental sustainability, digital access, and humanitarian assistance. These new human rights of solidarity recognize that certain rights can only be realized through collective global action (Alston, 1982).

Among these are the right to development, ensuring equitable access to the benefits of globalization; the right to peace, guaranteeing freedom from war and structural violence; and the right to a healthy environment, formally recognized by the United Nations in 2022 as a universal human right (United Nations, 2022). The right to a healthy environment, recognized in the 2022 UN General Assembly resolution, addresses the pressing global challenge of environmental sustainability and intergenerational equity (Boyle, 2012). Other solidarity rights include the right to humanitarian assistance and the right to share in the common heritage of humankind, which apply to global commons such as the oceans, outer space, and cultural treasures. Additionally, the right to digital inclusion and information access has gained prominence as societies transition into the digital age (UNESCO, 2021).

These rights underscore the need for transnational cooperation, intergenerational justice, and the protection of the global commons. They also challenge traditional notions of sovereignty by emphasizing shared moral and legal responsibilities across borders (Marks, 2009). Solidarity rights encompass a variety of collective entitlements that transcend national boundaries. Among the most recognized are the right to development, the right to peace, and the right to a healthy environment (Marks, 2004).

The New Human Rights of Solidarity reflect an important transformation in the understanding of human dignity and global justice. By emphasizing cooperation, mutual responsibility, and shared human destiny, these rights extend the scope of human rights beyond individual and national concerns to encompass the collective well-being of humanity. While their practical realization faces numerous obstacles—ranging from legal indeterminacy to political resistance—their normative significance cannot be understated. Solidarity rights serve as a moral compass for addressing global challenges such as poverty, conflict, and environmental degradation. In an increasingly interconnected world, the fulfill-

ment of human rights depends not only on national action but also on genuine international solidarity and collective commitment to the common good.

The evolution of human rights reflects humanity's continuous pursuit of dignity, equality, and justice. From the individual freedoms of the first generation to the social entitlements of the second and the collective aspirations of the third, human rights have progressively adapted to new social realities. The emergence of solidarity rights signifies an important transition from independence to interdependence, affirming that in an increasingly globalized world, the protection of human dignity requires cooperation, sustainability, and mutual responsibility. As global challenges such as climate change, digital inequality, and conflict intensify, the new human rights of solidarity offer a moral and legal framework for global justice and shared humanity.

The evolution of human rights illustrates the dynamic nature of moral and legal progress. From the assertion of individual freedoms to the recognition of collective and global responsibilities, human rights have continually expanded to address the complexities of modern society. The human rights of solidarity highlight the necessity of global cooperation in ensuring justice, peace, and sustainability for present and future generations.

III. The right to a healthy environment

The right to a healthy environment is recognized in the law of many States and by some international treaties. Litigants all over the world have increasingly relied on this right to demand the protection of a host of environmental interests. In recent years, initiatives by the United Nations and by the Council of Europe have reignited the debate concerning the explicit recognition of the right to a healthy environment.

Most constitutions protect a range of human rights, with the right to a healthy environment enjoying constitutional protection in more than 110 States in every region of the world, as well as subnational jurisdictions in Argentina, Brazil, Canada, Mexico, Switzerland and the USA (Hawaii, Illinois, Massachusetts, Montana, New York, Pennsylvania and Rhode Island).

The Universal Declaration of Human Rights (UDHR), adopted in 1948, recognized human rights as universal and interdependent without explicitly categorizing them as civil and political rights or economic, social, and cultural rights (United Nations, 1948). Several of the rights enshrined in the UDHR can be interpreted as forming the substantive and procedural foundations of the

modern right to a healthy environment. Substantive rights such as the right to life (Article 3), the right to an adequate standard of living (Article 25), and the right to participate in the cultural life of the community (Article 27) directly relate to environmental well-being, as a safe and sustainable environment is essential for the realization of these rights. Procedural rights, including the right to an effective remedy for violations (Article 8), the right to privacy, family, and home (Article 12), and the right to freedom of opinion and expression (Article 19), support environmental protection by ensuring access to justice, information, and public participation in environmental decision-making. Although the UDHR did not expressly articulate a right to a healthy environment, subsequent international developments—such as the Stockholm Declaration on the Human Environment (1972), the Rio Declaration on Environment and Development (1992), and the United Nations General Assembly Resolution 76/300 (2022) — have progressively affirmed the interdependence between human rights and environmental protection. Thus, the UDHR laid the conceptual groundwork for the recognition of the right to a clean, healthy, and sustainable environment as a fundamental human right.

The right to a healthy environment has emerged as a fundamental component of contemporary human rights discourse, emphasizing the intrinsic link between environmental protection and the realization of basic human rights. The right to a healthy environment has gained increasing recognition as an essential element of human dignity, sustainable development, and global justice. Rooted in the interdependence between human well-being and ecological balance, this right affirms that a safe, clean, healthy, and sustainable environment is fundamental to the realization of all other human rights. Although not originally included in the foundational international human rights instruments, it has progressively evolved through environmental law, soft law instruments, and judicial interpretations.

Treating environmental protection as a human right announces that it is at the same level of importance as other rights considered necessary to human dignity, equality, and freedom, and helps to foreground the human beings most affected by environmental harm, who are often marginalized and disempowered. Advocates often frame environmental harm in human rights terms to put a human face on what might otherwise seem abstract or technical problems (Gonzalez, 2015). For example, in 2008, when the Maldives became the first country to portray climate change as a threat to the human rights of its people, it explicitly did so to “show the world the immediate and compelling human face of climate change” (Knox 2014, p. 24).

The concept of a right to a healthy environment emerged during the late twentieth century as environmental degradation became a global concern. The 1972 United Nations Conference on the Human Environment in Stockholm marked the first formal acknowledgment of the link between human rights and environmental protection. The Stockholm Declaration proclaimed that humans have the “fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being” (United Nations, 1972, Principle 1). This recognition was further reinforced by the 1982 World Charter for Nature, the 1992 Rio Declaration on Environment and Development, and the 1994 Draft Declaration of Principles on Human Rights and the Environment (Atapattu, 2016).

Building upon Stockholm, the World Charter for Nature (1982) reinforced the ethical dimension of environmental protection. It emphasized that humanity is part of nature and has a moral duty to respect the intrinsic value of all forms of life (United Nations General Assembly, 1982). The Charter articulated that the survival and well-being of humanity depend upon the conservation of natural ecosystems and biodiversity. This recognition represented a shift from an anthropocentric to a more eco-centric approach, situating the protection of nature as both a moral and legal imperative. Collectively, these instruments established a normative foundation for understanding environmental protection as an integral part of the human rights framework.

Regional treaties such as the Aarhus Convention (1998), the African Charter on Human and Peoples’ Rights (Article 24), and the Escazú Agreement (2018) provide explicit recognition and procedural guarantees related to environmental rights. Recent initiatives by the United Nations and the Council of Europe have further advanced this discourse. The United Nations Human Rights Council (2021) and General Assembly (2022) have officially recognized the human right to a clean, healthy, and sustainable environment, marking a milestone in the evolution of international human rights law and reflecting a growing global consensus that environmental protection is integral to human dignity and well-being (Boyd, 2020).

Few years ago, on October 8, 2021, the UN Human Rights Council adopted a historic resolution recognizing, for the first time at the global level, the human right to a clean, healthy, and sustainable environment. The General Assembly adopted a similar resolution, with overwhelming support, in 2022. These resolutions have catalyzed widespread interest in the content and consequences of the right to a healthy environment. Although the UN recognition is recent, this is not a new human right—the right to a healthy environment and associated obli-

gations have deep roots in many Indigenous legal systems. Further, governments in Portugal, Slovenia, and the United States began to enact the constitutional recognition of environmental rights at the national and subnational levels in the early 1970s. Today, this right enjoys legal protection in 164 nations through constitutions, legislation, regional treaties, and court decisions.

In essence, the right to a healthy environment has emerged as a bridge between human rights and environmental law. From the UDHR to contemporary resolutions, the international community has come to acknowledge that the protection of the environment is not merely an ecological concern but a fundamental precondition for the realization of all human rights.

These instruments not only affirm the substantive right to a healthy environment but also operationalize it through participatory and transparency mechanisms, thereby strengthening environmental democracy and accountability (Knox, 2018). In Europe, the Aarhus Convention has significantly influenced the development of procedural environmental rights within the European Union and the Council of Europe systems, emphasizing that environmental protection is inseparable from the realization of fundamental human rights. Similarly, Article 24 of the African Charter establishes the right of peoples to “a general satisfactory environment favourable to their development,” providing one of the earliest binding regional affirmations of environmental rights (Organization of African Unity, 1981, art. 24). More recently, initiatives by the United Nations and the Council of Europe have advanced this discourse by seeking to formalize the right to a healthy environment at the international level.

In 1981, the African Charter on Human and Peoples’ Rights (African Charter) became the first human rights treaty to include an environmental right, as mentioned above. Seven years later, the Additional Protocol to the American Convention on Human Rights (San Salvador Protocol) in Article 11, was the first treaty to state the “right to live in a healthy environment” as an individual right. Two later instruments, the 2004 Arab Charter on Human Rights (Arab Charter) and the 2012 Human Rights Declaration of the Association of South East Asian Nations (ASEAN) countries (ASEAN Declaration), include the right to a “healthy” or “safe, clean, and sustainable” environment as an element of the right to an adequate standard of living (Article 38 and Principle 28(f) respectively).

At the national level, at least 100 countries provide direct constitutional protection to some form of a right to a healthy environment (Boyd, 2018), and at least 12 other countries, including India and Pakistan, have asserted that the right to a healthy environment is inherent in the constitutional right to life (Boyd, 2011). In some countries, the right has rarely, if ever, resulted in litigation. But

many other countries, including for example Argentina, Costa Rica, India, Pakistan, and the Philippines, have developed an extensive domestic jurisprudence based on the right to a healthy environment (Boyd, 2012; Daly and May, 2018).

The 2023 Bonn Declaration for a Planet Free of Harm from Chemicals and Waste and the Global Stocktake that emerged from the climate conference in Dubai (COP28) also refer to the importance of the right to a healthy environment. There was another series of important victories made possible by the right to a healthy environment in 2023, with courts in Costa Rica using the right to protect endangered hammerhead sharks from fishing, Panama overturning a law that authorized a massive open pit mine for up to 40 years, and Montana (USA) challenging fossil fuel development. Also in 2023, the Supreme Court of Indonesia upheld a lower court decision concluding that the government violated the constitutional right to a healthy environment by failing to improve air quality in Jakarta, the capital city.

Already in 2024, a court in Norway overturned permits for offshore petroleum exploration because the government failed to do a comprehensive assessment of the anticipated greenhouse gas emissions, thus violating the constitutional right to a healthy environment. The Inter-American Court of Human Rights recently made a monumental judgment in a case with profound importance for the right to a healthy environment. A group of residents of La Oroya in Peru successfully asserted that their rights to health and a healthy environment were violated over a period of decades by massive volumes of air pollution and toxic substances (including lead) from a metal smelter.

The right to a healthy environment is also being harnessed by litigants pursuing climate justice, accelerating the transition away from fossil fuels and halting deforestation, as demonstrated by cases in Brazil, Colombia, Kenya, Norway, and the United States. The world's highest court, the International Court of Justice, and the Inter-American Court of Human Rights are engaged in ongoing processes to articulate the obligations of states to address the climate crisis. The advisory opinions issued by these highly respected judicial institutions should provide further clarification and impetus to the right to a healthy environment.

IV. Right to a safe climate

Climate change represents not merely an environmental crisis but a profound human rights challenge that threatens the full enjoyment of life, health, food, water, housing, and cultural integrity. In recent years, scholars

and courts have articulated the idea of a right to a safe climate—a right to live within a stable and sustainable climate system capable of supporting human dignity and ecological balance.

In this context, it is important to consider the theoretical foundations, legal status and practical consequences of this new right within the framework of international human rights law.

Drawing from the jurisprudence of the United Nations Human Rights Council (UN HRC), the Inter-American Court of Human Rights (IACtHR), and the International Court of Justice's (ICJ) 2025 Advisory Opinion, it argues that the right to a safe climate is moving from *lex ferenda* to *lex lata*.

The analysis begins by tracing normative foundations within the Universal Declaration of Human Rights (UDHR), the International Covenant on Economic, Social and Cultural Rights (ICESCR), and regional instruments, demonstrating that the right to a safe climate can be inferred from pre-existing environmental and socio-economic rights. It then surveys critical jurisprudence — including *Urgenda Foundation v. Netherlands* (2019), *Neubauer v. Germany* (2021), and *Held v. Montana* (2024) — which illustrate how domestic courts operationalize this right through the principles of due diligence, inter-generational equity, and substantive state obligations.

At the same time, domestic and regional courts have begun to operationalize the concept. The Dutch Supreme Court's decision in *Urgenda Foundation v. State of the Netherlands* (2019) stands as a landmark, grounding climate protection duties in Articles 2 and 8 of the European Convention on Human Rights (ECHR). Similarly, in *Neubauer v. Germany* (2021), the German Constitutional Court held that insufficient climate legislation infringed the rights of future generations, while the Montana Supreme Court in *Held v. State of Montana* (2024) recognized a state constitutional right to a “safe and livable climate.” These cases collectively signal an emergent judicial consensus that human rights entail climate-related obligations.

The climate crisis has become the defining moral and legal issue of the twenty-first century. Anthropogenic greenhouse-gas emissions have altered the global climate system to such an extent that entire ecosystems, economies, and communities face existential threats. While scientific consensus has long identified the dangers of exceeding a 1.5 °C global temperature increase (IPCC, 2023), international legal frameworks have struggled to impose enforceable duties on states and corporations to prevent dangerous climate change. Against this background, a novel legal concept has emerged — the right to a safe climate — situating climate protection within the broader architecture of international human rights law.

The idea that individuals hold a legal entitlement to climate stability represents both an evolution and a synthesis. It draws upon earlier recognitions of environmental rights — such as the right to a “clean, healthy, and sustainable environment” affirmed by the United Nations General Assembly in 2022 (UN GA Res 76/300) — and extends them to encompass the climate system itself. The shift from an environmental right to a climate-specific right reflects a growing understanding that climate change undermines the effective enjoyment of all human rights, from the right to life (Article 6 ICCPR) to the right to health and an adequate standard of living (Articles 12 and 11 ICESCR).

Yet, the path to establishing a universal right to a safe climate remains fraught with doctrinal and political obstacles. International human rights law traditionally addresses harms within state boundaries, whereas climate change is transboundary and cumulative. Moreover, attributing responsibility for specific climate impacts to individual states challenges conventional notions of causation and jurisdiction. Despite these complexities, the recognition of a right to a safe climate offers a transformative legal narrative: it reframes climate change from a matter of environmental policy to a matter of human justice and global solidarity.

The right to a safe climate rests upon deep moral, legal, and philosophical premises that connect human dignity, environmental integrity, and intergenerational justice. To understand its emergence within international human rights law, it is necessary to situate it within three intersecting traditions: (1) the human rights framework that protects life, health, and subsistence; (2) environmental ethics and the notion of ecological interdependence; and (3) evolving principles of international environmental law, such as precaution, prevention, and sustainable development. Together, these sources reveal that the right to a safe climate is not an innovation *ex nihilo*, but a logical extension of established norms responding to the planetary conditions of the Anthropocene.

Scholarship has revealed that for a new right to emerge, six criteria are needed. The right to a safe climate essentially meets the criteria for a new right as discernible from literature. For a new right to emerge, according to Alston, certain criteria are required: such a right should reflect a fundamental social value; be relevant throughout the world value system; be recognised as an interpretation of Charter obligations, reflect a customary law or a formulation that is declaratory of general principles of law; not be repetitive of existing body of international human rights law; be capable of attaining high degree of international consensus; compatible with state practice; and be precise to give rise to identifiable rights and obligations. These yardsticks set out by Alston have been tested and deployed in a number of works covering areas such as safe motherhood,

and the right not to be displaced. Alston yardsticks are preferred to investigate the need for the right to a safe climate as they serve as a convenient platform to analyse as far as possible, the extent to which the right to a safe climate can be justified as a new human right. Arguably, establishing the human right to safe climate under the UN human rights system meets the criteria.

The recognition of a right to a safe climate carries three principal normative implications.

- First, it re-frames state obligations from discretionary policy choices to binding human rights duties. States are no longer merely encouraged but required to act consistently with a safe climate.
- Second, it expands the temporal and spatial scope of rights, acknowledging duties to future generations and to peoples beyond one's borders.
- Third, it invites a pluralization of duty-bearers, extending accountability to corporations, international organizations, and even individuals whose actions materially contribute to climate harm (Bordner et al., 2023).

These implications collectively transform the relationship between humans, states, and the planet. The right to a safe climate emerges as both a moral claim and a legal construct—one that situates humanity within the ecological limits of the Earth system while preserving the universality and indivisibility of human rights. The international human rights regime has long protected the material conditions necessary for life, health, and well-being. Only recently, however, has it begun to articulate those protections in explicitly climatic terms. The right to a safe climate remains formally unenumerated in major human rights treaties, but it is increasingly derived through dynamic interpretation and recognized through resolutions, advisory opinions, and case law.

V. Intersectionality and climate vulnerability

The link between climate change and human rights gained significant international focus following the adoption of UN Human Rights Council Resolution 7/23 in 2008. This milestone resolution underscored that climate change poses both urgent and long-term risks to the enjoyment of human rights. It drew particular attention to the unequal burden faced by vulnerable groups, acknowledging that communities already in fragile conditions are most acutely affected by environmental shifts. Climate change effects are not uniform and have disproportionate impacts among different groups of people within com-

munities. It is therefore important to understand the underlying issues of intersectionality for climate change adaptation and human well-being.

In the years following, UN reports and resolutions have repeatedly adopted a “vulnerability” lens, with a strong focus on populations such as women, children, and indigenous communities. A notable example is the 2009 report by the Office of the United Nations High Commissioner for Human Rights (OHCHR), which made extensive use of this framing. The report detailed how these groups face amplified dangers from climate change, largely due to their socio-economic disadvantages and the geographic areas they inhabit — factors that intensify their susceptibility to climate-related threats.

The portrayal of vulnerability in these documents highlights the disproportionate burden that climate change imposes on certain populations. It is often characterized as a condition intensified by poverty, limited access to essential resources, and socio-political exclusion. This perspective not only pinpoints those at greatest risk but also seeks to rally global attention and resources toward alleviating these threats. In line with this, subsequent resolutions have urged the integration of human rights considerations into climate policies, ensuring that the needs and protections of vulnerable groups remain a priority.

Moreover, the UN has increasingly emphasized the principle of climate justice, which addresses the uneven distribution of climate change impacts. Within this framework, vulnerability remains a key concept, advocating for measures that acknowledge and reduce the systemic inequalities affecting marginalized communities. By centering vulnerability, the approach aims to promote a more equitable climate response—one that safeguards human rights universally, with particular focus on those most susceptible to the harmful consequences of environmental change.

The concept of vulnerability appears frequently in UN discourse, yet it is often presented without clear or consistent definitions. When articulated, definitions typically describe vulnerability as an individual’s or group’s diminished capacity to fully exercise human rights, shaped by factors such as poor health, poverty, or social marginalization. This framing tends to emphasize the perceived shortcomings of affected people rather than the systemic or structural drivers of their situation.

For example, the report *The Slow Onset Effects of Climate Change and Human Rights Protection for Cross-Border Migrants* adopts a broad definition, focusing on a person’s relative ability to realize their human rights. It integrates both contextual and personal elements, suggesting that higher vulnerability equates to lower adaptive capacity. However, such definitions often remain im-

precise, lacking detailed criteria to identify the exact conditions that create or exacerbate vulnerability.

UN documents also imply a hierarchy of vulnerability, referring to “particularly vulnerable” or “most vulnerable” populations. Yet, the benchmarks for these distinctions are seldom clarified, leaving significant interpretive ambiguity.

This stands in contrast to the treatment of discrimination and inequality under international human rights law, where emphasis is placed on identifying actions, policies, and systemic structures that disadvantage particular groups. In this framework, discrimination is defined by the UN as any distinction, exclusion, or restriction — based on specified grounds — that undermines the recognition, enjoyment, or exercise of human rights on an equal basis.

Intersectional approaches are becoming essential to understanding the differential impacts of climate change and the heterogeneity of adaptive capacities. More than three decades ago, Kimberlé Crenshaw introduced the concept of intersectionality to challenge the limitations of both feminist theory and anti-racist discourse. Her work highlighted how Black women face overlapping and compounded forms of discrimination that are often overlooked when race and gender are considered in isolation (Crenshaw, 1989). Crenshaw’s conceptualization of intersectionality was undoubtedly shaped by earlier contributions from marginalized scholars, whose pioneering work had already established the groundwork for intersectional analysis. (Hill Collins & Bilge, 2016). Since its inception, intersectionality scholarship has expanded to encompass analyses aimed at uncovering and responding to the distinct forms of inequality that emerge from overlapping systems of privilege and oppression. These interwoven dynamics contribute to and intensify many of today’s pressing social challenges — including those linked to environmental degradation and climate change (Hill Collins, 2019).

Intersectionality and Climate Vulnerability refers to the understanding that individuals and communities experience the impacts of climate change differently, depending on how various aspects of their identities—such as gender, race, class, disability, age, and geography—intersect. This approach recognizes that climate vulnerability is not evenly distributed, but shaped by overlapping systems of oppression and inequality.

Climate change manifests differently across regions due to geographic variability and disparities in greenhouse gas emissions. However, the effects are distributed evenly around the globe, regardless of where the emissions originate. They also have uneven impact on societal groups differentiated by generations, age class, income group, occupation, and gender. Developing countries and the

poorest people face the impacts of climate change disproportionately and this exacerbates inequities in lives and livelihoods including health, access to adequate and nutritious food, clean water, and other resources. Climate-vulnerable populations refer to communities or individuals who face heightened exposure to the negative consequences of climate change due to factors such as poverty, marginalized social or political status, geographic risk zones, or physical and health-related constraints. These groups often lack sufficient resources or infrastructure to effectively respond to or recover from climate-related challenges like floods, droughts, heatwaves, rising sea levels, and threats to food security. Notably, numerous global studies have underscored the increased vulnerability of women, who are often more severely affected by climate-related disasters due to social, economic, and cultural inequalities. However, there is more to this inequality than physical and biological differences between genders. Crucially, the degree of vulnerability experienced by different sexes — as well as their respective abilities to cope with and adapt to climate change — is shaped by a complex interplay of social, economic, and political conditions.

In recent years, intersectionality has emerged as a valuable analytical tool, revealing that individuals are shaped not only by gender but also by a web of interconnected social and political identities. These include ethnicity, age, caste, race, socioeconomic status, religion, sexuality, education level, family structure, and disability — all of which significantly impact a person's resilience and well-being. Empirical research from countries like Nepal and India illustrates how the convergence of caste, gender, and economic status can intensify vulnerability to disasters and climate risks, while also affecting people's ability to adapt or migrate in response to such threats. An intersectional perspective acknowledges that individuals' experiences are influenced by the complex interplay of their identities and social connections. These overlapping factors can lead to compounded advantages or disadvantages, depending on the specific social, cultural, and political context. Systems of power and discrimination — such as patriarchy, ableism, colonialism, racism, and homophobia — shape how these intersecting identities affect people's opportunities, vulnerabilities, and lived realities. An intersectional approach goes beyond a description of differential impacts, to investigate the dynamic interactions between contextual factors, agents of change and their transformational potential.

Vulnerability refers to the inherent susceptibility of an individual, group, or system to suffer negative consequences from hazardous events, based on internal factors that affect their capacity to cope and respond (Cardona, 2004; IPCC, 2014). In public health, vulnerability to climate change reflects how likely people or

communities are to experience adverse health outcomes due to climatic shifts and extreme weather.

UN documents frequently label specific groups as vulnerable, such as women, children, the elderly, migrants, and indigenous peoples. This categorization aims to draw attention to those most affected by climate change and to mobilize resources and policy interventions to support them. However, the criteria for these designations often remain ambiguous, which can perpetuate stereotypes and oversimplify the complexities of vulnerability.

Historically, UN documents have referred to “vulnerable groups,” implying that vulnerability is an intrinsic characteristic of these populations.

According to the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015), vulnerability arises from conditions shaped by physical, social, economic, and environmental factors or processes, which collectively heighten a community’s exposure to harm from hazards. This perspective aligns with the World Health Organization’s (WHO) understanding of the social determinants of health, which include the settings in which individuals are born, grow, live, work, and age, alongside the structures and systems in place to manage illness. These determinants are, in turn, influenced by the unequal distribution of wealth, political power, and resources at local, national, and global levels.

Crucially, vulnerability is not static — it evolves over time and space, and is influenced by a combination of social, economic, demographic, geographic, cultural, institutional, political, and ecological factors. As such, any strategy for climate change adaptation must begin with a thorough assessment of vulnerability to climate variability and extremes.

Policymakers, urban and regional planners, health authorities, and social service agencies must have a clear understanding of these vulnerabilities—especially among marginalized and at-risk groups—to develop effective, equity-driven responses to climate-related health risks. Vulnerability assessments should capture the multifaceted and intersecting risks that certain populations face, recognizing that these risks are often layered and compounded by existing social inequalities.

The Vulnerable Populations Conceptual Model (VPCM), developed by Flaskerud and Winslow (1998) supports the interconnected relationship of three aspects that have relevance for climate change and mental health: *resources available*, *relative risk*, and *health status*. Through the lens of this model, *resources available* refers to both socioeconomic and environmental resources; *relative risk* refers to likelihood of exposure to a variety of well-documented risk factors; and *health status* refers to «age- and gender-specific morbidity and mortality».

When applying the VPCM to climate change, *relative risk* can be conceptualized as risk of exposure to climate-related stressors compared to individuals in a healthy climate zone. *Resources available* can be conceptualized as access to clean water, clean air, stable temperatures, finances, and social support. *Health status* can be conceptualized as impact of climate-related exposure on morbidity and mortality data. Persons with pre-existing mental illness are classified as vulnerable populations and are disproportionately affected by climate-related stressors. An inter-connectedness between exposure to climate-related stressors, decreased availability of and access to resources, and decreased health status exists which further perpetuates resource availability and risk exposure. Albarrán and Nyamathi (2011) offer evidence of the relevance of this model for vulnerable populations across culture, socioeconomics, and migrant status, thus attesting to the model's relevance in mental health sequelae of climate change.

Conducting vulnerability assessments is a critical step toward identifying populations most at risk from climate impacts and determining suitable mitigation and adaptation strategies. These assessments support targeted interventions by highlighting which communities need the most protection from climate-sensitive health threats.

Among the key health risks exacerbated by climate change are exposure to extreme heat or cold, severe weather events, ultraviolet (UV) radiation, the spread of vector-borne diseases, and threats to food and water quality, availability, and air purity.

Certain population groups face a heightened likelihood of experiencing psychological distress and negative mental health effects following climate-related or weather-induced disasters. The criteria for determining who qualifies as being in a vulnerable situation often lack clarity. For example, women are often highlighted as a vulnerable group due to gender-specific inequalities that exacerbate their risk to climate impacts. Children, likewise, are often classified as vulnerable because their dependency and developmental needs heighten their susceptibility to environmental threats.

In recent years, UN language has shifted toward the expression “people in vulnerable situations,” aiming to foreground the situational and contextual drivers of vulnerability rather than implying that it is an intrinsic characteristic. This reframing underscores that vulnerability is fluid, shaped by external factors such as socio-economic status, geographic location, and political exclusion.

Nevertheless, the standards for determining who falls into a “vulnerable situation” often remain undefined. Many documents refer to an “increased susceptibility to harm,” yet seldom clarify the precise indicators or measurement

criteria for such susceptibility. This lack of specificity risks producing overly broad and inconsistent classifications, hindering targeted responses to the distinct needs of affected populations.

Furthermore, repeated labeling of certain groups — such as women or Indigenous peoples — as inherently vulnerable can unintentionally reinforce stereotypes. This framing may obscure their resilience, resourcefulness, and agency, reducing complex and diverse lived realities to simplified narratives of weakness and dependency.

Understanding which groups are most at risk is essential for designing targeted adaptation strategies, implementing equitable climate policies, and ensuring the protection of human rights in the context of environmental change. Classification of climate-vulnerable populations typically takes into account variables such as geographic exposure, socio-economic status, health conditions, gender, age, and political marginalization. Such classification frameworks help identify priority groups—ranging from low-income communities in flood-prone areas to Indigenous peoples whose cultural heritage depends on fragile ecosystems — thereby enabling more efficient allocation of resources and support mechanisms.

This discussion will explore the main categories of climate-vulnerable population groups, the criteria used for their classification, and the implications for policy and climate justice:

1. Low-Income Communities

Why vulnerable: Often live in high-risk areas (e.g., floodplains, urban slums), lack resources for adaptation (e.g., cooling systems, insurance).

Examples: Informal settlements in urban areas of Sub-Saharan Africa or South Asia.

2. Indigenous Peoples

Why vulnerable: Depend on natural ecosystems for livelihoods; may lack political power to influence climate policy.

Examples: Arctic Inuit communities affected by melting ice; Amazonian tribes threatened by deforestation and fires.

3. Women and Girls

Why vulnerable: May have less access to resources, land, and decision-making; often responsible for food, water, and caregiving.

Examples: Rural women in drought-prone parts of Sub-Saharan Africa walking longer distances to fetch water.

4. Children and Youth

Why vulnerable: Physically more susceptible to diseases, malnutrition, and trauma from displacement or disasters.

Examples: Children living in cyclone-prone areas of Southeast Asia with limited healthcare access.

5. Elderly People

Why vulnerable: Higher health risks in heatwaves and natural disasters; mobility or medical issues may limit evacuation.

Examples: Elderly populations in Europe affected during the 2003 and 2022 heatwaves.

6. People with Disabilities

Why vulnerable: Barriers to evacuation, lack of accessible infrastructure or communications during emergencies.

Examples: People in disaster zones without adapted shelters or emergency information.

7. Migrant and Displaced Populations

Why vulnerable: Often lack legal protections, housing, or employment; may be in regions with fragile governance.

Examples: Climate refugees from Pacific Islands or drought-affected zones in the Sahel.

8. Coastal and Island Communities

Why vulnerable: Face sea-level rise, increased salinity, storm surges.

Examples: Maldives, Tuvalu, and low-lying areas of Bangladesh and Louisiana.

9. Agricultural and Fishing Communities

Why vulnerable: Highly dependent on climate-sensitive livelihoods; affected by drought, desertification, or ocean warming.

Examples: Farmers in East Africa or small-scale fishers in Southeast Asia.

Moreover, communities dependent on their immediate natural environment for survival — such as small-scale farmers, fishers, and indigenous groups — as well as those residing in regions highly susceptible to climate hazards, face elevated mental and physical health risks as climate change intensifies.

Understanding these complex vulnerabilities allows decision-makers to design inclusive and resilient health systems, capable of responding not just to environmental threats but also to the social and psychological dimensions of climate risk.

Climate change does not affect all individuals and communities equally. Instead, it exacerbates pre-existing social and economic inequalities, placing already vulnerable populations at even greater risk. These disparities are not only reflected in exposure to climate hazards but also in the capacity to prepare for, respond to, and recover from climate-related events.

1) Unequal Exposure and Risk

Marginalized populations — such as low-income households, women, children, the elderly, people with disabilities, indigenous communities, and informal workers — often live in geographically exposed or infrastructure-deficient areas. These include flood-prone zones, informal settlements, or drought-affected rural regions, where basic services like clean water, healthcare, or transportation are limited or unreliable. This increases their direct exposure to hazards such as extreme heat, hurricanes, and water scarcity.

2) Economic Vulnerability

The economic impacts of climate change — loss of livelihood, damage to property, crop failure, or increased healthcare costs — disproportionately affect the poor. Vulnerable groups tend to work in climate-sensitive sectors (agriculture, fishing, construction), where a single disaster can lead to job loss or food insecurity. Lacking financial savings, insurance, or social protection mechanisms, these communities are often pushed further into poverty after climate-related events.

3) Social Injustice and Uneven Recovery

Even in post-disaster contexts, recovery resources and aid are frequently distributed unequally. Wealthier communities often receive faster assistance and rebuild quicker, while vulnerable populations may face bureaucratic hurdles, language barriers, or discrimination, delaying their recovery. Women and girls may face additional risks, including gender-based violence, during displacement or in emergency shelters.

4) Climate Adaptation Gaps

Access to climate-resilient infrastructure, education, and adaptive technologies (e.g., irrigation systems, clean energy, early warning systems) is not eq-

uitably available. As a result, wealthier populations are better able to protect themselves, while vulnerable groups remain disproportionately exposed and underprepared.

5) A Call for Climate Justice

Addressing the inequitable impacts of climate change requires a justice-oriented approach that integrates social equity into climate policy and planning. This includes:

- Centering vulnerable voices in decision-making
- Investing in targeted adaptation and resilience strategies
- Expanding access to social safety nets, healthcare, and education
- Recognizing and addressing systemic discrimination and historical marginalization.

Only by acknowledging and correcting these intersecting inequalities can societies build truly inclusive and resilient responses to climate change.

VI. Types of threatened human rights: case analysis and reporting

The convergence of human rights and climate change constitutes one of the most urgent and complex challenges facing humanity today. Anthropogenic greenhouse gas emissions have intensified the climate crisis, with far-reaching consequences for the enjoyment of fundamental human rights. Among the most affected are the rights to life, health, food, water, and an adequate standard of living — all of which are increasingly undermined by rising temperatures, extreme weather events, and environmental degradation (Ekardt & Bärenwaldt, 2023).

The formal acknowledgment of a *right to a stable climate* in response to the mounting scientific evidence on climate change and its far-reaching consequences for both human rights and the environment would mark a crucial advancement for global society (Anisah & Hadi, 2023). A thorough examination of how climate change and extreme weather events affect fundamental human rights reveals the inextricable link between the right to a safe climate, climate justice, and the urgent necessity of implementing effective mitigation strategies.

This escalating climate crisis is not limited to environmental degradation — it deeply undermines human dignity and the protection of core rights. Within this framework, it becomes increasingly evident that climate change directly threatens multiple essential human rights, as outlined below:

VI.1. The Right to Life

Climate change poses a direct threat to the right to life through the rising frequency and severity of extreme weather events — such as storms, floods, and heatwaves — which endanger millions globally. The UN Human Rights Council (OHCHR), in its A/HRC/RES/48/13 resolution (October 2021), formally recognized a human right to a clean, healthy, and sustainable environment, underscoring the link between environmental protection and safeguarding the right to life (A/HRC/RES/48/13 - E - A/HRC/RES/48/13 -Desktop).

For example, Cyclone Hamoon (October 2023, Bangladesh) made landfall in Bangladesh, particularly impacting the Cox's Bazar region — including Rohingya refugee camps. The cyclone damaged or destroyed thousands of homes and uprooted trees. Approximately 470,000 people were displaced, with hundreds rendered homeless. At least three fatalities and 63 injuries were reported in the affected districts (Cyclone Hamoon). This event highlights a clear threat to the right to life, as well as related rights like adequate housing and health, due to loss of shelter, exposure to the elements, and increased risk of injury and illness.

VI.2. The Right to Health

The effects of climate change severely compromise physical and mental health. Prolonged heatwaves lead to an increase in heat-related illnesses and fatalities, while floods facilitate the spread of infectious and waterborne diseases, such as cholera and leptospirosis (Wewerinke-Singh & Doebbler, 2022; World Health Organization, 2023). According to the World Health Organization (WHO), climate-related factors such as malnutrition, malaria, diarrheal diseases, and heat stress may result in an estimated 250,000 additional deaths annually between 2030 and 2050 (Luporini & Kodiveri, 2021; Luporini & Savaresi, 2023; World Health Organization, 2023; Solntsev, 2024).

For example, Climate change — through rising temperatures and altered rainfall cycles — is expanding the habitats and breeding seasons of *Anopheles* mosquitoes, which transmit malaria. This expansion is introducing malaria into new regions, including highland zones in countries like Malawi, Mozambique, Kenya, and Uganda (SDG ActionAP News Financial Times). In 2023, malaria caused nearly 600,000 deaths globally, with the vast majority (94 %) occurring in Africa — especially among young children and pregnant women who are

particularly vulnerable. The World Health Organization attributes this increase to climate-related factors, disruptions like floods, and funding cuts for control efforts (Malaria cases rise for fifth year, 2024). Under climate scenarios RCP 4.5 and RCP 8.5, new endemic malaria hotspots are expected to emerge in regions currently unsuitable — such as northern Angola, southern DRC, western Tanzania, central Uganda, and the East African highlands —potentially placing tens of millions more at risk by the 2030s (Caradee Y. et al., 2024).

VI.3. The Right to Food

Food security is increasingly under threat as climate-induced droughts, floods, and shifting growing seasons disrupt agricultural productivity. These changes reduce crop yields, inflate food prices, and exacerbate hunger — especially among vulnerable and low-income populations (Rueda Abad & Vargas Castilleja, 2021).

The Horn of Africa crisis highlights how climate-driven food insecurity directly threatens the right to food, with vulnerable populations facing displacement, malnutrition, and elevated mortality. International mechanisms like those led by FAO are essential—but effective policy and climate action are needed to protect this fundamental human right. The Horn of Africa—including Somalia, Ethiopia, and Kenya—endured the region’s worst drought in decades (2020–2023). Three consecutive failed rainy seasons destroyed crops and led to the death of millions of livestock. According to FAO and WHO, around 46 million people experienced acute food insecurity. In Somalia alone, approximately 6.7 million people were severely affected, with 1.8 million children facing malnutrition and 43,000 excess deaths in 2022. These events fueled displacement, public health crises, and humanitarian emergencies (Somalia drought may, 2023).

VI.4. The Right to Water and Sanitation

Access to clean and safe water—essential for health and dignity—is under strain. Climate change contributes to prolonged droughts and intensifies contamination risks during floods, leading to reduced availability of potable water. This challenge is compounded by pollution from industrial, urban, and agricultural sources, further degrading water quality and undermining the right to water and sanitation (Babuji et al., 2023; Adeosun et al., 2016 Negrete-Bolagay et al., 2021; Zamora-Ledezma et al., 2021).

For example, Tuvalu and Kiribati, two of the world's lowest-lying island nations in the Pacific Ocean, are facing acute water insecurity. These countries rely primarily on: Freshwater lenses (thin layers of freshwater that float atop saltwater in porous coral atolls), Rainwater collection systems for drinking and domestic use. However, rising sea levels — driven by climate change — are intruding saltwater into these freshwater sources, rendering them undrinkable and unsafe for daily use. This leads to the following consequences:

In Tuvalu, almost all traditional groundwater wells are too saline for consumption or irrigation.

In Kiribati, especially on the main island of Tarawa, residents have limited access to safe water, and waterborne diseases like diarrhea and typhoid are increasing due to contaminated sources.

Both countries experience long dry periods and seasonal droughts, making rainwater collection unreliable.

Climate-induced water scarcity also affects food production, as saline soils reduce agricultural productivity.

UNICEF has documented the water crisis in Kiribati and Tuvalu as part of its climate and WASH (Water, Sanitation and Hygiene) programs. Their reports highlight that: “Sea-level rise is causing saltwater to contaminate limited freshwater supplies, leaving communities without safe drinking water and increasing the risks of disease.” — *UNICEF Pacific Islands, 2021*.

The UN Development Programme (UNDP) identifies water insecurity in Pacific Small Island Developing States (SIDS) as a critical development issue. It notes that: “The intrusion of saltwater into freshwater aquifers, driven by sea-level rise and extreme weather, has left many islands with inadequate drinking water, threatening public health and livelihoods.” — *UNDP Pacific Office, Climate Resilience Brief, 2020*.

According to UN General Assembly Resolution 64/292 (2010), the right to water and sanitation is a fundamental human right. In Tuvalu and Kiribati:

- This right is directly undermined by climate-driven environmental change.
- Access to safe drinking water is no longer guaranteed, especially for remote or poorer communities.
- This raises broader questions about climate justice, displacement, and the obligation of wealthier nations to support climate adaptation.

The case of Tuvalu and Kiribati illustrates how climate change transforms environmental stress into human rights crises. Without urgent adaptation support—such as desalination infrastructure, rainwater harvesting expansion, and

climate finance — entire populations could face forced displacement due to uninhabitable living conditions, beginning with water scarcity.

VI.5. The Right to Housing

The growing intensity of climate-related disasters has devastating impacts on housing security. Sea-level rise, coastal erosion, and extreme weather events frequently damage or destroy homes, forcing displacement and rendering entire communities homeless (Cooper et al., 2018).

For example, in August 2005, Hurricane Katrina struck the Gulf Coast of the United States, with New Orleans, Louisiana suffering the worst devastation. The hurricane caused:

- Over 1,800 deaths and the displacement of more than one million people.
- Massive flooding due to levee failure, submerging 80% of the city.
- Widespread housing destruction, especially in low-income neighborhoods like the Lower Ninth Ward.

Poor and African American communities bore the brunt of the disaster:

- They lived in low-lying, under-protected areas more vulnerable to flooding.
- Many lacked the means for timely evacuation, resulting in higher exposure to harm.
- Post-disaster recovery programs favored homeowners over renters and public housing residents, leading to long-term displacement and housing insecurity.

Amnesty has criticized the racial and economic inequalities in the U.S. government's response: "The U.S. government failed to adequately protect the right to housing, especially for Black and low-income residents who were displaced and denied equitable assistance." — *Amnesty International USA Report, 2010*.

The HRW Transparency Project emphasized that displaced residents faced violations of international housing rights standards: "Government policies after the storm led to long-term homelessness and forced eviction of many low-income families from public housing." — *HRW, "After the Storm: Housing Rights in Post-Katrina New Orleans," 2006*.

While Hurricane Katrina is a domestic case, it foreshadowed global climate displacement:

- Similar vulnerabilities are evident in Bangladesh, Mozambique, and Pacific Island nations.

- Marginalized communities globally often lack resources for climate adaptation, emergency relocation, or reconstruction, deepening housing crises.

Hurricane Katrina demonstrates how climate-induced disasters exacerbate existing structural inequalities, turning natural hazards into human rights failures. It underscores the need for climate-resilient housing policies grounded in equity and justice, especially for historically disadvantaged populations.

Moreover, the impacts of climate change are deeply unequal, disproportionately burdening the most vulnerable populations. Marginalized communities, particularly those living in climate-sensitive regions, often lack the financial, infrastructural, and institutional capacity to withstand or recover from climate-induced shocks. Women and children are especially at risk due to systemic barriers to resources, services, and decision-making, as well as the increased caregiving and survival responsibilities they shoulder during and after crises. Similarly, Indigenous peoples, whose livelihoods, cultural identity, and spiritual practices are intimately tied to the natural environment, face existential threats as their ancestral lands and ecosystems are increasingly degraded by climate disruption (Rueda Abad & Vargas Castilleja, 2021).

Growing international concern over the human rights implications of extreme weather events is reflected in several resolutions adopted by the United Nations Human Rights Council (UNHRC) — notably Resolutions 29/15, 32/33, and 44/7. These documents affirm that climate change contributes significantly to the intensification of natural disasters, which, in turn, hinders the realization of a broad range of human rights (United Nations, 2015, 2016a, 2020). The Office of the United Nations High Commissioner for Human Rights (OHCHR) has echoed this position in its report A/HRC/52/48, which documents insights from global roundtable discussions. It emphasizes that vulnerable and marginalized populations bear the brunt of the adverse effects of climate change, often losing access to basic rights such as food, water, shelter, and health (United Nations, 2022b).

Further reinforcing this linkage, the Special Rapporteur's report A/77/226 explores the promotion and protection of human rights in the context of climate change. The report underlines the urgency of adopting fair, inclusive, and timely responses to the climate crisis. It highlights the necessity of addressing loss and damage, promoting equity, and ensuring that those most affected have a meaningful role in climate-related decision-making (United Nations, 2022a).

In a broader context, the report titled "The human right to a clean, healthy and sustainable environment: a catalyst for accelerating the achievement of the

Sustainable Development Goals” (A/77/284) underscores the recognition of a safe and stable climate as a core element of the right to a healthy environment. This right encompasses both substantive and procedural dimensions. Substantive rights include access to a safe climate system, protection from the harmful impacts of climate change, and the preservation of ecosystems essential to human well-being. Procedural rights guarantee access to environmental information, the ability to participate in policy-making processes, and the availability of legal remedies in cases of environmental harm or rights violations (United Nations, 2022c).

Taken together, these documents assert that climate justice is inseparable from human rights. To ensure sustainable development and protect current and future generations, states must take urgent, rights-based climate action — rooted in transparency, participation, and justice.

The adoption of United Nations General Assembly Resolution 76/300 represents a landmark achievement in the global recognition of environmental rights. By affirming the human right to a clean, healthy, and sustainable environment, the resolution significantly strengthens the normative and legal foundations for addressing the climate crisis. It formally establishes the intrinsic connection between human rights and environmental integrity, thereby empowering individuals and communities to call for more decisive measures to combat environmental harm and climate change (United Nations, 2022d).

This recognition also has profound implications for national legal systems. Resolution 76/300 may serve as a catalyst for states to enshrine environmental rights in their constitutions or legal frameworks, thus fostering stronger institutional commitments to environmental protection and supporting environmental human rights defenders. In doing so, it can pave the way for more ambitious, rights-based climate policies and greater accountability from governments and corporations alike.

Fundamentally, the resolution underscores that a stable climate and a healthy environment are not optional luxuries, but essential prerequisites for the realization of all other human rights. It provides a solid platform for advancing equitable and effective climate action on a global scale — anchored in justice, sustainability, and human dignity.

The Sendai Framework for Disaster Risk Reduction 2015–2030 stands out as a key international policy tool that bridges the relationship between climate change, extreme weather events, and human rights. Recognizing climate change as a significant driver of disaster risk, the Framework underscores the importance of comprehensive risk reduction strategies to uphold the right to a safe and healthy environment. Its overarching goal is to significantly reduce disaster-related losses

— including loss of life, economic damage, harm to health, and destruction of critical infrastructure — over a 15-year timeline (Busayo et al., 2020).

The Framework sets forth seven global targets, such as reducing disaster mortality and the number of people affected, minimizing economic losses, protecting infrastructure, and enhancing the number of countries with national and local risk reduction strategies. It also promotes international cooperation and calls for improved access to early warning systems. These objectives closely align with the right to a stable climate, as they seek to reduce human vulnerability to climate-induced hazards (Patel et al., 2021).

Moreover, the four strategic priorities for action — (1) understanding disaster risk; (2) strengthening disaster risk governance; (3) investing in risk reduction for resilience; and (4) improving preparedness for effective response — further reinforce the integration of human rights into disaster policy. This approach requires an in-depth analysis of vulnerability, capacity, and exposure, while encouraging better governance and long-term resilience investment (Mavhura & Raj Aryal, 2023).

Inclusivity is a core principle of the Sendai Framework. It emphasizes the engagement of all societal actors, especially marginalized or vulnerable populations, in disaster risk planning and response. This principle supports climate justice, ensuring that the voices and rights of those most at risk are recognized and safeguarded. The Framework also advocates for coherence between disaster risk reduction, climate adaptation, and sustainable development policies, thereby promoting the right to development in a climate-resilient and equitable manner (Maly & Suppasri, 2020).

Overall, the Sendai Framework provides a holistic foundation for integrating climate change adaptation into disaster risk governance. Its objectives and principles can significantly strengthen the protection of human rights as climate-related hazards intensify (Busayo et al. 2020; Mavhura & Raj Aryal, 2023; Patel et al., 2021).

