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Climate Change and Legal Theories

Abstract

Legal theory has always considered the historical relationship between climate and law according to four different lines of research: the influence of climate on political regimes; the social forms dependence of organization and regulation according to the type of energy used; the emergence of the issue of environmental sustainability as a consequence of the exploitation forms of nature; the conditioning of energy production systems on the qualification of space and legal categories (§ 1). With the climate emergency, new challenges have arisen. The first concerns the planetary space of the emergency phenomenon. In particular, the problem arises on two fronts: the relationship between the definition of the space of the climate system and the spatial concepts of the individual legal systems (§ 2); the relationship between state sovereignty over natural resources and the planetary character of climate stability (§ 3). But the climate emergency is also a matter of urgency, therefore of time. This situation undermines the linear representation of legal processes (§ 4). Unpublished scenarios open up in speeches on human rights, which foreshadow the emergence of the human right to a stable and safe climate (§ 5), and on democracy, whose deliberative and representative functions appear dysfunctional with respect to the times and space of the climate emergency (§ 6). The most recent legal practices try to react to these difficulties in three ways: through the so-called "climate change litigations strategies"; by promoting the rights of nature in the Constitutions or other legal sources; with the hypotheses of construction of transnational juridical infrastructures consistent with the logic of "planetary boundaries" (§ 7).

Keywords: climate change law; climate emergency; tragedy of the horizon; metabolic rift; status oecologicus; tornado politics, weather-world.

Introduction

Climate change is debated by the legal theory from four perspectives. These perspectives can be respectively classified as: formal, substantial, epistemological and axiological.

The formal perspective includes all the analyzes about the sources of international climate law, starting with the United Nations Framework Convention on Climate Change (UNFCCC) dated 1992. In fact, the UNFCCC is an international legal instrument with a dual content: by one side it provides legal definitions based on science, identifies objectives and establishes the principles and obligations of States (see *Preamble* and articles 1-6); on the other side, it enables (with article 7) the so-called Conferences of the Parties (COPs), a multilateral process of producing further State objectives and obligations, which integrate the Convention. Furthermore, the formula of art. 2 *«any related legal instruments that the Conference of the Parties may adopt»* allows COPs to create new rules and even new sources of law, which are added to the Convention itself. The Convention, therefore, is not only a dynamic legal document but also a multiplication of rules (Boran 2020), to be interpreted on the basis of both Vienna Convention on the law of treaties of 1969, and the Constitutions of the States that signed it, to the extent in which the Constitutions contain themselves principles, rules and obligations that are consistent and compatible with the international ones (Carducci 2021).

In the substantive perspective, there are the legal theories that discuss about the consequences that the phenomenon of climate change produces on the formants (normative, jurisprudential and doctrinal) of state constitutional systems. This field includes studies on climate mitigation and adaptation policies (Hollo et al. 2013), those on the law of climate disasters (Lyster and Verchick 2018) and those about the legal nature of causality, damage and climate responsibility (in terms of both Responsibility and Liability) (Mechler et al. 2019). Research on "climate change litigation strategies" and their function of promoting climate mitigation (Sindico and Mbengue 2021) from the bottom can also be inserted in the same context.

The third perspective has an epistemological character. The knowledge of the legal problems linked to the climate change requires an understanding of the principles of thermodynamics and above all the mechanism of entropy. With thermodynamics, epistemology (with the fundamental contributions of Ilya Prigogine, Murray Gell-Man, Edgar Morin) has abandoned the reductionism of a Cartesian matrix and the representation of the world as a product of cause and effects, to open up to the discovery of complex interactions and reciprocals of matter and energy. This awareness has not fully involved scholars of the social sciences, particularly in the fields of economics and law. It is only from the second half of the twentieth century that thermodynamics principles have been studied to verify, thanks also to Heisenberg's "uncertainty principle", the physical-natural limits of the economic and legal organization models, inherited from modernity (with the ideas of unlimited growth of goods and ever new rights). This type of interdisciplinary approach is due to authors such as Nicholas Georgescu-Roegen, for economics, and Joachin Herrera Flores, for legal theory. Their contribution, however, did not shake the ontological and reductionist dualism of the majority of jurists. In legal systems, the double separation still persists between the physical-chemical universe ("things" and