However, the Framework is not without limitations. Critics argue that it leans too heavily on technocratic and science-driven approaches, often overlooking the structural social, economic, and political inequalities that underlie vulnerability. This narrow focus may inadvertently increase the risk to certain groups by failing to address systemic drivers of exposure and marginalization. Additional concerns include the inadequate integration of gender perspectives and the insufficient attention paid to localized and small-scale hazards. These critiques call for a more justice-oriented approach that prioritizes equity, inclusiveness, and the root causes of vulnerability over purely technical fixes (Maly & Suppasri, 2020).

In summary, this analysis reinforces the deep interdependence between human rights and the right to a stable climate. It highlights the urgent need for robust, fair, and inclusive climate action. States are therefore obligated to adopt ambitious, rights-based climate policies that not only mitigate climate impacts but also uphold the dignity and well-being of all individuals, particularly those most at risk. Integrating human rights principles into climate governance is not only a legal and ethical necessity — it also contributes to more effective, sustainable, and equitable climate solutions.

Bibliography

- Aberman, N. L., Ali, S., Behrman, J., Bryan, E., Davis, P., Donnelly, A., Gathaara, V., Koné, D., Nganga, T., & Ngugi, J. (2015). *Climate change adaptation assets and group-based approaches: Gendered perceptions from Bangladesh, Ethiopia, Mali, and Kenya*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2564556
- Adeosun, F. I., Adams, T. F., & Amrevuawho, M. O. (2016). Effect of anthropogenic activities on the water quality parameters of Federal University of Agriculture Abeokuta reservoir. *International Journal of Fisheries and Aquatic Studies*, 4, 104–108.
- African Union. (n.d.). *African Charter on Human and Peoples' Rights*. <https://au.int/en/treaties/african-charter-human-and-peoples-rights>
- Ahmed, S., & Eklund, E. (n.d.). Intersectionality shapes the access to various adaptive resources in climate-vulnerable contexts. *IOP Conference Series: Earth and Environmental Science*. <https://iopscience.iop.org/article/10.1088/2752-5295/ad8d04/meta>
- Al Jazeera. (2023, June 15). *Somalia drought may have killed 43,000 in 2022, half under 5*: UN. <https://www.aljazeera.com/news/2023/3/20/somalia-drought-may-have-killed-43000-in-2022-half-under-5-un>
- Albarrán, C. R., & Nyamathi, A. (2011). HIV and Mexican migrant workers in the United States: A review applying the vulnerable populations conceptual model. *Journal of the Association of Nurses in AIDS Care*, 22, 173–185. <https://doi.org/10.1016/j.jana.2010.08.001>

- Alston, M. (2014). Gender mainstreaming and climate change. *Women's Studies International Forum*, 47, 287–294. <https://doi.org/10.1016/j.wsif.2013.01.016>
- Alston, P. (1982). A Third Generation of Solidarity Rights: Progressive Development or Obfuscation of International Human Rights Law? *Netherlands International Law Review*, 29(3), 307–322. <https://www.cambridge.org/core/journals/netherlands-international-law-review/article/abs/third-generation-of-solidarity-rights-progressive-development-or-obfuscation-of-international-human-rights-law/14642D2A748D-146213B9401404ADA5AC>
- Alston, P. (1982). A third generation of solidarity rights: Progressive development or obfuscation of international human rights law? *Netherlands International Law Review*, 29(3), 307–322. <https://www.cambridge.org/core/journals/netherlands-international-law-review/article/abs/third-generation-of-solidarity-rights-progressive-development-or-obfuscation-of-international-human-rights-law/14642D2A748D-146213B9401404ADA5AC>
- Alston, P. (1984). Conjuring up new human rights: A proposal for quality control. *American Journal of International Law*, 78(3), 607–621. <https://doi.org/10.2307/2202599>
- Amnesty International. (2010, May 27). *The state of the world's human rights*. <https://www.amnesty.org/en/documents/pol10/001/2010/en/>
- Anisah, S., & Hadi, S. (2023). The human right to a fair trial in competition law enforcement procedures: A rising issue in Indonesian experiences. *Laws*, 12, 55. <https://doi.org/10.3390/laws12030055>
- Arora-Jonsson, S. (2011). *Virtue and vulnerability: Discourses on women, gender and climate change*. *Global Environmental Change*, 21, 744–751. <https://doi.org/10.1016/j.gloenvcha.2011.01.005>
- Assaduzzaman, M., Filatova, T., Lovett, J. C., & Coenen, F. H. J. M. (2023). Gender-ethnicity intersectionality in climate change adaptation in the coastal areas of Bangladesh. *Sustainability*, 15, 3744. <https://doi.org/10.3390/su15043744>

- Atapattu, S. (2016). *Human rights approaches to climate change: Challenges and opportunities*. Routledge.
- Babuji, P., Thirumalaisamy, S., Duraisamy, K., & Periyasamy, G. (2023). Human health risks due to exposure to water pollution: A review. *Water*, 15, 2532. <https://doi.org/10.3390/w15142532>
- Bodansky, D. (2016). *The Art and Craft of International Environmental Law*. Harvard University Press.
- Bordner, A., Barnett, J., & Waters, E. (2023). The human right to climate adaptation. *npj Climatic Action*, 2, 43. <https://doi.org/10.1038/s44168-023-00079-w>
- Boyd, D. R. (2011). The implicit constitutional right to live in a healthy environment. *Review of European, Comparative & International Environmental Law*, 20(2), 171–179.
- Boyd, D. R. (2012). *The environmental rights revolution: A global study of constitutions, human rights, and the environment*. UBC Press.
- Boyd, D. R. (2018). Catalyst for change: Evaluating forty years of experience in implementing the right to a healthy environment. In J. Knox & R. Pejan (Eds.), *The human right to a healthy environment* (pp. 19–23). Cambridge University Press.
- Boyd, D. R. (2022). *The right to a healthy environment: Revitalizing human rights for the Anthropocene*. Cambridge University Press.
- Boyd, D. R. (2024). The right to a healthy environment: A user's guide. JUST FAIR. https://justfair.org.uk/wp-content/uploads/2024/09/The-Right-to-a-Healthy-Envnt-Users-Guide_Boyd-2024.pdf
- Boyd, D. R., Rodríguez-Garavito, C., & De Bona, M. (2024, September 29). Can judges help save the planet? Landmark court decisions on the right to a healthy environment. Open Global Rights. <https://www.open-globalrights.org/can-judges-help-save-the-planet-landmark-court-decisions-on-the-right-to-a-healthy-environment/>
- Boyd, D.R., Knox, J.H., Tigre, M.A., & Pradhan, M. (2021). *Human rights and the environment: Current status and emerging issues*. United Nations Environment Programme. <https://wedocs.unep.org/handle/20.500.11822/34952>

- Boyle, A. (2012). Human Rights and the Environment: Where Next? *European Journal of International Law*, 23(3), 613–642. <https://doi.org/10.1093/ejil/chs054/>
- Busayo, E. T., Kalumba, A. M., Afuye, G. A., Ekundayo, O. Y., & Ori-moloye, I. R. (2020). Assessment of the Sendai Framework for disaster risk reduction studies since 2015. *International Journal of Disaster Risk Reduction*, 50, 101906. <https://doi.org/10.1016/j.ijdr.2020.101906>
- Cannon, T. (2002). Gender and climate hazards in Bangladesh. *Gender & Development*, 10, 45–50. <https://doi.org/10.1080/13552070215906>
- Caradee, Y., Kapwata, T., Naidoo, N., Asante, K. P., Arku, R. E., Cissé, G., Simane, B., Atuyambe, L., & Berhane, K. (2024). Climate change and human health in Africa in relation to opportunities to strengthen mitigating potential and adaptive capacity: Strategies to inform an African “brains trust”. *Annals of Global Health*, 90(1), 7, 1–21. <https://doi.org/10.5334/aogh.4260>
- Cardona, O. (2004). The need for rethinking the concepts of vulnerability and risk from a holistic perspective: A necessary review and criticism for effective risk management. In *Mapping vulnerability: Disasters, development and people* (pp. 37–51). Earthscan Publishers.
- Colectivo EPU México. (2024). Colectivo EPU México 2024. <https://centroprodh.org.mx/colectivo-epu-mx-2024/>
- Cooper, C., Swindles, G., Savov, I., Schmidt, A., & Bacon, K. (2018). Evaluating the relationship between climate change and volcanism. *Earth-Science Reviews*, 177, 238–247. <https://doi.org/10.1016/j.earscirev.2017.11.009>
- Council of Europe. (n.d.). *European Convention on Human Rights*. https://www.echr.coe.int/documents/d/echr/convention_ENG
- Council of Europe. (n.d.). *The evolution of human rights*. <https://www.coe.int/en/web/compass/the-evolution-of-human-rights>
- Cranston, M. (1973). *What Are Human Rights?* Bodley Head.
- Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory, and antiracist politics. *University of Chicago Legal Forum*, 1989(1), 139–167.

- Daly, E., & May, J. R. (2018). *Implementing environmental constitutionalism*. Cambridge University Press.
- Dasgupta, S., Kamal, F. A., Khan, Z. H., Choudhury, S., & Nishat, A. (2015). *River salinity and climate change: Evidence from coastal Bangladesh*. In World Scientific Reference on Asia and the World Economy (pp. 205–242). Singapore: World Scientific.
- Declaration of the Rights of Man and of the Citizen. (2003). In L. Hunt (Ed.), *The French Revolution and Human Rights: A Brief Documentary History* (pp. 77–80). Bedford/St. Martin's. (Original work published 1789).
- Donnelly, J. (2013). *Universal human rights in theory and practice* (3rd ed.). Cornell University Press.
- Ekardt, F., & Bärenwaldt, M. (2023). The German climate verdict, human rights, Paris target, and EU climate law. *Sustainability*, 15, 12993. <https://doi.org/10.3390/su151712993>
- Flaskerud, J. H., & Winslow, B. J. (1998). Conceptualizing vulnerable populations health-related research. *Nursing Research*, 47, 69–78. <https://doi.org/10.1097/00006199-199803000-00005>
- Global Alliance of National Human Rights Institutions. (n.d.). Universal periodic review: Tips for engagement at country level for national human rights institutions and civil society. <https://ganhri.org/universal-periodic-review-tips/>
- Gonzalez, C. (2015). Environmental justice, human rights, and the Global South. *Santa Clara Journal of International Law*, 13, 1151–1195.
- Held v. State of Montana (Montana Supreme Court, August 14, 2024).. <https://law.justia.com/cases/montana/supreme-court/2024/da-23-0575-0.html>
- Hill Collins, P. (2019). *Intersectionality as critical social theory*. Durham, NC: Duke University Press.
- Hill Collins, P., & Bilge, S. (2016). *Intersectionality*. Cambridge, UK and Malden, MA: Polity Press.
- Hossain, M. S., Dearing, J. A., Rahman, M. M., & Salehin, M. (2016). Recent changes in ecosystem services and human well-being in the Bangladesh coastal zone. *Regional Environmental Change*, 16, 429–443. <https://doi.org/10.1007/s10113-014-0748-z>

- Human Rights Committee. (2018). *General comment No. 36 (2018) on article 6 of the International Covenant on Civil and Political Rights, on the right to life* (CCPR/C/GC/36). United Nations. <https://digitallibrary.un.org/record/1640660>
- Human Rights Watch. (2006). *World report 2006: Events of 2005*. <https://www.hrw.org/legacy/wr2k6/wr2006.pdf>
- Huq, H., & Easher, T. H. (2021). Coastal water: Wisdom, destruction, conflicts and contestation—A case of southwest coastal region of Bangladesh. In *Coastal Environments* (p. 21). London, UK: IntechOpen.
- Ikpoyi, D., & Mutsaka, F. (2024, April 25). *Climate change is bringing malaria to new areas. In Africa, it never left*. The Associated Press. <https://apnews.com/article/malaria-explainer-poverty-climate-change-8d4437a316c-ce82e4a69e68f9a6521b7>
- Intergovernmental Panel on Climate Change. (2014). Climate change 2014—Impacts, adaptation and vulnerability: Part A: Global and sectoral aspects. Volume 1, Global and sectoral aspects: Working Group II contribution to the IPCC Fifth Assessment Report. Cambridge, UK: Cambridge University Press.
- Intergovernmental Panel on Climate Change. (2023). *AR6 synthesis report: Climate change 2023*. <https://www.ipcc.ch/report/ar6/syr/>
- Ishay, M. R. (2008). *The history of human rights: From ancient times to the globalization era*. University of California Press.
- Jegede, A. O. (2020). Arguing the right to a safe climate under the UN Human Rights System. *International Human Rights Law Review*, 9(2), 184–212. <https://doi.org/10.1163/22131035-00902001>
- Jegede, A. O. (2020). Should a human right to a safe climate be recognized under the AU human rights system? In M. Addaney & A. O. Jegede (Eds.), *Human rights and the environment under African Union law* (pp. 45–70). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-46523-0_3
- Julien, H. (2015). Is there a human right to safe motherhood within the United Nations legal system? *Queen Mary Human Rights Review*, 2(1), 1–29.
- Kabir, J., Cramb, R., Alauddin, M., Gaydon, D. S., & Roth, C. H. (2020). Farmers' perceptions and management of risk in rice/shrimp farming sys-

- tems in South-West Coastal Bangladesh. *Land Use Policy*, 95, 104577. <https://doi.org/10.1016/j.landusepol.2020.104577>
- Khan, M. M. (2022). *Disaster and gender in coastal Bangladesh: Women's changing roles, risk and vulnerability*. Berlin, Germany: Springer Nature.
- Khine, M. M., & Langkulsen, U. (2023). The implications of climate change on health among vulnerable populations in South Africa: A systematic review. *International Journal of Environmental Research and Public Health*, 20, 3425. <https://doi.org/10.3390/ijerph20043425>
- Knox, J. H. (2014). Climate ethics and human rights. *Journal of Human Rights and the Environment*, 5, 22–34.
- Knox, J. H., & Pejan, R. (Eds.). (2018). *The human right to a healthy environment*. Cambridge University Press. <https://doi.org/10.1017/9781316997923>
- Knox, J. H. (2018). Human Rights, Environmental Protection, and the Sustainable Development Goals. *Washington International Law Journal*, 27(3), 535–555.
- Leghari v. Federation of Pakistan, W.P. No. 25501/2015 (Lahore High Court, Green Bench, 2015). <https://elaw.org/pk.leghari.2015>
- Luporini, R., & Kodiveri, A. U. (2021). *The increasing role of human rights bodies in climate litigation*. London, UK: The British Academy.
- Luporini, R., & Savaresi, A. (2023). International human rights bodies and climate litigation: Don't look up? *Review of European, Comparative & International Environmental Law*, 32, 267–278. <https://doi.org/10.1111/reel.12491>
- Maly, E., & Suppasri, A. (2020). The Sendai Framework for Disaster Risk Reduction at five: Lessons from the 2011 Great East Japan Earthquake and Tsunami. *International Journal of Disaster Risk Science*, 11, 167–178. <https://doi.org/10.1007/s13753-020-00268-9>
- Marks, S. (2004). The Human Right to Development: Between Rhetoric and Reality. *Harvard Human Rights Journal*, 17, 137–168.
- Marks, S. P. (2009). Human rights in development: The significance of the right to development. *Netherlands Quarterly of Human Rights*, 27(3), 347–374. <https://doi.org/10.1177/016934410902700304>

- Mavhura, E., & Aryal, K. R. (2023). Disaster mortalities and the Sendai Framework Target A: Insights from Zimbabwe. *World Development*, 165, 106196. <https://doi.org/10.1016/j.worlddev.2023.106196>
- Mayrhofer, M. (2024, August 1). *Vulnerability Framing in UN Climate Change and Human Rights*. Politics and Rights Review. <https://politicsri-ghts.com/vulnerability-climate-change-human-rights/>
- McAdam, J. (2020). *Climate change, forced migration, and international law (2nd ed.)*. Oxford University Press.
- Negrete-Bolagay, D., Zamora-Ledezma, C., Chuya-Sumba, C., De Sousa, F. B., Whitehead, D., Alexis, F., & Guerrero, V. H. (2021). Persistent organic pollutants: The trade-off between potential risks and sustainable remediation methods. *Journal of Environmental Management*, 300, 113737. <https://doi.org/10.1016/j.jenvman.2021.113737>
- Neubauer et al. v. Germany*, 1 BvR 2656/18 (Federal Constitutional Court [Bundesverfassungsgericht], March 24, 2021). https://www.climatecasechart.com/document/neubauer-et-al-v-germany_0a3e
- Office of the High Commissioner for Human Rights. (2009). *Report of the Office of the United Nations High Commissioner for Human Rights on the relationship between climate change and human rights (A/HRC/10/61)*. United Nations.
- Patel, S., McCaul, B., Cáceres, G., Peters, L., Patel, R., & Clark-Ginsberg, A. (2021). Delivering the promise of the Sendai Framework for disaster risk reduction in fragile and conflict-affected contexts (FCAC): A case study of the NGO GOAL's response to the Syria conflict. *Progress in Disaster Science*, 10, 100172. <https://doi.org/10.1016/j.pdisas.2021.100172>
- Pau de Vilchez Moragues, & Savaresi, A. (2022). The right to a healthy environment and climate litigation: A game-changer? *Yearbook of International Environmental Law*. Advance online publication.: <https://ssrn.com/abstract=4155484>
- Pearse, R. (2017). *Gender and climate change*. *Wiley Interdisciplinary Reviews: Climate Change*, 8, e451. <https://doi.org/10.1002/wcc.451>
- Pörtner, H.-O., Roberts, D., Tignor, M., Poloczanska, E., Mintenbeck, K., Alegría, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., et al.

- (2022). *Cities, settlements and key infrastructure*. In *Climate change 2022: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland: IPCC.
- Reuters. (2024, June 21). *Over 2 million people stranded after devastating floods in northeastern Bangladesh, reflecting the growing threat to life from climate extremes*. Reuters. https://www.reuters.com/business/environment/floods-ravage-parts-bangladesh-strand-over-2-million-people-2024-06-21/?utm_source=chatgpt.com
- Rueda Abad, J. C., & Vargas Castilleja, R. C. del C. (2021). Los derechos humanos ante la emergencia climática. *Revista Internacional de Cooperación y Desarrollo*, 8, 95–111.
- Ruggie, J. G. (2011). *Guiding principles on business and human rights: Implementing the United Nations “Protect, Respect and Remedy” framework*. United Nations.
- Sen, A. (1999). *Development as Freedom*. Oxford University Press.
- Setzer, J., & Higham, C. (2022). *Global trends in climate change litigation: 2022 snapshot*. Grantham Research Institute on Climate Change and the Environment, London School of Economics. <https://www.lse.ac.uk/granthaminstitute/publication/global-trends-in-climate-change-litigation-2022>
- Shameem, M. I., Momtaz, S., & Kiem, A. S. (2015). Local perceptions of and adaptation to climate variability and change: The case of shrimp farming communities in the coastal region of Bangladesh. *Climatic Change*, 133, 253–266. <http://dx.doi.org/10.1007/s10584-015-1470-7>
- Singh, A., Svensson, J., & Kalyanpur, A. (2010). The state of sex-disaggregated data for assessing the impact of climate change. *Procedia Environmental Sciences*, 1, 395–404. <https://doi.org/10.1016/j.proenv.2010.09.027>
- Skutsch, M., Roehr, U., Alber, G., Rose, J., & van der Heul, R. (2004, December 14). *Mainstreaming gender into the climate change regime*. Paper presented at COP 10 of the UNFCCC, Buenos Aires, Argentina.
- Solntsev, A. (2024). The growing importance of human rights treaty bodies in environmental dispute resolution. In C. Voigt & C. Foster (Eds.), *International courts versus non-compliance mechanisms: Comparative advan-*

- tages in strengthening treaty implementation* (pp. 361–382). Cambridge, UK: Cambridge University Press.
- Stavropoulou, M. (1994). The right not to be displaced. *American University International Law Review*, 9(3), 689–749.
- The Guardian. (2024, December 11). *Malaria cases rise for fifth year as disasters and resistance hamper control efforts*. https://www.theguardian.com/global-development/2024/dec/11/global-health-deaths-malaria-rise-drug-insecticide-resistance-climate-crisis-funding-un?utm_source=chatgpt.com
- U.S. Declaration of Independence. (1776). In *The Charters of Freedom*. National Archives. <https://www.archives.gov/founding-docs/declaration>
- UNESCO. (2021). *Recommendation on the ethics of artificial intelligence*. <https://unesdoc.unesco.org/ark:/48223/pf0000381137>
- United Nations Children’s Fund. (2021). *The climate crisis is a child rights crisis: Introducing the Children’s Climate Risk Index*. New York, NY: UNICEF. <https://www.unicef.org/media/105376/file/UNICEF-climate-crisis-child-rights-crisis.pdf>
- United Nations Conference on Environment and Development. (1992). *Rio Declaration on Environment and Development*. United Nations. <https://www.un.org/en/development/desa/population/theme/agenda-21>
- United Nations Conference on the Human Environment. (1972). *Stockholm Declaration on the Human Environment*. United Nations. <https://www.un.org/en/conferences/environment/stockholm1972>
- United Nations Development Programme. (2021). *Rising up for SIDS*. UNDP. https://www.undp.org/sites/g/files/zskgke326/files/migration/bb/undp-bb-Full_SIDS-Offer-Rising-Up-for-SIDS.pdf
- United Nations Economic Commission for Latin America and the Caribbean. (2018). *Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú Agreement)*. <https://observatoriop10.cepal.org/en/treaty/regional-agreement-access-information-public-participation-and-justice-environmental-matters>
- United Nations Framework Convention on Climate Change (2015). Paris Agreement. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

- United Nations Framework Convention on Climate Change. (2010). *The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention* (Decision 1/CP.16). <https://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>
- United Nations General Assembly. (1982). *World Charter for Nature* (A/RES/37/7). United Nations. <https://digitallibrary.un.org/record/39295>
- United Nations General Assembly. (2022). *The human right to a clean, healthy and sustainable environment* (A/RES/76/300). United Nations. <https://digitallibrary.un.org/record/3982508>
- United Nations General Assembly. (2022d). *The human right to a clean, healthy and sustainable environment—Resolution adopted by the General Assembly* (A/RES/76/300). <https://undocs.org/A/76/L.75>
- United Nations Human Rights Council (UNHRC). (2021). *The human right to a clean, healthy and sustainable environment* (Resolution 48/13). <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G21/296/76/PDF/G2129676.pdf>
- United Nations Human Rights Council. (2008). *Human rights and climate change* (Resolution 7/23). <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G08/145/71/PDF/G0814571.pdf>
- United Nations Human Rights Council. (2016a). *Resolution 32/33: Human rights and climate change* (A/HRC/RES/32/33). <https://undocs.org/A/HRC/RES/32/33>
- United Nations Human Rights Council. (2020). *Resolution 44/7: Human rights and climate change* (A/HRC/RES/44/7). <https://undocs.org/A/HRC/RES/44/7>
- United Nations Human Rights Council. (2021). *Resolution 48/13: The human right to a clean, healthy and sustainable environment* (A/HRC/RES/48/13). <https://undocs.org/en/A/HRC/RES/48/13>
- United Nations Human Rights Council. (2021). *The human right to a clean, healthy and sustainable environment* (Resolution 48/13). <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G21/296/76/PDF/G2129676.pdf>

- United Nations Human Rights Council. (2022a). *Report of the Special Rapporteur on the promotion and protection of human rights in the context of climate change—Promotion and protection of human rights in the context of climate change mitigation, loss and damage and participation* (A/77/226). <https://www.ohchr.org/es/documents/thematic-reports/a77226-promotion-and-protection-human-rights-context-climate-change>
- United Nations Human Rights Council. (2022b). *Round table on the adverse effects of climate change on the full and effective enjoyment of human rights by people in vulnerable situations—Report of the Office of the United Nations High Commissioner for Human Rights* (A/HRC/52/48). <https://www.ohchr.org/es/documents/thematic-reports/ahrc5248-panel-discussion-adverse-impact-climate-change-full-and->
- United Nations Human Rights Council. (2022c). *The human right to a clean, healthy and sustainable environment: A catalyst for accelerated action to achieve the Sustainable Development Goals* (A/77/284). <https://www.ohchr.org/en/documents/thematic-reports/a77284-human-right-clean-healthy-and-sustainable-environment-catalyst>.
- United Nations Human Rights Council. 2015. *Resolution 29/15: Human Rights and Climate Change*, A/HRC/RES/29/15. <https://undocs.org/A/HRC/RES/29/15>.
- United Nations Office for Disaster Risk Reduction. (2015). *Sendai framework for disaster risk reduction 2015–2030*. United Nations.
- United Nations. (1948). Universal Declaration of Human Rights. United Nations. <https://www.un.org/en/about-us/universal-declaration-of-human-rights>.
- United Nations. (1948, December 10). *Universal Declaration of Human Rights (General Assembly Resolution 217 A (III))*. <https://www.un.org/en/about-us/universal-declaration-of-human-rights>
- United Nations. (1966a). *International Covenant on Civil and Political Rights*. United Nations Treaty Series, vol. 999, p. 171. <https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights>

- United Nations. (1966a). *International Covenant on Civil and Political Rights*. <https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights>
- United Nations. (1966b). *International Covenant on Economic, Social and Cultural Rights*. United Nations Treaty Series, vol. 993, p. 3. <https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights>
- United Nations. (1966b). *International Covenant on Economic, Social and Cultural Rights*. <https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights>
- United Nations. (1972). *Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration)*. United Nations. <https://www.un.org/en/conferences/environment/stockholm1972>
- United Nations. (1986). *Declaration on the Right to Development*. <https://www.ohchr.org/en/instruments-mechanisms/instruments/declaration-right-development>
- United Nations. (1992). *Rio Declaration on Environment and Development*. United Nations Conference on Environment and Development, Rio de Janeiro. <https://www.un.org/en/development/desa/population/theme/agenda-21>
- United Nations. (1992). *Rio Declaration on Environment and Development*. <https://www.un.org/en/conferences/environment/rio1992>
- United Nations. (2022). *The human right to a clean, healthy and sustainable environment (A/RES/76/300)*. United Nations General Assembly. <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N22/449/97/PDF/N2244997.pdf>
- United Nations. (2022, July 28). *General Assembly declares access to a clean, healthy and sustainable environment a universal human right (Resolution 76/300)*. <https://news.un.org/en/story/2022/07/1123482>
- United Nations. (2022, July 28). *Resolution adopted by the General Assembly*. <https://docs.un.org/en/a/res/76/300>

- Urgenda Foundation v. The State of the Netherlands, ECLI:NL:HR:2019:2007 (Supreme Court of the Netherlands, 20 December 2019). <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:HR:2019:2007>
- Urgenda Foundation v. The State of the Netherlands, ECLI:NL:HR:2019:2007 (Supreme Court of the Netherlands, December 20, 2019). https://www.climatecasechart.com/document/urgenda-foundation-v-state-of-the-netherlands_3297
- Vasak, K. (1977). Human rights: A thirty-year struggle: The sustained efforts to give force of law to the Universal Declaration of Human Rights. *UNESCO Courier*, 30(11), 29–32.
- Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, Application No. 53600/20 (European Court of Human Rights, 9 April 2024). <https://hudoc.echr.coe.int/eng?i=001-231522>
- Wewerinke-Singh, M., & Doebbler, C. (2022). Protecting human health from climate change: Legal obligations and avenues of redress under international law. *International Journal of Environmental Research and Public Health*, 19, 5386. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4097454
- World Commission on Environment and Development. (1987). *Our common future*. Oxford University Press. <https://digitallibrary.un.org/record/139811>
- World Health Organization. (2019). *Mental health, poverty and development*. https://www.who.int/mental_health/policy/development/en/
- World Health Organization. (2023, October 12). *Climate change*. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
- Zamora-Ledezma, C., Negrete-Bolagay, D., Figueroa, F., Zamora-Ledezma, E., Ni, M., Alexis, F., & Guerrero, V. H. (2021). Heavy metal water pollution: A fresh look about hazards, novel and conventional remediation methods. *Environmental Technology & Innovation*, 22, 101504. <https://doi.org/10.1016/j.eti.2021.101504>

Social injustice and climate vulnerability

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SUMMARY: I. Introduction. II. Vulnerability and social justice. III: Age. III.1. Children. III.2. Older adults. IV. Gender. IV. 1. Women. IV. 2. LGBTBIQ+. V. National identity. V.1. Migrants. V.2. Indigenous People. VI. Social inequalities. VI.1. Poor. VI.2. Social Class. VII. Disabilities. VIII. Conclusions. Bibliography.

I. Introduction

Climate change poses an existential threat to the stability of the natural systems that sustain life on Earth (Steffen et al, 2023). Its consequences extend far beyond environmental degradation, triggering a cascade of interconnected socioeconomic impacts that jeopardize the very fabric of human civilization. By intensifying existing inequalities and creating new forms of vulnerability, climate change intensifies existing risks and creates new ones, acting as a pervasive multiplier of vulnerability.

As a profound disruptor of Earth's systems, climate change is a key driver of accelerated biodiversity loss. Many species are unable to adapt or migrate quickly enough to keep pace with rising temperatures and ocean acidification. This leads to widespread ecosystem homogenization and the collapse of essential services such as pollination, water purification, and natural climate regulation. Additionally, climate change intensifies the global hydrological cycle, producing a paradox of simultaneous extremes: prolonged droughts that increase wildfire risk in some regions, and catastrophic flooding from extreme rainfall in others. These disruptions push critical biophysical systems – including polar ice sheets, coral reefs, and thermohaline ocean circulation – dangerously close to tipping points, beyond which changes become irreversible on human timescales (IPCC 2019).

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The degradation of ecosystems has profound and uneven social consequences. Food and water security are severely compromised, especially in tropical and subtropical regions reliant on rain-fed subsistence agriculture. This disruption exacerbates malnutrition and famine and can ignite conflicts over increasingly scarce resources. In public health, the geographic range of vector-borne diseases such as dengue and malaria are expanding, while extreme heat waves increase mortality rates among vulnerable populations, including the elderly and those with pre-existing health conditions. Economically, the costs of inaction – spanning disaster recovery, lost productivity, and forced migration – far exceed the investments needed for a proactive and orderly transition to a resilient economy. Crucially, these impacts fall most heavily on communities and nations that have contributed least to the problem – developing countries and marginalized social groups – deepening global injustices and creating a legacy of ecological debt.

As a result, academic and policy discourse increasingly recognizes that climate change is not merely an environmental issue (IPCC, 2022). It is a multiplier threat that interacts with pre-existing social, economic, and political vulnerabilities, destabilizing governance institutions, threatening economic stability, and undermining fundamental human rights. Addressing this polycentric crisis requires an urgent, transdisciplinary response grounded in the ethical framework of climate justice. This framework acknowledges the common but differentiated responsibilities of nations and economic actors, emphasizing equity and accountability.

Within this context, climate justice has emerged as a central paradigm. It moves beyond technical solutions to frame the climate crisis as a matter of ethics, equity, and human rights. Climate justice is based on the principle that the benefits of emissions-intensive activities and the burdens of their impacts must be distributed fairly. It demands those historical polluters – nations and corporations that have profited from unrestricted carbon emissions – assume proportionate responsibility for mitigating further warming and financing adaptation, technology transfer, and sustainable development in the most affected regions.

United Nations has explicitly recognized that climate change disproportionately affects people in vulnerable situations. This recognition goes beyond empirical observation and has been translated into normative resolutions that link climate action with the protection of human rights.

In this sense, the United Nations Human Rights Council has adopted multiple resolutions that emphasize this relationship. For instance, Resolution 47/24 (2021) acknowledges that people in vulnerable situations – including Indigenous communities, women, persons with disabilities, migrants, and children – face heightened risks due to climate change, and calls for the development

of specific reports on the issue. Similarly, Resolution 41/21 (2019) highlights the need to integrate human rights into climate policies, particularly regarding marginalized groups (Human Rights Council, 2019).

In addition, the report by the United Nations Department of Economic and Social Affairs provides a conceptual framework for understanding how climate change exacerbates existing social inequalities (UN DESA, 2017). It identifies three main channels: increased exposure of disadvantaged groups, greater susceptibility to harm, and reduced capacity to recover. This body of normative and analytical work clearly demonstrates that the fight against climate change is inseparable from the fight against inequality. Climate justice demands not only effective mitigation and adaptation strategies, but also the transformation of the underlying social structures that perpetuate exclusion, marginalization, and systemic vulnerability.

While climate justice is often invoked to draw attention to the disproportionate suffering of certain groups, such references point to deeper, pre-existing social injustices that climate change intensifies. The focus of this chapter, therefore, is on the structural dimensions of differential vulnerability. The groups and communities examined here are not rendered vulnerable solely by climate change itself. Rather, their exposure and sensitivity to climate impacts are shaped by long-standing socioeconomic, political, and geographic disadvantages. Their vulnerability is multidimensional – rooted in histories of marginalization, entrenched poverty – restricted access to essential resources, and political disenfranchisement. Climate change acts as a magnifier of these injustices, reinforcing patterns of inequality unless explicitly addressed through inclusive and rights-based climate action.

Accordingly, this chapter begins by establishing a robust theoretical framework for understanding both ontological and social vulnerability. The latter is not as a natural condition, but as a product of systemic injustice. This perspective is essential for connecting biophysical climate impacts to human consequences. It enables a more nuanced analysis of how climate change interacts with existing societal fault lines and argues that building resilience requires addressing the root causes of vulnerability.

II. Vulnerability and social justice

The fundamental starting point of this chapter is the recognition of the existence of deeply rooted structural injustices within our societies. These systems of oppression – historically and systemically fuelled by racism, colonialism, patriarchy, and capitalism – materialized in increasingly pronounced socioecono-

mic and political inequalities. Added to these primary axes of domination are other forms of discrimination that persist in everyday life, such as those based on age, nationality, disability, or gender identity and sexual orientation.

The spectrum of discrimination is broad and multidimensional. Its main analytical complexity lies not in the mere superposition of these axes, but in the complex interconnections and synergies that occur between them, shaping unique experiences of privilege and oppression. This is where the intersectional perspective emerges as an indispensable analytical tool (Crenshaw, 1989). This approach allows us to unravel how the different axes of discrimination converge and mutually reinforce each other, uniquely shaping the vulnerability, agency, and life experience of each individual.

It is crucial to understand that this intersectionality of pre-existing vulnerabilities is not an isolated phenomenon. On the contrary, it constitutes the foundation upon which the climate crisis impacts. Climate change acts as an amplifier of these injustices, disproportionately exacerbating the risks for those groups already situated at the most disadvantaged intersections. Therefore, climate vulnerability cannot be adequately analysed without first examining these structures that determine who is most at risk and for what reasons. It is opportune to explore these intertwined dynamics because climate justice is contingent on the systems of oppression that reproduce and exacerbate vulnerability.

When we consider who are most vulnerable to climate change, the intuitive answer points to those who will suffer its worst consequences. However, this apparent tautology conceals a crucial truth: vulnerability is not a static attribute but is profoundly affected by the temporal dimension. An intragenerational approach is insufficient, as the impacts will worsen over time. Present inaction not only increases the magnitude of future damage but also expands the number of people exposed to severe risks, thus generating growing intergenerational vulnerability. This is called the intergenerational multiplier effect.

It is important to distinguish between ontological vulnerability (common to all human beings) and social vulnerability (determined by social relations) (Butler, 2006: 26–31; Liedo, 2021: 242–257). This distinction is surely insufficient to fully account for the notion of vulnerability, but it is very illustrative of its content, since it assumes that all human beings are vulnerable (due to our own condition) but emphasizes that this vulnerability increases based on social determinants.

The idea of ontological (Fineman, 2008) or anthropological vulnerability (de ten Have, 2016) includes the idea that vulnerability is a characteristic of human beings because every human being is “susceptible to being harmed or hurt” (Liedo, 2021: 244). Vulnerability is intrinsic to human beings, and this is

reflected in the possibility of being harmed, hurt, and is evident in the fact that human beings, like any living being, get sick and die.

The other side of ontological vulnerability is that of care and mutual dependence. This question, however, can give rise to problematic interpretations. By understanding vulnerability as a characteristic (ontological or anthropological) of the human being, it is necessary to consider whether there is room for individual autonomy and, consequently, for responsibility. If we are dependent subjects due to our vulnerability, how can we be autonomous and responsible at the same time?

This question, however, seems less significant when we consider that vulnerability is inherent and unavoidable. It is a precondition to any other condition. It is not that we lack autonomy because we are dependent; rather, our autonomy is bound up with vulnerability and its consequent dependence. For this reason, the conceptualization of autonomy cannot be dissociated from the inherent characteristics of the human being, such as our condition as vulnerable and dependent subjects.

The conception of autonomy must therefore be linked to the human condition. This is why this first ontological condition derived from vulnerability cannot be treated as an obstacle to considering human beings as “autonomous” and, consequently, “accountable.” Rather, it requires us to understand autonomy from a perspective that also takes into account this vulnerability and dependence.

In this sense, it is precisely ontological vulnerability that provides the starting point for understanding autonomy and its connection to our dependence on the social world and, of course, the natural environment in which we live our lives. Here another relevant issue arises that we must consider, ontological vulnerability. It is inherent to human beings, can also be intensified independently of specific social or personal situations, due to our dependence on society and the natural environment.

The two sides of ontological vulnerability – the potential for harm and dependence on others – are amplified in situations of risk. The effects of climate change, therefore, amplify ontological vulnerability, regardless of its specific conditions.

Social life is influenced by several determinants that influence the increase in vulnerability. Increased vulnerability is due to the existence of a set of social causes that unequally affect different individuals or groups of individuals. In this sense, an individual may be vulnerable due to one or more causes. Thus, we can find different degrees of vulnerability depending on each individual.

Age, gender, origin, identity, or sexual orientation can be causes that increase the vulnerability of individuals. This increase in vulnerability may be tempo-

rary, as in the case of newborns or minors, for whom a safety net is extended to alleviate this vulnerability. It may also affect a certain age group, such as older adults, who depend on others to meet their basic needs. Or it may also affect individuals with disabilities who are placed in a vulnerable situation due to the need for others to carry out certain activities. Another type of vulnerability refers to situations arising from structural injustices that artificially place individuals in vulnerable positions.

This type of vulnerability may originate in a specific cultural or socioeconomic pattern. Thus, under patriarchal culture, women are vulnerable relative to men; under capitalism, workers are vulnerable relative to capitalists or rentiers, etc. In this context, social vulnerability shows that sometimes the inherent vulnerability of human beings increases due to social situations that can be alleviated through institutional mechanisms. The vulnerability of certain groups due to their purchasing power, gender, sexual orientation, identity, national origin, etc., determines the degree of vulnerability. Accepting that all human beings are ontologically vulnerable is no obstacle to combating those situations of artificially created vulnerability. In this context, specialized literature on climate change has emphasized that certain groups or collectives may be more vulnerable to climate change due to their personal circumstances (age groups) or conditions of structural injustice (Shue, 2014).

Specific vulnerability to climate change is linked to different factors.

The first factor is the difference between developed and developing countries. The capacity to react, the resilience of infrastructure, and institutional development are key to addressing a problem like climate change. Individuals residing in countries where climate change has a greater impact will suffer the consequences to a greater extent. Thus, residents of countries where storms, droughts, or high temperatures are frequent will be more vulnerable to climate change. Furthermore, among these countries, those with lower development indices will have a lower capacity to react to these consequences.

According to this argument, we must consider those individuals who are vulnerable because they live in geographic areas where climate change will have a greater impact, and those who live in geographic areas that have a lower capacity for resilience and adaptation due to their level of development. In many situations, both extremes of vulnerability will occur. Those who live in underdeveloped areas will be severely affected by the consequences of climate change.

Additionally, climate change will have unequal consequences within a country, whether due to direct environmental impacts, such as coastal or forested areas that may be affected by flooding or fires; or due to the economic impact

linked to changes in the economic structure, such as communities that are highly dependent on the climate to develop their economies.

Furthermore, the consequences of climate change are distributed unevenly, disproportionately impacting individuals and groups rendered vulnerable by their physical condition, socioeconomic status, age, origin, or role in society. This inequality manifests in two keyways: first, by most severely affecting those with the least capacity to adapt; and second, by exacerbating the precarity of those already marginalized due to physical, social, or cultural circumstances.

This vulnerability is intrinsically linked to our total dependence on the natural environment. As ecological systems deteriorate from rising global temperatures, the fundamental human needs for water, food, shelter, and security are increasingly threatened. This erosion of life-sustaining resources lies at the very heart of growing climate-induced vulnerability.

Critically, this is a gradual and accelerating process. Time and ongoing inaction are potent catalysts; each year of delayed response deepens the crisis, thereby amplifying vulnerability for all. However, this increase is not uniform. The most vulnerable populations face a compounded risk, where pre-existing disadvantages are multiplied by the severe physical and social consequences of a changing climate.

Consequently, a grave intergenerational injustice emerges. As temperatures rise and systemic damage accumulates, the young and future generations – who are inherently dependent and whose physical and social development is at stake – will inherit a world where their ability to meet basic needs is critically diminished. With each passing year of inaction, the window to safeguard their interests closes further, as the escalating damage locks in ever-greater vulnerability for their future.

III. Age

Age constitutes a fundamental axis of vulnerability to climate change, a notion supported by two key strands of specialized literature. First, from a temporal and intergenerational perspective, the climate crisis reveals a profound asymmetry: future generations, who have not contributed to the problem, will suffer its most severe consequences. This injustice is intensified by current inaction, which progressively increases the ontological and social vulnerability of those who will inhabit the planet in the future. Second, there is an intragenerational and ontological vulnerability that affects specific age groups due to their biological and social conditions. This applies particularly to children and older

adults, whose physical capacity, autonomy, and socioeconomic resilience are diminished, placing them at greater risk from climate impacts.

Age-related vulnerability can thus be analysed from two interconnected but conceptually distinct dimensions. On the one hand, there is biophysiological or inherent vulnerability, which refers to the health and physical conditions characteristic of the extreme stages of life. On the other hand, there is social or contextual vulnerability, linked to age discrimination. This dimension does not stem from biological factors per se, but from social constructs, stereotypes, and power structures that discriminate on the basis of age. It becomes evident in adaptation and mitigation policies that overlook the specific needs of these groups, in their exclusion from decision-making processes, and in the unequal distribution of resources and aid, which often prioritize the economically active population.

This systemic discrimination amplifies climate risks, rendering both children and older adults *doubly vulnerable*: on the one hand due to their physical characteristics, and on the other because they are subject to social discrimination.

However, it is crucial to recognize that this second dimension – socio-structural vulnerability – is contingent upon social and cultural contexts. The social status and perceived value of youth and old age are not universal but are instead constructed by cultural norms and economic systems. Furthermore, unlike fixed identity markers, an individual's position within these age categories is fluid and temporary. This temporality can make systemic age discrimination more difficult to identify and address than other forms of bias, as it is a category that everyone, in theory, will experience.

III.1. Children

Children are particularly vulnerable to climate change due to their physiological, developmental, and social characteristics. Their immune systems are still developing, making them more susceptible to vector-borne diseases such as dengue and malaria, which are expanding due to rising temperatures and changing precipitation patterns. Additionally, children have a lower tolerance to heat stress and are more likely to suffer from dehydration and heat-related illnesses during extreme weather events. Here it is key to distinguish between the age of the children and their national origin, since their physical conditions and needs will be different and, therefore, public policies to mitigate this vulnerability must take this into account (Iliscupidez, 2025).

Socially, children depend on adults for protection, access to resources, and decision-making. In climate emergencies, this dependency can become a liability, especially when caregivers are overwhelmed or displaced. Disruptions in education, nutrition, and healthcare services further compound their vulnerability. According to UNICEF (2021), over 1 billion children live in countries at extremely high risk of climate impacts, highlighting the urgent need for child-centred climate adaptation policies.

Moreover, children's voices are often excluded from climate governance, despite their unique perspectives and long-term stake in the planet's future. Integrating child rights into climate policy frameworks is essential to ensure equitable protection and empower younger generations to participate in shaping resilient societies. In this sense, it is crucial to emphasize that the younger generations will grow up and spend their entire adult lives in a context of accelerated climate crisis. This prolonged exposure to its effects not only makes them the primary victims but also key agents of change in driving the transformation towards a more sustainable future (Sanson & Bellemo, 2021).

III.2. Older adults

Addressing the climate vulnerability of older adults requires a rights-based and inclusive approach. Policies must integrate gerontological expertise, ensure equitable access to resources, and promote intergenerational solidarity. Climate justice demands that older adults be recognized not only as vulnerable subjects but also as agents of resilience, whose lived experience and community ties can contribute meaningfully to adaptation and mitigation efforts.

Structurally, economic insecurity among older adults – particularly women and minorities – limits their ability to invest in adaptive infrastructure or relocate from high-risk areas. Pension disparities, inadequate social protection, and housing precarity exacerbate their exposure to climate hazards. In many regions, older adults are concentrated in rural or climate –sensitive zones, where public services are scarce, and infrastructure is fragile.

Socially, older adults often experience isolation, especially those living alone or in institutional settings. This isolation reduces access to timely information and assistance during climate emergencies. Ageism further compounds this vulnerability, as older individuals are frequently excluded from decision-making processes and overlooked in policy design. Emergency response plans and climate adaptation strategies rarely account for the specific needs of older po-

pulations, such as accessible shelters, continuity of care, and age-appropriate communication channels.

Physiologically, aging is associated with diminished thermoregulatory capacity, reduced cardiovascular and respiratory resilience, and a higher prevalence of chronic conditions such as diabetes, hypertension, and cognitive impairments. These factors significantly increase susceptibility to extreme heat events, air pollution, and vector-borne diseases, which are exacerbated by climate change (Kriebel–Gasparro, 2022). Moreover, limited mobility and sensory impairments hinder evacuation during disasters, while dependence on medications and medical devices makes older adults particularly sensitive to disruptions in healthcare and energy systems.

Older adults represent a uniquely vulnerable demographic in the context of climate change, facing compounded risks due to physiological decline, social isolation, and systemic neglect. Their vulnerability is multidimensional, encompassing biophysical, psychological, and structural dimensions that interact to heighten exposure and reduce adaptive capacity.

IV. Gender

Gender is a central issue in contemporary environmental studies. When analysing climate change, it is also important to consider the disparate effects on groups discriminated against because of their sexual or gender identity. In this section, it is relevant to examine the perspectives of women and the LGTBIQ+ community.

IV.1. Women

Women's vulnerability to environmental and climate impacts can be understood through two interconnected yet analytically distinct dimensions. The first is structural, anchored in patriarchal systems that generate and perpetuate the socioeconomic and political inequalities intensifying risks for women. This vulnerability manifests in systematic limitations on women's access to and control over critical resources – including land, water, financial credit, and technology – as well as their frequent exclusion from formal decision-making processes in environmental management and climate policy. The absence of robust institutional and legal frameworks to combat gender discrimination exacerbates this situation, leaving women disproportionately exposed to systemic risks, including gender-based violence.

The second-dimension stems from socially assigned gender roles and responsibilities. In many communities, particularly those with rural subsistence economies, women bear primary responsibility for managing key natural resources. These tasks include collecting water and fuelwood, engaging in small-scale farming, and ensuring household food security. While such roles often provide women with invaluable local ecological knowledge, they also place them on the front lines of exposure to environmental degradation and resource scarcity. This increased burden amplifies their workload and restricts the time available for education, income-generating activities, or civic participation. Ecofeminist theory, which approaches gender inequalities from a critical and largely non-essentialist perspective, has been especially relevant in analysing these dynamics (Mies & Shiva, 1993).