"goods") and the human universe (will) and between human relations and the rest of the planet Earth, in the asymmetry between the (short) time of human action and (unlimited) time of terrestrial thermodynamics. The climate emergency has definitively denied these dualistic narratives: the emerging behavior of instability of the whole climate system and of all its components (atmosphere, biosphere, hydrosphere, cryosphere, lithosphere) involves and compromises all flows of matter and energy, including the energy/matter of which any human being is composed. The very concept of the Anthropocene reflects this awareness. Not coincidentally, the debate on the Anthropocene and the climate emergency has led to the maturation of new research programs focused on the relationship between law and the use of climate sciences (Greco 2021), on the legal and political significance of the appropriation of the atmosphere through emissions of CO_2 and on the consequences in terms of equity and justice in the effects of global warming (Folkers 2020), on the need to build legal infrastructures and planetary governance tools, capable to provide planetary answers to the unitary and systemic problem of climate change (Kotzé and Kim 2019).
Finally, the axiological perspective discusses the relationship between climate change and human rights, democracy and theories of justice (Brown and Taylor 2015).
The classification into four perspectives appears very simple and clear. However, it is not easily identifiable in reality. The world debate on climate change and law crosses all perspectives, emphasizing some elements rather than others. Consequently, exposing them in separate single "blocks" would sacrifice in any case to offer an incomplete representation of each theory.
On the contrary, it is important to note that all four perspectives have in common, in an implicitly or explicitly way, two elements: knowledge of the historical evolution of the relationship between law, energy and climate; consideration of the consequences of the planetary climate emergency on the legal categories of time and space.
Therefore, it is worth starting from these two observations, to frame all the legal problems connected with climate change.

1. The historical relationship between climate, natural resources and law

The cultural history of climate has analyzed the relationship between climate and the human organization of society, with particular reference to the intellectual representations of atmospheric phenomena.
Instead, legal and political theory has considered the relationship between climate, natural resources, climate change and law within four different lines of research of "Global History": the influence of climate on political regimes; the dependence of the forms of social organization and regulation according to the type of used energy; the emergence of the theme of environmental sustainability as a consequence of exploitation of nature forms; conditioning the energy production systems for the qualification of space and legal categories (Greco 2021).
The last two perspectives are particularly interesting.

The studies of Marquardt and Sieferle (Sieferle and Marquardt 2009) allow to divide the global history of law into energetic eras. Each of these eras has been characterized by different modes of interaction between places-legal relations-ecosystem functions-flows of matter and energy. The modes of production and distribution of goods as well as the contents of freedoms and related legal regimes depended on them. Human use of energy, therefore, has not simply interacted with the climate system. It has also changed over time the eco-dependence of human action from nature and has altered the energy return of freedoms, that is the relationship between the energy necessary for the concrete exercise of freedoms and the sources available to maintain it.

In the "Paleolithic" era law, humanity, living mainly by gathering and hunting to survive, favors the natural cycles of ecosystemic goods, resources and services, adapting to them (for example the discipline of work and rest, compared to day and night for hunting, or nomadism). Consequently, the human subject operates as a simple "ecosystem consumer" subordinated to nature.

In the era of "bio-chemical" law, humanity learns to practice agriculture and pastoralism and therefore can reproduce and transform natural resources and assets. The human subject is transformed into an "ecosystem producer", being no longer just a "consumer." However, agricultural goods and livestock are perishable goods, to be cared for and preserved. Consequently, the human function is still subordinate to nature.