These two dimensions do not operate in isolation but intersect synergistically, creating a self-reinforcing cycle of vulnerability. Gendered roles increase direct exposure to environmental threats, while the lack of economic and political power, rooted in patriarchal structures, simultaneously undermines women's capacity to respond effectively. Consequently, any climate adaptation or resilience strategy that aims to be both effective and equitable must simultaneously address the redistribution of resources and power and the transformation of the gendered social roles that overburden women.

IV.2. LGBTQ+

The social determinants that cause discrimination against the LGBTQ+ community are intensified during climate emergencies. Events such as natural disasters not only exacerbate existing inequalities but also create specific risks for this group that are often overlooked in public policies.

These risks include greater difficulties in migrating safely, disruptions in access to essential medical treatments (such as hormone therapy), and direct discrimination in shelters and in the distribution of humanitarian aid (Mann et al., 2024). These factors leave LGBTQ+ people in a state of particular vulnerability during a crisis.

Therefore, it is crucial that emergency action plans include specific measures that take these vulnerabilities into account. Developing inclusive protocols, ensuring continuous access to medication, and training response personnel are all necessary steps to build disaster management systems that leave no one behind and ensure equitable protection for all.

V. National identity

National identity is a broad and complex concept, and its interpretation is certainly open to debate. In this context, I include two vulnerable groups whose climate-related vulnerability is closely linked to their national or ethnic identity: migrants and refugees – who may be referred to as climate migrants or climate refugees – and Indigenous communities. The latter are collectives defined by their national, ethnic, and often religious origins, characterized by a deep spiritual and cultural connection to their ancestral lands. They are also distinguished by their political and social independence from the dominant group within a given country.

V.1. Migration

Migrants face heightened vulnerability to climate change due to legal, economic, and social marginalization. Climate-induced displacement – whether internal or cross-border – often results in precarious living conditions, limited access to healthcare, and exposure to exploitation. Migrants may lack legal recognition or residency rights, which restricts their access to public services and social safety nets during climate emergencies.

Climate change also acts as a driver of forced migration, particularly in regions affected by sea-level rise, desertification, and extreme weather events (Hastrup & Olwig, 2012). The inability to migrate safely or legally can trap populations in high-risk areas, exacerbating their exposure to climate hazards. According to the Internal Displacement Monitoring Centre (IDMC), over 30 million people were displaced by climate-related disasters in 2022 alone. Furthermore, climate migration exacerbates other forms of discrimination, such as against women, LGBTQ+ groups, or people with reduced mobility due to their age or physical abilities.

Policy responses must address the intersection of climate vulnerability and migration by ensuring legal protections, inclusive disaster planning, and access to adaptation resources for migrant communities. Recognizing climate migrants as rights-bearing individuals is a critical step toward climate justice.

The term “climate refugee” is conceptually and politically relevant, as it encapsulates one of the most severe injustices of the climate crisis: the forced displacement of populations who, while minimally responsible for global warming, must abandon their territories due to devastating environmental impacts.

Based on the principles of climate justice, which highlight the tension between major historical emitters and the most vulnerable communities, it is clear that a growing number of people will be forced to migrate beyond their national borders. In these cases, the historical responsibility of the main contributors to climate change imposes ethical and legal obligations of international protection.

Among the most urgent scenarios are those where climate change threatens the very existence of entire states, especially SIDS in the Pacific. For these nations, rising sea levels jeopardize their territorial sovereignty and the survival of their communities. Two recent cases illustrate the international response to this challenge. On the one hand, there is the case of Ioane Teitiota, a citizen of Kiribati, who requested asylum in New Zealand arguing that his life was in danger due to the flooding of his territory, water salinization, and social violence over scarce resources. Although the UN Human Rights Committee recognized that environmental degradation could threaten the right to life, it denied the request, considering that the risk was not “imminent” in his particular case, highlighting the limitations of the current legal framework on asylum in addressing these contexts.

On the other hand, the bilateral agreement between Australia and Tuvalu (Falepili Union Treaty) represents a significant step toward concrete solutions. Australia commits to granting 280 annual permanent residence visas to Tuvaluan citizens, allowing them to live, work, and study in that country, within the framework of the Pacific Engagement Visa. This pact, although limited in scale, embodies the principle of differentiated responsibility by offering a safe and legal means of mobility in the event that Tuvalu becomes uninhabitable. However, it also reflects the discretionary nature of current responses, which depend on the political will of States rather than a universal system of protection.

V.2. Indigenous people

Indigenous communities are among the most vulnerable to climate change due to their deep interdependence with the natural environment and their historical marginalization. Their traditional knowledge systems, cultural practices, and subsistence livelihoods are intricately tied to ecosystems that are increasingly disrupted by climate-related phenomena. In Arctic regions, for example, melting permafrost and altered animal migration patterns directly threaten Indigenous subsistence strategies and cultural continuity (Tsosie, 2007).

Despite this vulnerability, Indigenous peoples possess invaluable ecological knowledge that can significantly enhance climate adaptation and

resilience. Their practices often embody principles of sustainability, inter-generational stewardship, and holistic ecosystem management. However, these communities are frequently excluded from formal climate governance structures and face systemic barriers to land rights, resource access, and political representation. Also, climate change endangers not only the physical survival of Indigenous communities but also their cultural, spiritual, and legal identities (Williams, 2012).

Climate justice demands the recognition of Indigenous sovereignty, the protection of ancestral lands, and the meaningful inclusion of Indigenous voices in climate decision-making. Supporting Indigenous-led adaptation strategies is essential for equitable and sustainable climate responses.

Moreover, Indigenous communities are also disproportionately affected by the transformation processes associated with climate mitigation. The ecological transition –while necessary – often entails new forms of extractivism, particularly in the mining of transition minerals such as lithium, cobalt, and nickel. These resources are frequently located on or near Indigenous territories, and their exploitation can violate the right to Free, Prior and Informed Consent (FPIC), disrupt ecosystems, and threaten water access and cultural heritage. Although these impacts are not direct consequences of climate change itself, they are intimately linked to the global response to it. A truly just transition must ensure that the shift toward sustainable energy does not replicate colonial patterns of dispossession and environmental injustice.

VI. Social inequalities

The specialized literature on climate change and environmental justice highlights a deeply intertwined and mutually reinforcing relationship between poverty and climate impacts. This connection goes beyond mere correlation – it reflects a dynamic of structural causality and amplification –, where poverty exacerbates vulnerability to climate-related hazards, and those hazards, in turn, deepen existing social and economic inequalities.

This dynamic is particularly acute in contexts marked by structural poverty and systemic exclusion, where climate vulnerability intersects with entrenched forms of inequality such as ethnic marginalization, gender-based discrimination, and lack of access to political representation or social protection. In these settings, climate change does not act in isolation – it magnifies historical injustices and reproduces patterns of dispossession and precarity -.

Therefore, any climate adaptation or mitigation strategy that seeks to be just and effective must place social equity at its core. This means not only reducing emissions or building resilience, but also addressing the root causes of inequality – including land tenure insecurity, unequal access to resources, and exclusion from decision-making processes –. Climate action and poverty eradication are not parallel goals; they are interdependent struggles for human dignity, justice, and collective survival.

VI.1. Poor

Poverty is a central determinant of climate vulnerability (Sherbinin, 2019). Individuals living in poverty often reside in high-risk areas – such as floodplains, informal settlements, or drought-prone regions – with limited infrastructure and adaptive capacity. Their economic precarity restricts access to insurance, healthcare, and emergency services, making recovery from climate disasters more difficult.

Poverty, in its absolute and relative dimensions, constitutes a determining factor of socio-climatic vulnerability. Communities experiencing poverty often live in high-risk geographic areas – such as unstable hillsides, erodible coastlines, or flood-prone areas – have homes made of fragile materials, have limited access to early warning systems, and lack the financial resources to relocate or recover from a disaster. Furthermore, their direct dependence on climate-sensitive natural resources – such as subsistence agriculture, fishing, and livestock – disproportionately exposes them to droughts, disruptions to production cycles, and loss of livelihoods.

At the same time, climate change acts as a “threat multiplier” that exacerbates pre-existing inequalities. Events such as hurricanes, floods, or crop failures not only cause immediate damage but also generate vicious cycles of impoverishment: forced indebtedness, sale of productive assets, disruption of childhood education, and deteriorating health due to malnutrition or waterborne diseases. In this sense, poverty is not only a state of material deprivation, but also a condition of high exposure and low resilience, which limits the capacity for adaptation and increases the risk that minor environmental shocks will escalate into major humanitarian catastrophes.

Environmental poverty refers to the lack of access to clean air, water, and safe housing, which is exacerbated by climate change. Food poverty arises when climate impacts disrupt agricultural production and supply chains, leading to malnutrition and hunger. Energy poverty, defined as the lack of reliable and affordable energy, limits the ability to cope with extreme temperatures and access vital information during emergencies.

Addressing poverty in climate policy requires redistributive measures, targeted social protection, and inclusive planning. Climate adaptation must prioritize the needs of the poor to prevent further entrenchment of inequality and ensure that resilience is not a privilege but a right.

Additionally, the risk of falling into extreme poverty due to the consequences of climate change is not only real but increasingly urgent. According to estimates by the World Bank, climate change could push up to 132 million people into extreme poverty by the end of this decade (Jonin et al., 2020). This projection underscores the disproportionate burden climate change places on vulnerable populations, particularly in low-income countries where adaptive capacity is limited, and livelihoods are closely tied to climate-sensitive sectors such as agriculture and fisheries.

The mechanisms driving this impoverishment are multifaceted: rising temperatures, erratic rainfall, and increased frequency of extreme weather events disrupt food production, reduce income opportunities, and exacerbate health risks. Moreover, climate-induced displacement and loss of assets further compound economic insecurity. Without targeted mitigation and adaptation strategies, climate change threatens to reverse decades of progress in poverty reduction globally.

VI.2. Social class

Similarly to poverty, social class influences climate vulnerability through differential access to resources, decision-making power, and adaptive capacity. Lower socioeconomic groups often bear the brunt of climate impacts while contributing the least to greenhouse gas emissions. This disparity reflects broader systemic injustices rooted in capitalist modes of production and consumption.

Working-class communities may face job insecurity due to climate-related disruptions in agriculture, manufacturing, and service sectors. They are also more likely to live in areas with poor infrastructure and environmental degradation. In contrast, affluent groups can insulate themselves from climate risks through private adaptation measures, such as air conditioning, insurance, and relocation.

Climate policies require a class-conscious approach that challenges the structural inequalities underpinning vulnerability. Policies must redistribute resources, democratize climate governance, and ensure that the transition to a low-carbon economy does not reproduce existing hierarchies but fosters social equity. Additionally, labour policies and legislation must take into account the impact of climate change on workers – such as heat waves, wildfires, and

large-scale floods –. Adapting labour laws to new meteorological conditions is essential to safeguard workers' rights and interests.

Lastly, it is important to note that the energy transition threatens jobs that rely on highly polluting industries. The working class depends on its labour power and losing it can lead to a serious risk of falling into poverty or even extreme poverty. This creates a tension between the goals of the energy transition, job security, and the fulfilment of basic needs. Resolving this tension requires a direct and critical examination of capitalism, not only because it is the root cause of the climate crisis, but also because it is the only path through which the interests of both the working class and the environment can be protected without generating irreconcilable conflicts.

VII. Disability

Persons with disabilities face unique challenges during climate emergencies due to physical, sensory, cognitive, and social barriers. These include limited mobility, dependence on assistive technologies, and exclusion from emergency communication systems. Inaccessible shelters, transportation, and evacuation protocols further increase their risk during disasters.

Climate change also exacerbates health conditions and disrupts access to essential services, including medication, rehabilitation, and support networks. As Jodoin et al. (2020) emphasize, disability-inclusive climate governance is essential to uphold human rights and ensure equitable protection.

Adaptation strategies must incorporate universal design principles, inclusive communication, and active participation of persons with disabilities in planning and decision-making. Building resilience for all requires dismantling ableist structures and recognizing disability as a dimension of diversity, not deficiency.

VIII. Conclusions

In conclusion, this analysis has unequivocally demonstrated that climate change is far more than an environmental crisis; it is a profound multiplier of social injustice and systemic vulnerability. The paper establishes that the impacts of a warming planet are not distributed equally but are instead filtered through and intensified by pre-existing social structures. Crucially, an intersectional lens reveals that these vulnerabilities are not isolated but interconnected and mutually rein-

forcing. An individual's risk is not determined by a single factor, such as poverty or gender, but by the complex convergence of their identity, where axes like race, class, gender, disability, age, and immigration status intersect to create unique and compounded experiences of exposure and marginalization.

Climate change, therefore, acts as a powerful magnifying glass, exacerbating these deep-seated inequalities. The chapter's central argument rests on the critical distinction between ontological vulnerability – a universal human condition – and socially produced vulnerability. While all humanity is inherently vulnerable, the analysis confirms that the most affected are those at the most disadvantaged intersections of identity: an Indigenous woman, an elderly migrant with a disability, or a child from a low-income household in the Global South. Their heightened risk is a product of systemic injustice, not happenstance.

Consequently, an effective response demands a paradigm shift. Technical solutions for mitigation and adaptation, while necessary, are insufficient if they are “one-size-fits-all” and fail to address these root causes. The ethical and practical imperative is to ground all climate action in the framework of climate justice, informed by intersectionality. This requires moving beyond mere risk management to actively dismantle the interconnected structures of oppression that create differential vulnerability. It calls for policies that are not only environmentally sound but also explicitly designed to tackle overlapping discriminations, ensuring a just transition that protects the most vulnerable.

Ultimately, the fight against climate change is inseparable from the fight for a more equitable and inclusive world. Building true resilience necessitates a trans-disciplinary approach that prioritizes the redistribution of power and resources, guarantees the meaningful participation of marginalized groups in decision-making, and upholds human rights as the foundation of all policy. To ignore this intersectional reality is to risk crafting solutions that leave the most vulnerable behind, thereby replicating the very injustices that fuel the crisis. The path forward must be one of transformative change, where ecological sustainability and deep social justice are pursued as two inseparable and interdependent goals.

Bibliography

- Arora-Jonsson, S. (2011). Virtue and vulnerability: Discourses on women, gender and climate change. *Global Environmental Change*, 21(2), 744–751.

- Borràs–Pentinat, S. (2023). Climate Migration: A Gendered Perspective. *Environmental Policy and Law*, 53(5-6), 385-399.
- Butler, J. (2006). *Precarious life: The powers of mourning and violence*. Verso.
- Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, 1989(1), 139–167.
- Delgado Rodríguez, J. (2017). The relevance of the ethics of vulnerability in bioethics. **Les ateliers de l'éthique / The Ethics Forum*, 12*(2–3), 154–179.
- Denton, F. (2002). Climate change vulnerability, impacts, and adaptation: Why does gender matter? *Gender & Development*, 10(2), 10–20.
- Fineman, M. A. (2008). The vulnerable subject: Anchoring equality in the human condition. *Yale Journal of Law and Feminism*, 20(1), 1–23.
- Hastrup K, Fog Olwig K, eds. *Climate Change and Human Mobility: Global Challenges to the Social Sciences*. Cambridge University Press; 2012.
- Human Rights Council. (2019). *Resolution 41/21: Human rights and climate change*. United Nations.
- Human Rights Council. (2021). *Resolution 47/24: Human rights and persons in vulnerable situations in the context of climate change*. United Nations.
- Iliscupidez, L.J., et al. (2025). Children and Climate Change Vulnerability Indices: a Scoping Review. *Child Ind Res* 18, 1467–1494
- IPCC, 2019: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley (eds.)].
- IPCC, 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group

- II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001.
- Jafino, B. A., B. Walsh, J. Rozenberg, S. Hallegatte (2020), Revised estimates of the impact of climate change on extreme poverty by 2030. World Bank Policy Research Working Paper 9417
- Jodoin, S., Ananthamoorthy, N., & Lofts, K. (2020). A disability rights approach to climate governance. *Ecology Law Quarterly*, 47(1), 1–44.
- Kriebel–Gasparro. (2022). Climate Change: Effects on the Older Adult. *The Journal for Nurse Practitioners*, 18, 4, pp. 372–376.
- Liedo, B. (2021). Vulnerabilidad. *Eunomía. Revista en Cultura de la Legalidad*, 20, 288–293.
- Mann, S., et al. (2024). Climate change-related disasters & the health of LGBTQ+ populations. *The Journal of Climate Change and Health*, 18(2).
- Mies, M., & Shiva, V. (1993). *Ecofeminism*. Zed Books.
- Sanson, A., & Bellemo, M. (2021). Children and youth in the climate crisis. *BJPsych Bulletin*, 45(4), 205–209.
- Sherbinin, A. et al. (2019). *Climate Vulnerability Mapping: A Systematic Review*. Journal of Environmental Health Perspectives, 127(12).
- Shue, H. (2014). *Climate justice: vulnerability and protection*, Oxford: Oxford University Press.
- Steffen, W., Richardson, K., Rockström, J., et al. (2023). Safe and just Earth system boundaries. *Nature*, 619, 102–111.
- ten Have, H. (2016). *Vulnerability: Challenging bioethics*. Routledge.
- Tsosie, R. (2007). Indigenous people and environmental justice: The impact of climate change. *University of Colorado Law Review*, 78, 1625–1677.
- UN DESA. (2017). *Climate Change and Social Inequality*. United Nations Department of Economic and Social Affairs. <https://www.un.org/en/desa/climate-change-and-social-inequality>

- United Nations Children's Fund. (2021). *The Climate Crisis is a Child Rights Crisis: Introducing the Children's Climate Risk Index*. New York.
- Williams, J. (2012). The impact of climate change on indigenous people: the implications for the cultural, spiritual, economic and legal rights of indigenous people. *The International Journal of Human Rights*, 16(4), 648–669.

The emerging climate jurisprudence of regional human rights courts

GASTÓN MEDICI-COLOMBO

SUMMARY: I. Introduction. II. Climate change before the ECtHR. II.1. KlimaSeniorinnen: the contours of access to justice in climate matters and policy-related obligations. II.2. Duarte Agostinho: extraterritorial climate victims under the ECHR? II.3. Greenpeace Nordic: project-related obligations. III. Climate change before the IACtHR. III.1. The Advisory Opinion OC-32/25 on Climate Emergency and Human Rights. IV. Climate change before the ACtHPR. V. Conclusions. Bibliography.

I. Introduction

Climate change is one of the most pressing challenges of our time. As rising temperatures, extreme weather events, and environmental degradation threaten livelihoods, displace communities, and endanger lives, there is growing recognition that climate change directly impacts a wide range of human rights (United Nations Human Rights Council, 2008; United Nations Human Rights Council, 2024). In response, individuals and communities are increasingly turning to courts to demand accountability, urging States and corporations to take more decisive action to prevent climate harm and redress its consequences (United Nations Environment Programme, 2023; Setzer & Higham, 2025).

Although human rights law has played an instrumental role in domestic climate change litigation, the contribution of international human rights courts to establishing States responsibility, preventing further risks and providing redress for climate-related losses and damages remains limited. At the time of writing, the European Court of Human Rights (ECtHR) remains the only regional hu-

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man rights court that has rendered a judgment on the matter. No contentious climate cases have yet reached the other two relevant regional human rights courts, namely the Inter-American Court of Human Rights (IACtHR) and the African Court on Human and Peoples' Rights (ACtHPR).

The matter has, however, been brought before these two courts through the exercise of their advisory jurisdiction. In July 2025, the IACtHR delivered an extensive Advisory Opinion —Advisory Opinion 32/25 (AO-32/25) on the *Climate Emergency and Human Rights*— in which it identified and elaborated a comprehensive set of human rights obligations in relation to climate change. In February 2025, the Pan African Lawyers Union (PALU) filed a petition before the ACtHPR requesting an advisory opinion on States' obligations with respect to the climate change crisis. This advisory proceeding remains pending.

The limited role played by international human-rights courts so far may be attributable partly to the elusive nature of States' obligations in this context and partly to challenges stemming from procedural requirements for access to justice, such as legal standing and victim status at the admissibility stage (de Jong, 2024). As will be shown below, with the adoption of both contentious and advisory pronouncements these obstacles are progressively diluting.

This chapter introduces the emerging climate-related jurisprudence of the three main regional human rights courts. In doing so, it describes and explains the factual and legal bases of both contentious and advisory climate cases, with a focus on the relevant substantive and procedural developments brought about by the courts. The aim of this chapter is to serve as a guide for readers in approaching (and undertaking their own reading of) the judgments and opinions, which are particularly complex and intricate.

II. Climate change before the ECtHR

Seventeen climate-related contentious cases have been brought before the ECtHR to date (Sabin Center, 2026a). Eleven of these cases have been decided, but only two resulted in judgments on the merits: *Verein KlimaSeniorinnen Schweiz and Others v. Switzerland* and *Greenpeace Nordic and Others v. Norway*. The remaining cases were dismissed on admissibility grounds. Addressing all these cases in any detail in this piece would be impracticable. So, this section focuses on the judgments in *KlimaSeniorinnen* and *Greenpeace Nordic* and on the inadmissibility decision in *Duarte Agostinho and Others. v. Portugal and 32 Others*. In these pronouncements, the ECtHR arguably provided the most rele-

vant insights into the contours and limits of human rights protection under the European Human Rights System (EHRS) in relation to climate change and the prospects for litigation therein. As a general observation, the ECtHR's jurisprudence to date signals its willingness to engage with State responsibility arising from the effects of climate change on the full enjoyment of human rights, while still preserving a broad margin of appreciation for States as regards the measures to be adopted. Furthermore, from a procedural perspective, the ECtHR's jurisprudence points to the prioritisation of collective access to justice through the representative standing of association, with the more traditional individual approach being reserved only for exceptional cases.

II.1. KlimaSeniorinnen: the contours of access to justice in climate matters and policy-related obligations

In 2016, a group of older women and an association, of which the individual applicants and other persons were members, filed a suit against various Swiss governmental agencies, alleging that they had failed to uphold obligations under the Swiss Constitution and the European Convention on Human Rights (ECHR) by not placing Switzerland on an emissions reduction trajectory consistent with the Paris Agreement's goals. According to the claimants, this amounted to a violation of constitutional provisions and the rights to life (Article 2) and to respect for private and family life (Article 8) protected under the ECHR. One key ground of the suit: individual claimants belonged to a demographic group particularly vulnerable to the heat waves expected to result from climate change. In 2017, 2018 and 2020 the petition was rejected by all the three domestic instances — including the Supreme Court — on the basis that the petitioners lacked standing, as they were neither exclusively nor sufficiently seriously affected by the effects of climate change, which were characterised as community-wide (for a summary, see Sabin Center, 2026b).

On 26 November 2020, the claimants took Switzerland to the ECtHR. The application alleged the impairment of four rights protected under the ECHR, including the right to life (Article 2) and the right to respect for private and family life (Article 8), affected by inadequate climate policies and measures — in particular Switzerland's 2030 and 2050 climate targets.

On 9 April 2024, the ECtHR delivered its landmark decision, holding Switzerland responsible for breaching the ECHR and pointing to gaps in the

relevant domestic climate regulatory framework and in its implementation. Before reaching that conclusion on the merits, the ECtHR addressed complex admissibility issues concerning victim status, legal standing and the prohibition of *actio popularis*, thereby redefining the contours of access to justice in climate matters under the EHRS. Next section explains these new approaches to victim status and legal standing. The Court's findings regarding climate policy-related obligations arising from the ECHR, and Switzerland's resulting responsibility, are subsequently addressed.

a) Climate exceptionalism and the tailored approach to victim status and legal standing

By the time the case reached the ECtHR, legal standing (and victim status) had become its crux — the principal reason why domestic bodies had dismissed it. The ECtHR would have to assess these issues again under the standards of the ECHR (Article 34) and its own jurisprudence. In doing so, it firstly examined the compliance with admissibility requirements by individual claimants — the older women —, and then by the association representing them and other members. Remarkably, in *KlimaSeniorinnen*, the ECtHR began to delineate a novel and distinctive 'tailored' approach to victim status and legal standing in climate change litigation.

This new approach was based on the notion of 'climate exceptionalism', that is the idea that climate change, by virtue of its unique nature, differs from 'classic' environmental problems and therefore warrants a special treatment with regard to access to justice — ECtHR's environmental jurisprudence would not straightforwardly apply. Several features of climate change were enlisted by the ECtHR to support that consideration: diffuse, community-wide and cumulative character of sources and impacts, non-toxic nature of the greenhouse gas (GHG) emissions, complex causal chains, globally interdependent mitigation and adaptation needs, intergenerational and cross-sectoral impacts, and necessity of a polycentric governance response of general character affecting indefinite numbers of persons (para. 479) (Schuldt, 2026). In particular, the ECtHR observed that everyone may be, one way or another to some degree, directly affected, or at real risk of being directly affected, by the adverse effects of climate change (para. 483).

In light of this — and regarding the victim status of *individual applicants* —, the ECtHR questioned how allegations of harm to individuals' ECHR rights (to life or health) could be examined without undermining the well-established prohibition of *actio popularis* and without ignoring the reactive nature of its judicial function (para. 481). Recognising victim status in the context of cli-

mate change without sufficient and careful qualification could prove problematic (para. 483). Defining such qualification, however, entails parallel risks: a) if too broad, national constitutional principles and the separation of powers may be disrupted by granting overly expansive access to the judiciary as a means of prompting changes in general policies regarding climate change; b) if too restrictive, even obvious deficiencies or dysfunctions in governmental action or democratic processes could lead to the ECHR rights affected without them having any judicial recourse (para. 484).

As a response to this conundrum, the ECtHR established, for the purposes of this kind of climate cases, heightened criteria to assess victim status of individuals concerning the particularity, foreseeability and the severity of the (risk of) harm, and also considering the applicant's personal vulnerability. Specifically, under this new standard, in order to claim victim status:

“(a) the applicant must be subject to a high intensity of exposure to the adverse effects of climate change, that is, the level and severity of (the risk of) adverse consequences of governmental (in)action affecting the applicant must be significant;

and

(b) there must be a pressing need to ensure the applicant's individual protection, owing to the absence or inadequacy of any reasonable measures to reduce harm” (para. 487).

According to the Court, the threshold for fulfilling these criteria is especially high and whether it is met will depend on a careful assessment of the concrete circumstances of the case. This includes considerations on the (i) context (prevailing local conditions); (ii) applicants (individual specificities and vulnerabilities), (iii) complaint (its nature and scope) and (iv) harm or risk (the actuality/remoteness and/or probability of the adverse effects of climate change in time, the specific impact on the applicant's life, health or well-being, the magnitude and duration of the harmful effects, the scope of the risk — localised or general —) (para. 488).

Applying these criteria, the Court found that the individual applicants of the case — the four older women —, although part of an allegedly vulnerable group, did not meet the requirements to be granted victim status (para. 535). In this regard, the Court noted that it was not apparent from the evidence that they were, or were at risk of being, exposed to the adverse effects of climate change with a degree of intensity that would give rise to a pressing need to ensure their individual protection:

“It cannot be said that the applicants suffered from any critical medical condition whose possible aggravation linked to heatwaves could not be alleviated by the adaptation measures available in Switzerland or by means of reasonable measures of personal adaptation given the extent of heatwaves affecting that country” (para. 533).

This “specially high threshold” would be subsequently applied to dismiss other climate cases filed by individuals, such as *Uricchio* and *De Conto*, both against Italy.

Having dismissed the victim status of the older women, the ECtHR proceeded to define its stance on the victim status and legal standing of the *association* that joined the claim. At this point, it is worth recalling, on the one hand, that under Article 34 ECHR, only those who claim being affected in their rights — i.e., victims — may lodge petitions before the ECtHR; and, on the other hand, that although associations may qualify as victims, they cannot complain of nuisances that can only be experienced by natural persons, e.g., health-related issues. The straightforward application of these principles led the ECtHR to reject the association’s victim status under Article 2 and 8 ECHR in relation to climate change impacts (para. 496). This would have entailed the dismissal of the complaints under Article 2 and 8 — and with that of the substantive climate-related grounds in the case. However, the ECtHR broke new ground by recognising a special form of legal standing for associations acting as representatives of individuals or groups who are affected — but do not themselves meet the victim status criteria — in the context of climate cases.

In support of this novel development, the ECtHR once again referred to the special nature of climate change, recalling it condition as “a common concern of humankind” and emphasising its intergenerational dimension, particularly, the “necessity of promoting intergenerational burden-sharing in this context” (paras. 484, 499). In connection, it acknowledged the relevance of collective action through associations as one of the few means by which the voices of those at a distinct representational disadvantage can be heard and through which they may seek to influence relevant decision-making processes, including through litigation (paras. 489, 497). All of this, the ECtHR concluded, supports recognising the standing of association in climate cases, “...instead of exclusively relying on proceedings brought by each individual on his or her own behalf” (para. 499).

Concerned about the potential for *actio popularis* through this recourse, the Court sought to limit such standing by establishing certain conditions that associations must meet to lodge applications. Drawing on the Aarhus Convention (on this, see Eckes & Trapp, 2024), and on how the European Union and States parties have implemented its provisions (para. 233), the Court defined that:

“...the association in question must be: (a) lawfully established in the jurisdiction concerned or have standing to act there; (b) able to demonstrate that it pursues a dedicated purpose in accordance with its statutory objective in the defence of the human rights of its members or other affected individuals within the jurisdiction concerned, whether limited to or including collective action for the protection of those rights against the threats arising from climate change; and (c) able to demonstrate that it can be regarded as genuinely qualified and representative to act on behalf of members or other affected individuals within the jurisdiction who are subject to specific threats or adverse effect of climate change on their lives, health or well-being as protected under the Convention” (para. 502).

Notably, this *novel locus standi* is not subject to the separate requirement of demonstrating that the represented individuals would themselves meet the previously outlined victim status criteria (para. 502). This may be understood as a ‘standing without victimhood’ — a groundbreaking development not only within the framework of the ECtHR, but also more broadly with regard to the functioning of international human rights protection mechanisms. That being said, associations still appear to be required to demonstrate that the individuals they represent (not necessarily their members) fall within the jurisdiction of the respondent State and are arguably exposed to threats to, or adverse effect of, climate change on their lives, health or well-being. How specific those effects must be remains unclear (Sefkow-Werner, 2025b).

Under this standard, the ECtHR recognised the association legal standing (para. 526) and proceeded to examine the merits under Article 8 ECHR, ultimately finding Switzerland responsible for its violation, as will be explained in the next section. The fact that this new representative standing applies only to climate cases (i.e., the climate exceptionalism) was subsequently confirmed in *Cannavacciuolo et al. v. Italy* — a large-scale pollution case —, with some judges criticising the sharp distinction between environmental and climate cases as artificial and counterproductive (Sefkow-Werner, 2025a; Poto, 2025).

b) Climate policy-related obligations emerging from Article 8 ECHR

As noted above, the ECtHR identified climate policy-related obligations arising under Article 8 ECHR and found Switzerland responsible for breaching them. These obligations were grounded on the general positive obligations under Article 2 and 8 that the ECtHR have developed in its broader environment-related jurisprudence, namely: a) to establish a relevant and adequate legislative and administrative framework to provide effective protection of human health and life (to regulate); and b) to implement that framework effectively in

practice (to apply and enforce) (para. 538). In complying with these obligations, States retain a margin of appreciation, which, in principle, encompasses the choice of the means employed, in consideration of competing priorities and available resources. That being said, States must act with due diligence — having regard to the level of risk and the particular circumstances — and must give due consideration to all competing interests. Compliance with these requirements remains subject to the Court’s scrutiny.

Translating these general obligations to the climate change context — and taking into account the most up-to-date scientific knowledge and the international legal framework — the ECtHR observed that:

“...the Contracting States need to put in place the necessary regulations and measures aimed at preventing an increase in GHG concentrations in the Earth’s atmosphere and a rise in global average temperature beyond levels capable of producing serious and irreversible adverse effects on human rights...” (para. 546).

“...Article 8 of the Convention requires that each Contracting State undertake measures for the substantial and progressive reduction of their respective GHG emissions levels, with a view to reaching net neutrality within, in principle the next three decades...” (para. 548).

Moreover, the ECtHR asserted regarding the mitigation path to be established that:

“...in order for this [reduction] to be genuinely feasible, and to avoid a disproportionate burden on future generations, immediate action needs to be taken and adequate intermediate reduction goals must be set for the period leading to net neutrality. Such measures should, in the first place, be incorporated into a binding regulatory framework at the national level, followed by adequate implementation. The relevant targets and timelines must form an integral part of the domestic regulatory framework, as a basis for general and sectoral mitigation measures” (para. 549).

The ECtHR summarized the emerging obligations in paragraph 550:

“...(a) [to] adopt general measures specifying a target timeline for achieving carbon neutrality and the overall remaining carbon budget for the same time frame, or another equivalent method of qualification of future GHG emissions, in line with the overarching goal for national and/or global climate-change mitigation commitments;

- (b) [to] set out intermediate GHG emissions reduction targets and pathways (by sector or other relevant methodologies) that are deemed capable, in

principle, of meeting the overall national GHG reduction goals within the relevant time frames undertaken in national policies;

- (c) [to] provide evidence showing whether they have duly complied, or are in the process of complying, with the relevant GHG reduction targets...;
- (d) [to] keep the relevant GHG reduction targets updated with due diligence, and based on the best available evidence; and
- (e) [to] act in good time and in an appropriate and consistent manner when devising and implementing the relevant legislation and measures” (para. 550).

In addition, the ECtHR noted that these mitigation measures must be supplemented by adaptation measures aimed at alleviating the most severe or imminent consequences of climate change, while taking into account any particular needs for protection. Such adaptation measures — the Court clarified — must be adopted and effectively applied in accordance with the best available evidence (para. 552).

According to the Court’s assessment, Switzerland’s regulatory framework did not comply with these standards, particularly with regard to the quantification of national GHG emissions limitations (for instance, through carbon budget methodology), and thus incurred responsibility under Article 8 (paras. 570-573).

II.2. Duarte Agostinho: extraterritorial climate victims under the ECHR?

In 2020, six Portuguese youths brought a case before the ECtHR against 33 European States, alleging that their GHG emissions — and the failure to adequately regulate or limit them — had contributed to climate change risks and resulted in violations of various rights. In advancing their claims, the applicants sought to transpose into the EHRS the developments on extraterritorial jurisdiction articulated by the IACtHR in relation to transboundary environmental pollution, which were subsequently applied to a climate case by the Committee on the Rights of the Child (CRC).

Back in 2017, the IACtHR delivered its landmark Advisory Opinion on Environment and Human Rights (AO-23/17), in which it held that when human rights are affected by transboundary pollution, persons whose rights are violated fall under the jurisdiction of the State of origin of the pollution, provided that a causal link exists between the source within its territory and

the harm suffered by the persons beyond its borders (para. 102). The basis for such extraterritorial jurisdiction lies not in the State's effective control over the victims themselves — the common basis for extraterritorial jurisdiction —, but rather over the activities that caused the pollution. In a 2021 decision, the CRC, — a quasi-judicial body under the Convention on the Rights of the Child — applied this distinctive jurisdictional approach to a case submitted by 16 children from 12 countries against five States, alleging their failure to prevent foreseeable harm and to ensure intergenerational justice in the context of climate change (CRC, 2021).

The ECtHR, however, would not follow suit. In order to assess jurisdiction, the Court adopted a two-pronged approach. First, it considered the traditional principles of extraterritoriality. In that regard, the Court emphasized that “there is no suggestion that any of the respondent states exercised in any manner effective control of an area outside its national territory” (para. 181) and that “it cannot be held that any of the respondent states exercised authority or control over the applicants” (para. 182). Second, the Court explored whether “exceptional circumstances” might justify an extension of State responsibilities in the context of climate change. The Court recognised that States have ultimate control over activities within their territories — whether public or private — that produce GHG emissions (para. 192). It also acknowledged that certain positive obligations under the ECHR arise in relation to climate change (para. 192), and that, albeit complex and multi-layered, a causal relationship exists between activities based on a State's territory and the adverse impact on the rights of people residing outside its borders (para. 193). However, and even acknowledging the findings by the IACtHR and the CRC (para. 210), the Court refused to extend extraterritorial jurisdiction under the ECHR, stating that such considerations “cannot in themselves serve as a basis for creating by way of judicial interpretation a novel ground for extraterritorial jurisdiction or as justification for expanding on the existing ones” (para. 195).

The Court provided no further elaboration on this point, merely asserting that “it was not relevant to jurisdiction that certain effects might relate to activities within the territory or under the control of a State” (para. 82), thereby rejecting the possibility of granting victim status to individuals abroad. In doing so, the ECtHR clearly departed from the developments on extraterritorial jurisdiction in the context of transboundary pollution and climate change articulated by the IACtHR and closed the door for *diagonal* climate cases (see Seck, 2021 and Raible, 2025).

II.3. Greenpeace Nordic: project-related obligations

In 2016, two environmental organisations sought judicial review of the decision of the Norwegian authorities to grant a block of oil and gas licenses for deep-sea production in the Barents Sea. The organisations contended that the decision was in breach of Article 112 of the Constitution, which protects the right to a healthy environment, because it was inconsistent with the mitigation efforts required to avoid dangerous climate change and with those undertaken by Norway under international law. Furthermore, they alleged procedural flaws in the decision-making process concerning the assessment of the foreseeable climate impacts of the licensing decision (Medici-Colombo, 2024: 435-440). In January 2018, the Oslo District Court dismissed the claim. On appeal to the Borgarting Court of Appeal, the claimants added new grounds, namely that the licensing decision violated the right to life and to respect for private life as protected by the Norwegian Constitution and the ECHR. In January 2020, the Court of Appeal dismissed the appeal, and, in December 2020, the Supreme Court did likewise, although it made findings relevant to the claimants' interests (for a summary, see Sabin Center, 2026c). On 15 June 2021, the organisations, together with six individuals, lodged an application before the ECtHR against Norway. On 28 October 2025, the ECtHR delivered its judgment on the merits, in which it ultimately found no violation of any rights protected under the ECHR. Despite this, the ECtHR articulated relevant standards concerning the procedural obligations incumbent on States parties when authorising climate-disruptive projects, in particular those related to fossil fuel production.

First, it formulated, in the following terms, a general obligation to conduct an environmental impact assessment (EIA) before authorising an activity that may contribute to the adverse effects of climate change:

“... an adequate, timely and comprehensive environmental impact assessment in good faith and based on the best available science must be conducted before authorising a potentially dangerous activity that may be harmful to the right for individuals to effective protection by the State authorities from serious adverse effects of climate change on their life, health, well-being and quality of life” (para. 318).

Second, it set out the minimum content requirements of such an EIA in the context of fossil-fuel production projects: a quantification of the anticipated GHG emissions, including combustion emissions both domestically and abroad; an assessment of whether the activity is compatible with the au-

thorities' obligations under national and international law to take effective measures against the adverse effects of climate change; and informed public consultation (para. 319).

By articulating these standards, the ECtHR aligned its jurisprudence with the most relevant international and domestic case law in the matter, to which the judgment expressly refers. On the one hand, this includes the quartet of advisory opinions delivered by international tribunals: the International Tribunal for the Law of the Sea (2024), the IACtHR (see below), the International Court of Justice (2025), and the European Free Trade Association (EFTA) Court (2025); on the other, the landmark judgment of the United Kingdom Supreme Court in *Finch*.

III. Climate change before the IACtHR

As noted above, although the IACtHR has developed a considerable body of environment-related jurisprudence, it has not yet dealt with a contentious case with focus on climate change. To date, only three climate-focused petitions have been submitted to the Inter-American Commission on Human Rights (IACommHR): the 2005 *Inuit Petition*, the 2013 *Athabaskan Petition*, and the 2025 *Juliana Petition*. The Inuit Petition (Watt-Cloutier, 2005:1), brought by 63 individuals against the United States, was dismissed by the IACommHR on unclear grounds (IACommHR, 2006). The *Athabaskan Petition* (Arctic Athabaskan Council, 2013), filed against Canada, is still pending an admissibility decision. The recent *Juliana Petition* (Our Children's Trust, 2025), brought against the United States by an association and 15 young people who were plaintiffs in the well-known case of *Juliana v. United States*, remains at the initial review stage. It should be noted that none of these petitions is capable of reaching the IACtHR, since neither the United States nor Canada is a party to the ACHR and, consequently, neither State has accepted the IACtHR's contentious jurisdiction.

Climate change has, however, reached the IACtHR through its advisory jurisdiction. On 9 January 2023, Chile and Colombia submitted an interpretative consultation under Article 64.1 of the American Convention on Human Rights (ACHR), asking the Court to clarify "... the scope of State obligations... in order to respond to the climate emergency within the framework of international human rights law..." More than 20 questions were raised, covering a wide range of topics, including: mitigation, adaptation, losses and damages, procedural rights,

differentiated protection of vulnerable groups, rights of the child and future generation, environmental defenders, just transition policies, climate-induced migrations and forced displacement, duty to cooperate, and common but differentiated responsibilities and fair share (Colombia & Chile, 2023). Given the number and intricate nature of the questions posed, the IACtHR decided to reformulate them along three main lines: 1. The scope of obligations emerging from substantive rights (e.g., life, personal integrity, freedom of movement, healthy environment); 2. The scope of obligations emerging from procedural rights (e.g., access to information, participation and justice); 3. The scope of obligations emerging from the duty to ensure the exercise of rights without discrimination, concerning groups in situation of vulnerability (e.g., children, women, Indigenous Peoples) (para. 28).

III.1. The Advisory Opinion OC-32/25 on the Climate Emergency and Human Rights

On 29 May 2025 the IACtHR adopted its advisory opinion OC-32/25, clarifying the human rights obligations arising under the Inter-American Human Rights System (IAHRS) and laying the foundations for future contentious climate cases (see Medici-Colombo & Rocha, 2025). For the purposes of this chapter, the main findings of the IACtHR in the OC-32/25 can be summarised in eight points, which are presented in the following sub-sections.

- a) The climate emergency as a determining element for the interpretation of States' obligations

The IACtHR devoted the first substantive part of its opinion to reviewing the basics of climate change science as well as the international and regional regulatory responses (paras. 176-180). This assessment led the IACtHR to the following opinion:

“Pursuant to the best available science, the present situation constitutes a climate emergency due to the accelerated increase of global temperature, as a result of diverse activities of anthropogenic origin, produced in an unequal manner by the States of the international community, which are having incremental effects and represent a severe threat to humanity and, in particular, the most vulnerable. This climate emergency can only be addressed adequately by urgent and effective mitigation and adaptation actions, and by making progress towards sustainable development with a human rights perspective, coordinated around resilience...” (operative para. 1).

According to the IACtHR, the climate emergency — conceived as part of the ‘triple planetary crisis’ — (para. 42) is characterized by the conjunction and interrelation of three factors, namely urgency of effective action, severity of impacts and complexity of the required responses (paras. 184-215), and constitutes a determining factor in the interpretation of the States’ obligations. For instance, it supports the recognition of an ‘enhanced’ standard of due diligence with regard to the States’ conduct.

b) The recognition of Nature and its components as subjects of rights

In the OC-32/25, the IACtHR —by a narrow majority of four votes to three— endorsed the recognition of Nature and its components as subjects of rights. This idea had first been introduced in the OC-23/17, when delineating the contours of the right to a healthy environment. On this occasion, the IACtHR affirmed that:

“Recognition of Nature and its components as subjects of rights constitutes a normative development that permits reinforcing the protection of the long-term integrity and functionality of ecosystems, providing effective legal tools to confront the triple planetary crisis, and facilitating the prevention of existential damage before it becomes irreversible. This concept represents a contemporary expression of the principle of the interdependence between human rights and the environment, and reflects a growing tendency at the international level aimed at strengthening the protection of ecological systems in the face of present and future threats...”(operative para. 7).

c) A novel *jus cogens* norm

By a narrow majority as well, the IACtHR recognised that the prohibition of conduct that may irreversibly affect the interdependence and vital balance of the common ecosystem that makes the life of species possible constituted a novel *jus cogens* norm. The reasoning advanced by the majority of the IACtHR in support of this recognition may be summarised as follows.

First, an international community’s consensus exists regarding the reality of existential risks and the individualization of specific behaviours that can irreversibly affect the interdependence and vital balance of the common ecosystem that sustains life on the planet. Anthropogenic contribution to climate change is among such behaviours, demanding universal and effective legal responses (paras. 288, 289). Second, it is indisputable that the vital balance of the common planetary ecosystem is a prerequisite —a precondition, a *sine qua non*— for the present and future habitability of the planet and, consequently, for the protection and continued enforceability of all fundamental rights safe-

guarded under international law, including through imperative prohibitions (paras. 290, 293). To consider conduct with an irreversible impact on the vital balance of the planetary ecosystem as not imperatively prohibited would thus be logically inconsistent (para. 290). Third, the legal foundation of such a norm lies in the general principles of law, in particular the principle of effectiveness, which aims to ensure that the rights and obligations recognized in legal systems are interpreted and applied effectively to achieve their purpose. Where the fulfilment of a recognized obligation is not possible without the recognition of a prior obligation, the principle of effectiveness operates to ensure the recognition of the latter (para. 292). And fourth, State practice, the development of multilateral environmental treaties, the resolutions of the United Nations General Assembly, and the jurisprudence of regional courts constitute a process of progressive consolidation that must be interpreted as an emerging legal recognition of the non-derogable prohibition of irreversible environmental damage (para. 293).

According to the IACtHR's majority, the recognition of this novel *jus cogens* norm: (a) is necessary — and not merely convenient or desirable — for the effective fulfilment of obligations already codified by international human rights law; (b) has a solid basis in general principles of law, fundamental human rights and a growing consensus within the international community; and (c) is not arbitrary, but rather grounded in broad and sound legal considerations, consistent with existing positive law, and contributes to the effectiveness of existing norms (para. 293). In sum, IACtHR's majority argued:

“...the principle of effectiveness added to the considerations of dependence, necessity, the universality of the underlying values and the fact that there is no conflict with current law, forms the legal grounds for recognition of the peremptory prohibition to generate massive and irreversible damage to the environment, and it contributes to compliance with existing obligations recognized by international law. Therefore, and given the nature of jus cogens norms, the Court finds that all States should [must – deben in the original version] cooperate to put an end to conduct that violates the prohibitions derived from peremptory norms of general international law protecting a healthy environment.”

- d) The right to a healthy climate as derived from the right to a healthy environment

A third notable legal development in the AO-32/25 is the recognition of a right to a healthy climate as a component of the right to a healthy environment (operative para. 9). Being a derivative right, this newly recognized

right shares the core features of the right to a healthy environment. This includes having both an individual and a collective dimension, where an intergenerational and ecocentric approach is expressed: this right protects the collective interest of present and future generations of humans and other species in preserving a climate system capable of sustaining their well-being and the balance among them. Entitlement to the right in this dimension rests indivisibly and non-exclusively with all those who share this collective interest. Accordingly, measures taken to prevent, cease, or remedy a violation of this right must simultaneously benefit present and future humanity, as well as Nature as a whole (para. 302).

As regards the inter-generational element of this right, the IACtHR observed that States must ensure an equitable distribution of the burdens of climate action and climate impacts, taking into account their contribution to the causes of climate change and their respective capabilities. Such distribution must avoid imposing disproportionate burdens on both future and present generations:

“The former may occur if, for example, climate action is unjustifiably postponed, leaving the damage and cost to future generations. The latter would happen if, for example, the costs of the energy transition are allocated without taking into account the vulnerability of certain groups of the population today” (para. 310).