In the "fossil age", on the other hand, humanity discovers new natural resources (the so-called "subterranean forest"), not used to survive, as they can neither eat nor drink, but allowing unprecedented processes of energy transformation. The human subject evolves into an "ecosystem manipulator" of nature. It definitively emancipates itself from biochemical nature and produces goods of direct or indirect fossil derivation, with a use and exchange value higher than even the primary subsistence goods. Ultimately, fossil energy has dissociated the human being into two asymmetrical dimensions: the consumable one and the natural survival one, within a growing differentiation between basic human needs, which remain eco-dependent - eating, drinking and reproducing like *Homo climaticus* (Campillo Álvarez 2008) - and artificial needs for exchange and consumption - as *Homo consumens* (Bauman 2007).

During the twentieth century, the constitutional freedoms were transformed by this dissociation and the Welfare State was also built on it. In other words, social well-being (to be maintained or promoted, depending on the context) was "based on carbon" and on overcoming thermodynamic constraints through law, as explained by Timothy Mitchell, Andreas Malm, Jeremy Rifkin and Michel Serres, that is, achieved through a unprecedented geophysical-constitutional experiment that at the same time consumed, within a few generations, resources accumulated in the subsoil in the previous millions of years, and then released increasing quantities into the atmosphere in the form of pollution, global warming and climate change (Greco 2021; Pirani 2018). Research on "social metabolism" and "bio-economy" has proven this scenario: fossil energy has always promoted freedoms as "material" opportunities (in terms of "progress", "development", "growth", "emancipation", "social cohesion"), but, on the other, it has caused increasing entropy in the Earth

system, as fossil resources are exhaustible and have a negative impact on the Earth system.

Several studies have confirmed this. Four very recent ones are mentioned: the one on the so-called "equation of the Anthropocene"; the reference to the "consumptagenic" nature of the contemporary social subject; the reconstruction of the energy consumption necessary for social well-being in recent decades; the prevalence of anthropomass over biomass (Greco 2021).

The "Anthropocene equation" has made it possible to measure the pressure of growth and maintenance of human well-being on the physical and chemical cycles of the Earth, demonstrating how that well-being has become, in the span of less than a century, quantitatively prevalent and totally dominant over any natural process, due to fossil resources.

The second observes how the material autonomy of access to rights and freedoms has conditioned civil coexistence, channeling it towards lifestyles based on the growth of material consumption, for this reason they can be called "consumptagenic", increasingly predominant with respect to basic survival needs.

The third shows that, in the last seventy years, human activities have exceeded the energy consumption of the previous 11,700 years, largely thanks to the use of fossil fuels.

Finally, the fourth verifies the weight of the production of material goods, necessary for human consumption, on the biomass of the entire planet Earth.

Only the recent Andean Constitutions of the "Buen Vivir" (not by chance of indigenous origin, therefore pre-fossil) express an attempt to overcome this vicious circle, abandoning the myth of the Welfare State in function of attempts to legitimize the "Caring State" and the so-called "post-development".

However, the phenomena of pollution and anthropogenic CO_2 emissions have highlighted another problematic feature of the fossil era of law: the qualification of space and legal entities according to energy production systems.

The evolution of law is a history of appropriation of spaces. Think about the reconstruction of the "Nomos of the earth" by Carl Schmitt (Schmitt 1950). In this perspective, constitutional power has been nothing more than an "ecological" power (Folkers 2020), that is to say, delimiting the space for the appropriation of natural resources, even before that of subjects. This "ecological" power has characterized above all the Western legal tradition, producing an order of space, structured on two different relationships: a place of physical objects, in relation to the human being, and a place of exclusively human relations, distinct from physical reality. The distinction thus created a separation between the order of natural things and the order of social relations.

With the use of fossil energy, it has extended to the atmosphere, identifying it as a new territory for the conquest of the "ecological" power of Western law through anthropogenic CO_2 emissions.

This representation of all the dimensions of the climate system has generated further consequences in the relationship between law and earth system: just think about the division between private law (as an order of relations between human beings and things) and public law (as an order of relations between human beings in the dialectic of freedom and power); between soil and subsoil in the regulation of property rights; between political freedoms and economic freedoms. It was also the

basis of the Hobbesian conception of "public goods" ("public goods" are powers of human beings towards other humans and towards things: security, justice, peace, war, etc.).
However, it was not known from other legal traditions, from Islamic to "chthonic" (Glenn 2000). For this reason, it has fueled the so-called "epistemic extractivism", or better said the imposition of Western "ecological" power on other ways of human coexistence in the earth system (Folkers 2020). The formal enunciation of this "epistemic extractivism" is contained in art. 22 of the "Covenant" of the League of Nations dated 28th June 1919. Here it is what we read: «*To those colonies and territories which as a consequence of the late war have ceased to be under the sovereignty of the States which formerly governed them and which are inhabited by peoples not yet able to stand by themselves under the strenuous conditions of the modern world, there should be applied the principle that the well-being and development of such peoples form a sacred trust of civilisation and that securities for the performance of this trust should be embodied in this Covenant. The best method of giving practical effect to this principle is that the tutelage of such peoples should be entrusted to advanced nations who by reason of their resources, their experience or their geographical position can best undertake this responsibility, and who are willing to accept it*».
During the twentieth century, the numerous economic and institutional theories on the so-called underdevelopment, dependence, the sovereignty of natural resources and sustainable development were continuously elaborated on this original matrix of Western law (Greco 2021).

2. The climate system in the legal theory

Climate is not object of a specific legal definition. The UNFCCC defines the climate change «*a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods*» (art. 1.2) and the climate system «*the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions*» (art. 1.3). It also specifies that the Convention's objective is «(the) *stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system*» (art. 2), and recognizes climate change and its adverse effects as «*common concern of humankind*» (Greco 2021).
These linguistic formulas are both denotative and connotative, since, on one hand, they identify the "space" of the climate system, but on the other hand they negatively qualify the "effects" of anthropogenic greenhouse gases as a "common concern". In EU law, the UNFCCC formulas have recently been integrated and updated by art. 2 of the EU Regulation n. 2020/852 dated 18th June 2020.
Legal theory uses the linguistic constructions referred to in various ways.
Some theories disregard this, to frame the climate within the category of "Global Commons" (Boran 2020), in which it concerns the classic "tragedy" of access and use without reciprocal damage. This perspective tends to confuse the climate with the climate system. In fact, the climate cannot be appropriated, being a variation of

the temperature over time. On the other hand, all the components of the climate system can be appropriated and, in particular, the atmosphere, the only space for the effective release of greenhouse gases (Vanderheiden 2008). Consequently, the possibility of resorting to the category of the "tragedy of the Commons" can only be attempted with regard to the components of the climate system, not the climate itself.

In fact, other orientations use the category of "Commons" in a critical perspective, to demonstrate the limits of the dominant point of view of the governance of climate change, entrusted to international agreements among States (Boran 2020). The solutions from above do not allow to solve all the problems related to the use of different resources present in the local contexts of the climate system: from soil to water services, biodiversity, ecosystemic vulnerabilities, etc ... Also for this reason, the agreements on the climate would tend to fail. On the contrary, the involvement from below of local actors in different territorial contexts, framed as "Commons", would favor processes of knowledge of the single territories with cooperation and mutual accountability in the fight against climate change (Paavola 2012).

Other scholars reduce the normative constructions of the UNFCCC to a system of state imputation of CO_2 emissions and of differentiation of responsibilities always between States, even if climate change is legally attributed to any human activity, which, independently content, contributes directly or indirectly to global warming (see art. 1.2 UNFCCC). Therefore, even these interpretations do not seem to consider the concrete articulation of the climate system.

Another interpretation underlines the transformation of the legal nature of CO_2 from a simple phenomenon of anthropogenic emission, as indicated in the UNFCCC, to a resource legally identified as scarce, due to the new contents of the 2015 Paris Agreement (McKinnon 2015). The commitment to keep the global average temperature increase below 1.5°/well below 2°C compared to pre-industrial levels has in fact imposed a quantitative legal limit on emissions into the atmosphere with respect to the time required to achieve the climate stabilization and the emission reduction objectives indicated by international, supranational and national legal instruments (2030 and 2050). Think, for example, about the EU Regulations nn. 2018/842, 2018/1999 and 2021/241, which define binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement.