As regards its ecocentric element, the IACtHR emphasized that its protection reaffirms the need for a holistic understanding of the many interactions that sustain life, and calls for recognising humanity as just one more manifestation of Nature’s interdependent network (para. 314). As part of this holistic understanding, the IACtHR noted a reciprocal interdependence between climate stability and ecological equilibrium: the protection of the global climate system requires safeguarding the integrity of ecosystems and the living and non-living components that make up and sustain them, while the preservation of climate conditions compatible with life is essential to maintain the balance and functionality of these ecosystems.

“This reciprocal interdependence... reinforces the need for integrated legal approach, capable of uniting the protection of human rights and the rights of Nature within a legal framework coherently aligned with the harmonious interpretation of the pro persona and pro natura principles” (para. 315).

e) The specific obligations derived from the right to a healthy climate

The IACtHR identified three core obligations associated with this emerging right: to regulate, to monitor and supervise, and to conduct environmental impact studies (EIS).

The obligation *to regulate* comprises three interrelated elements: the definition of a mitigation target, the formulation of a strategy to achieve that target, and the regulation of private actors' behaviour.

First, States must define an appropriate mitigation target that reflects the principles of progressivity and common but differentiated responsibilities. This duty applies unequivocally to all Organization of American States (OAS) Member States and the failures of other States to comply with their international obligations cannot be invoked as justification for inaction (paras. 324, 325). Given that the 1.5°C temperature goal does not entirely eliminate climate-related risks, the global mitigation needs quantified by the best available science on the basis of that temperature threshold — through tools such as the carbon dioxide budget, the annual mitigation gap or the mitigation scenarios developed by the IPCC — must be considered as a minimum baseline, rather than an endpoint, for determining each State's mitigation target (para. 326). Second, States must formulate and uphold a human rights-based strategy — including the adoption of binding measures — to achieve the mitigation target. Both the formulation and implementation of such a strategy must be conducted in accordance with the standard of enhanced due diligence, which demands the compliance with certain procedural and substantive requirements (paras. 333-344). Third, States must regulate corporate conduct. States, but also corporations bear responsibilities in relation to climate change and its impacts on human rights. Accordingly, it is the duty of States to establish these responsibilities within their domestic legal frameworks and ensure full compliance (paras. 346, 347). States must establish enhanced climate-related obligations for companies, based on their current and historical contributions to climate change and in line with the polluter pays principle (paras. 350, 351).

The obligation *to monitor* implies that States must strictly supervise and control public and private activities that generate GHG emissions. At a minimum, this duty applies to activities such as exploration, extraction, transport and processing of fossil fuels; cement manufacturing; and agro-industrial activities (para. 353). To fulfil this obligation, States must have robust and independent judicial, quasi-judicial or administrative mechanisms in place, with sufficient staff, resources and technical capacities (para. 354), which must periodically monitor progress towards the national mitigation target and issue the necessary recommendations to ensure effective compliance (paras. 355-357).

Finally, the obligation *to conduct EIS* in the context of the climate emergency implies that EIS must explicitly include an assessment of the potential effects on the climate system, particularly, of projects that pose the risk of generating

significant GHG emissions. States must identify, in accordance with their mitigation strategies, which activities require the prior approval of a climate impact assessment. In such cases, the assessments must contain a distinctive mandatory section determining the climate impact (para. 359). Regulations must be clear on: (a) the activities and impacts to be examined; (b) the procedure for assessing the climate impact; (c) the responsibilities and duties of the project's proponents, the competent authorities and the decision-makers; (d) the manner in which the results of the assessment will inform the decision; and (e) the steps and measures to be taken in cases of non-compliance with the assessment procedure or with the terms or conditions of approval (paras. 361, 362). In compliance with the standard of enhanced due diligence, States must carefully assess the approval of activities that may cause significant harm to the climate system. This assessment must take into account the best available science, the mitigation strategy and target, and the irreversible nature of the climate impacts (para. 363).

f) Obligations derived from other rights adversely affected by climate impacts

Even if mitigation measures are successful, the best available science leaves no doubt about the inevitable production of multiple climate impacts on natural and human systems, with an extraordinary potential to affect human rights. In this understanding, States are obliged to take measures that avoid or reduce such impacts to the greatest extent possible, in accordance with the enhanced standard of due diligence. These measures are qualified, under the international climate regime, as climate adaptation (paras. 378, 379).

According to the IACtHR, as part of their duty to ensure human rights, States have an immediately enforceable obligation to define and keep their national adaptation plan—including a goal and a strategy—up to date. The adaptation plan must be designed to achieve its goals and include all necessary measures to prevent and mitigate climate change-related human rights impacts to the greatest extent possible and in accordance with a standard of enhanced due diligence (para. 385). Adaptation goals and plans must establish short, medium and long-term measures that respond adequately to immediate needs, but also to the structural causes of vulnerability (para 386), and must be designed based on the best available science and in a way that minimise negative side effects on communities and ecosystems (paras. 387, 388).

In addition to these general rules governing adaptation action, the IACtHR observed that adaptation responses must be defined according to the particular risks to each right and, in this sense, it referred to specific obligations emerging from the protection of the following rights: life, personal integrity and health

(paras. 401, 402); private and family life (paras. 404, 405); private property and housing (paras. 411-413); freedom of residence and movement (paras. 422-434); water and food (para. 439); labour and social security (paras. 445-447); culture (para. 452); and education (paras. 454-457).

These specific obligations relate to, among others: the improvement of infrastructure and capacity of health systems; family unity, unaccompanied children and resettlement in climate-related displacement and migration; real state speculation and social housing programmes; domestic and inter-state prevention and management of forced migration and displacement, including creation of migratory categories which can provide protection against *refoulement*; water and food security; climate risks into occupational safety and just transition in labour; protection of culturally significant sites and cultural and natural heritage, including Indigenous heritage; and resilience of educational infrastructure and climate change education.

- g) The specific obligations derived from procedural rights in the context of the climate emergency

The IACtHR characterised procedural rights as an essential condition for both the legitimacy and effectiveness of climate action. In this regard, the IACtHR drew a clear link between procedural rights, democracy and climate change, observing that the latter exacerbates social conflicts, places additional pressure on public budget, deepens inequalities, and heightens political and social tensions (para. 461). In this context, it is States must ensure the full respect of procedural rights, under the standard of enhanced due diligence. This standard entails not only the normative enshrinement of these rights, but also the strengthening of States' technical and legal capacities to guarantee the broadest and most effective involvement of citizens in the response to the climate emergency (para. 468).

In addition to the three classic pillars of so-called environmental democracy —access to information, public participation and access to justice—, the IACtHR identified two additional procedural rights of particular relevance in the context of the climate emergency: the right to science and the recognition of local, traditional and indigenous knowledge and the right to defend human rights. In developing the specific procedural obligations, the IACtHR relies —in addition to its previous rich jurisprudence— on several international and regional instruments, including the Bali Guidelines, the Escazú Agreement, the Aarhus Convention and European Union Directives. The influence of the Escazú Agreement is particularly remarkable.

Regarding the *right to science and the recognition of local, traditional and indigenous knowledge*, the IACtHR asserted that it encompasses the access to the benefits of scientific and technological progress, as well as the opportunities to contribute to scientific activity, without discrimination, and that it constitutes a key means for effective access to fundamental rights, as well as one of the objective foundations of public decision-making (paras. 471-473). Furthermore, the IACtHR observed that alongside scientific knowledge, other forms of knowledge coexist, such as local, traditional and indigenous knowledge (para. 476). This right also includes access to the benefits derived from these alternative systems of knowledge (para. 477). Accordingly, States have obligations concerning the protection of such knowledges (para. 484). Finally, the IACtHR established that, in order to determine what constitute the best available science, States must take into account several criteria related to its up-to-date nature, as well as the methodologies and processes through which it produced, disseminated, and validated (para. 486). In this regard, the IACtHR emphasises that the best available science on climate change is currently compiled in the IPCC reports (para. 487).

With regard to the *right to access information in the context of the climate emergency*, the IACtHR found three specific State duties that derive from this right: (1) to produce information; (2) to disseminate and facilitate access to information; and (3) to adopt measures against disinformation. These duties relate to and include: the establishment of early warning systems, the production and dissemination of data necessary to establish, implement, update and monitor mitigation and adaptation goals and strategies; corporate reporting duties; transparency of climate action-related funds (paras. 505-510, 516, 517); free access to climate information; dissemination of information in the event of imminent threats (paras. 519-521, see also para. 522); and measures against false or misleading climate-related information (paras. 524-527).

Concerning the *right to public participation*, the IACtHR reaffirmed that States must ensure processes for meaningful, broad and non-discriminatory participation in decision-making that may affect the climate system, as well as the rights of communities. Public participation in climate matters extends to decision-making processes concerning mitigation goals and strategies, adaptation and risk management plans, financing, international cooperation and redress for damages (para. 535). In addition, States must cooperate to ensure public participation in climate-related decision-making at the regional and international levels (para. 536). Among other requirements, States must guarantee the public the possibility to effectively influence the design of and decision

on projects and policies. Consequently, the results, consensus and decisions of participatory processes must be central elements in the motivation of the decisions of the authorities, who must explain how they have taken such inputs into account (paras. 538, 539).

As for the *right to access to justice*, the IACtHR underscored its essential nature in the context of the climate emergency and established a notably broad and detailed set of duties and conditions applicable to various stages of the litigation process. As such, these provisions are undoubtedly relevant for the deployment of climate litigation in the region. These include: (i) the provision of adequate institutional resources, such as training for legal operators and the creation of specialised bodies (para. 542); (ii) the application of the “*pro actione*” principle, i.e., the interpretation most favourable to access to justice must always prevail (para. 543); (iii) the processing and resolution of cases within a reasonable time (paras 544, 545); (iv) the establishment of procedural mechanisms that allow for broad forms of legal standing (collective, public or popular standing), and the flexible assessment of the interest to act (paras. 546-550); (v) the adoption of alternative probative standards, such as the reversal of the burden of proof, as a response to complexities of climate cases and asymmetry in the control and access to evidence (paras. 552-554); (vi) and the provision of effective mechanisms to enable full reparation (paras. 557-559).

Finally, in respect of the *right to defend human rights and the protection of environmental defenders*, building upon its previous jurisprudence, the IACtHR articulated a comprehensive and detailed set of State obligations. This development was grounded in the recognition that environmental defenders perform an essential function and, as such, are owed a special duty of protection by the State. This special duty includes obligations to recognise, promote and ensure their rights; guarantee a safe and favourable environment to perform their activities; and investigate and punish any attack they receive. Ultimately, it imposes an enhanced obligation to devise and implement appropriate public policy instruments and to adopt the pertinent domestic legal provisions and practices to ensure the free and safe exercise of their activities (paras. 566, 567).

In the context of the climate emergency, environmental defenders are at heightened risk. Such risk is revealed by censorship of discussions on the environment and the climate, online violence, suppression of protests and public meetings, arbitrary detentions and strategic lawsuits against public participation (SLAPP) (para. 568). More broadly, a context of criminalisation and violence aimed at silencing environmental defenders exist. They face violent attacks and threats to their families, enforced disappearances, unlawful surveillance, travel

bans, blackmail, sexual harassment, judicial harassment and the use of force to dispel peaceful protests. Women defenders, journalists, members of rural communities, Afro-descendants and indigenous peoples face even greater risks (paras. 569, 576). In view of this, the IACtHR identified a set of specific State obligations concerning defenders' protection, monitoring and punishment of attacks, the dismantling of the structural causes of violence, as well as the adoption of national programmes with the participation of the defenders, and including training and education aimed at State agents, the general public, and the media (paras. 575-586). In addition, the IACtHR expressly addressed the criminalisation of environmental defenders' activities by the undue use of law, judicial harassment, arbitrary detention, and convictions with disproportionate sentences (para. 587).

h) The differential obligations towards groups in vulnerable situations

The IACtHR dedicated the Opinion's final section to the differential obligations owed to groups in vulnerable situations. The Court found a special duty of protection regarding actions of third parties that, under the State's tolerance or acquiescence, create, maintain or favour discriminatory situations (para. 591). In other words, it is not sufficient for States to abstain from violating rights, but rather they must adopt measures tailored to the particular protection needs of the right-holders. States incur international responsibility in those cases in which, in the presence of structural discrimination, they fail to adopt specific measures with respect to the particular situation of victimization in which vulnerability arises (para. 592).

Climate change generates extraordinary and increasingly severe risks for the human rights of certain groups whose vulnerability is increased by the convergence of intersectional and structural factors. To ensure real equality in the enjoyment of rights amid the climate emergency, differential measures are required in all State actions. While such measures must be shaped by the particular risks identified by each State, the existence of shared patterns of vulnerability gives rise to corresponding specific obligations (para. 596). The IACtHR identified differential protection measures that States must adopt for the protection of children (paras. 599-604); Indigenous and Tribal Peoples, Afro-descendants, peasant farmers and fishermen (paras. 606-613); and, in the context of climate disasters, women (para. 614), older persons (para. 616), persons with disabilities (para. 617), and gender-diverse persons (para. 618). The Court observed that there are other groups especially affected by climate change that do not correspond to categories traditionally protected and that the State must identify their needs and adopt specific measures for them (para. 629).

Finally, the IACtHR noted that climate change is a determining factor that aggravates inequality and multidimensional poverty (paras. 623, 624). It affirmed that States must design and implement policies and strategies to ensure people living in poverty have access to the goods and services necessary for a dignified life in the context of the climate emergency, and to progressively eradicate the structural causes of their vulnerability. Where relevant, these policies must be included in climate mitigation and adaptation plans and strategies (para. 626). A just climate transition must not deepen poverty but instead be used as an opportunity to overcome it (para. 627).

IV. Climate Change before the ACtHPR

As in the case of the IACtHR, no contentious case has been brought before the ACtHPR to date. The remarkable jurisprudential development in this respect also stems from the advisory jurisdiction of the Court. On 2 May 2025, an association uniting African lawyers (PALU), supported by civil society organizations, filed a request to the ACtHPR for an Advisory Opinion pursuant Article 4 of the Protocol to the African Charter on Human and Peoples' Rights on the Establishment of the ACtHPR. In a manner similar to Chile and Colombia before the IACtHR, PALU is asking the Court to interpret a range of African human rights instruments — including the African Charter for Human and Peoples Rights (which includes a right to a general satisfactory environment in Article 24), the African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa, the African Charter on the Rights and Welfare of the Child, the Revised African Convention on Conservation of Nature (para. 38) — in order to identify climate-related obligations. Several human rights enshrined in these instruments are allegedly impaired or threatened by the impacts of climate change, which disproportionately affect Africa and its population, characterised by a minimal historical contribution to GHG emissions and heightened vulnerability.

Questions regarding the following issues were posed to the Court: 1. General obligations for the protection of individuals and peoples of the past, present and future generations from negative climate impacts; 2. Obligations to protect from climate impacts vulnerable populations, including: environmental defenders; Indigenous Peoples; women; children and youth; future, current and past generations; elderly; and people with disabilities; 3. Obligations regarding the facilitation of a just, transparent, equitable and accountable transition; 4. Obligations

regarding the implementation of adaptation, resilience and mitigation measures; 5. Obligations regarding compensation for loss and damage and reparations; 6. Responsibilities with respect to third parties (such as large corporations) operating on the continent to ensure the compliance with climate international and regional treaties and laws; 7. Obligation to cooperate in the international framework, especially with historical emitters to limit global warming and avert the climate crisis (paras. 39, 40). Notably, beyond the obligations of African States, the petition may be interpreted as asking the Court to refer to the responsibilities of other States, particularly of developed States toward African ones (Suedi, 2025).

Once the request is submitted, the Court registers it and conducts a preliminary examination to ensure it meets the admissibility criteria, including legal standing and jurisdiction. If deemed admissible, the Court notifies the Member States of the African Union, the African Commission on Human and Peoples' Rights, the African Union Commission, and other relevant stakeholders, inviting them to submit written observations. Public hearings may also be held before the Court deliberates and adopts the Opinion by a majority of its judges (Tigre & Samuel, 2025). At the time of writing, the Court is actively receiving written observations from States, as well as amicus briefs from international organs, organisations and civil society actors (Pan African Lawyers Union, 2026).

V. Conclusions

Human rights courts are progressively gaining prominence in climate governance through litigation, a trend that will arguably continue in the coming years. To the legal developments emerging from the cases within the regional systems — as introduced in this chapter — one must add those stemming from resolutions adopted by quasi-judicial bodies of the United Nations universal human right system (Human Rights Committee, 2020, 2023; CRC, 2021), as well as from other international courts, most notably the International Court of Justice (2025) and the International Tribunal for the Law of the Sea (2024). Taken together, these developments are gradually uncovering and clarifying a tapestry of independent yet interconnected international climate-related obligations (de Vilchez Moragues, 2022), which will arguably expand and reinforce the role of litigation — both international and domestic — as a climate governance tool (Peel & Osofsky, 2020).

As regards the regional human rights systems analysed here, it is worth noting the existence of two alternative pathways for the development of cli-

mate-related obligations. In the context of the IAHRs (and likely also in the case of the African System), a broad range of such obligations have been identified upfront through the advisory opinion, with the stage of enforcement now approaching through future contentious cases. By contrast, in the context of the EHRS, climate-related obligations are being progressively discovered and clarified through a succession of contentious cases. Whereas the first process warrants systematisation of the full spectrum of climate-related obligations, the second is marked by fragmentation and incompleteness, though it can, in turn, be regarded as more legitimate and more considerate of political processes that are essential for the suitability of the economic and societal transformations required to the climate crisis.

Bibliography

- African Court on Human and Peoples' Rights. (2025, May 2). In the matter of a request by the Pan African Lawyers Union (PALU) for an advisory opinion on the obligations of States with respect to the climate change crisis (Request for Advisory Opinion).
- Arctic Athabaskan Council. (2013, April 23). Petition to the Inter-American Commission on Human Rights seeking relief from violations of the rights of Arctic Athabaskan peoples resulting from rapid Arctic warming and melting caused by emissions of black carbon by Canada.
- Cannavacciuolo and Others v. Italy, Apps. Nos. 51567/14 et al. (Eur. Ct. H.R., Jan. 30, 2025; final Apr. 30, 2025).
- Carême v. France, App. No. 7189/21 (Eur. Ct. H.R., Apr. 9, 2024).
- Colombia & Chile. (2023, January 9). Request for an advisory opinion on the Climate Emergency and Human Rights submitted to the Inter-American Court of Human Rights.
- Daniela Uricchio v. Italy and 31 Others, App. No. 14615/21 (Eur. Ct. H.R., May 7, 2025).
- de Vilchez Moragues, P. (2022). *Climate in court: Defining state obligations on global warming through domestic climate litigation*. Edward Elgar. <https://doi.org/10.4337/9781800886896>

- de Jong, I.J.M. (2024). Beyond the turn to human rights: a call for an intersectional climate justice approach. *The International Journal of Human Rights*, 28(5), 738-758. <https://doi.org/10.1080/13642987.2023.2297315>
- Duarte Agostinho and Others v. Portugal and 32 Others, App. No. 39371/20 (Eur. Ct. H.R., Apr. 9, 2024).
- Eckes, C., & Trapp, T. (2024, September 11). The Aarhus Convention's relevance for climate litigation through the lens of KlimaSeniorinnen. *European Law Blog*. <https://www.europeanlawblog.eu/pub/xx9vrteu/release/2>
- European Free Trade Association Court. (2025, May 21). The Norwegian State v Greenpeace Nordic, Nature and Youth Norway (Case E-18/24). <https://eftacourt.int/download/18-24-judgment/?wpdmdl=10625>
- Elena De Conto v. Italy and 32 Others, App. No. 14620/21 (Eur. Ct. H.R., May 7, 2025).
- Greenpeace Nordic and Others v. Norway, App. No. 34068/21 (Eur. Ct. H.R., Oct. 28, 2025).
- Human Rights Committee. (2020, September 23). Views adopted under article 5(4) of the Optional Protocol concerning communication No. 2728/2016 (Ioane Teitiota v. New Zealand), U.N. Doc. CCPR/C/127/D/2728/2016.
- Human Rights Committee. (2023, September 18). Views adopted under article 5(4) of the Optional Protocol concerning communication No. 3624/2019, U.N. Doc. CCPR/C/135/D/3624/2019.
- Inter-American Commission on Human Rights. (2006, November 16). Letter to Sheila Watt-Cloutier et al., Petition N° P-1413-05 (United States).
- Inter-American Court of Human Rights. (2017, November 15). The Environment and Human Rights (Advisory Opinion OC-23/17).
- Inter-American Court of Human Rights. (2025, May 29). The Climate Emergency and Human Rights (Advisory Opinion OC-32/25; Series A No. 32).
- International Court of Justice. (2025, July 23). Obligations of States in respect of Climate Change (Advisory Opinion).
- International Tribunal for the Law of the Sea. (2024, May 21). Advisory Opinion 31 (Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law).

- Medici-Colombo, G. (2024). *La litigación climática sobre proyectos: ¿Hacia un punto de inflexión en el control judicial sobre la autorización de actividades carbono-intensivas?*, Tirant lo Blanch.
- Medici-Colombo, G., & Rocha, A. (2025). The impact on domestic law of climate change-related advisory opinions: The experience of the IACtHR and the ITLOS. In M. A. Tigre & A. Rocha (Eds.), *The role of advisory opinions in international law in the context of the climate crisis* (pp. 306–355). Brill.
- Our Children's Trust (2025, Sep. 25). Petition alleging violations of human rights by the United States of America with requests for precautionary measures and relief.
- Pan African Lawyers Union. (2026, Jun. 2). Press Release. https://cdn.climatepolicyradar.org/navigator/XAB/2025/request-for-an-advisory-opinion-on-the-human-rights-obligations-of-african-states-in-addressing-the-climate-crisis_d10f390cd1d1bc76d041d518edcb536d.pdf
- Peel, J., & Osofsky, H. M. (2020). Climate change litigation. *Annual Review of Law and Social Science*, 16, 21–38. <https://doi.org/10.1146/annurev-lawsocsci-022420-122936>
- Poto, M. P. (2025). Caring for Environmental and Climate Justice: Reflections on the Society's Voice Through the Courts for a Just Common Future. *Rivista Quadrimestrale di Diritto Dell'Ambiente*, 1, 600-620.
- Raible, L. (2025). State's extraterritorial jurisdiction in relation to GHG emissions after Duarte Agostinho v Portugal. *European Convention on Human Rights Law Review*. Advance online publication. <https://doi.org/10.1163/26663236-bja10124>
- Sabin Center for Climate Change Law. (2026a). European Court of Human Rights (Global Climate Change Litigation database). <https://climatecasechart.com/non-us-jurisdiction/european-court-of-human-rights/>
- Sabin Center for Climate Change Law. (2026b). Association of Swiss Senior Women for Climate Protection v. Federal Department of the Environment, Transport, Energy and Communications (DETEC) and Others. <https://climatecasechart.com/non-us-case/union-of-swiss-senior-women-for-climate-protection-v-swiss-federal-parliament/>

- Sabin Center for Climate Change Law. (2026c). Greenpeace Nordic Ass'n v. Ministry of Petroleum and Energy (People v Arctic Oil). https://www.climatecasechart.com/document/greenpeace-nordic-assn-v-ministry-of-petroleum-and-energy-people-v-arctic-oil_508f
- Schuldt, Nele, Galmiche, Anna, & Stuart-Smith, Rupert (2026), An Especially High Threshold: Victim Status and the Climate-Environment Distinction in the European Court of Human Rights' Jurisprudence, 2 Strasbourg's Jurisprudence. *Under review, not published*. Personal communication.
- Seck, S. L. (2021). Climate justice and the ETOs. In M. Gibney, G. E. Türkelli, M. Krajewski, & W. Vandenhoe (Eds.), *The Routledge handbook on extraterritorial human rights obligations* (1st ed., pp. 421–433). Routledge. <https://doi.org/10.4324/9781003090014-38>
- Sefkow-Werner, V. (2025a, April 2). Individual vs. representative applications or environment vs. climate issues – The ECtHR's Cannavacciuolo and Others v. Italy judgment. *Strasbourg Observers*. <https://strasbourgobservers.com/2025/04/02/individual-vs-representative-applications-or-environment-vs-climate-issues-the-ecthrs-cannavacciuolo-and-others-v-italy-judgment/>
- Sefkow-Werner, V. (2025b). Consistent inconsistencies in the ECtHR's approach to victim status and locus standi. *European Journal of Risk Regulation*, 16, 814–823. <https://doi.org/10.1017/err.2024.95>
- Setzer, J., & Higham, C. (2025). Global trends in climate change litigation: 2025 snapshot. Grantham Research Institute, London School of Economics and Political Science. <https://www.lse.ac.uk/granthaminstitute/publication/global-trends-in-climate-change-litigation-2025-snapshot/>
- Suedi, Y. (2025, May 22). Africa's turn: The African Court's advisory opinion on climate change. *EJIL: Talk!*. <https://www.ejiltalk.org/africas-turn-the-african-courts-advisory-opinion-on-climate-change/>
- Tigre, M. A., & Samuel, S. A. (2025, May 7). Africa's advisory opinion request: Taking climate justice to the continent's highest court. *Climate Law: A Sabin Center Blog*. <https://blogs.law.columbia.edu/climatechange/2025/05/07/africas-advisory-opinion-request-taking-climate-justice-to-the-continents-highest-court/>

- United Nations Committee on the Rights of the Child. (2021, November 11). Decision adopted under the Optional Protocol to the CRC on a communications procedure in respect of Communication No. 104/2019 (CRC/C/88/D/104/2019).
- United Nations Environment Programme. (2023, July 27). Global climate litigation report: 2023 status review. <https://www.unep.org/resources/report/global-climate-litigation-report-2023-status-review>
- United Nations Human Rights Council. (2008, March 28). Human rights and climate change (A/HRC/RES/7/23).
- United Nations Human Rights Council. (2024, August 28). Analytical study on the impact of loss and damage from the adverse effects of climate change on the full enjoyment of human rights, exploring equity-based approaches and solutions to addressing the same (A/HRC/57/30).
- Urgenda Foundation v. The Netherlands, Supreme Court (Civil Chamber), Judgment of 20 December 2019, ECLI:NL:HR:2019:2007
- Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, App. No. 53600/20 (Eur. Ct. H.R., Apr. 9, 2024).
- Watt-Cloutier, S. (2005, December 7). Petition to the Inter-American Commission on Human Rights seeking relief from violations resulting from global warming caused by acts and omissions of the United States.

Part 4

CLIMATE LITIGATION AND CLIMATE JUSTICE

General overview

MARICA DI PIERRI*

SUMMARY: I. From Environmental Justice to Climate Justice. *I.1. Origins and Development of the Environmental Justice Paradigm. I.2. Dimensions of Justice in the Concept of Environmental Justice. I.3. Climate Justice as an Evolution and Specification. I.4. Distinctive Features of the Climate Justice Paradigm.* II. Climate Litigation: Definition, Origins, and an Introductory Overview. - III. Possible Classifications of Climate Litigation. III.1. Climate Litigation Against State Authorities. III.2. Climate Litigation Against Private Actors. III.3. Additional Classifications. IV. Strategic Climate Litigation. IV.1. Definition. IV.2. Approach and Defining Features. IV.3. Examples of Strategic Climate Litigation. V. Climate Litigation as a Catalyst for Climate Action. Bibliography

I. From Environmental Justice to Climate Justice

I.1. Origins and Development of the Environmental Justice Paradigm

The environmental justice paradigm emerged in the United States during the 1980s as a political, social, and cultural response to the unjust distribution of environmental impacts along racial, economic, and geographic lines. Early mobilizations developed in response to growing awareness of the disproportionate siting of landfills, chemical plants, and other polluting facilities in areas predominantly inhabited by low-income African American, Latino, and other ethnic minority communities (Bullard, 1990).

In this context, environmental justice takes shape as a paradigm centered on the distributive dimension of environmental inequalities, denouncing the inequity in the geographical allocation of risks and the systematic exclusion of marginalized social groups from environmental decision-making processes. It

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introduces elements of social, racial, and class justice into ecological thought, rejecting a purely naturalistic conception of the environment and asserting the right of communities to actively participate in resource governance and in the formulation of environmental policies.

The paradigm soon extended beyond the US, inspiring movements worldwide and intersecting with Indigenous, peasant, and popular struggles in the Global South. It articulated itself through a plurality of claims, including distributive, procedural and recognitional justice (Dobson, 1999; Martínez Alier, 2009). This approach laid the groundwork for the emergence of climate justice by the late 1990s.

I.2. Dimensions of Justice in the Concept of Environmental Justice

The environmental justice paradigm is structured around a robust taxonomy of claims that constitute its theoretical and political backbone. The three main dimensions — distributive, procedural and recognitional justice — are widely acknowledged in the literature. Distributive justice focuses on equity in the allocation of environmental benefits and burdens, arguing that vulnerable populations should not bear a disproportionate share of pollution or environmental degradation (Bullard, 1990). Procedural justice, by contrast, emphasizes democratic participation in environmental decision-making processes, promoting transparency, inclusiveness, and equitable access to information and decision-making institutions (Bullard, 2005). Finally, recognitional justice, as articulated by Dobson (1999), refers to the need to acknowledge the identities, cultures, and knowledge systems of communities interacting with the environment, moving beyond homogenizing approaches and valuing local diversity. These three components are not alternative but complementary, interacting dynamically to delineate a framework of environmental justice capable of shaping power structures, institutional practices, and ecological relationships.

I.3. Climate Justice as an Evolution and Specification

The concept of climate justice developed as an evolution and further elaboration of the environmental justice paradigm, while at the same time exhibiting distinctive features that configure it as an autonomous para-

digm. It gained prominence in both the scholarly literature and the praxis of international social movements following the recognition that climate change constitutes a global phenomenon whose impacts are distributed in profoundly unequal ways.

From this perspective, climate justice emerges at the intersection of the environmental dimension and the human rights dimension. It is grounded in the recognition that global warming and its effects disproportionately affect populations that have contributed least to greenhouse gas emissions. At the same time, these populations are often excluded from climate-related decision-making processes, while the historical drivers of climate change—the industrialized economies of the Global North—continue to retain control over political, technological, and financial choices.

Accordingly, the notion of climate justice is articulated around four main justice claims: distributive justice; procedural justice; recognitional justice; and reparative or retributive justice (Posner & Weisbach, 2010).

I.4. Distinctive Features of the Climate Justice Paradigm

Unlike environmental justice, which often operates through local and community-based dynamics, climate justice is characterized by a pronounced global and multiscalar dimension. It addresses a systemic problem that connects different geographical levels and involves public and private, institutional and non-institutional actors within a complex network of responsibilities and vulnerabilities. Another defining element is its intergenerational dimension: climate justice takes into account the implications of climate change for future generations as well, introducing an ethical perspective grounded in the principle of responsibility extended over time.

The climate justice paradigm further breaks with the classical dichotomy between humanity and nature by adopting an integrated ecological vision in which human rights, social justice, and the protection of ecosystems are understood as inseparable. Climate justice thus provides a theoretical and political framework for redefining the priorities of climate policies, shifting the focus from narrowly conceived goals of efficiency and mitigation toward principles of equity, inclusion, and responsibility. Its strength lies in its ability to connect macro-level dynamics with micro-level realities, thereby proposing a new balance between human rights and environmental protection.

II. Climate Litigation: Definition, Origins, and an Introductory Overview

Over the past two decades, climate litigation has assumed an increasingly prominent role in international debates and in legal practices related to the fight against climate change. It can be defined as the set of legal actions brought by public or private actors with the aim of prompting, enhancing, or compelling climate action by states, institutions, or corporations, on the basis of legal, constitutional, international, or moral obligations. The phenomenon emerged in a context marked by the inadequacy of political and diplomatic responses to climate change (Peel & Osofsky, 2018) and has progressively established itself as an alternative and complementary tool for advancing claims of climate justice.

Climate litigation can now be regarded as a significant pressure mechanism for ensuring the effectiveness of climate action. In this sense, the judicial arena has become a strategic channel for encouraging or compelling public authorities to act, particularly where domestic or international legal instruments establish obligations to protect the environment and safeguard fundamental rights.

The earliest experiences of climate litigation date back to the early 2000s and focused on innovative attempts to link responsibilities arising from the climate crisis with the protection of fundamental human rights. An emblematic case is represented by the action brought in 2005 by the Inuit Circumpolar Conference against the United States government before the Inter-American Commission on Human Rights. On that occasion, representatives of the Inuit people alleged violations of their cultural, economic, and social rights caused by the melting of Arctic ice resulting from emissions produced by industrial activities in the United States. Although the Commission did not formally admit the petition, the initiative marked a symbolic and political turning point, paving the way for a new form of legal action grounded in the connection between climate change and human rights (Savaresi & Setzer, 2020).

From that point onward, climate litigation experienced rapid expansion and geographical diversification. Pioneering cases emerged across highly diverse legal contexts—from the United States to Canada, from Australia to India, and notably in the Netherlands—reflecting a growing awareness of the limitations of traditional political strategies and the urgency of exploring new avenues for claims-making and protection. The case *Massachusetts v. EPA* (2007), in which the Supreme Court of the United States recognized the authority of the Environmental Protection Agency to regulate greenhouse gas emissions as air pollutants,

represented a landmark in the North American context, marking the transition from an experimental phase to a more structured stage of the phenomenon.

In parallel, a heterogeneous set of claimants has consolidated, including environmental NGOs, civic associations, Indigenous communities, youth movements, and, in some cases, local authorities. These actors have been distinguished by their ability to combine sophisticated legal arguments with scientific evidence provided by experts and independent research centres, thereby creating a synergy between law and science that has strengthened both the credibility and the impact of climate-related litigation. A particularly emblematic example is the *Urgenda* case, in which the environmental NGO, acting in the interest of Dutch citizens, obtained a landmark judgment obliging the government of the Netherlands to significantly reduce its greenhouse gas (GHG) emissions, on the basis of obligations derived from the European Convention on Human Rights (ECHR). This decision resonated internationally, inspiring numerous similar claims in other jurisdictions and contributing to the consolidation of courts as key arenas of climate governance. Among the actors engaged in climate litigation are individuals, associations, local authorities, Indigenous communities, activists, and young people. Recourse to national courts and international bodies is increasingly accompanied by the use of scientific tools, such as reports produced by the Intergovernmental Panel on Climate Change, which enable legal arguments to be grounded in shared and authoritative climate data (Boom & Richards, 2018).

III. Possible Classifications of Climate Litigation

There are several possible ways to classify climate litigation, each of which is useful for capturing different dimensions of the phenomenon. One of the most well-established classifications is based on the identity of the defendant: in this sense, a distinction is drawn between cases brought against public actors — such as states or governmental bodies — and those initiated against private actors, particularly large corporations in the fossil fuel, financial, or industrial sectors. The former aim to prompt or compel the fulfilment of climate-related obligations incumbent upon public authorities; the latter seek to acknowledge and constrain the direct or indirect responsibility of private actors in exacerbating the climate crisis.

A cross-cutting distinction concerns the legal nature of the claims advanced. On the one hand, rights-based climate litigation invokes violations of fundamental rights guaranteed by constitutional provisions, international conven-

tions, or established case law; on the other hand, regulatory climate litigation is grounded in breaches of environmental standards, emission limits, or procedural obligations (JSetzer & Vanhala, 2019). In many instances, the two typologies intersect, giving rise to hybrid forms of litigation that combine references to human rights with claims based on environmental legality.

It is important to emphasize that the taxonomy of climate litigation is evolving rapidly. Annual reports produced by the London School of Economics—such as the *Global Trends in Climate Change Litigation* reports published in 2023, 2024, and 2025—demonstrate a steady expansion of analytical categories, involved actors, and legal strategies employed in climate-related cases (Setzer & Higham, 2025). From this perspective, the following paragraphs will be devoted to an in-depth examination of the main types of climate litigation: cases directed against state authorities, actions brought against private actors, and cross-cutting classifications that help to elucidate the evolving dynamics of the phenomenon. In all its forms, climate litigation plays a crucial role in strengthening accountability, generating judicial precedents, and encouraging normative and institutional development.

III.1. Climate Litigation Against State Authorities

Climate litigation against state authorities represents the most widespread and symbolically significant form of climate-related legal action at the global level. Such judicial initiatives generally seek to prompt the fulfilment of mitigation and adaptation obligations already established under domestic or international law, or to address regulatory and policy gaps that hinder an effective response to the climate crisis.

The common element in such disputes is the attribution to the state of primary responsibility for climate protection, in its capacity as the guarantor of the public interest and of individuals' fundamental rights. In many jurisdictions, claimants argue that governmental inaction or insufficient action violates constitutionally protected rights—such as the rights to life, health, a healthy environment, or property—as well as obligations arising from international treaties and climate commitments undertaken in multilateral fora. A paradigmatic example of this approach is provided by European and Latin American judgments that have recognized the justiciability of climate-related rights and the need for more ambitious state action. As discussed above, the *Urgenda* case, although not the first of its kind, marked a turning point in the recognition of state responsibility for climate inaction. The court held that the Netherlands, by

failing to adopt emission reduction policies consistent with climate science and international standards, had breached its duty of care and violated the fundamental rights of its citizens. This line of reasoning has since been echoed across multiple jurisdictions, including Germany, France, Belgium, and Colombia, where courts have increasingly affirmed the obligation of states to act urgently to protect the climate (Setzer & Higham, 2025).

Alongside these emblematic cases, litigation grounded in constitutional law and human rights has proliferated, often initiated by youth groups, Indigenous communities, or non-governmental organizations. The case *Held v. State of Montana* (2023), the first in the United States to recognize a violation of constitutional rights resulting from climate inaction, reinforced the view that climate change constitutes a direct threat to fundamental rights, thereby expanding the scope of strategic climate litigation to federal and subnational contexts.

In Italy, the case *A Sud et al. v. Italy* (2021) — also known as ‘*Giudizio Universale*’ — fits squarely within this trend, seeking a ruling from the Italian judges recognizing violations of citizens’ rights to life and health resulting from the failure to adopt adequate climate policies. Regardless of the outcome of the proceedings, the case constitutes a significant example of how civil society mobilizes the law as a tool for political pressure and accountability (Di Pierri, 2023).

According to reports by the Grantham Research Institute on Climate Change and the Environment (Setzer & Higham, 2024; 2025), more than 60 per cent of global climate cases fall within this category. Claimants turn to courts to seek the adoption or strengthening of climate policies, the revision of national targets, or declarations of the unconstitutionality of insufficient plans. Often, the primary impact of such litigation is not immediately enforceable; rather, it lies in its capacity to generate political pressure, create judicial precedents, and reshape the normative framework governing climate action. Disputes brought against the state thus constitute a dynamic field in which law and politics intersect, positioning the judiciary as a central actor in climate governance. These cases not only fill the gaps left by legislative or administrative inertia, but also contribute to redefining the parameters of public responsibility in the Anthropocene.

III.2. Climate Litigation Against Private Actors

In recent years, alongside the rise in cases brought against states, there has been a significant increase in climate litigation targeting private actors. Such claims are grounded in the recognition of the decisive role that corporations,

financial institutions, and investors play in driving — or, conversely, mitigating — the climate crisis. The underlying rationale is that responsibility for emissions and environmental harm does not rest solely with public institutions, but also extends to those actors that profit from high-climate-impact activities.

Climate litigation against private actors is articulated across several typologies. A first category encompasses civil and commercial liability actions brought to obtain compensation for damages resulting from emissions or to compel corporations to adopt conduct consistent with climate objectives. An emblematic case is *Milieudefensie et al. v. Royal Dutch Shell* (2021), in which, at first instance, the District Court of The Hague ordered Royal Dutch Shell to reduce its direct and indirect emissions by 45 per cent by 2030 compared to 2019 levels, recognizing an environmental duty of care aligned with the goals of the Paris Agreement. This decision paved the way for a wave of similar lawsuits against energy companies and other major emitters, extending the principle of climate responsibility beyond the state sphere (Setzer & Higham, 2024).

A second typology of litigation concerns actions related to climate disinformation and so-called greenwashing, aimed at challenging corporate practices that mislead consumers or investors regarding the actual sustainability of products or industrial plans. These cases, increasingly frequent in North America and Europe, reflect an evolution of climate litigation toward the communicative and reputational sphere. The growing judicial scrutiny of the accuracy of environmental claims is contributing to the establishment of new standards of corporate transparency and accountability (London School of Economics, 2025).

A further strand of litigation involves banks, investment funds, and insurance companies, which are called upon to account for the financing or underwriting of fossil fuel activities incompatible with climate objectives. This trend reflects an expansion of the notion of ‘climate responsibility’ along the economic value chain, in which finance is recognized as a strategic actor in shaping the trajectory of global emissions. In some cases, claimants have secured rulings requiring financial institutions to revise their investment policies by introducing more stringent sustainability constraints (Setzer & Higham, 2025). Finally, shareholder and stakeholder litigation initiated from within corporations should also be noted. Such actions seek to protect the long-term corporate interest against industrial strategies deemed inconsistent with the ecological transition. These cases reflect the emergence of a form of ‘climate-conscious’ corporate law, in which corporate governance is increasingly expected to integrate climate objectives into strategic decision-making (Peel & Osofsky, 2018).

Overall, litigation against private actors contributes to redefining the boundaries of environmental responsibility and to expanding the scope of climate law. The judgments obtained, although limited in time and space, generate systemic effects on corporate behaviour, market regulation, and public perceptions of climate risk. In this sense, such disputes constitute a fundamental component of multilevel climate governance, within which private law assumes a complementary — and increasingly decisive — role alongside public law.

III.3. Additional Classifications

Beyond the distinction between litigation against public authorities and litigation against private actors, both the scholarly literature and judicial practice propose additional taxonomies that are useful for interpreting the complexity of the phenomenon. One of the most widely adopted distinctions differentiates between project-based litigation and policy-based litigation.

The first category concerns cases brought against specific projects or activities that directly contribute to increased emissions or to the destruction of essential ecosystems. These include, for example, challenges to environmental permits for fossil fuel facilities, energy infrastructure, deforestation projects, or developments that undermine the adaptive capacity of vulnerable territories. In such cases, the immediate objective is to halt or modify a project deemed incompatible with climate goals or with fundamental environmental rights. Project-based actions are often grounded in breaches of procedural norms—such as failures to conduct environmental impact assessments or to ensure adequate public consultation—but they also assume a broader strategic significance, as they contribute to shaping standards of climate compliance for future permitting decisions (Setzer & Higham, 2025). The second category, namely policy-based litigation, encompasses cases that challenge or defend general policies, national climate plans, or sectoral regulations. In these disputes, the claim does not target a single project but rather calls into question the overall consistency of public action with international climate commitments and with the principle of intergenerational equity. Such actions may take either a declaratory or a prescriptive form: they ask courts to ascertain the insufficiency of state measures or to mandate the adoption of more ambitious policies, as has occurred in numerous European and Latin American cases (Peel & Osofsky, 2018; Di Pierri, 2023).

Another classification increasingly employed in reports by the Grantham Research Institute on Climate Change and the Environment and in recent scholarship distinguishes between aligned litigation and non-aligned litigation (Setzer & Higham, 2024). So-called aligned litigation refers to cases that seek to strengthen and accelerate climate action by calling for the implementation or enhancement of mitigation and adaptation objectives. This category encompasses a large share of the state and private liability actions discussed above, in which litigation functions as a tool for advancing climate justice. By contrast, non-aligned litigation includes cases that oppose or seek to delay the implementation of climate policies, often invoking the protection of economic, social, or territorial interests allegedly threatened by transition measures. This category includes, for example, challenges to environmental regulations, carbon taxes, or energy transition projects, as well as strategic legal actions used to intimidate or hinder public participation, commonly referred to as Strategic Lawsuits Against Public Participation (SLAPPs). Although not examined in detail in this chapter, the latter represent a phenomenon of growing relevance and will be addressed more specifically in subsequent sections devoted to non-climate-aligned litigation. The distinction between aligned and non-aligned litigation makes it possible to capture the dual direction in which climate litigation is currently evolving: on the one hand, as a force driving the advancement and consolidation of climate policies; on the other, as an instrument of resistance or reaction to the structural transformations that such policies entail. This distinction serves as the organizing framework for the analysis developed throughout the remainder of the book, especially in Chapters 9 and 10. At the same time, this duality confirms the deeply political nature of climate litigation, which fully qualifies as a tool of climate governance.

Overall, the plurality of classifications discussed above highlights that climate litigation is not a monolithic phenomenon, but rather a continuously evolving field in which law, science, and social movements intersect in the articulation of new forms of responsibility and justice. While analytical categories are useful for organizing the phenomenon, they do not exhaust its complexity. Rather, they constitute a transitional framework toward a broader interpretation of the role of law in guiding the ecological transition and in supporting climate-related social mobilization — a dimension that finds its fullest expression in strategic climate litigation, which is the focus of the following chapter.

IV. Strategic Climate Litigation

Strategic climate litigation constitutes one of the most significant modalities through which legal action is articulated and produces transformative effects. This expression refers to judicial actions that, beyond seeking the resolution of a specific dispute, pursue a broader objective of systemic change: influencing case law, promoting the improvement of public policies, raising public awareness, and redefining principles of environmental and climate responsibility (Rodríguez-Garavito, 2011).

Strategic litigation, therefore, is not confined to the legal dimension alone, but operates as a tool of mobilization and political and cultural transformation. In this sense, it represents an evolution of the aligned litigation discussed in the previous chapter, in which legal action is deliberately employed as a means of pressure and of constructing new paradigms of climate justice.

IV.1. Definition

Strategic climate litigation is distinguished by its transformative intent. Unlike ordinary legal actions, which seek to obtain remedies limited to a single case, strategic claims are designed to produce broader social, normative, and political impacts. They aim to generate judicial precedents, stimulate legislative change, and consolidate new standards for the protection of environmental and climate-related rights.

This form of litigation is grounded in the awareness that law can function as a catalyst for structural transformation, and that the courtroom can become a space for the collective articulation of climate responsibilities and priorities. The strategic element thus lies in the intentional construction of the case: in the selection of claimants and defendants, in the framing of legal claims, in the choice of jurisdiction, and in the public communication that accompanies the proceedings (Rodríguez-Garavito, 2011).

In recent years, the strategic approach has become a defining feature of most climate-related legal actions promoted by civil society, particularly following the expansion of transnational networks of lawyers, activists, and climate scientists. These networks have facilitated the dissemination of best practices and replicable litigation models across different jurisdictions, thereby contributing to the internationalization of the legal debate on climate change.

IV.2. Approach and Defining Features

The strategic nature of these cases is reflected both in the selection of disputes and in the choice of claimants. Youth activists, Indigenous communities, local authorities, and non-governmental organizations frequently play a central role in such initiatives, not only because of their legal standing, but also due to the strong symbolic and narrative value they embody. Many claimants also act on behalf of future generations or in the name of the global collective interest, bringing claims against states or major corporations for climate inaction or insufficient climate action. Case construction is supported by a robust scientific foundation and by carefully designed communication strategies, which enhance the scope and visibility of the litigation. Strategic cases seek rulings capable of setting precedents or compelling institutions to modify behaviors and policies. In this sense, judicial action may become a tool of transformative governance, capable of accelerating the adoption of regulations consistent with international climate objectives. Strategic litigation is also distinguished by the careful construction of the claimant's profile. Youth activists, Indigenous communities, local authorities, and vulnerable groups are frequently selected not only for reasons of legal standing, but also to achieve symbolic and narrative legitimization. In many cases, these actors litigate on behalf of future generations or in the name of the collective interest, giving shape to a new form of environmental and intergenerational agency. This approach resonates with the notion of 'emerging climate rights', which is increasingly discussed in both legal scholarship and jurisprudence and is supported by a convergence between climate science, an ethics of responsibility, and law (Burke et al., 2016).

The effectiveness of strategic litigation does not depend solely on judicial outcomes, but also on its capacity to influence public debate and to stimulate democratic participation. Media campaigns, alliances among social movements, and the dissemination of case outcomes constitute integral components of the strategy, aimed at generating public consensus and political pressure. In this sense, strategic climate litigation can be understood as a form of transformative governance, capable of integrating law into broader processes of social change (Di Pierri, 2023).

IV.3. Examples of Strategic Climate Litigation

Many of the most prominent climate litigation cases fall within the category of strategic actions, as they are deliberately constructed with the aim of producing impacts that extend beyond the resolution of the individual dispute.

Among the most emblematic examples is the case *Urgenda Foundation v. the Netherlands* (2015), in which Dutch courts required national authorities to adopt more ambitious emission reduction measures, recognizing a duty to protect fundamental rights also with regard to future risks arising from climate change. Although this case was already discussed in the previous chapter as an example of policy-based litigation, its strategic character lies in the deliberate aim to establish a judicial precedent capable of shaping both national and international climate policies.

A second significant case is the Colombian decision STC4360-2018, in which the Supreme Court of Justice of Colombia recognized the Amazon rainforest as a subject of rights and ordered the government to develop a plan to achieve the objective of zero deforestation. Beyond strengthening the close connection between environmental protection and human rights — particularly the rights of future generations — the ruling introduced the principle of the legal personhood of ecosystems, a concept that has subsequently been taken up and further developed in other national experiences.

In Pakistan, the judgment in *Leghari v. Federation of Pakistan* (2015) established that governmental inaction in implementing the national climate adaptation policy constituted a violation of the claimant's fundamental rights. The decision of the Lahore High Court paved the way for a new paradigm of justiciability of climate policies in countries of the Global South, affirming the role of courts in enforcing climate-related duties through a human rights-based approach.

The case *Milieudefensie et al. v. Royal Dutch Shell* (2021) marked a significant turning point in the evolution of climate litigation by extending its reach to the private sector and recognizing that a large multinational corporation may also be subject to emission reduction obligations. The District Court of The Hague held that corporations, like states, must actively contribute to achieving the objectives set out in the Paris Agreement. On appeal, this recognition of the existence of a legal obligation was largely upheld, although the court emphasized the difficulty of translating such a duty into a rigidly quantified and predetermined emissions reduction target. As a result, a margin of discretion was acknowledged with respect to the modalities and timing of compliance by the company, without calling into question the underlying existence of the obligation itself. Given that the first-instance judgment remains enforceable, the case continues to produce tangible effects and, above all, retains strong symbolic and normative value, demonstrating how climate litigation is now capable of influencing not only public policies but also corporate strategies and global production chains.

Taken as a whole, strategic climate litigation demonstrates how climate justice can be translated into an operational language capable of influencing governance, political culture, and collective perceptions of environmental risk. Courtrooms thus become laboratories of climate democracy, in which civil society redefines the meaning of responsibility and intergenerational equity.

IV.4. Future Perspectives of Climate Litigation

While strategic climate litigation offers significant potential, it also entails important limitations and risks. Chief among these is the progressive judicialization of climate policy, which may risk weakening legislative responsibility and excessively delegating the definition of environmental priorities to the courts. Moreover, the outcomes of such actions are far from guaranteed, and their effectiveness depends on a range of contextual factors, including the functioning of the judicial system, the country's constitutional culture, access to justice, and the broader political and media environment. Even where claims are upheld, the practical implementation of judicial decisions may face substantial obstacles.

Despite these challenges, strategic climate litigation has proven to be a powerful tool for redefining the boundaries of climate responsibility. Its global diffusion and growing legitimacy make it today one of the principal avenues for claiming climate justice and for asserting new rights in the context of a global ecological crisis.

V. Climate Litigation as a Catalyst for Climate Action

Climate litigation does not merely represent a reaction to the inadequacy of environmental policies, but increasingly functions as a driver of climate action. Through judicial decisions, claimants' legal arguments, and the media impact of litigation, it contributes to reshaping political priorities and strengthening the accountability of governments and corporations. From this perspective, climate litigation operates as a form of bottom-up governance, capable of filling the gaps left by institutional inertia and accelerating the implementation of international climate commitments (Setzer & Higham, 2025).

In recent years, the expansion of climate litigation has produced a dual effect: on the one hand, it has generated concrete legal constraints on states and corporations; on the other, it has stimulated broader public reflection on climate justice,

making it an integral part of political and social discourse. Climate-related legal actions are therefore not merely instruments of compensation or contestation, but genuine catalysts of normative, cultural, and institutional change.

As shown by the annual reports of the Grantham Research Institute on Climate Change and the Environment (Setzer & Higham, 2024; 2025), the spread of climate-related litigation cannot be measured solely by the growing number of judicial decisions, but also by their capacity to shape governmental and corporate agendas. In many instances, the mere prospect of judicial proceedings is sufficient to prompt a revision of mitigation strategies, increased transparency in sustainability reporting, or the adoption of new planning instruments.

Climate litigation thus operates as an external stimulus and a pressure mechanism on political and regulatory systems. Through its various forms—from litigation against states to actions targeting private actors, from regulatory to strategic claims—it translates the ethical and social demands of a just transition into legal language, making law a vehicle for collective responsibility and systemic transformation.

V.1. Direct Effects: Normative and Institutional Impacts of Judicial Decisions

One of the principal effects of climate litigation lies in its capacity to directly influence public policies and legislation. Judicial decisions in climate-related cases — particularly those issued by supreme or constitutional courts — often produce normative effects that extend well beyond the individual dispute, shaping legislative agendas and administrative practice.

In several jurisdictions, court rulings have required states to adopt more ambitious emissions reduction plans, to update their adaptation strategies, or to ensure consistency between energy policies and international mitigation commitments. The judgment in *Urgenda Foundation v. the Netherlands* (2015), for example, did not merely establish the responsibility of the Netherlands for climate inaction, but compelled the government to revise its emissions targets, thereby becoming a landmark precedent at the global level. Similarly, in Germany, the Federal Constitutional Court, in the *Neubauer* case (2021), held that the national Climate Protection Act violated the fundamental rights of future generations and ordered the legislature to strengthen emissions reduction targets beyond 2030. This intervention produced an immediate effect: within

a few months, the German government amended the law, raising its emissions reduction commitment to 65 per cent compared to 1990 levels. These decisions illustrate the potential of climate litigation as a tool for normative acceleration and for renegotiating the balance between branches of government, reinforcing the judiciary's role in shaping climate governance (Setzer & Higham, 2025).

Even in contexts where judicial decisions do not carry binding enforcement power, their jurisprudential and political significance can be considerable. In France, the Tribunal administratif de Paris, in the case *Notre Affaire à Tous v. France* (2021), recognized the state's responsibility for 'culpable inaction' in addressing climate change, ordering corrective measures and establishing a precedent that has influenced national environmental planning.

At the institutional level, climate litigation has contributed to strengthening the justiciability of environmental policies, positioning courts as central actors in the oversight of public action. The use of law to monitor the compliance of climate policies with international and constitutional commitments marks a profound transformation in the relationship between the judiciary and the executive. Courts thus evolve from mere arbiters of disputes into guarantors of the ecological transition and of the protection of emerging climate rights.

In countries of the Global South, finally, courts have often stepped in to fill the gaps left by absent or non-compliant political institutions, mandating the implementation of climate and adaptation plans. The case *Leghari v. Federation of Pakistan* (2015) is a paradigmatic example: the Lahore High Court did not merely acknowledge the state's failure to act, but went further by establishing a Climate Change Commission tasked with monitoring and coordinating public policies. This dimension of institutional substitution illustrates how climate litigation can contribute to the construction of new governance architectures, particularly in fragile contexts or in systems lacking effective implementation mechanisms (Di Pierri, 2024).

V.2. Indirect Effects: Public Culture, Markets, and Civil Society

Beyond its immediate legislative and institutional effects, climate litigation exerts a broader and more subtle influence on public culture, economic dynamics, and social behavior. Climate-related lawsuits generate indirect impacts that often prove to be more enduring and significant than the judicial outcomes themselves.

At the cultural level, the expansion of climate litigation has contributed to legitimizing the language of climate justice within the public sphere, fostering a

new awareness of the connection between the ecological crisis and fundamental rights. Courts, when called upon to rule on issues involving science, ethics, and responsibility, have provided a legal framework capable of translating moral claims into normative terms, thereby framing climate change as a matter of law as well as of politics (Boom & Richards, 2018).

Each case, even when it does not result in a legal victory, contributes to generating an educational and symbolic effect. Legal campaigns initiated by youth activists, Indigenous communities, or civil society organizations have reshaped public discourse, introducing into the collective lexicon concepts such as ‘the rights of future generations’, ‘climate due diligence obligations’, and ‘transnational responsibility’. Climate litigation thus emerges as a tool of social and cultural mobilization, strengthening the legitimacy of collective climate action and encouraging institutions and the media to integrate ethical considerations into debates on the ecological transition (Di Pierri, 2021).

At the economic level, the consequences are equally significant. Judicial decisions and pending proceedings have contributed to reshaping the behaviour of corporations and investors, who increasingly perceive climate risk in legal and reputational terms as well. The growing number of actions brought against fossil fuel companies and financial institutions has prompted many firms to reassess their communication strategies and to strengthen their sustainability policies, out of concern for potential accusations of greenwashing or liability for omission. The prospect of legal action thus operates as a deterrent mechanism, encouraging greater corporate transparency and closer alignment with international standards (Setzer & Higham, 2024).

Climate litigation has also fostered the emergence of new alliances among social actors—lawyers, scientists, NGOs, local communities, and youth movements—who cooperate in the construction of cases and in the dissemination of their outcomes. These transnational networks of legal and civic action, beyond enhancing the effectiveness of litigation strategies, contribute to consolidating a participatory model of climate governance. In this sense, climate litigation is transformed into a process of co-production of knowledge and power, in which law becomes a shared language for environmental justice (Savaresi & Setzer, 2020).

Financial and insurance institutions are also increasingly sensitive to the pressure generated by climate litigation. Concerns over legal risks associated with investments in fossil fuel sectors have led many banks and investment funds to adopt more stringent Environmental, Social, and climate Governance (ESG) criteria, demonstrating how judicial action can operate as a mechanism of indirect market regulation. In this way, climate litigation contributes to rede-

fining the economic value of sustainability and to the diffusion of a broader and more systemic conception of corporate climate responsibility.

In sum, the strength of climate litigation lies not solely in judicial rulings, but in its capacity to generate diffuse effects: raising awareness, shaping economic choices, transforming political language, and constructing new collective imaginaries of environmental justice.

V.3. Limits and Prospects of Climate Litigation as a Tool for Action

Despite its growing prominence, climate litigation presents structural limitations that condition its effectiveness as a governance tool. A primary constraint concerns the justiciability of climate policies: in many legal systems, the separation of powers and administrative discretion operate as barriers to judicial intervention in public policy choices. Courts, while acknowledging the severity of the climate crisis, often hesitate to rule on matters regarded as falling within the remit of legislative or executive authority, confining themselves instead to recommendations or to decisions articulated in principled terms (Setzer & Higham, 2025).

A second limitation is procedural in nature. Climate-related claims require the establishment of a causal link between conduct and harm, which, in the context of climate change, is notoriously difficult to ascertain. The global nature of the phenomenon, the multiplicity of actors involved, and the long temporal horizon of its effects complicate the direct attribution of responsibility. Nevertheless, advances in climate science and the increasing use of predictive models and forensic analyses are progressively expanding evidentiary possibilities, enabling courts to recognize liability even where contributions are ‘partial but significant’ (Burke et al., 2016).

A further challenge concerns the asymmetry of resources between the parties. Civil society organizations and vulnerable communities that initiate climate claims often confront state or corporate actors endowed with far greater economic and legal resources. This imbalance of power risks limiting access to justice and turning litigation into an elitist tool, accessible only to large NGOs or international networks. In response to this challenge, collaborative strategies have emerged that combine legal, scientific, and communicative expertise, constructing emblematic cases capable of attracting public attention and social support (Rodríguez-Garavito, 2011).

From a political perspective, climate litigation cannot replace public policy. It operates as a corrective and catalytic mechanism, yet remains a reactive tool, dependent on civil society initiatives and on the openness of judicial systems. In the absence of political will and administrative capacity, even the most progressive judicial decisions risk remaining unimplemented. Nonetheless, it is precisely within this tension between law and politics that the effectiveness of climate litigation is measured: climate cases generate change not only when they succeed in court, but also when they open spaces for public debate, compel states to account for their actions, and consolidate a shared language of climate responsibility (Peel & Osofsky, 2018).

The future prospects of climate litigation will depend on its ability to evolve in a more inclusive and systemic direction. Two emerging trends appear to be decisive. The first concerns the integration of litigation with instruments of democratic participation and environmental justice, embedding legal action within broader processes of collective mobilization and monitoring. The second lies in the growing hybridization between climate law and human rights law, which makes it possible to overcome the fragmentation of legal regimes and to consolidate a universalistic approach to climate protection (Savaresi & Setzer, 2020).

Finally, climate litigation is increasingly taking shape as a form of transnational governance, in which courts, civil society, and the scientific community collaborate in the construction of new standards of global responsibility. Whereas in past decades climate justice was primarily pursued through diplomatic fora, it is now also contested in courtrooms, where a new grammar of coexistence and intergenerational equity is being articulated. In this sense, climate litigation is not merely a reaction to political failure, but a laboratory of environmental democracy and legal innovation for the ecological transition.

Bibliography

- Bodansky, D. (2010). *The Art and Craft of International Environmental Law*, Harvard University Press.
- Boom, K. & Richards J.-A. (2018). Climate justice: the international momentum towards climate litigation, in Peeters, M. and Sanders, M. T. (eds), *Climate Law in EU Member States*, Edward Elgar.
- Bullard, R. D. (1990). *Dumping in Dixie: Race, Class, and Environmental Quality*, Westview Press.

- Bullard, R. D. (2005). *The Quest for Environmental Justice: Human Rights and the Politics of Pollution*, Sierra Club Books.
- Burke, M. et al. (2016). Global non-linear effect of temperature on economic production, *Nature*, 527(7577).
- Carlarne, C. P. (2016). *Climate Change Law and Policy: EU and US Approaches*, Oxford University Press.
- Di Pierri, M. (2021). Cambiamenti climatici e diritti umani. Il paradigma della giustizia climatica e il ruolo delle climate litigations per la protezione dei diritti umani nel contesto clima-alterato. PhD thesis, Università degli Studi di Palermo.
- Di Pierri, M. (2024). *Il contenzioso climatico. Origine, prospettive e questioni giuridiche*, Editoriale Scientifica.
- Dobson, A. (1999). *Justice and the Environment: Conceptions of Environmental Sustainability and Theories of Distributive Justice*, Oxford University Press.
- Gill, B. and Curtin, D. (2022). *Litigating the Climate Crisis: Responsibility, Law and the Future*, Edward Elgar.
- Hilson, C. (2019). Framing climate change litigation: beyond the precedent-setting case, *Law and Policy*, 41(3).
- Kotzé, L. J. & Du Plessis, A. (2020). Climate change litigation in the Global South: re-framing justice, equity and human rights, *Transnational Environmental Law*, 9(1).
- Lin, J. (2020). Litigating climate change: insights from theory and practice, *Annual Review of Law and Social Science*, 16.
- Markell, D. & Ruhl J. B. (2012). An empirical assessment of climate change in the courts: a new jurisprudence comes of age?, *Ecology Law Quarterly*, 39(1).
- Martínez Alier, J. (2009). *L'ecologia dei poveri*. Milano, Jaca Book.
- Osofsky, H. M. (2021). *Energy Law and Climate Change: A Justice-Oriented Transition*, Cambridge University Press.
- Peel, J. & Osofsky, H. M. (2018). A rights turn in climate change litigation?, *Transnational Environmental Law*, 7(1).

- Peel, J. & Osofsky, H. M. (2015). *Climate Change Litigation: Regulatory Pathways to Cleaner Energy*, Cambridge University Press.
- Posner E. A. & Weisbach D. (2010), *Climate Change Justice*, Princeton University Press.
- Rajamani L. & Peel J. (2021). *The Oxford Handbook of International Climate Change Law*, Oxford University Press.
- Rodríguez-Garavito C. (2011). Toward a sociology of the global rule of law field: neoliberalism, neoconstitutionalism, and the contest over judicial reform in Latin America, in Dezalay Y. and Garth B. (eds), *Lawyers and the Rule of Law in an Era of Globalization*, Routledge.
- Savaresi, A. & Setzer, J. (2020). Mapping the whole of the moon: an analysis of the role of human rights in climate litigation, *Current Opinion in Environmental Sustainability*, 45.
- Setzer, J. & Higham,, C. (2023). *Global Trends in Climate Change Litigation: 2023 Snapshot*. Grantham Research Institute on Climate Change and the Environment, LSE.
- Setzer, J. & Higham, C. (2024). *Global Trends in Climate Change Litigation: 2024 Snapshot*. Grantham Research Institute on Climate Change and the Environment, LSE.
- Setzer, J. & Higham, C. (2025). *Global Trends in Climate Change Litigation: 2025 Snapshot*. Grantham Research Institute on Climate Change and the Environment, LSE.
- Setzer, J. and Vanhala, L. C. (2019). Climate litigation: a new class of environmental litigation, *Current Opinion in Environmental Sustainability*, 37.
- Voigt, C. (2023). Climate justice in the courts: emerging legal pathways, *Journal of Environmental Law*, 35(2).

Cases and other sources

- A Sud et al v Italia (Civil Court of Rome, 2021, No RG 21545/2021) (Climate Case Chart, Sabin Center for Climate Change Law).

Duarte Agostinho and others v Portugal and 32 other States (European Court of Human Rights, pending) (Climate Case Chart, Sabin Center for Climate Change Law).

Held v State of Montana (District Court of Lewis and Clark County, Montana, 2023) (Climate Case Chart, Sabin Center for Climate Change Law).

Intergovernmental Panel on Climate Change, Climate Change 2023: Synthesis Report. Summary for Policymakers (2023) (IPCC).

Leghari v Federation of Pakistan (Lahore High Court, Pakistan, 2015) (Climate Case Chart, Sabin Center for Climate Change Law).

Milieudefensie et al v Royal Dutch Shell (The Hague District Court, Netherlands, 2021) (Climate Case Chart, Sabin Center for Climate Change Law).

STC4360-2018 (Corte Suprema de Justicia, Colombia, 2018) (Climate Case Chart, Sabin Center for Climate Change Law).

Urgenda Foundation v Netherlands (Supreme Court of the Netherlands, 2015) (Climate Case Chart, Sabin Center for Climate Change Law).

Strategic climate-aligned litigations

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SUMMARY: I. Government framework cases. II. Integrating climate considerations cases. III. Failure to adapt cases. IV. Corporate framework cases. V. Polluter pays cases. VI. Transition risk cases. VII. Climate-washing cases. VIII. Turning off the taps cases. Bibliography.

I. Government framework cases

In order to provide a comprehensive overview of the legal cases that constitute the so-called *strategic climate litigation*, it is first necessary to recall the definition of *strategic* litigation. As extensively illustrated in the previous chapter, the strategic element in the definition of climate litigation is closely linked to the intention to go beyond the purely legal dimension, aiming instead to bring about systemic political and social change (Setzer & Byrnes, 2020: 4). Consequently, the decisions handed down by judges in these cases can be characterised by far-reaching jurisprudential innovations capable of influencing climate policies (Di Pierri, 2024: 72).

Unlike the traditional taxonomy, which distinguishes strategic litigation based on the nature of the defendant and the legal sources cited (Di Pierri, 2024: 68-70) a more recent classification proposes a distinction between climate-aligned and non-climate-aligned litigation. Within the first category, it is possible to distinguish further subtypes based on the strategies adopted in individual lawsuits, which in some cases may be combined. Among the most relevant cases in the landscape of climate-aligned strategic litigation are the so-called government framework cases, whose fundamental objective is to challenge the implementation or adequacy of a country's climate policies, asking

^{*} A sud, I-IV.

^{**} A sud, V-VIII.

those responsible for adopting such policies to pursue more ambitious goals. Typically, the defendant against whom such cases are brought is the government, the state or, in general, public institutions, although climate-aligned litigation does not necessarily exclude the involvement of multiple defendants (Setzer & Higham, 2022: 18) and sometimes even includes non-state actors.

In any case, the category of ‘government framework’ cases, which therefore refers to climate governance at all levels, remains dominant in the landscape of climate litigation, especially in the Global North. Nevertheless, this trend is also growing steadily in the Global South, where the number of legal actions on this issue has increased dramatically (Setzer & Higham, 2025: 13). Furthermore, due to the inevitable impact that these cases have on public opinion, the phenomenon is attracting great interest in the media and is the subject of ongoing academic research.

In the context of climate litigation aimed at bringing public authorities to court, a further internal distinction can be made: ‘ambition cases’ and ‘implementation cases’ (Setzer & Higham, 2024: 26). The former, which represent a majority in the context of government framework cases, refer to legal claims for more adequate and efficient climate policies. In particular, where governments have adopted national legislation or policies in response to the climate crisis that are weak or even non-existent, the plaintiffs challenge the level of ambition of the climate targets set, as well as the commitment to pursuing them (Higham et al., 2022: 7). In fact, these cases often concern issues of interpretation of framework laws on climate change (Setzer & Higham, 2024: 26) with particular reference to the 2015 Paris Agreement, whose date of adoption coincides, not surprisingly, with a significant increase in climate litigation.

With regard to this last observation, although it is not possible to state with certainty how much the evolution of international law on climate change has affected the trend in litigation related to this issue (Setzer & Byrnes, 2020: 7), it is reasonable to say that recent interpretations of certain provisions contained in the relevant climate treaties have contributed to the creation of a jurisprudential orientation that strengthens the link between international and national obligations, encouraging citizens to demand increasingly ambitious climate policies. Furthermore, since the 2000s, there has been a significant increase in the number of climate-related treaties and regulations – at international, regional and national level – which have introduced new specific obligations for States, strengthening the legal basis for climate litigation (Di Pierri, 2024: 47). In this context, particular attention is often paid to *the Nationally Deter-*

mined Contributions (NDCs) provided for in Article 4 of the Paris Agreement, as well as to the political and legislative measures adopted to implement them. These instruments constitute the benchmark against which the consistency of state policies with mitigation obligations and with the objective of limiting the global average temperature increase to ‘well below’ 2°C, and possibly to 1.5°C, is assessed, including in court (United Nations, 2015: 4).

Within the so-called ‘ambition cases’, which form part of the broader context of litigation concerning the adequacy of states’ climate policies, there are various legal cases that are emblematic examples of this category. One of these is the *Urgenda Foundation v. Netherlands* case, which represented a turning point in the evolution of climate litigation. In the *Urgenda* case, the claimants argued, inter alia, that the Dutch government’s commitment to reduce emissions by 17% by 2020 was inadequate in light of the scientific evidence provided by the IPCC, which identified a 25–40% reduction range for industrialised countries by the same year. In 2019, following three levels of adjudication, the Supreme Court of the Netherlands upheld the lower courts’ rulings, holding that the insufficient ambition of the State’s climate policy violated Articles 2 and 8 of the European Convention on Human Rights and ordering the government to reduce greenhouse gas emissions by at least 25% by the end of 2020 compared with 1990 levels (Di Pierri, 2024: 40 – 53).

The ‘implementation cases’ mentioned above represent the second type of case that can be classified within the broad group of government framework cases, although they are less common than the ‘ambition cases’ described above. These cases are brought with the main purpose of pursuing existing climate action plans and targets, therefore without the intention of changing their substance, but with the intention of requesting a guarantee in terms of compliance (Higham et al., 2022: 7). Most enforcement cases have been brought in the courts of the Global South, where some aspects of the climate emergency are more critical. In this sense, it is possible to highlight the trend whereby in the countries of the Global North, plaintiffs are filing lawsuits to obtain more significant climate *targets*, a fact that is partly attributable to the issue of historical responsibility, while in the Global South, the tendency seems to be to overcome the obstacles arising from inertia and inefficiency in order to bind governments to comply with the mitigation and adaptation policies adopted (Setzer & Benjamin, 2019, 3).

A well-known case that falls into this category is *Leghari v. Federation of Pakistan*, brought by a Pakistani farmer who sued the national government for failing to implement the provisions of the National Climate Change Policy adopted in 2012 and the Framework for the Implementation of the Climate Change Policy

(2014–2030). The Pakistani citizen's claims were aimed at highlighting the link between the government's failure to achieve emission mitigation and adaptation targets for the localised impact of climate change and the repercussions on the national water, food and energy security system, which constitute a threat to the applicant's fundamental right to life. In 2015, the Lahore High Court upheld Mr Leghari's claims and recognised the violation of the applicant's constitutional rights to life and human dignity resulting from the Pakistani state's delay and inaction in implementing climate legislation. Furthermore, in order to liaise with the executive and thus monitor the government's progress, the Court established a Commission on Climate Change, which was replaced in 2018 by a Standing Committee (Leghari v. Federation of Pakistan, 2015).

That said, some famous enforcement cases have also been brought in countries in the Global North, with successful rulings. One example is the case of *R(ooa Friends of Earth) v Secretary of State for Business, Energy and Industrial Strategy*, brought in 2022 in the United Kingdom (Setzer & Higham, 2024: 28). The lawsuit was renamed *the 'Net Zero Case'*, as the three environmental NGOs argued that the climate policies adopted by the British government, and in particular the *Net Zero Strategy* (NZS) (*R (on the application of Friends of the Earth) v. Secretary of State for Business, Energy and Industrial Strategy*, 2022), constituted an insufficient action plan. In July 2022, the High Court of England and Wales ruled in favour of the applicant organisations, forcing the government to develop an updated strategy more focused on achieving its targets (Hingham et al., 2022: 7), such as net zero emissions by 2050. However, the NGOs also challenged the government's new plan, arguing that it still contained some of the critical issues already identified in the previous strategy (Setzer & Higham, 2024: 28), which could compromise compliance with the obligations under the Climate Change Act 2008 and, consequently, the achievement of the *Net Zero* target. In May 2024, the High Court upheld this further appeal, ordering the government to review its strategy again by October 2025, ensuring the necessary transparency in the decision-making process and basing it on reliable evidence (*R (Friends of the Earth Ltd) v Secretary of State for Energy Security and Net Zero*, 2021).

It can be observed that implementation cases often combine arguments typical of ambition cases, combining complaints about the weakness of climate targets with criticism of governments for their insufficient commitment to meeting those targets. Although there are reasons to believe that implementation cases are likely to increase over time, partly due to the recent trend towards requesting changes and revisions to climate legislation, this process is non-linear in nature. In fact, the choice of claims and strategy on which to base a climate

dispute depends closely on the objectives that the various actors wish to achieve, which in turn derives from the aspects of the climate crisis on which they wish to take legal action (Higham et al., 2022: 7-8).

Finally, a new line of case law has recently emerged in climate litigation, based on a *human rights-based approach*. As already mentioned in previous chapters, there is an essential intersection between environmental protection, combating climate change and protecting the human rights of every person. Therefore, in the context of cases relating to the regulatory framework adopted by states, i.e. within *government framework cases*, these cases are often based on legal arguments relating to fundamental human rights, such as the right to life, the right to health, the right to a healthy environment, and so on (Setzer & Higham, 2024: 26). The ruling of 9 April 2024 in the case of *KlimaSeniorinnen Schweiz v. Switzerland* represented an extremely significant step forward in the evolution of climate case law. On that occasion, the Grand Chamber of the European Court of Human Rights recognised that the inadequacy of Switzerland's climate mitigation policies constituted a violation of Article 8 of the European Convention on Human Rights, which protects the right to respect for private and family life. The Court stated that, in the presence of environmental risks such as those arising from climate change, state authorities have a positive obligation to take concrete, consistent and effective measures to protect people from negative impacts on their health, well-being and, more generally, quality of life. Furthermore, the Court found a violation of Article 6§1 of the Convention, noting that the Swiss courts had failed to guarantee effective access to justice to the applicants by dismissing their appeal without adequately examining the merits of the issues raised (*KlimaSeniorinnen and others v. Switzerland*, 2024). The *KlimaSeniorinnen* case is in line with other important climate litigation cases in the category of *government framework cases*, such as *Urgenda Foundation v. the Netherlands* and *Neubauer et al. v. Germany*, representing the first case in which an international court has bound a country's government to a minimum level of climate change emissions reduction (Setzer & Higham, 2024: 26).

II. Integrating climate considerations cases

Within climate-aligned strategic litigation, a further category can be identified that is particularly significant in terms of quantitative relevance, legal implications, and scholarly interest. These cases — which continue to represent the majority of strategic climate litigation — (Setzer & Higham, 2025: 31) are characterised by

a dual legal objective: on the one hand, to ensure the systematic integration of climate-related considerations and assessments; and on the other hand, to prevent the adoption or implementation of political decisions and economic activities that may generate adverse impacts on the environment and the climate.

More specifically, among the various challenges underlying these disputes, some concern legal challenges to climate policies that, at the time of their adoption, failed to adequately take into account the environmental and climate impacts they were likely to generate. In other cases, by contrast, claimants challenge the government's intention to review or revise existing climate policies with the aim of reducing their level of ambition (Setzer & Higham, 2025: 30).

However, the most frequent cases concern challenges to individual projects, often related to fossil fuel extraction activities, which inherently contribute to increased greenhouse gas emissions and are at odds with the internationally recognised objective of achieving climate neutrality by 2050. More specifically, many of these cases involve judicial challenges to the granting of authorisations and licences for the production of fossil fuels — or for the generation of electricity from fossil fuels — on the grounds that such permits are frequently issued without a prior and effective Environmental Impact Assessment (EIA).

Another issue that has attracted international attention concerns the calculation of emissions generated upstream and downstream of project operations, as well as so-called *Scope 3* emissions, i.e. indirect emissions. In particular, the issue concerns the extent to which, and the manner in which, policymakers are required to take such emissions into account and, consequently, how fossil fuel projects should be assessed in terms of their environmental and climate impacts. A prime example of this is the *Milieudefensie et al v Royal Dutch Shell plc.* case, decided in 2021 by the Hague court, which ruled that Shell has a direct responsibility to contribute to reducing emissions throughout the entire value chain, including *Scope 3* emissions. However, the scope of the decision was partially scaled back in the appeal ruling, reflecting the legal uncertainties and complexities that still characterise the issue of liability for indirect emissions (Saltalamacchia, 2025).

In 2024, the Supreme Court of the United Kingdom, one of Europe's major oil and gas producing countries, delivered its judgment in *Finch v Surrey County Council*, a decision that is particularly relevant to the treatment of direct and indirect emissions arising from fossil fuel activities (Setzer & Higham, 2025: 30 - 31). The dispute originated in 2019, when Surrey County Council granted a construction permit to a hydrocarbon company with the aim of drilling four new wells within an existing crude oil extraction site and ensuring hydrocarbon production for the next 25 years. A resident of

the county took the case to court to request a review of the County Council's decision to grant permission for the construction of the new wells. The applicant contended that the failure to consider certain indirect emissions, such as those resulting from hydrocarbon consumption, within the EIA amounted to a breach of the obligations arising under the European Union Environmental Impact Assessment Directive (Directive 2011/92/EU), which was applicable at the time of the events given that the United Kingdom was then a Member State and had been transposed into domestic law through the 2017 Regulations on urban planning and environmental impact assessment. The case ultimately reached the Supreme Court, which held the grant to the company to be unlawful on the grounds that the EIA preceding the project's implementation failed to assess the Scope 3 emissions that would inevitably result from the combustion of the oil extracted from the new wells. According to the Court, such emissions constitute a fundamental element that must be taken into account when conducting an EIA (*R (Finch on behalf of the Weald Action Group & Others) v. Surrey County Council (Others)*, 2019).

Similar cases have arisen in other European countries, including Norway, Germany, the Netherlands, France and Belgium. These disputes most clearly highlight the difficulty of balancing often competing political objectives, such as energy security, ecological transition and the fight against climate change (Setzer & Higham, 2025: 33).

III. Failure to adapt cases

Looking more closely at the legal cases mentioned in the previous paragraphs, it can be seen that the category of climate-related strategic litigation consists mainly of cases closely linked to the issue of greenhouse gas emissions mitigation. On the contrary, cases based on adaptation are less frequent, probably because their definition is still debated and their classification in the various jurisdictions is complicated (Donger, 2022). Data produced in 2024 by the Sabin Centre for Climate Change Law show that climate litigation focused on adaptation is clearly in the minority, with an estimated 205 cases out of a total of 2,500 lawsuits filed globally (Setzer & Higham, 2024: 34). Nevertheless, this phenomenon appears to be growing, with a relative increase specifically in cases of 'failure to adapt', i.e. disputes brought against state authorities or private entities accused of failing to implement adequate measures to ensure adaptation to the negative effects of the climate crisis or of not taking sufficient account of

foreseeable risks. In the context of adaptation cases, there is a possibility that the legal question underlying the dispute will focus on the allocation of costs, i.e. which entity should bear the cost of adaptation policies and measures; although, in this case, there is an overlap between the category of failure to adapt cases and the so-called ‘polluter pays cases’, which will be analysed in the following paragraphs. In any case, most cases of failure to adapt are legal actions brought against governments and public authorities, seeking compliance with existing adaptation policies (Setzer & Higham, 2024: 38).

As mentioned above, there are some differences between cases concerning mitigation and those concerning adaptation to the impact of climate change. Among these, the most significant aspect undoubtedly concerns the absence of international instruments on adaptation that are binding on States. This point is clearly confirmed by a 2024 ruling of the High Court of Justice of the United Kingdom, which marks an important defeat for the category of cases of failure to adapt.

The case in question refers to the dispute *R (Friends of the Earth Ltd, Mr Kevin Jordan and Mr Doug Paulley) v Secretary of State for Environment, Food and Rural Affairs*, initiated in 2023 with the intention of requesting a judicial review of the National Adaptation Programme 3 (NAP3). In particular, the promoters of the action argue that the general inadequacy of the objectives of the Programme adopted by the government violates their human rights and does not comply with section 58 of the Climate Change Act 2008, which governs the Climate Change Adaptation Programme. However, among the reasons for its dismissal, the Court ruled that there had been no violation of the applicants’ human rights and that NAP3 was in line with the legal requirements of the Climate Change Act (*R (Friends of the Earth Ltd, Mr Kevin Jordan and Mr Doug Paulley) v Secretary of State for Environment, Food & Rural Affairs*, 2023). That said, one extremely important element highlighted in the ruling concerns the difficulty of defining the legal parameters relating to the issue of adaptation, due to the lack of binding international rules governing how states should adapt to climate change. Furthermore, while mitigation targets are more easily quantifiable and monitorable over time – think of the carbon budget and the calculation of the ‘fair share’ of greenhouse gas emission reductions – there are no equivalent standards to facilitate the planning of effective adaptation policies. In light of these considerations, it is certainly more understandable that just under 30% of disputes relating to failure to adapt are successful in court (Setzer & Higham, 2025: 38).

In conclusion, failure to adapt to the disastrous impacts of climate change generates risks that most affect the most vulnerable groups living in areas most

prone to extreme events. In recent years, there has been an increase in cases of climate migration, i.e. people who have been forced to leave their homes due to environmental damage that makes it impossible to lead a safe and dignified life. It should be noted that the category of climate migrants or refugees still lacks clear, unambiguous and binding legal recognition, resulting in a substantial gap in the protection of the rights of this large group of people.

However, there is a positive case to report concerning an appeal filed in 2021. The two appellants, José Noé Mendoza Bohórquez and Ana Librada Niño de Mendoza, brought a case against multiple Colombian public authorities, including the Department of Arauca, the Administrative Department for Social Prosperity, the Unit for Comprehensive Care and Reparation for Victims, and others. Following the flooding of the Bojabá River in 2015 and 2016, the two farmers had to leave the land where they lived and worked, effectively becoming victims of forced displacement. The case is based on the recognition of the right to housing, work, life and personal safety of the two applicants, who argue that the Colombian State must treat victims of displacement due to environmental disasters in the same way as people who were forced to flee in the tragic context of the armed conflict. In 2024, the Constitutional Court concluded that, although the status of victim of displacement due to natural disasters does not fall within the provisions protecting victims of displacement due to armed conflict, this regulatory gap cannot in any way constitute a reason for the national authorities not to provide the necessary assistance, both in the emergency phase and in the recovery and stabilisation period, nor can it justify a failure to protect the human rights of citizens (José Noé Mendoza Bohórquez et al. v. Department of Arauca et al., 2024).

The above case highlights particularly strongly how the issue of adaptation to climate change takes on even greater significance when placed in the context of the Global South (Setzer & Higham, 2024: 34), where the impacts of climate change are more intense and dramatic. In these areas, the link between environmental protection and human rights is not only evident but has now become essential, representing one of the most urgent and complex challenges of our time.

IV. Corporate framework cases

The previous paragraphs provided a comprehensive analysis of climate-related strategic litigation most frequently brought against governments and public authorities, emphasising, however, that this type of legal action can also be

brought against non-state actors. In principle, the attribution of climate liability to companies is a sensitive issue from a legal point of view, due to the complexity of the concept itself.

Specifically, the recognition of *climate liability* depends strictly on two factors that must be assessed: the existence of sources of climate obligations on the part of the defendant, i.e. the regulatory instruments from which climate obligations attributable to the defendant derive, and the existence of a causal link, i.e. the link between the damage caused and the conduct in question. In light of this, there is a significant difference between the already non-immediate identification of climate liability on the part of states and the more complex attribution of liability to private individuals. In fact, the absence of regulatory sources that bind companies to comply with certain climate objectives – such as, for example, the imposition of a specific quota for reducing climate-changing emissions – constitutes a *de facto* obstacle to climate action in the courts (Di Pierri, 2024: 117–118).

The growing need to take action against large private polluters can be framed within the ‘polluter pays’ principle, which applies to the climate cases discussed in detail in the following paragraph. Similarly, so-called *corporate framework cases* refer to climate litigation in which private individuals are held accountable for their harmful conduct, with particular reference to emissions-generating activities. More specifically, these cases aim to compel companies to change their internal policies, forcing corporate *governance* to implement effective assessments aimed at mitigating the impact of their activities throughout the value chain – thus, including the aforementioned *Scope 3* emissions. The legal arguments underlying these disputes generally seek to uphold the existence of *due diligence standards*, which should give rise to positive obligations on private entities to respect human rights and the objectives of the Paris Agreement (JSetzer & Higham, 2024: 33).

The *Milieudefensie et al. v. Royal Dutch Shell* case, already mentioned in the context of climate integration cases, is an extremely important climate dispute for this category. The plaintiffs are suing the oil giant to demand a 45% reduction in its emissions by 2030, compared to 2019 levels, as well as the achievement of climate neutrality by 2050, in line with the Paris Agreement. The first instance trial concluded in 2021 with a landmark ruling for strategic climate litigation, as the District Court of The Hague, recognising the existence of a *standard of diligence* on the part of Shell, bound the multinational to reduce the aggregate volume of all carbon dioxide emissions by 45% by 2030, taking into account both the activities directly controlled by the company and the emissions produced indirectly upstream and downstream of the entire process (*Scope 3*) (*Milieudefensie et al. v. Royal Dutch Shell plc*, 2019). This decision

was overturned by the Court of Appeal in November 2024, stating in its ruling that, although the Court recognised Shell's legal duty of care under Dutch civil law and the provisions of the Paris Agreement, and although the 45% reduction in emissions was widely supported by scientific evidence, the Court could not impose specific reduction obligations on individual companies. The judges specifically identified legal problems in binding Shell to a specific reduction target, with particular reference to *Scope 3* emissions. In 2025, the case reached the third level of jurisdiction, but while awaiting the ruling, the international scene was affected by other important disputes arising with the intention of limiting the polluting behaviour of large fossil fuel companies.

In Italy, the case of *Greenpeace Italia and ReCommon v. Eni et al.* is a significant example of the fight for the recognition of private individuals' climate responsibility. The July 2025 ruling by the Joint Divisions of the Court of Cassation recognises the jurisdiction of judges to hear climate cases (*Greenpeace Italy et al. v. ENI S.p.A., the Italian Ministry of Economy and Finance and Cassa Depositi e Prestiti S.p.A., 2023*), in stark contrast to the decision taken by the Civil Court of Rome in the case of *A Sud et al. v. Italy*, which dismissed the appeal on the grounds of absolute lack of jurisdiction. In this ruling, the Court of Cassation expressly states that legal cases relating to climate issues do not constitute interference in the political sphere or in the business affairs of private individuals, and that Italian courts can judge whether the emissions of giants such as Eni have violated the human rights of the appellants and whether they are in line with international climate objectives (*ReCommon, 2025; Valentini & Gentile, 2025*).

V. Polluter pays cases

The increase in greenhouse gas (GHG) concentrations in the atmosphere and the reduced absorption capacity of forests and soils have already produced tangible impacts on the climate, including extreme weather events, glacier melt, desertification, and biodiversity loss. A substantial share of emissions can be attributed to industrial sectors, particularly those related to transport, agriculture, and land use management. In this context, the 'polluter pays' principle — originally developed to internalize the environmental costs of productive activities — has acquired increasing relevance in the legal sphere as well. Within climate governance, it enables the attribution to polluters of the obligation to bear the costs of preventing, mitigating, or remedying damage and losses resulting from

climate change (Nordlander, 2024: 106-107, 116), or from conduct that has contributed to its aggravation (Rehbinder, 2021: 46-47).

This explains why the principle today underpins a growing number of climate lawsuits, commonly referred to as polluter pays cases: legal actions brought by citizens, organizations, or public authorities seeking compensation from actors deemed responsible for contributing to climate change. The majority of these proceedings — particularly in the United States — have been initiated against Carbon Majors, which are accused not only of their greenhouse gas (GHG) emissions, but also of having knowingly disseminated misinformation about the climate risks associated with their activities and with global warming. More recently, analogous cases have also emerged in countries such as Brazil, Indonesia, and China, with reference to localized emissions and the environmental damage resulting therefrom (Setzer & Higham, 2024: 31, 34).

In the US, national courts have adopted divergent approaches when assessing whether climate liability claims may proceed under state law, resulting in a fragmented jurisprudential landscape. At the federal level, the Supreme Court of the United States has not yet ruled on the merits of these cases and has instead left their resolution to state courts, to be decided case by case. This position has been confirmed repeatedly, including in *Alabama v. California*, in which nineteen states, led by Alabama, petitioned the Supreme Court to prevent climate-related actions brought by California, Connecticut, Minnesota, New Jersey, and Rhode Island against several oil companies. The petitioning states argued that these actions threatened the principle of equal state sovereignty, as they purportedly sought to regulate interstate commerce in violation of the U.S. Constitution, invoking the Supreme Court's exclusive jurisdiction over controversies between states. The Court, however, denied the motion, albeit with several dissenting opinions (Burger & Wentz, 2023: 23; *Alabama v. California*, 2025).

Similarly, in 2022, a Hawaiian court dismissed motions by several oil companies seeking to have another lawsuit — this time brought by the City and County of Honolulu for climate change-related damages — thrown out, holding that the claims, based on state law, could proceed before the state court. In 2023, the Supreme Court of Hawai'i confirmed this decision, finding that jurisdiction was properly established and that neither federal common law nor the Clean Air Act precluded the proceedings. The Court also clarified that the regulation of deceptive marketing practices falls within state jurisdiction (*City & County of Honolulu v. Sunoco LP*, 2023). The companies subsequently sought to bring the case before the United States Supreme

Court, which in 2024 once again declined to hear the case, leaving the matter to be decided by state courts. (Dharna, 2025).

The same has occurred in other proceedings, such as *County Commissioners of Boulder County v. Suncor Energy USA, Inc.* and *City of New York v. Exxon Mobil Corp.* In the latter case, however, the national court held that the companies' statements were not misleading to an average consumer, even considering that the link between fossil fuels and climate change is now a matter of public knowledge, and therefore found no violation of the invoked legal provisions, reflecting a more restrictive approach. The appeal in that case is currently pending (*City of New York v. Exxon Mobil Corp.*, 2024).

Despite the uncertainty created by the divergent approaches taken by national courts, new polluter-pays lawsuits continue to be filed by a wide range of subnational actors, from state governments to small municipalities (Dharna, 2025). Furthermore, some jurisdictions, such as Puerto Rico, have chosen to voluntarily withdraw similar actions (*Estado Libre Asociado de Puerto Rico v. Exxon Mobil Corp.*, 2025). In the United States, another noteworthy case is *McCormick v. HRM Resources LLC*, brought by a group of Colorado landowners through a class action. The plaintiffs alleged a complex fraudulent scheme whereby the defendants transferred hundreds of non-producing oil and gas wells to a shell company that subsequently declared bankruptcy, with the sole purpose of evading statutory obligations related to well closure and site remediation. The failure to properly plug and abandon the wells resulted in ongoing methane emissions, environmental damage, and depreciation of property values. The federal court in Colorado dismissed the defendants' preliminary motions, recognizing the existence of a legally cognizable harm and a causal link to the defendants' conduct. This case reinforces an emerging trend toward holding companies accountable not only for the emissions they generate, but also for the economic and financial strategies employed to avoid the costs of environmental liability (*McCormick v. HRM Resources, LLC*, 2024).

In recent years, a new strand of climate litigation has emerged which, while grounded in the polluter pays principle, differs from traditional cases in that it concerns emissions linked to localized and unlawful conduct, such as illegal deforestation or violations of environmental regulations. In these proceedings, compensation for climate damage is not the sole objective, but constitutes a significant component of the damages awarded and derives its legal basis from the unlawfulness of the conduct that generated the emissions. In Brazil, in 2024, the 7th Federal Environmental and Agrarian Court issued landmark rulings ordering the payment of more than 10 million reais for climate damages resulting from il-

legal deforestation. The funds are allocated to the Climate Fund and are intended both for reforestation efforts and for economic support to communities affected by the impacts of climate change. These decisions are also based on a new calculation methodology adopted in September 2024 by the National Council of Justice (CNJ), which provides for the measurement of the deforested area, the estimation of the carbon released, and the attribution of an economic value to the tonnes of CO₂ emitted, thereby credibly quantifying climate damage and rendering compensation claims concrete and enforceable. Moreover, in the same year, in the case *Instituto Arayara v. Copel*, the Brazilian NGO initiated the first proceeding in the energy sector, alleging unlawful emissions persisting for over two decades due to irregularities in the environmental permits of a thermoelectric power plant. The action seeks compensation based on the social cost of carbon, the suspension of the plant's operations, and the annulment of the permits issued. Significant successes related to climate justice and unlawful conduct have also been recorded in Indonesia, an approach that may be followed by regulatory authorities in other countries as well (Setzer & Higham, 2025, 35).

Finally, in the European context, an important development occurred in 2025 with the conclusion of the German case *Lliuya v. RWE*. The Hamm Higher Regional Court dismissed the claim, holding that there was no concrete or imminent danger to the claimant's property — a Peruvian citizen affected by the retreat of Andean glaciers. The dismissal was based on evidentiary shortcomings, in particular the quality of the technical expert reports. Nevertheless, the judgment established a legally significant principle: it recognized that, in principle, major greenhouse gas-emitting companies may be held civilly liable under German law (Section 1004 of the German Civil Code, BGB) for climate-related damage proportionate to their contribution to global emissions, even where there is substantial geographical distance between the source of emissions and the damage suffered. Although harsh to the claimant, this precedent paves the way for future transnational lawsuits based on proportionality of harm and strengthens the legal foundation for an extraterritorial application of the 'polluter pays' principle (Bönnemann & Tigre, 2025).

In support of this growing body of climate litigation pursued at the global level, increasingly sophisticated knowledge tools have also been developed. One of the most prominent is the Zero Carbon Analytics database, built on data from the Sabin Center, which compiles and analyses 68 legal cases seeking compensation for climate damages brought against corporate actors (*Zero Carbon Analytics*, 2025). The second is the Climate Law Accelerator promoted by New York University, which currently maps 53 cases brought before national courts

or quasi-judicial bodies. This initiative highlights, in particular, the underrepresentation of state-owned enterprises in judicial proceedings, despite their significant contribution to global emissions. Overall, these tools contribute not only to increasing transparency in the landscape of climate litigation, but also to providing empirical evidence that strengthens the evidentiary basis of polluter pays cases, thereby facilitating their expansion at the global level (CLX – *Climate Law Accelerator Toolkit*, 2025).

VI. Transition risk cases

The so-called ‘Transition Risk’ Cases (hereinafter TRCs) refers to inadequate management of risks associated with climate transition processes, attributable to the conduct of directors, executives, and other actors operating within large corporations — particularly multinational companies — or within the financial sector. Unlike climate lawsuits brought against companies or carbon majors that are misaligned with the objectives of the Paris Agreement — such as limiting the increase in global temperature to 1.5°C — where the focus lies on emissions impacts and the company’s contribution to climate change (with possible implications also for the enjoyment of human rights), TRCs instead concentrate on the cross-cutting risks that such misalignment may entail, including financial and social risks, both for the company itself and for related stakeholders (Setzer & Higham, 2024: 39).

From this perspective, TRCs are situated within a broader context in which climate litigation not only exposes mismanagement, but also makes visible and accelerates the risks associated with the climate transition, particularly regulatory, financial, and reputational risks. As highlighted by the British Institute of International and Comparative Law (BIICL), legal actions can prompt companies to adopt adjustment measures that would in any event be required to comply with emerging regulations, thereby performing both a corrective and a preventive function. Moreover, litigation may act as a catalyst for the adoption or implementation of more stringent public policies, indirectly contributing to an increased risk of stranded assets and generating new forms of exposure for non-aligned companies. In this sense, climate litigation comes to be understood not only as an *ex post* response to omission or failure, but also as an active factor in the construction of transition risk, influencing both the timing and the intensity of its materialization. This confirms the view that a rapid and well-managed transition represents not only an environmental obligation, but also the most effective strategy for corporate risk management (Beermann & Arena, 2024).

A significant example of a Transition Risk Case is *Kim Min et al. v. Kim Tae-Hyun et al.*, brought in 2024 by 35 pension beneficiaries against three executives of South Korea's National Pension Service (NPS), including its Chief Executive Officer. The claimants initiated civil proceedings alleging that the defendants had breached their fiduciary duties by failing to implement the coal exit policy announced by the pension fund in 2021 and instead continuing to invest in companies operating in the coal-fired power generation sector. According to the plaintiffs, this conduct exposed the fund to financial risks linked to the devaluation of polluting assets (stranded assets) and, for some of them, also to health damage caused by emissions from power plants located near their homes. The case is grounded in domestic corporate law provisions and in South Korea's Framework Act on Carbon Neutrality (Park, 2024: 439 – 41), but it also carries international implications, insofar as it refers to obligations arising from the Paris Agreement and to global ESG standards, which have become central to transnational climate litigation (Applications by Australia and New Zealand Banking Group Ltd and Suncorp Group Ltd, 2023). In another case dating back to December 2023, the Polish state-owned energy company Enea brought a civil action against several former members of its board of directors and against the insurers responsible for directors' and officers' (D&O) liability coverage, seeking damages exceeding 656 million Polish zlotys. The claim is based on allegations that, in 2018, the defendants approved—in breach of their fiduciary duties—a highly risky investment in the construction of the Ostrołęka C coal-fired power plant, despite the availability at the time of evidence concerning the significant economic and environmental risks associated with the project. As early as 2018, the organization ClientEarth, a minority shareholder in the company, had raised legal concerns regarding the investment, initiating an initial round of litigation (*Climate Risk, Directors' Duties and Sustainability Disclosures*, 2024).

The project was ultimately discontinued in 2020, after construction had already begun, and resulted in an accounting write-down of nearly one billion PLN. Unlike the *Kim Min et al.* case, which focuses on the potential dimension of so-called transition risk arising from the failure to implement the divestment policy announced by the national pension fund (NPS), the Enea case concerns damage that has already materialized as a result of a concretely unsuccessful management decision (*Enea v. Former Board Members and D&O Insurers*, 2023). Finally, another noteworthy development comes from Australia. In February 2024, the Australian Competition Tribunal ruled on the proposed acquisition of the banking arm of Suncorp Group Ltd (SGL) by Australia and New Zealand Banking Group (ANZ).

Although the proceedings primarily concerned competition law issues, the Tribunal acknowledged that by divesting its banking business, SGL, also active in the insurance sector, could strengthen its capacity to address the growing risks associated with extreme climate events, to which it is particularly exposed as an insurer. The decision, which approved the transaction following the intervention of federal authorities, is notable for having accorded concrete relevance to both physical and transition risks linked to climate change, treating them as substantive elements in the assessment of corporate resilience and strategic reorganization. It thus confirms the progressive entrenchment of climate-related variables in economic, regulatory, and financial evaluations.

VII. Climate-washing cases

Climate washing is a form of greenwashing that focuses on misleading claims concerning the environmental and climate commitments of companies or governments. This trend relates in particular to unsupported or deceptive statements about the climate impact of products, services, or corporate strategies, often aimed at constructing a public image of sustainability that is not effectively justified (Benjamin et al, 2022). These practices include both the exaggeration of environmental benefits and the omission of known risks or relevant information regarding how an actor contributes to climate change. In some cases, the phenomenon also involves disinformation campaigns aimed at undermining or discrediting climate science.

In recent years, the number of lawsuits related to these practices has increased significantly, particularly against corporate actors, with the aim of countering distorted narratives and strengthening private-sector accountability in the transition toward a low-emissions economy (Abate, 2023: 6-7). Although the emergence of new litigation in this area appears to be slowing, the success rate for claimants remains high. In this regard, more than 60% of the approximately 100 cases decided by 2024 resulted in outcomes favorable to claimants. Among these, Australia has emerged in recent years as a key jurisdiction, owing to three consecutive rulings obtained by the Australian Securities and Investments Commission (ASIC). In one case, a record fine of AUD 11.3 million was imposed on the private pension fund Mercer Superannuation for unfounded claims relating to alleged 'sustainable' investments, while two further decisions were issued against Vanguard Investments (AUD 20 million) and Active Super for false statements concerning exclusions from fossil fuel investments (Setzer & Higham, 2025).

In light of these achievements, segments of civil society have expressed concern that the risk of litigation may lead companies to scale back or conceal their environmental communications. It is noteworthy that, of more than 1,000 large companies that had set emissions reduction targets for 2020, only 60% succeeded in meeting them, while the remaining 40% either failed to do so or provided no information on the outcomes, without facing concrete consequences or adequate transparency requirements (Jiang et al., 2025: 279).

Climate washing litigation has also developed in several European countries and in the United States. In Italy, for example, several proceedings were initiated against the automotive giant Volkswagen following the international scandal known as ‘Dieselgate’ (Topham et al., 2015). As early as 2015, the Italian Competition Authority (AGCM) initiated an investigation against Volkswagen Group Italia S.p.A. and Volkswagen Aktiengesellschaft for unfair commercial practices related to the marketing of EA 189 diesel vehicles. The Authority found that Volkswagen had disseminated misleading environmental claims, emphasizing the ecological performance of the vehicles despite their being equipped with an illegal software device (a defeat device) used to manipulate emissions test results. For this conduct, in 2016 the Authority imposed an administrative fine of EUR 5 million for violations of Articles 20, 21, and 23 of the Italian Consumer Code. Volkswagen subsequently challenged the decision before the Regional Administrative Court of Lazio (TAR Lazio), which in 2019 dismissed the appeal, upheld the sanction, and confirmed the misleading nature of the company’s green claims (AGCM v. Volkswagen Aktiengesellschaft & Volkswagen Group Italia S.p.A., 2023).

Following the findings of the Italian Competition Authority, in 2016 the consumer association Altroconsumo brought a civil class action against Volkswagen before the Venice Court, representing more than 63,000 Italian consumers who had purchased vehicles marketed under the Volkswagen, Audi, Seat, and Škoda brands. The court confirmed the misleading nature of the green claims relating to EA 189 diesel vehicles and ordered the company to compensate each consumer in the amount of EUR 3,300 for pecuniary and non-pecuniary damage (Altroconsumo v. Volkswagen Aktiengesellschaft and Volkswagen Group Italia S.p.A., 2023). In another case, this time in 2019, the Italian Competition Authority (AGCM) fined ENI EUR 5 million, finding that the advertising campaign for Diesel+ fuel violated rules on unfair commercial practices by attributing misleading environmental characteristics to the product. In particular, the use of a ‘green’ logo suggested that the fuel as a whole had a reduced environmental impact, whereas in

reality such benefits were limited to a single component (Autorità Garante della Concorrenza e del Mercato (AGCM) v. ENI S.p.A., 2024).

Lastly, a significant case of climate-washing between private actors involved Alcantara S.p.A. and Miko S.r.l., both operating in the automotive microfiber sector. Alcantara sought interim relief before the Court of Gorizia, accusing Miko of misleading environmental advertising. The contested claims included expressions such as ‘100% recyclable’ and ‘eco-friendly’, which were considered vague, false, or unverifiable, in violation of national and European rules on unfair commercial practices and unfair competition. On 25 November 2021, the court upheld the application, ordering the immediate removal of the green claims and the publication of the decision on the company’s website. However, the measure was overturned on appeal in March 2022 on procedural grounds (Alcantara S.p.A. v. Miko S.r.l., Tribunale di Gorizia, 25 novembre 2021, 2021). A similar approach was adopted in 2024 by the German Federal Court of Justice (Bundesgerichtshof), which found the use of the term ‘climate-neutral’ by the confectionery company Katjes to be misleading, holding that such claims must be accompanied by clear and contextual explanations of how climate neutrality is achieved (Beate & Meyer, 2025: 21-27). Overseas, by contrast, in 2024 several legal actions were initiated in the United States against climate-washing practices linked to the carbon credit market. In *Commodity Futures Trading Commission v. Newcombe* and *United States v. Newcombe*, civil and criminal authorities accused executives of a carbon credit company of orchestrating a complex fraud by providing false data on energy savings and emissions reductions in order to artificially inflate the value of carbon credits. The charges included wire fraud, securities fraud, and commodities fraud, aimed at deceiving investors, including one prepared to commit up to USD 250 million. In *United States v. Steele*, the company’s Chief Operating Officer pleaded guilty to conspiracy to commit fraud and agreed to cooperate against two other executives. These cases represent a significant enforcement outcome against deceptive practices in the voluntary carbon credit market (*Commodity Futures Trading Commission v. Newcombe*, 2024; *United States v. Newcombe*, 2024; *United States v. Steele*, 2024). More broadly, the cases examined so far confirm the growing legal scrutiny of climate washing: an evolution that reflects not only rising societal expectations regarding sustainability, but also the maturation of law as an instrument of climate accountability.

VIII. Turning off the taps cases

So-called ‘turning-off-the-taps’ cases aim to halt financial flows toward high-emission activities deemed incompatible with the objectives of the Paris Agreement. These legal actions, directed at both public and private financial institutions, seek to promote the integration of climate risk into capital allocation decisions, thereby discouraging investments with high carbon intensity. At the same time, such initiatives contribute to the implementation of the United Nations Guiding Principles on Business and Human Rights (UNGPs), underscoring the responsibility of banks and multinational corporations not to contribute, even indirectly, to human rights violations arising from the impacts of climate change (Macchi, 2022: 7-9, 129-133). These developments give rise to demands for enhanced financial transparency, divestment from fossil fuels, and the adoption of due diligence obligations aligned with climate objectives and human rights standards. Within this context, a significant case is *Milieudefensie v. ING*, filed in March 2025 before the District Court of Amsterdam, building on the principles established in *Royal Dutch Shell* (Johannsen et al., 2024: 270-273) and *Urgenda* (Pedersen 2020: 227-234). The Dutch NGO *Milieudefensie*, together with more than 30,000 claimants, has brought legal proceedings against ING Bank, alleging that the bank contributes to climate change through the continued financing of high-emission industries in the absence of adequate mitigation measures. According to the claimants, such conduct constitutes a breach of the duty of care under Article 6:162 of the Dutch Civil Code, interpreted in conjunction with other provisions of domestic and international law, including the European Convention on Human Rights (ECHR). This interpretation is consistent with the approach adopted in the landmark *KlimaSeniorinnen* case, as well as with the OECD Guidelines, the United Nations Guiding Principles on Business and Human Rights (UNGPs), and the best available scientific evidence. In essence, ING is alleged to have failed to adopt effective emissions-reduction policies, to have exhibited insufficient transparency in its financial operations, and to have continued supporting fossil-fuel companies across its entire value chain. Accordingly, *Milieudefensie* has requested that the court order the bank to halve its emissions by 2030, cease financing new fossil-fuel projects, and ensure that its major clients likewise comply with these international standards (Laniyan, 2024: 1-11). Alongside banks, additional actors frequently targeted in this type of litigation include pension funds, both public and private. For instance, in Luxembourg, Greenpeace initiated legal proceedings to obtain information on the degree of alignment of the sovereign pension fund with the objectives of the Paris Agreement. In the United Kingdom, a group of academics brought an action against the directors of a university pen-

sion fund for failing to adopt a fossil fuel divestment plan. In Australia, by contrast, proceedings brought by a fund beneficiary resulted in a settlement under which the REST superannuation fund committed to integrating climate-related risks into its investment strategy and to setting a target of climate neutrality by 2050 (*Greenpeace Luxembourg v. Schneider*, 2019; *Ewan McGaughey et al. v. Universities Superannuation Scheme Limited*, 2021; *McVeigh v. Retail Employees Superannuation Trust (REST)*, 2018).

In recent years, climate litigation against financial actors has also evolved significantly in France, drawing not only on human rights obligations and climate responsibility, but also on specific regulatory instruments such as the 2017 *Loi sur le devoir de vigilance*, which requires large companies to adopt and implement vigilance plans aimed at preventing environmental and social harm throughout their value chains. Two separate cases brought in 2023 and 2024 against BNP Paribas by French NGOs — including *Les Amis de la Terre*, *Notre Affaire à Tous*, and *Oxfam France* — have alleged systemic shortcomings in the bank's vigilance plan, in particular the absence of concrete measures to align its financial flows with the objectives of the Paris Agreement. Although these proceedings have not yet resulted in a decision on the merits, they may benefit from the jurisprudential momentum generated by another landmark case, *Notre Affaire à Tous et al. v. TotalEnergies*. In that litigation, the Paris Court of Appeal held in 2023 that the action brought by several NGOs was admissible, dismissing the preliminary objections raised by the company and clarifying the applicability of the duty of vigilance law to conduct with climate-relevant impacts (*Notre Affaire à Tous, Sherpa et al. v. TotalEnergies SE*, 2019). A potential positive ruling by the Court of Cassation — currently seized of procedural issues — could consolidate an important precedent and strengthen the position of claimants in subsequent cases. In parallel, increasing attention is being paid to greenwashing practices in the financial sector, with a particular focus on the transparency of ESG funds. In this regard, a notable example is the complaint filed in March 2025 by *ClientEarth* with the *Autorité des marchés financiers (AMF)* against *BlackRock*, alleging that the company disseminated misleading statements regarding the environmental sustainability of 18 retail funds marketed as 'sustainable'. According to an analysis conducted by *Reclaim Finance*, these funds held fossil fuel investments exceeding one billion US dollars in value. In response to the complaint, *BlackRock* subsequently announced the reclassification of the funds in question in order to comply with the new French guidelines on the naming of ESG products (*ClientEarth*, 2024). Taken together, these cases illustrate an increasingly structured trend in climate litigation, which is directed not only against industrial corporations but

also against the financial actors that — directly or indirectly — enable and sustain climate-harmful activities.

While the cases examined so far appear to chart a positive trajectory toward greater climate accountability of financial actors, the recent decision of the New Jersey Appellate Division in *Dawson v. Murphy* marks a troubling reversal. The court's rejection of the notion that public investments in fossil fuel companies may conflict with constitutional or fiduciary obligations reflects a restrictive view both of the justiciability of financial decision-making and of the scope of environmental rights (Tigre & Barry, 2025: 11). The court indeed denied the existence of a legally cognizable right to a stable environment and held that the investment decisions of the state pension fund fall outside the scope of judicial review, as they belong to the political sphere. In any event, the foregoing confirms that treating financial governance as a neutral and technocratic domain, insulated from environmental law and fiduciary duties, ultimately makes the transition toward sustainable finance more difficult. The Dawson case thus illustrates the limits that climate litigation continues to encounter, particularly when it seeks to drive systemic change in the absence of an explicit regulatory framework (Setzer & Higham, 2024: 41).

Bibliography

- Abate, R. S. (2023). Fool Me Once, Shame on You: Promoting Corporate Accountability for the Human Rights Impacts of Climate Washing, *Inter-cultural Human Rights Law Review*, 18.
- Beate, G. & Meyer, S. (2025), How to Combat 'Greenwashing': Comment on the Decision of the German Federal Court of Justice of June 27, 2024 – BGH I ZR 98/23 on Misleading Advertisement of Climate Neutrality, *Journal of European Consumer and Market Law* 14(1).
- Beermann, R. & Arena, C. (14 March 2024), Climate Lawsuits as a Social Corrective: How Companies Underestimate the Financial Risk of Climate Litigation, *British Institute of International and Comparative Law*.
- Benjamin, L. et al (2022), Climate-Washing Litigation: Legal Liability for Misleading Climate Communications, *Climate Social Science Network*.

- Bönnemann, M. & Tigre, M. A. (2025), What *Lliuya v. RWE* Means for Climate Change Loss and Damage Claims, *Climate Law Blog*, Columbia Law School.
- Burger, M. & Wentz, J. B. (2023), U.S. Climate Litigation in the Age of Climate Accountability, *Sabin Center for Climate Change Law*, Report No. 2023/01.
- Dharna, N. (2025), US Supreme Court Allows Hawaii Lawsuit Against Fossil Fuel Firms' Misinformation, *The Guardian*.
- Di Pierri, M. (2024), *Climate Litigation. Origins, Prospects and Legal Issues*. Editoriale Scientifica, Napoli.
- Donger, E. (2022), Lessons on "Adaptation Litigation" from the Global South. *Verfassungsblog*.
- Higham, C. et al. (2022), *Challenging Government Responses to Climate Change through Framework Litigation*. Policy Report, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, London.
- Jiang, X. et al. (2025). Limited accountability and awareness of corporate emissions target outcomes, *Nature Climate Change*, 15.
- Johannsen, B. et al, An Empty Victory? *Shell v. Milieudefensie et al.* (2024). 2024, the Legal Obligations of Carbon Majors, and the Prospects for Future Climate Litigation Action, *Review of European Comparative & International Environmental Law*, 32.
- Laniyan, B. (2024). La mise en demeure de la Banque ING par Milieudefensie, prémisses d'un nouveau contentieux climatique, *La Revue des droits de l'homme. Revue du Centre de recherches et d'études sur les droits fondamentaux*.
- Macchi, C. (2022). *Business, Human Rights and the Environment: The Evolving Agenda*, Springer.
- Nordlander, L. (2024). *Human Rights and Climate Change. The Law on Loss and Damage*, Routledge.
- Park, H. (2024). South Korea, in J. Fiorino D. et al., *Elgar Encyclopedia of Climate Policy*, Edward Elgar Publishing Limited.

- Pedersen, O. W. (2020). The Networks of Human Rights and Climate Change: The State of the Netherlands v Stichting Urgenda, Supreme Court of the Netherlands, 20 December 2019 (19/00135), *Environmental Law Review*, 22.
- Rehbinder, E. (2021). Climate damages and the “Polluter Pays” Principle, in W. Kahl e M. Weller, *Climate Change Litigation: A Handbook*, C.H. Beck – Hart – Nomos.
- Saltamacchia, L. (2025). The Milieudefensie vs. Shell case; what climate obligations do companies have?, *Questione giustizia*.
- Setzer, J. & Benjamin, L. (2019). Climate Litigation in the Global South: Constraints and Innovations. *Transnational Environmental Law*.
- Setzer, J. & Byrnes, R. (2020). *Global trends in climate change litigation: 2020 snapshot*. Policy Report, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, London.
- Setzer, J. & Higham, C. (2025). *Global Trends in Climate Change Litigation: 2025 Snapshot*. London, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science.
- Setzer, J. & Higham, C. (2024). *Global Trends in Climate Change Litigation: 2024 Snapshot*. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science.
- Tigre, M. A. & Barry, M. (January 2025), Climate Change in the Courts: A 2024 Retrospective, *Sabin Center for Climate Change Law*.
- Topham, G. et al. (2015). Volkswagen emissions scandal explained: Diesel cars, *The Guardian*.
- Valentini, G & Gentile, C. (2025). A Step Forward in Italian Climate Litigation. Preliminary Remarks on Greenpeace and Others v. ENI and Others, *Verfassungsblog on matters constitutional*.

Cases and other sources

- AGCM v. Volkswagen Aktiengesellschaft & Volkswagen Group Italia S.p.A., Climate Case Chart, Sabin Center for Climate Change Law (14 September 2023).
- Alabama v. California*, No. 220158, U.S. Supreme Court, decision on motion for leave to file a bill of complaint, 10 March 2025, Climate Case Chart.
- Alcantara S.p.A. v. Miko S.r.l., Tribunale di Gorizia, 25 November 2021, Climate Case Chart, Sabin Center for Climate Change Law.
- Altroconsumo v. Volkswagen Aktiengesellschaft and Volkswagen Group Italia S.p.A., 16 November 2023, Climate Case Chart, Sabin Center for Climate Change Law.
- Applications by Australia and New Zealand Banking Group Ltd and Suncorp Group Ltd*, 2023, *Climate Change Laws of the World – Sabin Center for Climate Change Law*, Columbia Law School, Climate Case Chart.
- Autorità Garante della Concorrenza e del Mercato (AGCM) v. ENI S.p.A., 2021, Climate Case Chart, Sabin Center for Climate Change Law.
- City & County of Honolulu v. Sunoco LP, No. 1CCV-20-0000380 (Haw. Cir. Ct., filed 9 March 2020; Hawai'i Supreme Court decision 31 October 2023), Climate Case Chart, Sabin Center for Climate Change Law.
- City of New York v. Exxon Mobil Corp.*, No. 451071/2021 (N.Y. Supreme Court, motion to dismiss granted 14 January 2025), Climate Case Chart, Sabin Center for Climate Change Law.
- ClientEarth v. BlackRock, complaint targeting BlackRock over misleading sustainability claims, filed 17 October 2024, Climate Case Chart, Sabin Center for Climate Change Law.
- Climate Risk, Directors' Duties and Sustainability Disclosures*, Climate Litigation, Directors' Duties Navigator, Climate Governance Hub / Commonwealth Climate and Law Initiative, 2024, hub.climate-governance.org
- CLX – Climate Law Accelerator Toolkit, 'Loss & Damage Hub', Climate Law Accelerator, n.d. (accessed 12 January 2026).
- Commodity Futures Trading Commission v. Newcombe*, No. 1:24-cv-07477 (S.D.N.Y., complaint filed 2 October 2024), Climate Case Chart, Sabin Center for Climate Change Law.

- Enea v. Former Board Members and DeO Insurers*, filed 2023, *Regional Court in Poznań (Poland)*, *Climate Change Laws of the World – Sabin Center for Climate Change Law, Columbia Law School*.
- Estado Libre Asociado de Puerto Rico v. Exxon Mobil Corp.*, No. 3-CIV-20-060 (P.R. Court of First Instance, filed 2 May 2025; voluntarily dismissed), *Climate Case Chart, Sabin Center for Climate Change Law*.
- Greenpeace Italy et al. v. ENI S.p.A., the Italian Ministry of Economy and Finance and Cassa Depositi e Prestiti S.p.A.*, 2023.
- Greenpeace Luxembourg v. Schneider* (Luxembourg Administrative Court, 17 December 2019), *Climate Case Chart, Sabin Center for Climate Change Law*.
- José Noé Mendoza Bohórquez et al. v. Department of Arauca et al.*, Constitutional Court of Colombia, Sentencia T-123 de 2024, 2024, judgment, *Climate Case Chart, Sabin Center for Climate Change Law*.
- KlimaSeniorinnen v. Switzerland*, European Court of Human Rights (Grand Chamber), Application No. 53600/20, 2024, judgment, *Climate Case Chart, Sabin Center for Climate Change Law*.
- Leghari v. Federation of Pakistan*, Lahore High Court, W.P. No. 25501/2015, 2015, judgment, *Climate Case Chart, Sabin Center for Climate Change Law*.
- McCormick v. HRM Resources, LLC*, 2024, *Climate Case Chart, Sabin Center for Climate Change Law* *McGaughey & Davies v Universities Superannuation Scheme Ltd [2023] EWCA Civ 873 (Court of Appeal)*.
- McVeigh v. Retail Employees Superannuation Trust (REST)*, filed July 2018; settlement reached 2 November 2020, *Climate Case Chart, Sabin Center for Climate Change Law*.
- Notre Affaire à Tous, Sherpa et al. v. TotalEnergies SE*, 2019, *Climate Case Chart, Sabin Center for Climate Change Law*.
- ReCommon, Historic Victory for the Climate: The Joint Divisions of the Court of Cassation Rule in Favour of Greenpeace Italia, ReCommon and Twelve Citizens against ENI*. Press release, 2025.

- R (Finch, on behalf of the Weald Action Group and others) v Surrey County Council and others [2019] CO/4441/2019; [2021] C1/2021/0261, Climate Litigation Database.
- R (Friends of the Earth Ltd, Mr Kevin Jordan and Mr Doug Paulley) v Secretary of State for Environment, Food & Rural Affairs, High Court of Justice (England and Wales), 2023, judgment, Climate Case Chart, Sabin Center for Climate Change Law.
- R (Friends of the Earth Ltd) v Secretary of State for Energy Security and Net Zero; ClientEarth v SSESNZ; Good Law Project v SSESNZ, High Court of Justice (England and Wales), [2024] EWHC 995, 2024, judgment, Climate Case Chart, Sabin Center for Climate Change Law.
- R (on the application of Friends of the Earth) v. Secretary of State for Business, Energy and Industrial Strategy, High Court of Justice (England and Wales), [2022] EWHC 1841, 2022, judgment, Climate Case Chart, Sabin Center for Climate Change Law.*
- United States v. Newcombe (24-cr-567 S.D.N.Y., indictment unsealed 2 October 2024), Climate Case Chart, Sabin Center for Climate Change Law.*
- United States v. Steele, No. 1:24-cr-00572 (S.D.N.Y., information unsealed 2 October 2024), Climate Case Chart, Sabin Center for Climate Change Law.*
- Urgenda Foundation v. State of the Netherlands, District Court of The Hague, 2015, judgment, Climate Case Chart, Sabin Center for Climate Change Law.
- Urgenda Foundation v. The State of the Netherlands, Supreme Court of the Netherlands, No. 19/00135, 2019, final judgment, Climate Case Chart, Sabin Center for Climate Change Law.
- Zero Carbon Analytics, 'Companies face financial risks from growing climate damage litigation' (2025), Zero Carbon Analytics.*

Non-climate-aligned litigations

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SUMMARY: I. ESG backlash cases. II. Strategic litigation against public participation (SLAPP) cases. *II.1. Defining Features and Objectives of SLAPPs. II.2. The Global Dimension and Uneven Impacts. II.3. Impact of SLAPPs. II.4. Countermeasures and Future Perspectives.* III. Just transition. IV. Green cases. Bibliography.

I. ESG backlash cases

Climate litigation can serve as a strategic tool enabling civil society, individuals, and other actors to respond to the inadequacy or omissions of governments and corporations with respect to climate objectives, within the context of multilevel governance. At the same time, both public institutions and private actors may use litigation to obstruct climate efforts, reduce the ambition of proposed measures, or delay their implementation (J. Setzer and C. Higham, 2025, p. 8). In this context, the term ‘climate misaligned litigation’ (CML) is used to refer to a phenomenon encompassing a wide range of legal actions, including challenges to environmental, social, and climate governance (ESG) regulations; strategic lawsuits aimed at limiting public participation and activism (so-called SLAPPs); litigation targeting initiatives for a just transition; and green vs. green cases, in which different environmental objectives come into conflict with one another. In all these situations, while not explicitly denying the urgency of the climate crisis, public institutions and private actors instrumentalize litigation to weaken, directly or indirectly, the climate regulatory framework or to obstruct climate change mitigation and adaptation policies (J. Setzer and C. Higham, 2025, p. 42).

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About 27% of the new climate litigation cases filed in 2024 can be classified as climate misaligned litigation (CML), reflecting legal actions that, rather than advancing climate goals, seek to challenge or impede climate policy and related regulatory frameworks (J. Setzer and C. Higham, 2025, 7 e 10). These are legal actions directed not only at public decision-makers but also at the private sector, which is accused of promoting ESG-oriented approaches. This exposes such actors to a dual pressure: on the one hand, that exerted by public opinion and civil society, which call for increasingly ambitious, transparent, and effective climate and ESG commitments; on the other hand, pressure from opponents of these initiatives, who seek to downscale the centrality of the environmental and climate objectives that inspire them. The latter often act on the basis of ideological motivations, but are also supported by legal arguments invoking alleged violations of fiduciary duties, economic freedom, or the purported illegitimacy of corporate strategies oriented toward non-financial objectives (A. I. Saad, 2024, 430-434). The growing spread of this phenomenon at the international level risks undermining the achievement of the climate commitments undertaken by States, in a context already marked by strong political tensions and increasing polarization of public opinion. Several recent examples confirm this trend, including on the regulatory front.

For example, at the time of writing, a legislative proposal is under discussion in Australia that would introduce a three-year transitional period during which companies would be exempt from civil actions relating to the content of sustainability reports, including climate analyses, Scope 3 emissions, and transition plans. During this phase, the initiation of proceedings — including criminal ones — would be reserved exclusively to the competent supervisory authorities. While the government justifies this measure as a tool to facilitate a gradual adjustment to the new mandatory disclosure regime, civil society has raised strong criticisms, fearing a weakening of transparency and corporate accountability, particularly with regard to major emitters (Australian Parliament House, 2024). Signs of regression are also emerging in Europe on the ESG regulatory front. At the beginning of 2025, the European Commission adopted the Omnibus Package to reduce regulatory burdens related to sustainability, in response to growing political pressure on EU climate and energy policies. Three key instruments of the European regulatory framework— Corporate Sustainability Reporting Directive (CSRD) and Corporate Sustainability Due Diligence Directive (CSDDD), and the Green Taxonomy — have been significantly reformed. The CSRD has been postponed by two years for large non-listed companies and has undergone a general easing of reporting requirements. The reform of the CSDDD has removed the obliga-

tion to adopt a climate transition plan aligned with the Paris Agreement, and its scope has been narrowed by excluding indirect business relationships from the due diligence framework. Finally, the EU Taxonomy, originally based on scientific criteria, has been amended to include fossil gas and nuclear energy among ‘transitional’ activities, prompting criticism from the scientific and environmental communities (A. Bertrand, 2025, p. 70 ss.).

On the climate litigation front, the United States remains the most prolific jurisdiction for ESG backlash cases, with private-sector and financial actors frequently targeted by lawsuits challenging the legitimacy of ESG strategies and measures (A. Hermes, 2025, 2). Such actions are grounded in a combination of political positioning and alleged violations of fiduciary duties, antitrust rules, or consumer protection laws, with the aim of obstructing or delegitimizing the integration of ESG criteria into investment decision-making processes (C. De Meulemeester, 2025). However, the outcome of these proceedings remains uncertain, as it is difficult to identify a coherent judicial trend in this area. In parallel, several U.S. states have enacted or proposed anti-ESG legislation aimed at discouraging sustainability-oriented investments (J. Setzer and C. Higham, 2025, 44).

A relevant example is *Wong v. NYC Employees’ Retirement System*, in which a group of public employees challenged the pension fund’s investment decisions, arguing that the allocation of resources to ESG-themed funds violated the fiduciary duties of loyalty and prudence set out in the Employee Retirement Income Security Act (ERISA). According to the claimants, the pursuit of non-financial objectives — such as environmental or social goals — could have compromised the fund’s financial performance and, consequently, the rights of its beneficiaries (*Wong v. New York City Employees’ Retirement System*, 2023). On appeal, the U.S. courts upheld the dismissal of the claim, noting that, as the plan was a defined benefit scheme, the claimants’ benefits were guaranteed regardless of investment performance, and that therefore no concrete harm had occurred. Accordingly, in the absence of a tangible injury, the court found the action inadmissible for lack of standing. The judges also characterized the claimants’ arguments as purely speculative, emphasizing the absence of evidence of a credible risk to the fund’s solvency or to the city’s ability to meet its financial obligations (T. Nchako and L. Benjamin, 2025, 280).

Unlike the *Wong* case, which challenged ESG investments by public pension funds, several more recent disputes have concerned the legality and applicability of state-level anti-ESG regulations, often with outcomes adverse to investors and actors supportive of integrating climate risks into financial decision-making processes. For example, in *SIFMA v. Ashcroft*, a federal court struck down two

Missouri regulations requiring financial advisers to inform clients and obtain their consent before incorporating environmental or social objectives into investment recommendations. The court found these provisions to be in violation of the First Amendment, excessively vague, and in conflict with federal legislation such as ERISA and the National Securities Markets Improvement Act (NSMIA), which ensure consistency in pension fund governance and financial market regulation. A similar outcome occurred in *Keenan v. Oklahoma*, where a former state employee challenged a law conditioning access to public contracts on companies certifying that they did not boycott the fossil fuel industry. The court declared the law unconstitutional for vagueness and for violating freedom of expression, also noting that it conflicted with the fiduciary principle requiring public funds to be managed exclusively in the interest of beneficiaries. In contrast to these decisions, *Spence v. American Airlines* — currently pending before a federal court in Texas — may lead to a different outcome. In this case, an employee accused a corporate pension fund of breaching the fiduciary duties established under ERISA by investing in ESG-oriented funds, which were deemed non-financial in nature. The claimant argued that certain managers prioritized sustainable strategies at the expense of maximizing returns. Although no concrete evidence of loss or underperformance was provided, the judge denied the motion to dismiss, citing unresolved substantive issues, including the alleged lack of oversight by the company over the exercise of proxy voting by asset managers on ESG-related matters. Unlike *Wong*, where the absence of a concrete injury led to the dismissal of the claim, *Spence* could become the first case in which a federal court rules on the merits of a potential conflict between fiduciary duties and the integration of ESG criteria in corporate pension plans, with potentially restrictive implications for sustainable investment practices (C. Campo and C. Hanawalt, 2024).

At the same time, the State of Texas has initiated a separate legal action, leading a coalition of eleven states against three major institutional investors, accused of violating federal antitrust laws. According to the complaint, the defendants allegedly acted in a coordinated manner to induce portfolio companies to reduce coal production, through instruments such as proxy voting and participation in collective initiatives such as the Net Zero Asset Managers Initiative and Climate Action 100+. The lawsuit refers, *inter alia*, to Section 1 of the Sherman Act and Section 7 of the Clayton Act, and includes allegations of deceptive practices, as well as requests for injunctive relief, monetary damages, and structural remedies aimed at limiting investors' influence over the energy market. These developments reflect an increasingly complex legal landscape for

companies that integrate ESG criteria, which are exposed to litigation both for having adopted such strategies and for having failed to implement them in a manner deemed adequate. One example is the complaint brought by ClientEarth v. BlackRock, which was accused of partially retreating from its ESG commitments (Texas v. BlackRock, Inc., 2024).

In *Nebraska v. Daimler Truck North America*, seventeen Republican state attorneys general brought an action against major manufacturers of heavy-duty vehicles, accusing them of having coordinated with the California Air Resources Board (CARB) a voluntary agreement for the gradual phase-out of diesel engines, formalized in 2023 through the Clean Truck Partnership. The claimants argue that this agreement constitutes an unlawful restraint of the market, with extraterritorial effects such as increased prices and reduced consumer choice (*Nebraska v. Daimler Truck North America*, 2024). At the same time, growing opposition to ESG policies has also given rise to a reactive form of climate litigation, in which organizations and companies supportive of sustainable investment challenge state-level anti-ESG laws. A significant example is *American Sustainable Business Council v. Hegar*, brought in 2024 against a 2021 Texas law that prohibits public entities from investing in or contracting with companies accused of ‘boycotting’ the fossil fuel industry. According to the claimants, the statute has resulted in the creation of a blacklist of financial institutions based on their participation in climate initiatives, such as the Net Zero Asset Managers Initiative, with removal from the list conditioned on withdrawal from those commitments (*American Sustainable Business Council v. Hegar*, 2024). These actions do not seek to introduce new climate obligations, but rather to defend existing ESG regulatory frameworks from attempts at dismantling them. Reactive climate litigation is therefore likely to play an increasingly significant role in response to deregulatory initiatives, contributing to the consolidation of a fragmented and increasingly conflictual regulatory environment for corporate sustainability (J. Setzer and C. Higham, 2025, 44).

II. Strategic litigation against public participation (SLAPP) cases

In recent years, alongside legal actions aimed at prompting stronger commitments to addressing climate change, an opposite trend has emerged in the form of judicial initiatives designed to obstruct public participation and to discourage dissent. So-called Strategic Lawsuits Against Public Participation (SLAPPs) constitute a category of litigation pursued for intimidatory purposes.

es rather than to obtain effective legal remedies. Such actions are intended to target activists, journalists, civil society organizations, scientists, or local communities who expose environmental violations, inadequate climate policies, or corporate practices harmful to the environment.

Originally emerging in the United States in the 1980s within the context of environmental and land-use disputes, SLAPPs are now widely recognized as a growing threat to freedom of expression and democratic participation, particularly in the fields of ecological transition and climate justice (European Center for Not-for-Profit Law, 2023). They typically take the form of defamation claims, allegations of trade secret violations, reputational damage, or interference with economic activities; however, their underlying purpose is to silence dissent and to impose significant economic and psychological costs on those who exercise their right to free expression or engage in public-interest advocacy.

In the climate context, SLAPPs assume particular relevance: they are used to counter or slow down collective climate action by defending entrenched economic interests linked to fossil fuels, extractivism, or land speculation. The actors targeted by such actions are often environmental organizations, researchers, or journalists who document the environmental impacts of large-scale infrastructure projects, energy developments, or harmful corporate practices. According to reports by the Grantham Research Institute on Climate Change and the Environment (Setzer and Higham, 2024; 2025), these cases fall within the category of non-aligned litigation, namely disputes that do not support climate action but instead directly or indirectly obstruct it.

In Europe, the phenomenon has gained increasing visibility. The European Union Agency for Fundamental Rights (FRA, 2022) and the European Commission have acknowledged the growing prevalence of SLAPPs targeting actors engaged in environmental protection and the energy transition. In response, the European Commission proposed, in 2022, an EU Anti-SLAPP Directive (COM/2022/177), aimed at ensuring procedural safeguards against abusive litigation and at strengthening the protection of freedom of expression. The debate surrounding the need for a common regulatory instrument has underscored the close connection between the defense of the climate and the defense of participatory democracy.

As also observed by the United Nations in the Policy Brief on SLAPPs and Environmental Defenders (United Nations Environment Programme and Office of the United Nations High Commissioner for Human Rights, 2023), such practices form part of a broader pattern of criminalization of environmental defense, which disproportionately affects local communities and land and envi-

ronmental defenders in the Global South. In these contexts, judicial actions are often accompanied by threats, smear campaigns, or physical violence, constituting a systemic risk to the safety of climate activists and to the very possibility of fostering an informed public debate.

From this perspective, SLAPPs fully fall within the category of non-climate-aligned litigation: not only do they fail to contribute to mitigation efforts, but they also constrict the civic space necessary for the effective implementation of climate policies. They therefore represent a form of legal resistance to change, reflecting the tension between entrenched economic interests and the growing demand for environmental accountability.

II.1. Defining Features and Objectives of SLAPPs

SLAPPs are distinguished from other forms of litigation by their eminently instrumental function. Their primary objective is not to prevail on the merits, but to intimidate and deter those who participate in public debate or expose practices harmful to the environment and the climate. The common feature of such actions is the use of law in a deterrent and punitive manner, through the threat of lengthy and costly judicial proceedings. The initiators of SLAPPs — most often corporations, energy lobbies, or institutional actors — exploit the legal system to produce a ‘chilling effect’ on freedom of expression and civic participation (United Nations Environment Programme and Office of the United Nations High Commissioner for Human Rights, 2023).

The most recurrent forms include:

- defamation actions brought against journalists or activists who expose corporate practices harmful to the climate;
- claims alleging violations of trade secrets or interference with economic activities, used against NGOs challenging projects with high environmental impact;
- charges of incitement to hatred or public disorder, strategically directed against demonstrations or awareness-raising campaigns.

Within the field of climate justice, such actions are often linked to territorial disputes, including the construction of fossil fuel facilities, deforestation, or the management of water resources. In these contexts, SLAPPs operate as instruments that legitimize economic power, reinforcing asymmetries between large private actors and local communities (European Center for Not-for-Profit Law, 2023).

II.2. The Global Dimension and Uneven Impacts

SLAPPs are not confined to a single legal context, but display a transnational spread. In the United States and Canada — where the legal category originally emerged — some jurisdictions have adopted specific countermeasures. Notably, several U.S. states have enacted anti-SLAPP legislation, such as the California Anti-SLAPP Act (Cal. Civ. Proc. Code §425.16), which empowers courts to dismiss unfounded claims at an early stage and to impose sanctions on abusive claimants.

In Europe, the situation remains more fragmented. In the absence of harmonized legislation, the protection of environmental defenders varies significantly from one country to another. The European Union's 2022 proposal for an Anti-SLAPP Directive (COM/2022/177) seeks to introduce uniform safeguards against abusive civil litigation, including early dismissal mechanisms and compensation measures for defendants. Some member states, such as France and Ireland, have already adopted domestic reforms in this direction, while in others — including Italy and Poland — the debate remains open (FRA, 2022).

In the Global South, SLAPPs are often intertwined with broader patterns of judicial repression and the criminalization of environmental defenders. According to a 2023 report by Global Witness, more than 170 activists advocating for climate and territorial justice were killed or subjected to criminal prosecution in 2022, many of them following unfounded legal actions initiated by mining, forestry, or agribusiness corporations. In such contexts, the judicial system is frequently instrumentalized as a means of political control and of neutralizing social movements, thereby undermining the democratic foundations of climate governance.

II.3. Impact of SLAPPs

SLAPPs produce profound consequences for democratic governance. By restricting freedom of expression and association, they erode the civic space necessary for the development of inclusive and participatory climate policies. As noted by the UN Special Rapporteur on Environmental Defenders (2023), the most insidious effect of such lawsuits is the normalization of fear: even when claims are dismissed, the economic and psychological costs borne by defendants generate a chilling effect of self-censorship that weakens public oversight of environmental decision-making.

From this perspective, the link between SLAPPs and non-climate-aligned litigation becomes evident. While ‘aligned’ cases seek to enhance the accountability of states and corporations with respect to climate objectives, SLAPPs function to preserve the status quo by shielding polluting economic models and entrenched power relations. In essence, they constitute a form of regressive litigation, one that instrumentalizes law as a barrier to change.

Their impact on climate governance is twofold: on the one hand, they slow the adoption of mitigation and adaptation measures; on the other, they undermine trust in justice as a tool for collective protection. Recent scholarship emphasizes the need to integrate the fight against SLAPPs into just transition strategies, recognizing environmental defense as an integral component of human rights protection (Savaresi and Setzer, 2020; Setzer and Higham, 2025).

II.4. Countermeasures and Future Perspectives

The recognition of the abusive nature of SLAPPs has, in recent years, fostered the emergence of legal and institutional tools aimed at curbing their spread. At the international level, the United Nations has adopted a human rights due diligence approach, calling on states to ensure the effective protection of environmental defenders and to prevent the misuse of civil or criminal law as a means of intimidation (United Nations Environment Programme & Office of the United Nations High Commissioner for Human Rights, 2023).

The UN Special Rapporteur on Environmental Defenders has emphasized that freedom of participation in environmental decision-making processes constitutes an essential condition for the implementation of the Paris Agreement and for the realization of climate justice (United Nations, 2023).

As anticipated, at the regional level the European Union has initiated a legislative process aimed at providing Member States with harmonized anti-SLAPP legislation, ensuring protection against abusive lawsuits, the right to compensation, and the possibility for courts to dismiss manifestly unfounded claims at an early stage. The EU Anti-SLAPP Directive, proposed in 2022 (COM/2022/177) and approved by the European Parliament in 2024, introduces procedural safeguards and recognizes journalistic, research, and environmental advocacy activities as forms of public participation.

In parallel, several independent research centers and civil rights organizations have developed monitoring mechanisms and legal assistance frameworks for individuals targeted by SLAPPs. The Coalition Against SLAPPs in Europe

(CASE), the European Center for Not-for-Profit Law (ECNL), and Greenpeace International promote awareness-raising initiatives and data collection efforts aimed at highlighting the correlation between SLAPPs and regressive environmental litigation (ECNL, 2023).

At the theoretical level, recent scholarship interprets SLAPPs as a form of anti-strategic litigation, namely an inverse strategic use of law aimed not at producing justice but at neutralizing accountability processes. In this sense, SLAPPs constitute a genuine form of ‘counter-climate jurisprudence’, operating against the collective interest and the protection of the commons (Gill and Curtin, 2022).

Looking ahead, the challenge will be twofold: on the one hand, to consolidate the legal protection of environmental defenders; on the other, to recognize public participation as a constitutive element of climate action. Countering SLAPPs ultimately means reaffirming the democratic principle within climate governance. Only by safeguarding a free, pluralistic, and well-informed civic space will it be possible to develop climate policies that are truly effective and just.

III. Just transition cases

The approach based on the so-called just transition seeks to ensure that the shift toward a low-emission economy takes place in a fair, inclusive, and socially sustainable manner. It forms part of a broader vision of sustainability, in which the fight against climate change cannot be separated from social justice. This means that, in the rapid and necessary transition from a fossil fuel-based economy to a low-carbon one, climate policies and objectives must be designed with due regard for equity, rights, and protective measures for those who risk suffering negative consequences, such as job losses or increased inequalities (Müllerová H. et al., 2025, 275 – 278).

To make the energy transition truly just, it is essential that policymakers, institutions, businesses, and civil society work together, actively addressing social and economic inequalities. Shifting to renewable energy alone is not sufficient; it is also necessary to ensure that the benefits of this transformation are distributed in an equitable manner (M. Graff, 2024, 300).

Among the key priorities is the need to support those who risk being adversely affected by decarbonization processes and to create new opportunities for those who have so far remained at the margins of the energy system. It is equally important to assist the most vulnerable households in managing energy costs, both through energy-efficiency measures and by facilitating access to clean tech-

nologies that are often prohibitively expensive, via public programs and targeted initiatives aimed at bridging gaps in resources and capacities. Moreover, a just transition cannot dispense with the active participation of communities, which must be ensured through timely, inclusive, and adequate information and engagement processes. Finally, the role of the private sector is crucial—not only from a technological perspective but also from a social one—through shared pathways of energy innovation. Only in this way can the transition truly be considered sustainable, not only environmentally, but also in human terms (Sanya C., Konisky D. M., 2020, 569-577).

For example, at the regulatory and policy level, the European Union has established a Just Transition Framework to address the social impacts of the climate transition, complementing energy and environmental objectives with specific instruments such as the Just Transition Fund, which supports regions most dependent on fossil fuels, and the Social Climate Fund, designed to help vulnerable households and micro-enterprises cope with the costs of the transition and improve energy efficiency (Kyriazi A. et al, 2025, 146).

In the context of climate litigation, the term just transition litigation refers to litigation that does not oppose climate objectives, but rather calls for their fairer and more equitable implementation, demanding that laws, policies, and projects take into account the rights and interests of communities adversely affected by the transition. This type of legal action highlights inequalities in the distribution of the benefits and costs of the transition — particularly the energy transition — as well as disparities in participation in decision-making processes, providing voice and protection to actors often excluded from institutional mechanisms (Savaresi A. et al., 2024, 1379 – 84).

Most just transition litigation cases concern the social impacts of emissions mitigation measures, particularly in strategic sectors such as renewable energy, or the repercussions on the enjoyment of human rights by communities directly affected by specific projects or programmes, especially in the Global South. This is the case, for example, for Indigenous peoples and the high environmental and social impacts associated with the development of low-emission technologies, such as the extraction and processing of critical minerals (Giupponi B. O., 2023, 383 -84). Other cases, by contrast, focus on the dimension of distributive justice, highlighting an inequitable allocation of the costs and benefits of the climate transition, which tends to fall disproportionately on already vulnerable social groups (Bright C., Buhmann K., 2021, 3).

It is useful to recall the creation, in 2024, of the Just Transition Litigation Tracking Tool by the Business & Human Rights Resource Centre, which has alre-

ady identified 95 cases worldwide. These are proceedings brought by Indigenous peoples, local communities, and workers, concerning mineral extraction projects for the transition and renewable energy facilities. The main alleged violations relate to environmental degradation, impacts on access to water, and the failure to protect the rights of Indigenous peoples, in particular the right to free, prior, and informed consent (Business & Human Rights Resource Centre, 2025). Such cases represent a clear warning signal for companies and investors: ignoring social safeguards in an effort to accelerate the deployment of transition infrastructure can give rise to lengthy and costly litigation, ultimately undermining the very objectives of a fair transition toward a carbon-neutral and resilient society.

At the same time, these disputes offer valuable guidance for policymakers, helping to shape transition policies that are more just, participatory, and sustainable (J. Setzer and C. Higham, 2025, 45).

IV. Green vs Green cases

The expression ‘Green vs. green’ refers to disputes characterized by a conflict between different environmental objectives, in which, on the one hand, the need to take climate goals into account is relevant, and, on the other hand, other equally important environmental or related objectives come into play. One may think, for example, of legal action aimed at protecting an animal species or the natural resources of a specific area, or at enforcing compliance with procedural guarantees in environmental impact assessment, in relation to projects such as the construction of a dam or the installation of solar panels (J. Setzer and C. Higham, 2024, 43). Such initiatives, although instrumental to the production of clean energy and the reduction of greenhouse gas emissions — in line with the commitments undertaken under the Paris Agreement — may nevertheless generate negative impacts at the local level. Consequently, this type of litigation, as well as the so-called ‘just transition’ cases, is characterized by the complexities associated with the design of climate action, unlike ESG backlash cases and SLAPPs, which are instead distinguished by their nature as expressions of direct and reactive opposition to climate efforts (A. Triponel, 2024).

In any event, although a reconciliation between different environmental priorities is always possible (M. C. Cordonier Segger et al, 2021, 196, 168 – 169), in the absence of adequate safeguards or effective integration mechanisms such initiatives risk producing localized forms of environmental degradation or interfering with the rights of local communities and vulnerable groups, such as

Indigenous peoples. Moreover, increasing investments in sectors strategic for reducing global greenhouse gas emissions—such as renewable energy or LU-LUCF—as well as in infrastructure aimed at strengthening adaptive capacity to the impacts of climate change, may further reinforce this trend in the future.

A relatively recent and paradigmatic case is undoubtedly *M. K. Ranjitsinh and Others v. Union of India and Others*, decided by the Supreme Court in March 2024 (*M. K. Ranjitsinh and Ors v Union of India and Ors*, 2024). The dispute marked a key moment in the country's environmental jurisprudence, addressing the difficult balance between biodiversity protection and the energy transition. The petition sought to protect two critically endangered ground-dwelling birds — the Great Indian Bustard (GIB) and the Lesser Florican — threatened by overhead power transmission lines crossing their habitats in Rajasthan and Gujarat. On that occasion, the Court recognized for the first time, within the scope of Article 21 of the Constitution, a fundamental right to be free from the adverse effects of climate change, linking it to the ecological duties of the State (Article 48A) and of citizens (Article 51A(g)). In light of this approach, the final order of 21 March 2024 modified the 2021 ruling by striking a balance between ecological protection and energy sustainability. The obligation to underground power lines was in fact limited to priority GIB habitat areas, covering approximately 13,163 square kilometres, and made subject to a technical feasibility assessment entrusted to an expanded committee of experts. In potential habitat areas, by contrast, the restrictions were relaxed, allowing the use of overhead lines provided that mitigation measures—such as bird diverters—were adopted. In this way, the Court moved beyond the rigid approach of its earlier decision, favouring a more flexible model that enables the State to pursue conservation and development objectives in a balanced manner (A. Kumar, 2025, 147 – 53). While, on the one hand, the decision deserves recognition for the importance it assigns to the 'constitutionalization' of climate rights and to the integration of technical expertise into environmental governance, on the other hand serious concerns emerge (J. Setzer e C. Higham, 2025, 46). These include uncertainty regarding the effective enforceability of the newly recognized right, given the weakness of its implementation mechanisms; the marginalization of ecological science in decision-making processes; and the risks associated with the rapid expansion of renewable energy infrastructure. The latter often occurs without adequate environmental assessments, resulting in negative impacts on rural communities and local ecosystems (J. Gupta, 2025). Furthermore, in *Declic and Bankwatch Romania v. the Răstolița Hydropower Project*, two environmental NGOs challenged before the

Cluj Administrative Court the authorization issued by the national authorities for the construction of the Răstolița hydropower plant. They contested the absence of a comprehensive environmental impact assessment, the inadequacy of the consultation process, and the failure to take into account issues relating to biodiversity and climate change adaptation, in breach of national and EU environmental law (Bankwatch Romania, 2025). Such aspects could and should have been integrated into the project's planning process (G. Deák et al., 2024). In particular, the project is located within a protected natural area and could accelerate deforestation in the region, yielding mitigation benefits that are clearly outweighed by the potential risks to the watercourses affected by the project. Following an initial first-instance decision allowing the continuation of the works, the Cluj-Napoca Court of Appeal upheld the appeal, annulled the previous ruling, and temporarily suspended the authorizations required for the completion of the plant, in light of the identified procedural shortcomings and environmental risks, notwithstanding the advanced stage of the works (*Declic and Bankwatch Romania v. Răstolița Hydropower Project*, 2025).

Another relevant aspect in the context of green vs. green litigation is the potential conflict between initiatives aimed at achieving climate objectives and their possible negative effects on marine biodiversity. A paradigmatic example is the case *Green Oceans v. U.S. Department of the Interior* in the United States (A. Severance, 2021, 211). In this case, several environmental organizations brought an action against the federal government to challenge the approvals issued by the Bureau of Ocean Energy Management (BOEM), the agency of the Department of the Interior responsible for managing offshore energy resources, in relation to two offshore wind projects off the coast of Rhode Island: the South Fork Wind Project and the Revolution Wind Project. The applicants raised a complex set of claims based on various federal statutes, including the National Environmental Policy Act, the Endangered Species Act, the Marine Mammal Protection Act, the Clean Water Act, and the National Historic Preservation Act, arguing that BOEM failed to adequately assess the environmental and climate impacts of the projects, to consider design or siting alternatives, or to carry out a genuine cumulative analysis of their effects on the climate and the marine ecosystem. In particular, the challenges focused on the marginalization of certain climate-related aspects, such as the way in which rising ocean temperatures may interact with and exacerbate ecological risks, highlighting the complexity and multidimensional nature of environmental arguments that often elude conventional legal categories (D. Jung, 2023, 73 – 74). The applicants further alleged deficiencies in consultation procedures, in the protection

of vulnerable species, and in the transparency of environmental assessments. In the course of the first-instance proceedings, the federal court dismissed two motions seeking to stay and enjoin the project approvals, finding that standing had not been established with respect to certain claims, but subsequently partially granted the motion to dismiss filed by the intervening company, Revolution Wind, allowing the more substantiated challenges—particularly those relating to environmental law violations—to proceed on the merits, while excluding claims based on other specific statutes for lack of standing or for procedural or substantive defects (*Green Oceans v. U.S. Department of the Interior*, 2024).

In another case in 2024, the Sierra Club and other environmental organizations brought an action before the California Superior Court against the Department of Water Resources (DWR), challenging the approval of the Delta Conveyance Project, an infrastructure project designed to divert large volumes of freshwater from the Sacramento River, in the northern Delta, to pumping facilities located in the south through an underground tunnel approximately 45 miles long. The project, conceived as a response to the anticipated effects of climate change — including sea-level rise and an increase in extreme weather events — was alleged to violate the California Environmental Quality Act (CEQA), the Delta Reform Act, and Fish and Game Code §3511. The applicants argued that the environmental impact report (EIR) was deficient, as it failed to consider genuinely feasible alternatives consistent with state environmental law and did not adequately assess the cumulative impacts of the project in a climate change context, particularly with regard to water availability, water quality, public health, and the conservation of protected fish species. In particular, they denounced the insufficient analysis of the interactions between worsening climate impacts and water diversion operations, which could exacerbate phenomena such as harmful algal blooms and compromise the Bay–Delta ecosystem (*Sierra Club v. California Department of Water Resources*, 2024).

The phenomenon of ‘green vs. green’ litigation is not confined to challenges brought by NGOs and other actors against projects deemed harmful to other ecological components or environmental objectives. Increasingly, it is the promoters of energy transition initiatives themselves who challenge governmental decisions that, on environmental grounds, hinder or prevent the implementation of such projects. A significant example comes from the case *Seadragon Offshore Wind Pty Ltd v. Minister for Climate Change and Energy*, launched in Australia in 2024, in which the company developing the first offshore wind farm off the coast of Victoria challenged the ministerial refusal to grant a feasibility licence. The refusal was based on a range of environmental concerns,

including impacts on threatened species, terrestrial, marine and riverine ecosystems, Aboriginal cultural heritage values, and the landscape. According to the applicant, however, the decision failed to take into account the public interest in decarbonization and applied excessively restrictive criteria in assessing risks to marine biodiversity, thereby undermining the balance between environmental protection and climate objectives (*Seadragon Offshore Wind Pty Ltd v. Minister for Climate Change and Energy*, 2024). In conclusion, the cases examined show that decarbonization strategies and climate-related decisions, while essential, must be accompanied by adequate safeguards and a balanced consideration of the various interests involved, including environmental and social concerns, human rights, and climate justice at the global level.

Bibliography

- Bankwatch Romania, 'Răstolița: major destruction for minimal energy' (2025) Bankwatch Stories
- Bertrand A., 'Deregulating to no avail: how the omnibus package falls short in simplifying key EU Green Deal instruments' (2025) 60(3) *Intereconomics*
- Bright C., Buhmann K., 'Risk-based due diligence, climate change, human rights and the just transition' (2021) *Sustainability*
- Campo C., Hanawalt C., 'The anti-ESG movement has not fared well in court, but critical decisions are pending' *Climate Law Blog* (Sabin Center for Climate Change Law, 2024).
- Cordonier Segger M. C. et al, 'The international law and policy implications of climate change litigation: sustainable developments in international investment law and policy related to renewable energy, climate change mitigation and adaptation' (2021) in Kahl W. and Weller M. P. (eds), *Climate Change Litigation: A Handbook* (Bloomsbury)
- De Meulemeester C., 'ESG backlash builds momentum for anti-climate lawsuits' *Sustainable Views* (2025)
- Deák G. et al, 'Mitigation measures for the impact of hydrotechnical works in Răstolița River, Romania on Hucho hucho species' (2024) 589 *E3S Web of Conferences*

- Gill B., Curtin D., *Litigating the Climate Crisis: Responsibility, Law and the Future* (Edward Elgar 2022)
- Giupponi B. O., 'Just transition in the global south: alternative approaches from Latin America' (2023) 39 (3 - 4) *International Journal of Comparative Labour Law and Industrial Relations*
- Graff M., 'Just energy transition' (2024) in Fiorino D. J. et al(eds), *Elgar Encyclopedia of Climate Policy* (Edward Elgar Publishing Limited)
- Gupta J., 'Climate judgement reveals nuanced interplay between biodiversity and renewable energy' (2024) *Mongabay India*, 30 April
- Hermes A., 'The anti-ESG backlash and asset manager capitalism' (2025) *Politics & Society*
- Jung D., 'Protection of the marine environment from offshore renewable energy operations' (2023) in Jung D., *The 1982 Law of the Sea Convention and the Regulation of Offshore Renewable Energy Activities within National Jurisdiction* (Nijhoff)
- Kumar A., 'M K Ranjitsinh and others v Union of India and others' (2025) 119(1)
- Kyriazi A. et al, *Social policy and EU polity-building through crises and beyond* (2025) (Routledge)
- M K Ranjitsinh and others v Union of India and others (Supreme Court of India, 21 March 2024) (Climate Case Chart, Climate Change Laws of the World)*
- Müllerová H. et al, 'Building the concept of just transition in law: reflections on its conceptual framing, structure and content' (2023) 53(4) *Environmental Policy and Law*
- Nchako T., Benjamin L., 'ESG backlash in the United States—investor concerns or Red Scare?' (2025) 268(5) *Journal of Law and Political Economy*
- Saad A. I., 'ESG litigation and the political economy of corporate governance' (2024) 43(3) *The Review of Litigation*
- Sanya C., Konisky D. M., 'The justice and equity implications of the clean energy transition' (2020) 5(8) *Nature Energy*

- Savaresi A. et al., 'Conceptualizing just transition litigation' (2024) 11(7) Nature Sustainability
- Savaresi A., Setzer J., 'Human rights in climate litigation' (2020) 45 Current Opinion in Environmental Sustainability
- Setzer J., Higham C., *Global Trends in Climate Change Litigation: 2024 Snapshot*. London: Grantham Research Institute on Climate Change and the Environment, LSE (2024)
- Setzer J., Higham C., *Global Trends in Climate Change Litigation: 2025 Snapshot*. London: Grantham Research Institute on Climate Change and the Environment, LSE (2025)
- Severance A., 'Offshore wind licensing in the United States of America' (2024) in Anchustegui I. H. and Hunter T. S. (eds), *Offshore Wind Licensing* (Edward Elgar)
- Triponel A., 'Global trends in climate change litigation' (2024) Human Level

Cases and other sources

- American Sustainable Business Council v Hegar* (US District Court for the Western District of Texas) (Climate Case Chart, Sabin Center for Climate Change Law)
- Australian Parliament House, Bills Digest No 68: Treasury Laws Amendment (Financial Market Infrastructure and Other Measures) Bill 2024 (Parliament of Australia, 14 May 2024)
- Business & Human Rights Resource Centre, 'Just Transition Litigation Tracking Tool'* (2025)
- Declic and Bankwatch Romania v Răstolița Hydropower Project* (No 6709/117/2024, Cluj Administrative Court, decided 4 June 2025) (Climate Case Chart, Sabin Center for Climate Change Law)
- European Center for Not-for-Profit Law, *Protecting the Watchdogs: Addressing SLAPPs in Europe* (2023) (ECNL)
- European Commission, *Proposal for a Directive of the European Parliament and of the Council on protecting persons who engage in public participa-*

- tion from manifestly unfounded or abusive court proceedings (SLAPPs) (2022) COM(2022) 177 final
- European Union Agency for Fundamental Rights, Protecting civic space and human rights defenders in Europe (2022) (FRA)
- Global Witness, Standing Firm: The Land and Environmental Defenders Annual Report 2023 (2023) (Global Witness)
- Green Oceans v U.S. Department of the Interior (No 1:24-cv-00141, DDC, filed 16 January 2024) (Climate Case Chart, Sabin Center for Climate Change Law)*
- Nebraska v Daimler Truck North America (No 24-CV-400, D Neb, filed 10 June 2024) (Climate Change Litigation Database, Sabin Center for Climate Change Law)*
- Seadragon Offshore Wind Pty Ltd v Minister for Climate Change and Energy (No —, Federal Court of Australia, filed 22 August 2024)*
- Sierra Club v California Department of Water Resources (No 24WM000008, California Superior Court, decided 19 January 2024)*
- Texas v BlackRock, Inc (No 6:24-cv-00437, ED Tex, filed 27 November 2024) (Climate Change Litigation Database, Sabin Center for Climate Change Law)*
- United Nations Environment Programme and Office of the High Commissioner for Human Rights, Policy Brief on SLAPPs and Environmental Defenders (2023) (UNEP and OHCHR)
- United Nations, ‘*Report of the Special Rapporteur on Environmental Defenders under the Aarhus Convention*’. Geneva: UN Economic Commission for Europe (2023)
- Wong v New York City Employees’ Retirement System (n 652297/2023) (Climate Change Litigation Database, Sabin Center for Climate Change Law)*

Emerging legal issues

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SUMMARY: I. Introduction. II. Separation of Powers. II.1. Traditional view: no positive obligations. II.2. Current trend: positive obligations do exist. II.3. On the legitimacy of imposing minimum objectives on legislators. III. Notions of “causality” and imputation of “responsibility”. IV. Legal standing. V. New subjects of rights. V.1. Future generations. V.2. Nature - ecosystems. V.3. Animals

I. Introduction

The emergence of environmental and climate law governance, resulting from the progressive and increasingly intense commitment of international organizations and national authorities to address the environmental crisis and climate change, has not only required a profound transformation of the economic system and energy sources to reduce greenhouse gas emissions, as well as a social shift in consumption patterns to reduce the production and purchase of material goods. It has also prompted a radical re-adaptation of the most established legal models and categories of contemporary law, especially those of Western origin. Indeed, the challenge posed by protecting the environment and climate from human activities that compromise ecosystems and alter the planet’s ecological balance cannot be addressed with traditional public law tools, as it must address entirely new and original legal issues that also require the search for new regulatory and case-law solutions.

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There are two reasons we can find behind this evolution of environmental and climate law. First, the need to ensure the effective legal protection of environmental and climate assets is clearly evident, which cannot be entrusted to outdated legal models, incapable of preventing irreversible environmental damage from human action. Second, protection must be extended to new situations, using certain legal categories beyond their ordinary scope, thus enhancing their potential for application.

From this perspective, then, at least four emerging legal themes can be identified: a) rethinking the theory of the separation of powers, in light of the existence of international legal obligations that bind state legislatures and lay the foundation for controversial judicial review, also recognizing that the climate emergency poses itself as an “external limit” to power; b) clarifying the procedures for determining liability for damage caused by climate change; c) defining the conditions for standing before international and national courts, thus broadening the scope for litigation; d) recognizing the rights of animals or other natural elements, to further bind state policies to respect for nature.

It should be noted that the solutions proposed on these issues depend on the dialectic that has developed between legislators and judges, with a growing role in integrating climate law by national and international jurisdictions. Through climate litigation, a phenomenon of judicial review over delays, omissions, or violations of international obligations, as well as constitutional ones, by national legislators has begun, favoring the emergence of new forms of political accountability that go beyond the legal models prevalent in national legal systems (Zirulia, Sandrini, Pitea, 2024).

II. Separation of Powers

A recurring point of controversy in climate litigation revolves around the principle of separation of powers, more specifically, between the legislative and executive powers (hereinafter, the ‘legislators’) with the authority to create law and the judicial power, with the authority only to apply the law. All parties agree that legislators, like other state institutions and individuals, are subject to the law and, therefore, that their activities are subject to review by the courts. On the other hand, the courts should not engage in political decision-making, which is the responsibility of legislators. Thus, if the matter brought before the court is deemed to fall within the realm of political discretion, the court shall declare itself incompetent to know it. Therefore,

the controversy lies in defining the scope of the courts' power to control the activity of legislators, what depends on how the relationship between law and politics is understood (Niehaus, 2023).

In the field of climate litigation, the cause of this point of controversy stems from the future, albeit foreseeable, failure to meet the GHG emission reduction targets required to sufficiently mitigate and/or adapt to climate change. This predictability is due to the fact that states: 1) either have simply not adopted any policy to combat climate change (failure to comply with a positive obligation - to act - due to total inaction; for not doing); 2) or have done so, but the reduction targets set are below of what is required (breach of a positive obligation due to insufficient action; for doing, but not enough) (Pouikli, 2022).

The distinction between these two situations allows to show the historical evolution of climate litigation from the perspective of the principle of separation of powers. In the early days, the courts would have opted to reject the existence of positive obligations that limit the discretion of legislators when legislating. In contrast, a growing number of court rulings have recently held that, in certain exceptional circumstances, legislators do have a positive obligation to legislate on climate matters. In these cases, the controversy shifts to the question of determining which objectives are enforceable and based on which criteria.

In what follows, we will not go into the specifics of each legal system, but we will outline the general lines of the controversy.

II.1. Traditional view: no positive obligations

In the early days, the courts opted for a standard interpretation of the principle of separation of powers, whereby each branch of government is understood to be independent, with distinct powers and functions, so that each has its own sphere of action (Montesquieu, [1735] 2007; Waldron, 2021). Thus, while the activity of legislators is political, the activity of the courts is confined to the legal sphere. Politics and law have distinctive features that allow for a clear distinction between them. The creation of abstract and general laws would be a political activity proper to legislators, while the control of the formal validity of laws and their application to specific cases would fall within the legal sphere and therefore be the responsibility of judges. The obligation of the latter would be to delimit these two spheres based on these distinctive features, so that political issues would not be justiciable.

On these premises, the courts did not recognise the existence of positive obligations, understanding that the opportunity to create or not create policies to combat climate change fell within the sphere of politics and, therefore, was not justiciable. It was understood that respect for the principle of separation of powers prohibited the courts from adjudicating on the lack of legislation (inaction) and, consequently, also on the ineffectiveness of legislators' measures (insufficient action). In other words, it was understood that it was up to legislators to decide whether it was desirable to pursue the goal of combating climate change, as well as to determine the measures to be taken to achieve it. Going into more detail, the courts rejected the existence of any positive obligation to approve policies to combat climate change because, in general, legislators must have broad discretion to assess the relative weight of the objectives involved in decision-making.

There are two reasons for this. The first is technical: only legislators (specifically, the executive branch) have the technical means to carry out such an assessment properly. The second is political: legislators (specially, the legislative), in accordance with the democratic principle, represent the demands of the citizenry. Both reasons are connected: in a complex reality, political decisions aimed at responding to citizens' demands require complex solutions based on technical knowledge. Thus, judicial review of the legislators' activity would be limited, above all, to questions of competence and procedure. In addition, controls of constitutionality (of laws) and legality (of executive orders) would be restricted to the power to annul, but not to compel legislation; legislators would have negative obligations, but not positive ones. Furthermore, the exercise of these controls would require a duty of self-restraint to respect the broad discretion that legislators must enjoy in decision-making. In particular, the interpretation of the constitutional text must allow for a wide range of political options. This approach tends to minimise the limits that judiciary can exert on the political discretion of legislators by invoking the liability of fundamental rights. Alternatively, the protection and guarantee of rights falls within politics, as it is the result of the institutional separation of State powers (Bellamy, 1996).

This approach, which conceives legal systems as impermeable normative systems, is reflected in the refusal to accept as sources of law any regulations that do not come from legislators and the acceptance as binding only of climate objectives approved by legislation. Thus, the following would not be legally binding: 1) purely political commitments made internationally (e.g., the Paris Agreement); 2) court rulings from other states; or 3) technical advice from climate scientists based on their expert knowledge (for instance, Bergkamp, 2015).

II.2. Current trend: positive obligations do exist

Recently, a growing number of courts have been acknowledging that, in the fight against climate change, states do have positive obligations, as political inaction would lead to violations of the legal system (Eckes et al., 2025). This approach is framed within an interpretation of the Constitution as the supreme law that establishes substantive obligations binding on all branches of government, including the legislative and executive. Within this framework, the courts are entrusted with the function of ensuring the compliance of those substantive obligations. In this manner, the principle of separation of powers is reshaped, so that the distinction and separation between the creation and application of law, between politics and law, is blurred. While there would be cases that fall exclusively within the realm of politics or law, there would also be cases with a dual political-legal nature, so that, even though they have a political dimension, they would be justiciable by the courts. This dual nature would be clear in the values and principles that inform legal systems, especially in constitutional principles and the guarantee of human rights. Constitutions and human rights conventions set out a series of values that express the political project, theoretically, shared by all. Their fulfilment implies optimising their implementation, so that the jurisdictional task of enforcing human rights conventions and constitutions inevitably has a political dimension. From this perspective, not all interference by the courts in political matters is understood as usurpation; on the contrary, it is understood as legitimate intervention aimed at ensuring that politics is subject to the law (Niehaus, 2023).

The core justification for the existence of positive obligations in climate policy would lie in the general principle of due diligence in governance and administration, and in the obligation to respect and guarantee constitutional rights and human rights (Preston, 2018). The principle of due diligence in governance and administration would consist of a highly indeterminate principle governing the political activity of states. In relation to climate change, this principle could be defined as the 'obligation of public authorities to ensure the habitability of the country and the protection and improvement of the environment'.

The second core element lies in the guarantee of constitutional rights and human rights as the supreme value of legal systems and their connection to the climate system, insofar as the latter establishes the preconditions for sustaining human life, for the existence of a free and orderly society and, ultimately, for the exercise of those rights. Thus, in the European context, the ECHR has linked

climate change to the violation of Articles 2 and 8 of the ECHR, which establish the obligation of States to protect the right to life and to private and family life (Voigt, 2022). Some courts have linked the guarantee of human rights to compliance with the principle of due diligence.

Alongside these two central elements, the courts have also justified the existence of positive obligations on the part of States based on other legal principles, notably, the principles of prevention, of precaution (or caution), and of intergenerational equity. Emerging environmental procedural rights have also been invoked, such as the right of access to justice and citizen participation in political decision-making, or the right to effective legal protection, particularly for young people and future generations, arguing that such effective protection would require the legislator to adopt legislative measures before future damage that may be irreparable occurs.

II.3. On the legitimacy of imposing minimum objectives on legislators

If the existence of positive obligations to legislate on climate matters is accepted, the question then becomes whether the courts can also impose the objectives to be achieved in that legislation; that is, once the interference in politics by the courts is accepted, the question arises as to what the limits of that interference are. Two main doctrinal and judicial positions can be distinguished:

The first position, while acknowledging the existence of positive obligations, i.e. that a legal violation may occur due to a lack of effective measures to reduce GHG emissions, rejects the possibility of courts setting and imposing specific targets on legislators. From this perspective, the Paris Agreement does establish an obligation to legislate and to set out a plan to combat climate change, but it does not set binding targets for states, which are left to the discretion of each state ('nationally determined contributions' (NDCs)). This position is inconsistent, as accepting that courts can monitor whether states are doing enough implies that they must first determine what minimum targets are enforceable. Furthermore, according to Schoukens (2024), it does not offer effective legal protection, as it undermines the limiting potential of human rights during the process of drafting climate legislation.

A second position holds that the existence of positive obligations to do enough not only authorise courts to compel legislators to legislate, but also to pursue minimum GHG reduction targets that ensure compliance with the principle of due diligence in governance and the guarantee of human rights.

The legislature would have discretion to set more ambitious targets and to determine the set of specific measures (the means) by which to achieve the targets set. Such limitations would ensure respect for the principle of separation of powers.

In this second position, the question arises as to what criteria are acceptable for determining these minimum requirements. It should be noted that accepting that courts can impose minimum targets means accepting that these targets may go beyond those set by domestic or EU legislation (to the extent that these are considered insufficient). These extra-legal criteria would refer to scientific knowledge and/or international commitments, which leads to the question of the legality and binding nature of the technical advice of experts or of such political agreements. Such justification would be based on reliance on the best available science as the basis for objective knowledge, and on the consensual nature that would make such agreements an expression of an opinion or vision widely accepted by the international community.

III. Notions of “causality” and imputation of “responsibility”

Attributing liability for damages caused by climate change is among the most pressing challenges in contemporary environmental law. The integration of scientific knowledge –particularly through IPCC reports– into legal reasoning has played a pivotal role. Yet, litigation concerning climate-related harm remains especially complex due to the difficulty of establishing clear causal links and identifying both responsible parties and victims. Climate change is, by definition, cumulative and global in origin, with impacts that are unpredictable, temporally disconnected, and geographically dispersed. These characteristics make the attribution of liability for “climate damages” particularly challenging (Minnerop, 2025).

Nonetheless, there is reason for cautious optimism. Climate litigation is increasingly emerging as a viable pathway to address these challenges, largely due to advances in climate attribution science (Phillips et al., 2025). This field enables the incorporation of scientific evidence into legal reasoning, allowing courts to assess causal relationships between specific events and the harm suffered by individuals or communities.

Climate attribution science has evolved significantly in recent decades. It encompasses three key dimensions: (1) attribution of climate change to anthropogenic activity; (2) source attribution, which links specific actors to climate change; and (3) event attribution, which connects particular impacts or events

to climate change. The latter two are especially relevant for climate litigation. Source attribution establishes the historical contribution of specific agents to the aggregate problem of climate change, while event attribution seeks to determine whether a specific event is linked to climate change.

The legal argument in climate litigation is built at the intersection of these two forms of attribution. Establishing a causal link between the source (emitter) and the event (harm) presents a major challenge for traditional legal frameworks. A central issue is that the absence of a single emitter would not substantially alter the overall problem, making it difficult to conclude a direct causal relationship between that emitter's actions and the specific harm.

This conceptual framework, while relevant, risks precluding liability for climate-related damages – even when attribution science confirms that an event was caused by climate change –. The traditional “but for” test requires plaintiffs to demonstrate that the harm would not have occurred without the defendant's actions. However, some jurisdictions have adopted a more flexible approach, accepting that it is sufficient for the defendant's actions to have materially contributed to the harm. This shift allows for liability even when the harm cannot be exclusively traced to a single actor, provided their contribution significantly increased the likelihood of the harm occurring (Steel, 2015).

In this way, climate litigation diverges from traditional environmental litigation. The causal relationship between source and event must be understood probabilistically rather than deterministically (Ganguly et al., 2022). Increasingly, legal doctrine acknowledges that uncertainty in the causal link is not a sufficient reason to dismiss climate liability (Burger et al., 2020). Attribution science thus plays a central role in judicial decision-making (Marjanac & Patton, 2018), shifting the focus from strict causality to probabilistic thresholds – an essential development given the complexity of the global climate system.

Within this evolving legal landscape, damages-based litigation against major emitters – often referred to as “carbon majors” (Heede, 2014) – offers a promising framework for analysing liability and causation. If their actions can be shown to have caused demonstrable and significant harm, they may be held accountable.

A notable example is *Lliuya v. RWE* (Schirmer, 2025), in which Peruvian farmer Luciano Lliuya has been suing German energy company RWE since 2015. He seeks to have RWE assume part of the costs of protecting his home from potential flooding. Lliuya argues that the melting of a nearby glacier – attributed to climate change – has created a lagoon that threatens to overflow and flood his property. He holds RWE partially responsible, citing its status as

one of the largest historical emitters of greenhouse gases. His legal claim rests on the principle that, having contributed to the risk, RWE should help bear the cost of mitigating it.

RWE countered that even if the plaintiff's estimate of its share of global emissions (0.38%) were accurate, this figure was insufficient to establish significant liability. The company argued that the causal link should be dismissed under the "causal adequacy test," asserting that its emissions neither appreciably increased the risk nor were foreseeable. However, the Hamm Court of Appeal rejected these arguments. It emphasized that all emissions – regardless of their source – contribute to climate change and its associated hazards. Therefore, had RWE's emissions not occurred, the risk of flooding would be quantitatively lower. The court also noted that RWE's share is relevant not because of its absolute proportion of global emissions, but due to its relative magnitude compared to other polluters, as RWE ranks among the largest emitters worldwide. Finally, the court concluded that by the mid-1960s, fossil fuel companies like RWE could reasonably foresee that greenhouse gas emissions were driving climate change and its associated risks, given the unequivocal warnings from the scientific community.

Beyond private actors, litigation against public entities for their inaction on climate change is also gaining prominence. Two landmark cases illustrate this trend: *Held v. Montana* in the United States and *KlimaSeniorinnen v. Switzerland* before the European Court of Human Rights.

In *Held v. Montana*, the court found that the state's fossil fuel-friendly policies violated the plaintiffs' constitutional right to a clean and healthful environment. The ruling established that states can be held accountable for policies that promote fossil fuel development without considering climate impacts (Ferguson, 2024), and rejected the "drop in the bucket" defence – that individual state contributions are too small to matter –.

Similarly, in *KlimaSeniorinnen v. Switzerland*, the European Court of Human Rights developed a comprehensive framework for analysing causation in climate cases. It identified four dimensions of causality: (1) the scientific link between GHG emissions and climate events; (2) the connection between climate effects and human rights impacts; (3) the link between specific harms and state acts or omissions; and (4) the attribution of responsibility to particular states, despite the multiplicity of contributors (Stoyanova, 2025). Despite the complexity, this judgment establishes a conceptual framework that enables courts to assess the causal relationship between state action or inaction and human rights violations.

Determining causality and attributing responsibility in climate change matters constitute a central legal challenge, in which epistemic authorities and specialized scientific knowledge play a fundamental role. In this area, the role of the IPCC and advances in attribution science are crucial for assessing the link between historical emissions, extreme weather events, and specific harms. However, the debate about the limits and flexibility of the causal link in law – especially given the probabilistic and cumulative nature of contributions to climate change – remains open.

IV. Legal standing

A particularly significant issue that has arisen with the progressive expansion of climate litigation undoubtedly concerns standing to bring an action, as this substantive and procedural aspect certainly preconditions access to justice. The question of legal standing (or *locus standi*) in climate litigation concerns a party's ability to demonstrate a direct and personal interest in suing for state inaction on climate matters or, potentially, for corporate violations of climate legislation.

However, it must be noted that, in light of the variety, if not heterogeneity, of climate disputes that can be brought before international or national courts, the solutions that have emerged to allow individuals to enforce international and European obligations in court have been diverse and provide for different procedural requirements and conditions (Mattalia, 2025 Valaguzza, 2024; Giordano 2023; Alogna & Clifford, 2020).

The main guidelines, which also reflect the indications for standing to bring an action contained in international conventions and national legal systems, according to the interpretations developed by the judges themselves, are four:

- a) the legitimacy of the individual affected by climate change: in many cases, the Courts may consider that the individual who has suffered damage as a result of climate change can bring an action to ascertain the inaction of the State and order him to adopt the necessary mitigation measures; however, they impose a very strict burden of proof on the interested party, because he must demonstrate that he is exposed to a real and immediate risk of damage to his fundamental rights (such as the right to life or to private and family life) due to insufficient climate policies (emblematic in this sense, the ECHR ruling, *Verein Klimaseniorinnen Switzerland and Others v. Switzerland*, 9 April 2024, rec. n. 53600/20);
- b) the legitimacy of every citizen: from another perspective, the action is recognized as being open to every citizen, because the right to a clean climate is considered

an integral part of a fundamental right to a healthy environment, which corresponds to a state obligation to mitigate greenhouse gas emissions, adapt to climate change, and regulate private activities to prevent irreversible environmental damage. Proof of specific damage to the applicant's private sphere is not required; it is sufficient that the climate change situation persists and the state's failure to comply with its climate obligations can be demonstrated (in this sense, see the Advisory Opinion of the Inter-American Court of Human Rights on Climate Emergency and Human Rights, May 29, 2025, No. 32). This also allows for action to be taken in the interest of future generations (see the Supreme Court of the Philippines ruling of July 30, 1993, *Oposa v. Secretary of the Department of Environment and Natural Resources* (DENR)) (Carlarne, 2020);

- c) legitimacy based on the theory of public interest law: in this case, the Court, with an evolutionary interpretation of the procedural rules, in order to safeguard vulnerable individuals and the most fragile social groups, who do not have easy access to justice, can allow the proposition, by third parties, of actions for the protection of the weakest social groups, even regardless of direct prejudices suffered by the applicants for protection (in this regard, Supreme Court of India, *MC Mehta v. State of Tamil Nadu*, AIR 1997 SC 699 (India);
- d) legitimacy of environmental associations: finally, the Court may recognise the legitimacy of environmental associations, which in their statute pursue the aim of environmental protection, in relation to the specific rules of the national legal system which regulate their activity (in this sense, the ECHR ruling, *Verein Klimaseniorinnen Switzerland and Others v. Switzerland*, 9 April 2024, rec. n. 53600/20) (Giordano, 2024).

The variety of approaches to ownership of action and models of legitimacy to bring proceedings demonstrates the transition phase of climate law and the need to once again experiment with new legal formulas, suited to the gravity of the climate crisis.

V. New subjects of rights

V.1. Future generations

The question of time is central to climate litigation (Hilson, 2017). Within this framework, younger generations and concerns about the fate of future generations have assumed a prominent role (Donger, 2022). This raises the question: Can future generations be considered a “new subject of rights”? To explo-

re this, we must distinguish between two pathways through which subjective rights are conferred: one via theories of subjective rights, and the other through the concept of legal personality.

Among the most prominent theories of subjective rights are will theory and interest theory. The latter, due to its broader inclusivity, may offer a more favourable framework for recognizing the rights of future generations. According to interest theory, a right exists when an individual's interest is sufficiently significant to impose duties on others. This leads to the critical question: Can future generations possess interests? The answer, however, must be negative. Since future generations do not yet exist, they cannot hold concrete interests and therefore cannot be bearers of subjective rights (Beckerman & Pasek, 2001; Gosseries, 2008).

Nonetheless, this conclusion may be unsatisfactory for some, as legal systems provide alternative avenues for the attribution of rights. One such possibility is the creation of a legal entity named "future generations", through which rights could be assigned. This approach relies on what some scholars refer to as a legal fiction. To adopt this framework, one must accept the theory of legal fictions as it pertains to legal personality.

From a more open and inclusive perspective, legal personality can be constituted independently of any moral foundation or theory of subjective rights. Its basis lies not in the legal relationships it establishes, but in its formal recognition within the legal system (Naffine, 2009). However, this approach is overly inclusive, as it permits the recognition of any entity based solely on legislative will, without regard to whether the entity can form a will (individual or collective) or possess interests. A more rigorous approach would prioritize the characteristics of potential subjects over mere legislative intent. Under such a framework, recognizing future generations as rights-bearing subjects appears to be a legal chimera.

Moreover, even if legal entity "future generations" were established, it would necessarily rely on present-day representation. The representative would be tasked with interpreting and advocating for the interests of those not yet born – a paradox that remains theoretically insurmountable –.

In climate litigation, we have seen instances where future generations have been granted standing through representatives, as in the landmark *Oposa* case in the Philippines (Allen, 1994), and in climate-related litigation such as the *Juliana* case in the United States (Torre-Schaub & de Armenteras, 2023). Yet, this form of ad hoc representation is problematic, as no single individual can adequately represent the diverse and unknowable interests of all future generations.

The solution lies in the institutionalization of mechanisms that operate within the public sphere (Gonzalez-Ricoy & Gosseries, 2016), and in the integration of long-term reasoning into judicial decision-making. A compelling example is the German Constitutional Court's ruling in the Neubauer case (Winter, 2021), which adopts an "intertemporal" interpretation of fundamental rights. This approach avoids the theoretical pitfalls of directly invoking future generations, instead focusing on the long-term impacts of current decisions on the rights of existing individuals and those likely to exist within the century. In this sense, a sound legal strategy would promote an open normative interpretation that accounts for the enduring effects of legal decisions on fundamental rights over time.

V.2. Nature - ecosystems. New perspectives on access to justice for personified natural entities: the case of the Mar Menor

The international movement for the recognition of the rights of Nature has its roots in the indigenous worldview present in the Global South and in the philosophical proposals made since the last quarter of the last century that advocate an intrinsic value for natural entities and non-human beings (Pelizzon, 2025). Legal proposals have been gaining ground in many parts of the world, with both the general recognition of the rights of Nature in some Constitutions and the legal personification of specific ecosystems (rivers, mountains, lakes) through specific legislation or jurisprudence (Putzer, 2025) being relevant.

The global legal movement for the rights of nature has reached the European continent through the recognition of the legal personality of the Mar Menor coastal lagoon in the Region of Murcia (Vicente Giménez & Salazar Ortuño, 2022), whose antecedents can be found not only in the inspiration of cases from the Global South, but also in programmatic documents within the European Union (Ito et al, 2024).

The recognition of the legal personality of the Mar Menor and its rights arose as a social reaction to the ecological collapse of the coastal lagoon (Mas Hernández, 2025) and was promoted by the Environmental Law Clinic of the University of Murcia, the professor of philosophy of law Teresa Vicente and a commission promoting a Popular Legislative Initiative (ILP) which, in times of pandemic, managed to organise a popular campaign that obtained 640,000 signatures of support from citizens of the Spanish State. As a result of the ILP,

a legal text was put before the Spanish Congress which, with a reinforced majority in both Houses, resulted in Law 19/2022 of 30 September (Vicente Giménez, 2024). This was a democratic and ecological milestone that has been recognised internationally and endorsed by the Constitutional Court in Ruling 142/2024 of 20 November.

The recognition of the rights of the Mar Menor and its basin is not limited to its legal personification – something that is not trivial and which, for the purposes of the legal capacity and procedural capacity of the ecosystem, is an unprecedented development on the European continent. Nor is it reduced to a formal recognition of rights, without mechanisms to guarantee them. Unlike other recognitions of rights to natural entities in other parts of the world, Law 19/2022 introduces guarantees of the applicability of the rights recognised to the ecosystem based on environmental democracy and the Aarhus Convention. Specifically, the law establishes a system of governance for the legal entity through the *Tutoría del Mar Menor y su cuenca* (Guardianship of the Mar Menor and its basin) – with broad political, social and scientific representation¹ – and broad access to justice for the defence of the ecosystem's rights. In this contribution, I will refer to the second of these aspects, which is covered in Article 6 of Law 19/2022, on the recognition of legal personality for the Mar Menor and its basin.

Article 6, as referred to by the Constitutional Court in its Ruling 142/2024, deals with a universal power *ex lege* to act on behalf of the 'ecological legal entity' in defence of its rights. It does not therefore imply the recognition of a popular action, as certain parts of the doctrine were quick to describe it (García de Enterría Ramos, 2023), but rather a case of open legitimacy 'by representation', whereby anyone can act before the administrations and the courts to assist in the exercise of the rights of the Mar Menor and its basin and prevent the violation of these rights.

The range of legal proceedings available to those who wish to act on behalf of the Mar Menor and its basin and defend their rights is wide, complex and still unexplored (Aviñó, 2024). The avenues of defence extend to all procedural orders, including administrative, contentious-administrative, criminal and civil proceedings.

To date, there are three known criminal cases before the Courts of Cartagena. On 4 September 2023, an investigating judge addressed, in accordance with the Criminal Procedure Act (art.782.2), the legal entity Mar Menor as the injured party in the crime to offer it legal action. Thus, based on Articles 3 and 6 of Law

¹ Real Decreto 90/2025, de 11 de febrero, por el que se regula el régimen de constitución, composición y funcionamiento de los órganos de representación y gobernanza de la laguna del Mar Menor y su cuenca.

19/2022, it was proposed that its representatives appear as a private prosecutor – not a public prosecutor – and, therefore, on the continuation of three proceedings in which the Public Prosecutor’s Office had doubts regarding the charges.

In one of these cases, concerning the inadequate management of mining waste in the Sierra de Pormán and the subsequent leaching into the watercourses leading to the coastal lagoon, the investigation phase is still ongoing and five environmental NGOs are acting as a coalition. In the second case, which concerns a possible offence of dumping polluting substances into the saltwater lagoon through clandestine desalination plants installed by an agricultural company, a trial has been ordered and a trial date has been set for May 2026. In the latter case, the same environmental NGOs and a local council on the shores of the Mar Menor (municipality of Los Alcázares) have brought a private prosecution and have not only requested prison sentences for the administrators of the agricultural companies, but also civil liability which, if included in the sentence, would be imposed on the legal entity of the Mar Menor and its basin.

The third case, which has also not been resolved, has taken a more peculiar turn. The subject of the third proceeding being a crime of dumping through a desalination plant attached to an agricultural plantation in the Mar Menor basin, the Provincial Court of Cartagena, in February 2024 and as a result of an appeal filed by the defence of the company under investigation, decided to reject the NGOs’ private prosecution on behalf of the Mar Menor, as it understood that Article 6 of Law 19/2022 of 30 September merely established the possibility of bringing a private prosecution. As a result, the NGOs were not eligible to be subject to the offer of action made by the investigating judge in September 2023, which was subsequently annulled. The NGOs appealed unsuccessfully to the Constitutional Court, and in November 2024 they filed a complaint with the European Court of Human Rights alleging a violation of the right to due process of the ecological legal entity ‘Mar Menor and its basin’. The outcome of this unprecedented complaint is not yet known.

The reflections that arise from the socio-ecological, regulatory and judicial landscape outlined above are as follows:

- The movement for the recognition of the rights of Nature continues in Europe and promises a paradigm shift towards ecocentrism in legislation, albeit a moderate one.
- The recognition of rights to specific ecosystems or to Nature in general must be accompanied by instruments of environmental democracy that guarantee that guardians or persons intending to defend the rights of Na-

ture can, through participatory or procedural tools, contribute to the management of the legal entity and access justice to promote its defense.

- In the case of the Mar Menor, the universal power of representation of the Mar Menor established in Article 6 has opened up broad procedural possibilities ranging from the exercise of private prosecution in the prosecution of ecological crimes to the exercise of civil action to claim for damage inflicted on the ecosystem, enabling its restoration.
- The possibility for the ecological person to defend itself through representatives in the courts using the figure of private prosecution has reached the European Court of Human Rights and, as in the case of companies and associations, could be the first time that fundamental procedural rights have been recognised for ecological legal persons.

V.3. Animals

Although to varying degrees, in recent decades there has been a proliferation of state laws aimed at protecting domesticated and human-used animals (for instance, for scientific or recreational purposes) and ensuring their welfare. Instead, protection of wildlife animals remains subordinated to ecosystem conservation objectives. Two features characterize the current legal framework.

Firstly, we can find legal systems that are very advanced in the recognition of the rights of nature, such as Ecuador, but where animals continue to be considered movable property in their Civil Code, without prejudice to the protection they receive in other special laws (Art. 585). On the other hand, despite the fact that some states have included constitutional principles aimed at protecting animals, there is no constitution that recognizes animal rights as subjects of law, beyond those rights attributed to them in specific legislation (Global Animal Law, 2025; World Animal Protection, 2025). Regarding non-wild animals, they are considered “objects” or “things” subjects to property (Eisen, 2017: 911).

Secondly, in those countries that recognise legal rights to animals, the closer the relationship to humans, the more the rights recognised to animals. Expressed in the terminology of Donaldson and Kymlicka (2011), while domesticated and, in less extension, liminal animals are increasingly being recognised as subjects of rights, wilderness animals are not.

As biodiversity and animal welfare are closely related to environmental and climatic conditions, many scholars assert that wildlife animals should also be

protected, and that animal law should be interwind to environmental and climate law (Harrop, 2011; Bilchitz, 2019; Gellers, 2021; Stucki, 2026). Firstly, as climate change caused by human activities have impacts on ecosystems, it also affects negatively the lives of animals. Secondly, normalised practices of animal maltreatment not only legitimates violence, but also contributes to environmental degradation and climate change.

While the protection of ecosystems through the recognition of the rights of nature benefits the protection of the species that form part of those ecosystems and vice versa, on the other hand, conflicts between these two areas should not be neglected, as evidenced by the growing problem of invasive species that are harmful to the health of the invaded ecosystem (Futhazar, 2020; IPBES, 2023). Therefore, without denying the interrelationships between the rights of nature and animal rights, in an increasingly interlinked and human-intervened world it should be noted that both areas enjoy some degree of autonomy. The rights of nature may collide with the rights of animals.

This general overview of the present legal framework raises the questions of who is entitled to act in court on behalf of an animal that has suffered a harm related to an activity that contributes to climate change.

Nowadays, while a growing number of rulings are granting standing to NGOs and/or the public to represent nature in defence of its rights, in the field of animal rights the traditional approach that denies legal standing to human individuals or organisations to represent the interests and rights of animals continues to prevail. In this area, plaintiffs are still required to have suffered concrete and individualised harm. Therefore, only damage suffered by humans is claimable, so that claims are only admissible if the person or organisation can demonstrate that the damage suffered by an animal has an impact on them. In addition, the harm suffered shall be actual or imminent. It is argued that courts should not assess hypothetical or future harm, i.e. abstract situations, as this would constitute an illegitimate interference by the judiciary in the political and legislative activity of the legislative and executive powers. As a result, human individuals or organisations are not granted access to justice as representatives of the public interest when it comes to enforcing animal welfare legislation.

In this context, it is more likely to prove the connection between specific harm suffered by a human being or organisation and the harm suffered by an animal when domesticated animals are involved. On the other hand, the livestock industry is one of the most criticised human activities in terms of animal abuse (Nollkaemper, 2023) and one of the most polluting, responsible for 14% of total GHG emissions (UN, 2017; see also FAO, 2020).

These two factors would help explain a series of lawsuits recently filed in the United States of America against the livestock industry in which the harm caused to animals and their contribution to climate change are linked to harm suffered by humans. For example, in *Farm Sanctuary v. Department of Agriculture* (2021), the U.S. Department of Agriculture has been sued for establishing a new inspection system for pig slaughter facilities without adequately considering the environmental impacts caused by a potential increase in greenhouse gas emissions, animal welfare, or consumer food safety. In the case *Animal Legal Defense Fund et al. v. Azar*, the U.S. Food and Drug Administration has been sued for failing to adequately assess the environmental impacts of an approved drug intended, in theory, to reduce ammonia emissions from cattle manure, including greenhouse gas emissions, as well as the effects on animal welfare, worker safety, and consumer food safety.

The need to connect the harm suffered by the animal with the harm suffered by a person or organisation is particularly relevant when the case involves the constitutional protection of fundamental rights or the application of international human rights conventions.

The first case brought before an international court has been *Humane Being v. United Kingdom*, brought before the ECHR. The organisation Humane Being argued that industrial livestock farming violates human rights due to the risks it poses to climate change, the outbreak of future pandemics and antibiotic resistance. The Court declared the lawsuit inadmissible, arguing that the plaintiffs were not sufficiently affected by the alleged violation of the ECHR to be considered victims within the meaning of Article 34 of the Convention.

Perhaps this series of lawsuits is the spearhead of a trend within climate litigation interested in addressing environmental and climate impacts not only from an ecological perspective, but also from the perspective of animal ethics and human rights.

Bibliography

- Allen, T. (1994). The Philippine children's case: Recognizing legal standing for future generations. *Georgetown International Law Review*, 6, 713–41.
- Alogna, I. & Clifford, E. (2020). *Climate Change Litigation: Comparative and International Perspectives*, London.

- Aviñó Balaguer, D. (2024), La loi 19/2022 espagnole, au-delà de la personification de la Mar Menor (région de Murcie, Espagne). Une ouverture vers une action populaire et une responsabilité civile environnementale?, *Actualidad jurídica iberoamericana*, núm. 20, 1370-1391.
- Beckerman B & Pasek, J. (2001). The Rights of Future Generations, in *Justice, Posterity & the Environment*, Oxford: Oxford University Press.
- Bellamy, Richard (1996). The Political Form of the Constitution: the Separation of Powers, Rights and Representative Democracy. *Political Studies*, V. XLIV, 436-456.
- Bilchitz, David (2019). Why conservation and sustainability require protection for the interests of animals. In: Scholtz, W. (ed.). *Animal Welfare and International Environmental Law: From Conservation to Compassion*. Edward Elgar, 207-234.
- Bergkamp, Lucas (2015). Adjudicating scientific disputes in climate science: the limits of judicial competence and the risks of taking sides. *Environmental Liability. Law, policy and practice*, v. 23, Issue 3, 80-102.
- Burger, M., Wentz, J., & Horton, R. (2020). *The law and science of climate change attribution*. Columbia Law School Sabin Center for Climate Change Law. https://scholarship.law.columbia.edu/sabin_climate_change/12/
- Carlarne, C. (2020). *Climate Change, human Rights, and the Rule of law*. int'l l. & foR.
- Donaldson, S., Kymlicka, W. (2011). *Zoopolis. A political theory of animal rights*. Oxford University Press, Oxford.
- Donger E. (2022) Children and Youth in Strategic Climate Litigation: Advancing Rights through Legal Argument and Legal Mobilization. *Transnational Environmental Law*, 11(2), 263-289.
- Eckes, C. et al. (2025). Separation of Powers. *The Cambridge Handbook on Climate Litigation*, Cambridge, Cambridge University Press.
- Eisen, J. (2017). Animals in the constitutional state. *International Journal of Constitutional Law*, v. 15(4), 909-954. doi:10.1093/icon/mox088
- FAO (2020), FAOSTAT Analytical Brief Series No. 14. Rome. <https://openknowledge.fao.org/server/api/core/bitstreams/f0cebffd-725e-4d7a-8e14-3ba8fb1486a7/content>

- Ferguson, E. C. (2024). *Held v. State of Montana*: A constitutional rights turn in climate change litigation? *Journal of Environmental Law*, 36(3), 453–460.
- Futhazar, G. (2020). The Conceptual Challenges of Invasive Alien Species to Non-human Rights. *Journal of Human Rights and the Environment*, 11, 224–43.
- Ganguly, G., Setzer, J., & Heyvaert, V. (2018). If at first you don't succeed: Suing corporations for climate change. *Oxford Journal of Legal Studies*, 38(4), 841–868.
- García de Enterría Ramos, A. (2023), *La personalidad jurídica de los entes naturales: ¿un cambio de paradigma?*, *Revista del Parlamento Vasco*, 4, 8–37.
- Gellers, J. C. (2021). Earth system law and the legal status of non-humans in the Anthropocene. *Earth System Governance*, 7, 1–8. <https://doi.org/10.1016/j.esg.2020.100083>
- Giordano, A. (2024). *Introduzione alla tutela del clima come bene comune*, Napoli.
- Giordano, A. (2023), La giustizia climatica ai tempi della transizione ecologica. *Ordine internazionale e diritti umani*.
- Global Animal Law (2025), Database Legislation. Animal legislations in the world at national level.
- Gonzalez-Ricoy, I. & Gosseries, A. (2016). *Institutions for future generations*. Oxford: Oxford University Press.
- Harrop, S. (2011). Climate Change, Conservation and the Place for Wild Animal Welfare in International Law. *Journal of Environmental Law*, 23(3), 441–462.
- Heede, R. (2014). *Carbon Majors: Accounting for carbon and methane emissions 1854–2010 – Methods & Results Report*. Climate Accountability Institute.
- Hilson, C. (2019). Framing Time in Climate Change Litigation. *Oñati Socio-Legal Series*, 9(3), 361–379.
- IPBES (2023). Thematic Assessment Report on Invasive Alien Species and their Control. Roy, H. E., Pauchard, A., Stoett, P., and Renard Truong, T. (eds.). IPBES secretariat, Bonn. <https://doi.org/10.5281/zenodo.7430682>
- Ito, M., Montini, M., Bagni, S. (2024), Towards an EU fundamental chapter for the Rights of Nature: Integrating nature, people economy, in García Ruales, J. & Hovden, K., *Rights of Nature in Europe*, Routledge, New York.

- Marjanac, S., & Patton, L. (2018). Extreme weather event attribution science and climate change litigation: An essential step in the causal chain?, *Journal of Energy & Natural Resources Law*, 36(3), 265-298.
- Mas Hernández, J. (2025). The History of Environmental Degradation in Mar Menor. A Case Study, in Zaragoza, J.M. (coord.), *The Mar Menor, the transition of an ecosystem over the time*, Oxon. Routledge.
- Mattalia, M. (2025). *Contenzioso climatico e condizioni dell'azione avanti al giudice amministrativo*. Giappichelli Editore
- Minnerop, P. (2025). Climate causality: From causation to attribution. In M. Wewerinke-Singh & S. Mead (Eds.), *The Cambridge handbook on climate litigation*. Cambridge University Press, 415-444.
- Montesquieu ([1735] 2007), *Del Espíritu de las leyes*. 6ª ed., Madrid, Tecnos.
- Naffine, N. (2009). *Law's Meaning of Life. Philosophy, Religion, Darwin and the Legal Person*. Portland: Hart Publishing.
- Niehaus, M. (2023). The rol of the Courts in CCL. In: *Global Climate Constitutionalism from below*. Springer, 371-413.
- Nollkaemper, A. (2024), International law and the agony of animals in industrial meat production. *European Journal of international Law*, 34(4), 939-972. <https://doi.org/10.1093/ejil/chad049>
- Peel, J., Osofsky, H. M. (2020). Climate Change Litigation. *The Annual Review of Law and Social Science*, 16, 21-38. <https://doi.org/10.1146/annurev-lawsocsci-022420-122936>
- Pelizzon, A. (2025), *Ecological Jurisprudence. The Law of Nature and the Nature of Law*. Springer.
- Phillips, C. A., Merner, L. D., & Otto, F. (2025). Attribution science: Insights into climate change and its consequences. In M. Wewerinke-Singh & S. Mead (Eds.), *The Cambridge handbook on climate litigation*, Cambridge University Press, 79-102.
- Pouikli, K. (2022). Editorial: a short history of the climate change litigation boom across Europe. *ERA Forum*, 22, 569–586. <https://doi.org/10.1007/s12027-022-00700-1>

- Preston, B. J. (2018). The evolving role of environmental rights in climate change litigation. *Chinese Journal of Environmental Law*, 2, 131–164.
- Putzer, A., Cook, J., & Pollock, B. (2025). *Putting the rights of nature on the map. A quantitative analysis of rights of nature initiatives across the world – Second Edition*. Journal of Maps, 21(1).
- Sabine Center for climate change litigation, *Humane Being v. United Kingdom*, Climate change litigation database. <https://climatecasechart.com/non-us-case/factory-farming-v-uk/>
- Schirmer, J. E. (2025). Climate liability after Lliuya v RWE: Causation and duty demystified. *Journal of European Tort Law*, 7(3), 285–311.
- Schoukens, H. (2024). Climate change litigation and the separation of powers: effective legal protection as the ultimate yardstick? In Sindico, F., McKenzie, K., Medici-Colombo, G. A. & Wegener, L. (eds.), *Research handbook on climate change litigation*, 184–206. <https://doi.org/10.4337/9781800889781.00016>
- Steel, S. (2015). Justifying exceptions to proof of causation in tort law. *The Modern Law Review*, 78(5), 729–755.
- Stoyanova, V. (2025). In search for the content of states' positive obligations under the European Convention on Human Rights: *KlimaSeniorinnen* and climate change. In C. A. Gomes, H. Oliveira, A. Roch, & M. Fermeglia (eds.), *Climate change before international courts: A comparative study*. Routledge.
- Stucki, Saskia (2026), Emerging animal rights and their pluralistic foundations: anthropocentric, zoocentric and ecocentric rationales. Forthcoming in: Anne Peters, Kristen Stilt & Saskia Stucki (eds), *Oxford Handbook of Global Animal Law*. Oxford University Press, Oxford, 1-17.
- Torre-Schaub, M & de Armenteras Cabot, M. (2023). Building Climate Law Through Intergenerational Justice: An Empirical Assessment. In H. Ruiz Fabri, A. Donati, and V. Rosoux, (Eds.). *Representing the Absents, Nomos*, Studies of the Max Planck Institute Luxembourg for International, European and Regulatory Procedural Law.
- United Nations Environment Programme (2025), *Climate change in the courtroom: Trends, impacts and emerging lessons*. Nairobi. <https://wedocs.unep.org/20.500.11822/48518>

- United Nations, Department of Economic and Social Affairs, Population Division (2017). Working Paper No. ESA/P/WP/248. https://esa.un.org/unpd/wpp/publications/files/wpp2017_keyfindings.pdf
- Valaguzza, S. (2024). Gli orizzonti del diritto dell'ambiente a partire dal contenzioso climatico. *Diritto Processuale Amministrativo*, fasc. 4, pp. 914-926
- Vicente Giménez, T. (2024), *Justicia Ecológica y Derechos de la Naturaleza*, Tirant Humanidades, Valencia.
- Vicente Giménez, T. & Salazar Ortuño, E. (2022), La iniciativa legislativa popular para el reconocimiento de personalidad jurídica y derechos propios al Mar Menor y su cuenca, *Revista Catalana de Dret Ambiental*, 13(1).
- Voigt, C. (2022). The climate change dimension of human rights: due diligence and states' positive obligations. *Journal of Human Rights and the Environment*, 13 (0), 152-171.
- Waldron, J. (2021). The rule of law and the role of courts. *Global Constitutionalism*, 10 (1), 91–105.
- Winter, G. (2021). The Intergenerational Effect of Fundamental Rights: A Contribution of the German Federal Constitutional Court to Climate Protection. *Journal of Environmental Law*, 34 (1), 209-221.
- World Animal Protection (2025), <https://api.worldanimalprotection.org>
- Zirulia, S., Sandrini, L., Pitea, C. (Eds.) (2024). *What future for environmental and climate litigation?* Milano University Press

Jurisprudence

- U.S. Supreme Court (1992), *Lujan v Defenders of Wildlife*. 504 U.S. 555
- U.S. Western District Court New York, Cases No. 6:19-cv-06910-EAW and 6:20-cv-06081, 28 June 2021. https://climatecasechart.com/case/farm-sanctuary-v-us-department-of-agriculture/?utm_source=chatgpt.com
- U.S. Northern District Court of California, Case No. 20-cv-03703-RS, 23 February 2021. https://climatecasechart.com/case/animal-legal-defense-fund-v-azar/?utm_source=chatgpt.com

Gullo, Fallada-García-Valle, Armenteras, Salazar

Inter-American Court of Human Rights, Advisory Opinion AO-32/25 of May 29, 2025. https://www.corteidh.or.cr/docs/opiniones/seriea_32_en.pdf

Trends, impact and challenges in the evolution of climate litigation

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SUMMARY: I. Trends in the evolution of climate litigation. I.1. Equity – fare share and carbon budget in climate litigation. I.2. Emergency climate disasters (ECD) - Assurance for climate disasters floodings, droughts, hurricanes, soil movements, forest fires, etc.; food sovereignty; access to water; etc. II. Direct and indirect impact of climate litigation. II.1 The 'normative function' of climate litigation II.2 Indirect or extra-trial impact. III. Challenges for the field of climate litigation. III.1 Prospective role of the judge. III.2. Implementation of decisions. Bibliography

I. Trends in the evolution of climate litigation

I.1. Equity – fare share and carbon budget in climate litigation

Equity has become a central organizing principle in contemporary climate litigation, serving as the normative bridge between climate science and legal responsibility. The fair share principle occupies a central yet historically contested position within the Paris Agreement's normative architecture. Although embedded in Articles 3 and 4 and reflected in the Agreement's emphasis on equity and common but differentiated responsibilities and respective capabilities (CBDR-RC), the principle was long dismissed by domestic courts as insufficiently determinate to function as a judicial standard. Recent climate litigation marks a decisive shift away from this position.

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Courts increasingly rely on equity-based reasoning to assess whether state and corporate climate action aligns with scientifically defined temperature goals and with legal obligations derived from human rights, constitutional, and international law frameworks.

In climate litigation, equity refers to fairness in the distribution of responsibilities for mitigating greenhouse gas emissions and adapting to climate impacts. Its legal foundation is most clearly articulated in the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC), embedded in the United Nations Framework Convention on Climate Change (UNFCCC) and reaffirmed in the Paris Agreement (UNFCCC, 1992; Paris Agreement, 2015). Equity also appears in human rights law through principles of non-discrimination, proportionality, and intergenerational justice, which courts have increasingly interpreted as imposing duties on states to prevent foreseeable climate harm (Peel & Osofsky, 2018).

Judicial recognition of equity reflects a broader shift away from viewing climate change solely as a collective political problem and toward recognizing individualized legal obligations grounded in responsibility and capacity (Bodansky et al., 2017).

The concept of a “fair share” operationalizes equity by translating abstract principles into allocable responsibility. A fair share represents the portion of the global mitigation effort that a particular state or corporation should undertake, based on criteria such as historical emissions, current emissions, economic capacity, and development needs (Rajamani et al., 2021).

As climate litigation increasingly turns to human rights law as a vehicle for enforcing mitigation obligations, courts and human rights bodies have begun to confront the question of how to assess the adequacy of state action in an inherently global problem. Central to this inquiry is the principle of equity, which finds concrete expression in fair-share reasoning and the allocation of the remaining global carbon budget. Recent jurisprudence demonstrates a growing willingness to translate these concepts into legally cognizable standards, particularly where failure to mitigate poses foreseeable and severe risks to human rights.

1) Carbon budgets as a legal standard

The concept of a global carbon budget—defined as the finite quantity of greenhouse gas emissions compatible with limiting global warming to a specified temperature threshold—has emerged as a critical bridge between climate science and legal accountability (IPCC, 2023). Although carbon budgets originate in scientific assessments, their normative significance lies in their capacity to oper-

ationalize temperature goals by establishing cumulative emissions limits. From a human rights perspective, this is particularly salient: once the remaining carbon budget is exceeded, the resulting warming and associated impacts become effectively irreversible, thereby locking in widespread violations of protected rights.

Courts have increasingly relied on carbon-budget logic to assess whether state mitigation pathways are compatible with positive human rights obligations. In *Urgenda Foundation v. State of the Netherlands*, the Dutch Supreme Court explicitly grounded its reasoning in scientific consensus regarding emission reduction pathways consistent with limiting warming, rejecting the argument that the Netherlands' contribution was too marginal to engage responsibility (Supreme Court of the Netherlands, 2019)⁷. While formally grounded in Articles 2 and 8 ECHR, the Court relied on international climate law and scientific consensus to determine a minimum mitigation threshold consistent with limiting warming to well below 2°C. Although the judgment did not explicitly reference carbon budgets, its logic aligns with the AR6 finding that cumulative CO₂ emissions determine peak warming and that delay in near-term reductions disproportionately exhausts the remaining global carbon budget. Similarly, in *Verein KlimaSeniorinnen Schweiz v. Switzerland*, the European Court of Human Rights held that inadequate mitigation planning inconsistent with the 1.5 °C objective could violate the rights to life and private life, thereby implicitly recognizing carbon budgets as a benchmark for evaluating state compliance (European Court of Human Rights [ECtHR], 2024). By translating temperature targets into measurable emissions constraints, carbon budgets enable courts to move beyond abstract commitments and to assess whether states are acting with the urgency required to prevent foreseeable human rights harm.

The German Federal Constitutional Court's decision in *Neubauer et al. v. Germany* more explicitly operationalized this logic. By recognizing that the remaining national carbon budget is finite and that inadequate near-term reductions shift an excessive mitigation burden onto future generations, the Court constitutionalized intertemporal equity. This reasoning mirrors the AR6 conclusion that pathways consistent with 1.5°C require steep and immediate emissions reductions, and that postponement irreversibly constrains future policy space. The Court's proportionality analysis thus transforms the carbon budget from a scientific descriptor into a legally salient constraint on legislative discretion. Despite the positive ruling in *Neubauer*, subsequent developments have revealed important setbacks. In February 2022, young adults supported by Environmental Action Germany (Deutsche Umwelthilfe, DUH) filed eleven constitutional complaints against ten

German states, seeking to compel them to comply with the requirements of the Paris Agreement. The German Federal Constitutional Court, however, rejected these claims, holding that the Länder have no independent obligation to meet emission-reduction targets. According to the Court, only the federal government has the constitutional competence and responsibility to regulate the allocation and consumption of emissions budgets.

2) CBDR-RC and fair-share reasoning in litigation

The legal relevance of carbon budgets is closely intertwined with the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC), enshrined in the UNFCCC and reaffirmed in the Paris Agreement (UNFCCC, 2015). CBDR-RC provides the normative foundation for allocating the remaining global carbon budget among states according to equity, taking into account historical emissions, economic capacity, and developmental needs.

Climate litigation has increasingly operationalized CBDR-RC through fair-share reasoning. Rather than treating mitigation as a purely collective endeavor, courts have assessed whether individual states are contributing their proportionate share to the global effort. In *Urgenda*, the Dutch Supreme Court emphasized that each state bears an independent obligation to undertake mitigation measures consistent with its responsibility and capacity, regardless of the actions of others (Supreme Court of the Netherlands, 2019). This approach was reinforced in *KlimaSeniorinnen*, where the ECtHR underscored that states must adopt mitigation pathways aligned with equity and the best available science, thereby rejecting purely discretionary interpretations of national climate policy (ECtHR, 2024).

Fair-share reasoning thus transforms CBDR-RC from a political principle into a justiciable standard, anchoring mitigation obligations in proportional responsibility and preventing states from externalizing the human rights costs of climate inaction.

3) Global North and Global South perspectives on mitigation obligations

The application of carbon budgets and fair-share principles has distinct implications for Global North and Global South states, reflecting profound asymmetries in historical responsibility and vulnerability. Litigation against Global North states has predominantly focused on excessive historical emissions and the consequent overconsumption of the global carbon budget. Claimants argue that industrialized countries bear heightened obligations to undertake rapid and deep emissions reductions, both as a matter of equity and to prevent trans-boundary human rights harm.

By contrast, Global South perspectives emphasize the disparity between contribution and impact. Although mitigation litigation against Global South states remains limited, international human rights bodies have acknowledged that differentiated responsibilities are essential to preserving the right to development. In *Torres Strait Islanders v. Australia*, the UN Human Rights Committee recognized that climate change poses an existential threat to vulnerable communities, while implicitly affirming that states with greater capacity and responsibility bear stronger duties to prevent harm (Human Rights Committee, 2022). This reasoning supports a differentiated allocation of the remaining carbon budget, allowing lower-emitting states greater emissions space to meet basic human needs.

Together, these cases illustrate how carbon budgets and CBDR-RC can reconcile universal human rights obligations with differentiated mitigation responsibilities, ensuring that climate action does not entrench existing global inequalities.

4) Extraterritorial obligations and transboundary harm

The global nature of climate change raises fundamental questions regarding extraterritorial human rights obligations. Because greenhouse gas emissions contribute cumulatively to global harm, mitigation failures in one state may foreseeably affect the enjoyment of rights beyond its borders. Human rights bodies have increasingly acknowledged that states may bear responsibility for transboundary environmental harm where there is a causal link between conduct and foreseeable rights violations.

In this context, carbon budgets provide a framework for assessing extraterritorial harm by clarifying the extent to which a state's emissions contribute to exceeding global thresholds. The Office of the High Commissioner for Human Rights has affirmed that states have obligations to prevent activities within their jurisdiction from causing human rights harm abroad, particularly where harm is foreseeable and preventable (OHCHR, 2019). Fair-share reasoning reinforces this approach by demonstrating that excessive emissions by high-emitting states effectively appropriate emissions space needed by others to realize basic rights.

As climate litigation increasingly invokes extraterritoriality, carbon budgets may serve as a key evidentiary tool for establishing responsibility for diffuse yet cumulative harm.

5) Critical perspectives: judicial overreach and separation of powers

Despite the growing judicial engagement with carbon budgets and fair-share reasoning, critics argue that such approaches risk judicial overreach and encroach-

ment upon the separation of powers. From this perspective, courts lack the institutional competence to determine appropriate mitigation pathways or to allocate emissions reductions, tasks traditionally reserved for the political branches. Critics further contend that reliance on carbon budgets risks transforming courts into de facto climate regulators, undermining democratic legitimacy.

However, this critique underestimates the limited and corrective role courts have assumed in climate litigation. Rather than prescribing detailed policy measures, courts have generally confined themselves to assessing whether state action meets minimum standards required to protect human rights, leaving the choice of specific measures to the executive and legislature. As demonstrated in *Urgenda* and *KlimaSeniorinnen*, judicial intervention has been framed as a response to clear gaps between scientific necessity and governmental action, rather than as an assertion of policy-making authority.

From a human rights perspective, judicial scrutiny of mitigation efforts is not an expansion of judicial power but a reaffirmation of the rule of law. Where states knowingly pursue emissions trajectories that endanger fundamental rights, judicial deference cannot justify inaction. Carbon budgets and fair-share reasoning thus function not as instruments of judicial governance, but as tools to ensure that political discretion is exercised within legally permissible bounds.

I.2. Emergency climate disasters (ECD). Assurance for climate disasters floodings, droughts, hurricanes, soil movements, forest fires, etc.-; food sovereignty; access to water; etc.

Climate change has emerged as one of the most pressing global challenges of the 21st century, manifesting in the form of emergency climate disasters (ECDs) such as floods, droughts, hurricanes, wildfires, and soil erosion. These events not only threaten ecosystems but also disrupt fundamental aspects of human life, including economic stability, public health, education, and access to critical resources such as food and water (European Commission, 2023; Fekete, 2024). Vulnerable populations, particularly those in low-lying coastal regions or arid zones, experience disproportionate impacts, exacerbating pre-existing inequalities and compromising their capacity for adaptation and recovery.

Climate change poses a serious threat to the achievement of sustainable development by intensifying existing challenges related to poverty, hunger, health, and inequality. Climate-induced disasters, including hydrological extremes such

as floods and droughts, have the potential to severely disrupt livelihoods, infrastructure, and ecosystems, particularly in the most vulnerable countries and communities. Achieving the Sustainable Development Goals (SDGs) therefore requires urgent action to reduce greenhouse gas emissions, adapt to the impacts of climate change, and strengthen resilience to climate-related disasters.

Climate change not only threatens sustainable development but has also become a central driver of climate litigation. As climate-induced disasters — such as floods, droughts, and other hydrological extremes — intensify, they exacerbate existing vulnerabilities related to poverty, hunger, health, and inequality, disproportionately affecting the most at-risk communities. These impacts have spurred an increasing number of legal challenges that seek accountability for greenhouse gas emissions and demand stronger mitigation, adaptation, and resilience measures. The occurrence of these events not only results in severe consequences for the environment but also presents substantial risks to human health and overall welfare.

However, the evolution of climate litigation also highlights significant challenges, including the complexity of attributing legal responsibility, the uneven capacity of courts to address scientific evidence, and the disparities in legal access between wealthy and vulnerable populations. Addressing these challenges is critical for leveraging litigation as an effective tool to drive climate action and support the achievement of the Sustainable Development Goals (SDGs).

Emergency climate disasters (ECDs) — including floods, droughts, hurricanes, wildfires, soil movements, and extreme heat events — have become central to contemporary climate litigation. Once treated primarily as natural hazards or matters of disaster management, ECDs are increasingly framed as legally cognizable manifestations of climate change and state inaction. This shift reflects a broader transformation in climate law, in which courts are asked to assess not only mitigation targets but also the human rights consequences of climate-induced emergencies. Claims grounded in ECDs frequently invoke violations of fundamental rights such as access to water, food sovereignty, health, housing, and human dignity, thereby reframing climate change as a rights-based legal issue rather than a purely environmental concern.

Between 1990 and 2023, an average of 364 extreme weather events occurred annually, affecting approximately 400 million people and displacing 26 million globally. In 2021, eight of the ten countries most affected by climate-related events were low- and middle-income countries (LMICs), including Myanmar, Haiti, the Philippines, Mozambique, Bangladesh, Pakistan, Thailand, and Ne-

pal. Many of these nations lack the resources necessary to adequately respond to the escalating impacts of climate change.

In Europe, climate-related health threats are also increasing, with risks including death and injury from heatwaves, floods, and wildfires; threats to food and water safety; and the emergence and spread of infectious diseases and allergens due to shifts in disease vectors and pathogens. These developments place pressure on public health systems. To address knowledge gaps, the European Climate and Health Observatory was launched in 2021. Recognising the interconnectedness of human, animal, and environmental health, the Commission has adopted a ‘One Health’ approach, including through the One Health European Joint Programme, to analyse and prevent climate impacts. The EC’s proposals for the 8th Environment Action Programme and the European Health Union further emphasise integrating climate and health policies and addressing the human health risks posed by climate and environmental threats, including cross-border emergencies.

The consequences of ECDs extend beyond immediate physical damage, affecting food sovereignty and water security, thereby undermining community resilience and long-term sustainability. For instance, droughts reduce agricultural yields and disrupt local food systems, while floods and hurricanes contaminate water supplies and damage essential infrastructure, heightening the risk of malnutrition and waterborne diseases (Frontiers in Sustainable Food Systems, 2021; American Progress, 2025). These multidimensional impacts highlight the urgent need for comprehensive mitigation, adaptation, and resilience strategies to protect both human and ecological systems.

In parallel, climate litigation has emerged as a strategic tool to enforce accountability and drive climate action. Legal cases around the world increasingly challenge governments and corporations for failing to prevent or address climate-induced harms, linking insufficient climate policies and corporate emissions to violations of fundamental human rights, including the rights to life, food, and water. Landmark cases such as *Verein KlimaSeniorinnen Schweiz v. Switzerland* and *Lliuya v. RWE AG* illustrate the growing role of courts in compelling stronger climate action and in framing climate change as a legal and ethical responsibility (*Verein KlimaSeniorinnen Schweiz v. Switzerland*, 2024; *Lliuya v. RWE AG*, 2025).

In the Global South, rights-based climate litigation has also yielded meaningful outcomes, albeit in different legal contexts. In *Asghar Leghari v. Federation of Pakistan* (2015), the Lahore High Court found that the Pakistani government’s failure to implement its National Climate Change Policy and

Framework violated fundamental constitutional rights, including the right to life and dignity, by exacerbating vulnerabilities to climate impacts such as water scarcity and extreme weather (*Asghar Leghari v. Federation of Pakistan*, 2015; BIICL, 2023). The court ordered the establishment of a Climate Change Commission to monitor and enforce policy implementation, illustrating how human rights arguments can catalyze institutional reforms and ongoing judicial oversight (*Leghari v. Federation of Pakistan*, 2015; BIICL, 2023). While Leghari did not specify quantitative emission targets, it underscored the potential for courts to embed climate obligations within broader procedural and governance rights frameworks.

In recent years, climate litigation has undergone a profound transformation worldwide, marked by a significant rise in cases across a wide range of jurisdictions. While this trend has attracted substantial scholarly attention — particularly in the Global North — climate litigation originating in the Global South has received comparatively limited focus. Yet, acknowledging the distinctive legal bases, remedies sought, and objectives pursued by plaintiffs in these regions is essential. A deeper understanding of the evolving landscape of climate litigation in the Global South is crucial, as such cases are shaped by nuanced challenges, capacity constraints, and context-specific needs that differ markedly from those typically encountered in the Global North.

Despite these advances, limitations and criticisms persist. First, judicial willingness to adjudicate complex climate issues varies significantly; some courts avoid precise emission targets or defer to legislative discretion, reflecting concerns about separation of powers and technical competence. Second, human rights frameworks often require interpretive bridges between traditional rights (e.g., life, family, environment) and climate harms, which judges may be reluctant to construct without strong textual support. Third, enforcement remains challenging; even where courts issue robust rulings, compliance depends on political will and administrative capacity.

Finally, the global impact of human rights-based climate litigation is influenced by broader international legal developments. Recent advisory opinions, such as from the Inter-American Court of Human Rights affirming a human right to a stable climate, and advisory guidance from the International Court of Justice on states' legal obligations to protect human rights in the climate context, suggest increasing normative pressure on states to align climate policy with human rights commitments (AP News, 2025). These international directions bolster domestic human rights litigation strategies, even if they remain non-binding.

II. Direct and indirect impact of climate litigation

The legal framework that has developed over the past few decades, with the overlap between international, European, and national regulatory sources, has produced a series of legally relevant obligations that now commit states to approve and implement a climate policy capable of halting the rise in our planet's temperature by reducing climate-altering emissions, according to increasingly precise and rigorous targets.

The climate emergency has prompted the international community and states to launch a comprehensive strategy, including legislative review, the development and identification of intermediate and final operational objectives, and the adoption of multiple implementation tools, primarily planning-based. From this perspective, however, the role of state authorities remains central, if not decisive, in combating climate change, both because they enjoy a certain degree of discretion in choosing the most appropriate mitigation and adaptation measures, albeit in strict compliance with the constraints arising from EU secondary legislation, and because their inaction can delay the achievement of climate objectives and contribute to undermining the overall efforts of the international community. This second phenomenon can be attributed to several factors that induce national governments to postpone the effective implementation of climate policies, such as resistance from part of the economic community, the technical difficulties associated with the energy transition, and the social costs of phasing out the production chain closely tied to the use of fossil fuels. (Naglieri, 2022).

Therefore, as highlighted, climate litigation can be considered the response of civil society, environmental NGOs, and citizens to the contradictions and rethinking of climate policies, so as to activate judicial review of state authorities' failures.

Climate litigation has succeeded, albeit with very different outcomes, in stimulating public debate and in inducing, in some cases, a strengthening of state initiatives for the stabilization and preservation of the climate.

The positive results of climate litigation can be appreciated from two perspectives: a) the legal clarification of climate obligations; b) public awareness in the face of climate change and civil mobilization, through strategic litigation.

II.1 The 'normative function' of climate litigation

First, we must recall the "normative function" of climate litigation, which refers to the courts' tendency to supplement regulatory provisions, particularly by clarifying, through an extensive or evolutionary interpretation, the scope of

obligations imposed on states or businesses, and also by identifying new and unprecedented forms of liability. In this way, judicial precedents are often set that compel climate action, reinforcing the constraints that limit and guide the exercise of public powers or the corporate strategies of large corporations. In this sense, the series of rulings that were adopted in the *Urgenda Foundation* case is particularly significant, in which, at the end of the legal process, the Dutch judges upheld the 2025 ruling of the District Court of The Hague, which ordered the Dutch government, on the basis of the latest IPPC reports, the Paris Agreement and scientific research, to reduce greenhouse gas emissions by at least 25% by 2020 compared to 1990 levels (Andrea Giordano, 2024).

Thus, where climate litigation has succeeded in encouraging jurisdictions to apply procedural rules in a manner consistent with the challenges posed by the climate emergency, judges have ended up integrating the legal framework for actions to combat climate change. Moreover, in relation to the system of dialogue between the Courts and the use of comparative law to outline the best models for the implementation of international obligations, the most advanced arguments and solutions adopted by some jurisdictions could also have an impact on other jurisdictions. (Carducci, 2025; Brian Preston, 2018)

II.2 Indirect or extra-trial impact

In all cases where plaintiffs' claims or appeals have been dismissed, due to a lack of legal interest, the inability to prove a causal link, or a judge's declaration of lack of jurisdiction, climate litigation can assume a "strategic" nature and have a significant impact on the consolidation of environmental democracy. The debate taking place in courtrooms allows for a focus on the gravity of the climate crisis and, beyond the judicial decision, influences public opinion, stimulates business behavior, and guides government policies by highlighting inefficiencies and delays.

Specifically, indirect and extra-trial impacts may include forcing companies to internalize the costs of climate externalities and avoid greenwashing practices to avoid reputational damage; or they may influence investors and financial institutions to divest from high-carbon assets due to climate risk, pushing them toward greener portfolios (Cass. civ. SS.UU. n. 13085/2024, published on July 21, 2025).

Furthermore, even before a climate case is concluded, they can push governments to adopt more ambitious climate policies, raising the level of climate regulation and protection, to avoid being convicted for violating existing environmental legislation.

Moreover, it should not be underestimated how climate litigation can help push climate change into public debate and media reporting, raising awareness of climate risks and legitimizing the authority of climate science in the public arena.

Last but not least, from the perspective of public participation — especially among its most ecologically aware and sensitive segments — in environmental decisions, climate causes can mobilize climate activism, allowing environmental commitment to be channeled into those economic policy choices or business strategies that are responsible for the air pollution that increases the greenhouse effect.

III. Challenges for the field of climate litigation

Climate litigation has been increasing over the past few decades, paralleling the worsening negative impacts of climate change (UNEP, 2025). This demonstrates that this is not a passing trend, but rather the most widely shared reaction in the environmental world to the inadequacy of climate policies, while respecting the very nature of the rule of law and thus the primacy of law.

However, the possibility of bringing a climate action for legal protection faces several crucial challenges, which affect and define the manner in which judicial review of climate policies can be exercised. There are several crucial issues regarding the scope of judicial review and the determination of government and corporate liability: a) it is necessary to define how the causal link between climate-altering emissions and specific environmental or health damage must be established with evidentiary relevance, including through the use of complex scientific evidence; b) procedural obstacles and difficulties, such as standing to bring an action, must be overcome; c) it is necessary to clarify the extent to which judges can influence, with their decisions, the powers of the government and parliament in the implementation of supranational climate law, by virtue of a revisitation of the principle of separation of powers; d) finally, it must be assessed whether climate litigation could be subject to a heterogenesis of ends, in the sense that the spread of legal actions could create a situation of legal uncertainty, capable of slowing down the ecological transition. (Sarah Kenenhan, 2023).

III.1 Prospective role of the judge

The most significant challenge facing climate litigation — and thus the possibility of achieving climate justice — is the changing role of the judge in the face of the climate emergency. According to many scholars, the judge can no

longer remain tied to a so-called “retrospective” approach, assessing damages and punishing perpetrators, but must adopt a “prospective” role, capable of preventing future harm and ensuring systemic change that can respond promptly to delays, inefficiencies, and failures, including those of political institutions. In this regard, it is essential for judges to safeguard intergenerational equity and thus recognize and protect the rights of future generations or the most vulnerable social groups, such as minors. Significant openings towards this perspective can already be found in current jurisprudence, such as the emblematic position of the German Constitutional Court in 2021 (*Neubauer v. Germany*, 2021), which ruled that the government’s climate law was unconstitutional because it placed the “burden of CO2 reduction” on the future, unfairly limiting the freedom of younger generations.

From this perspective, judges must assume a supplementary function — for some scholars, a “quasi-legislative” one — that involves, beyond mere interpretation of the law, the task of defining mitigation objectives or performance standards for governments, based both on the general principles of environmental and climate law and on the insights provided by climate science. Thus, the test of reasonableness, which concerns not only administrative acts (for example, planning) but also laws, should not be limited to the mere verification of strict proportionality between means and ends, but should also extend to assessing the actual adequacy of measures with respect to the climate emergency.

This expansion of decision-making powers and thus of the judge’s role, which requires moving beyond judicial deference to climate policy decisions, can only grow in light of the precautionary principle, according to which the lack of full scientific certainty regarding the correlation between dangerous activities and environmental damage should not be used as a reason to postpone measures that can reduce or limit environmental degradation and climate instability (Carducci, 2025 and 2021).

III.2. Implementation of decisions

In this highly advanced judicial landscape, another delicate and controversial aspect concerns the implementation of judicial decisions. Regardless of the challenges of establishing the causal relationship between climate-altering emissions, climate change, and environmental damage, in most contemporary constitutional systems, the principle of the separation of powers generally prohibits direct judicial interference in government or administrative activity, especially

if inaction or failure to implement supranational legal obligations is challenged. This does not affect the admissibility of financial liability for damages actually suffered by individuals as a result of the omission.

Nonetheless, even in this complex transitional phase, although the most significant transformations may require a constitutional amendment to regulate the relationship between the judiciary and the other branches of state, there is significant scope for action that can give the judge, while maintaining the current legal and institutional framework, an undoubtedly more impactful role.

Even a mere conviction or conviction, for example, can have a reputational impact, attracting the attention of the public or the international media, and can cause damage to the image of governments and companies, potentially influencing electoral consensus or the value of their shares on the stock market.

Furthermore, on a more strictly legal level, one could consider extending the *astray instrument*, present in various legal systems, which requires the debtor to pay a sum of money for each day of delay in fulfilling its obligations, not only where companies' failure to comply with climate commitments is contested, but in all cases where the inaction of public authorities in adopting complex climate protection measures required by supranational law is highlighted, which can be assimilated to irreplaceable obligations to *do so*.

However, the possibility of appealing to supranational courts remains fully operational in cases where a national government's judgment of conviction, which highlights a breach of international obligations, has not been enforced.

Bibliography

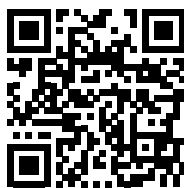
- American Progress. (2025). *How climate change and water and food insecurity drive instability*. <https://www.americanprogress.org/article/climate-change-water-food-insecurity-drive-instability/>.
- AP News. (2025, July 3). *Latin America's top human rights court says states have duty to act on climate crisis*. <https://apnews.com/article/be6ffb960ed9a55ccb72130c2790557c>.
- Asghar Leghari v. Federation of Pakistan*, PLD 2018 Lahore 364 (Lahore High Court, 2015). Retrieved from Climate Litigation Database. https://www.climatecasechart.com/document/leghari-v-federation-of-pakistan_80c5.

- British Institute of International and Comparative Law (BIICL). (2023). *Climate litigation in the Global South*.
- Bodansky, D., Brunnée, J., & Rajamani, L. (2017). *International climate change law* (online ed.). Oxford Law Pro. <https://doi.org/10.1093/law/9780199664290.001.0001>.
- Carducci, M. (2021). Cambiamento climatico (diritto costituzionale). *Digesto delle discipline pubblicistiche, Aggiornamento* 8, p. 51 ss.
- Carducci, M. (2025). Costituzionalismo ambientale e leggi della natura. *Federalismi*, www.federalismi.it, 12, pp. 23-36
- Carducci, M. (2025). Prima la natura. La svolta epistemologica nell'Opinione Consultiva n. 32/25 della Corte Interamericana dei Diritti Umani. *Diritti comparati*, in www.diritticomparati.it, 9 settembre 2025
- Cass. civ. SS.UU. n. 13085/2024, published on July 21, 2025. <https://www.giustiziainsieme.it/easyarticles/images/users/367/13085-24-1.pdf>
- European Commission. (2023). *Climate change and disaster risk reduction. Knowledge Centre for Biodiversity*. https://knowledge4policy.ec.europa.eu/biodiversity/climate-change-disaster-risk-reduction_en.
- European Commission. (n.d.). *Climate change and disaster risk reduction. Knowledge Centre for Biodiversity*. https://knowledge4policy.ec.europa.eu/biodiversity/climate-change-disaster-risk-reduction_en?utm.
- Fekete, A. (2024). Natural hazards and climate change impacts on food security and rural–urban livelihoods in Mozambique—A bibliometric analysis and framework. *Earth*, 5(4), 761–783. <https://www.mdpi.com/2673-4834/5/4/40>.
- Frontiers in Sustainable Food Systems. (2021). *Climate change, flood disaster risk and food security nexus in Northern Ghana*. <https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2021.706721/full>.
- Giordano, A., *Introduzione alla tutela del clima come bene comune*, Napoli, 2024.
- Human Rights Committee. (2022). *Daniel Billy and Others v. Australia (Torres Strait Islanders case)*, Communication No. 3624/2019, CCPR/C/135/D/3624/2019.

- Intergovernmental Panel on Climate Change. (2023). *Climate change 2023: Synthesis report*. IPCC. URL: <https://www.ipcc.ch/report/ar6/syr/>.
- Kenehan, S., Climate Change and Global Justice. G. Pellegrino, M. Di Paola (eds.), *Handbook of Philosophy of Climate Change. Handbooks in Philosophy*, Springer Nature, Switzerland, 2023, p. 1.
- Lliuya v. RWE AG*, Case No. 2 O 285/15 (2025). https://www.climatecasechart.com/document/luciano-lliuya-v-rwe-ag_dd33.
- Naglieri, G., Climate changes in Courts: different judicial approaches to government actions on cutting greenhouse emissions. Comparing Europe and America through selected cases. *DPCE online*, 4/2022, p. 1917 ss.
- Neubauer et al. v. Germany*, 1 BvR 2656/18 (Federal Constitutional Court [Bundesverfassungsgericht], March 24, 2021). https://www.climatecasechart.com/document/neubauer-et-al-v-germany_0a3e.
- Office of the United Nations High Commissioner for Human Rights. (2019). *Analytical study on the promotion and protection of human rights in the context of climate change* (A/HRC/41/21). United Nations.
- Peel, J., & Osofsky, H. M. (2018). A rights turn in climate change litigation? *Transnational Environmental Law*, 7(1), 37–67. <https://doi.org/10.1017/S2047102517000292>.
- Preston B., The Evolving Role of Environmental Rights in Climate Change Litigation. *Chinese Journal of Environmental Law*, 2, 2018, p. 131 ss.
- Rajamani, L., Jeffery, L., Höhne, N., Hans, F., Glass, A., Ganti, G., & Geiges, A. (2021). National ‘fair shares’ in reducing greenhouse gas emissions within the principled framework of international environmental law. *Climate Policy*, 21(8), 983–1004. <https://doi.org/10.1080/14693062.2021.1970504>.
- Thapa, S., Giri, S. & Ross, A.G. (2025) Extreme weather and climate-related adverse childhood experiences are a humanitarian crisis during the 21st century. *Communications Medicine*, 5, 357. <https://doi.org/10.1038/s43856-025-01089-x>.
- Tigre, M. A. (2024). *Climate litigation in the Global South: Mapping report*. Columbia Law School Scholarship Repository. https://scholarship.law.columbia.edu/sabin_climate_change/230.

- UNEP, *Climate change in the courtroom. Trends, impacts and emerging lessons*, in <https://www.unep.org/resources/report/global-climate-litigation-report-2025-status-review>
- UNFCCC. (1992). *United Nations Framework Convention on Climate Change*. <https://unfccc.int/resource/docs/convkp/conveng.pdf>.
- UNFCCC. (2015). *Paris Agreement*. United Nations. https://unfccc.int/sites/default/files/english_paris_agreement.pdf.
- Urgenda Foundation v. The State of the Netherlands*, ECLI:NL:HR:2019:2007 (Supreme Court of the Netherlands, 20 December 2019). <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:HR:2019:2007>.
- Verein KlimaSeniorinnen Schweiz and Others v. Switzerland*, Application No. 53600/20 (European Court of Human Rights, 9 April 2024). <https://hudoc.echr.coe.int/eng?i=001-231522>.

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