This limit is generally calculated using the formula of the so-called global carbon budget, that is the quantity of greenhouse gases that can still be emitted without exceeding the aforementioned quantitative and temporal limits.

In fact, the new constraints and objectives of the Paris Agreement raise important questions on two fronts: that of the differentiation of the responsibilities of States; that of the qualification of emissions with respect to the human activities that produce them.

The first group of questions can be summarized as follows: how to distribute the carbon budget among the different States? Is it possible to subtract the historic emissions of the States from the residual carbon budget, in order to distribute the remaining emissions fairly? How to calculate the mitigation and adaptation costs of the various States, compared to the losses and damage suffered by climate change

caused by previous historical emissions? These questions also include global equity issues, as required by the UNFCCC and the Paris Agreement (Greco 2021).
The second group of questions refers to the issue of the existence or not of a "right to emit" greenhouse gases into the atmosphere (Boran 2020), given that the UNFCCC does not prohibit it, and the possibility of differentiating emissions, object of this "right", in "survival" and "luxury" (Boran 2020) in order to define a fair allocation of emissions not only between States but also between types of human activities (precisely of "survival" or "luxury"), divide the mitigation costs into the rope of this allocation and possibly tax the "unnecessary" anthropogenic emissions (Schlosberg 2007).
These questions appear unprecedented. However, their origin can be traced back to the human history of the appropriation of climatic space. It was the geopolitics of the climate system that laid the foundations for those asymmetries and inequalities between human activities, which then had repercussions on the evaluation of "rights to emit". Initially, the appropriation of the climate system has invested its horizontal dimension of biosphere, hydrosphere, cryosphere and lithosphere. From the "conquest" to the colonial empires, geopolitics has produced asymmetries and inequalities exclusively in relation to the horizontal space of the Earth, both with reference to human subjects (just think of the slave trade and slavery) and with regard to natural resources (just think extractivism and land grabbing). With the industrial revolution and the fossil era of law, geopolitical appropriation has become vertical within the atmosphere. Emitting anthropogenic greenhouse gases through the large-scale combustion of fossil fuels has meant appropriating the atmospheric space in its molecular structure (CO_2, CH_4 etc ...), creating a real vertical colonization effect of the climate system, which has been added to previous horizontal colonization of the earth.
The climate system, therefore, has always been a space politicized by human action. With the verticalization caused by anthropogenic emissions, this politicization is enriched by three new elements (Greco 2021; Folkers 2020).
1. Unlike the horizontal one, atmospheric politicization is not delimitable in any way, as the thermodynamics of global warming and climate change is planetary, as shown by the scientific descriptions of "planetary boundaries", of the "safe operating space", of the "feedback loop" and of the "global tipping points". Thus, the appropriation of the atmosphere projects vertically, but causes horizontally extending effects on any other part of the climate system.
2. Humanity as a species participates in the politicization of the atmosphere, but with qualitative and quantitative differences in the attribution of emissions, from both an individual point of view (think of the distinction between emissions from economic activity and those from consumption activities, cultural, tourist etc ...) and geographic (emissions in countries where fossil resources are extracted, such as the rentier States, emissions in the countries of production of export goods, emission in the countries of import and consumption of those goods).
3. The negative effects of this politicization do not consist only in global warming which occurs everywhere, regardless of the geographical origin of the emission and the identity of the human action that caused it. They involve the chemical composition of the atmosphere and of all the other components of the climate

system, multiplying the imbalances of the horizontal and vertical space of the Earth and of all the human subjects who live there.

In this new scenario, the sphere of human justice no longer corresponds to a horizontal political space, artificially delimited by law. It coincides with the entire natural space of the climate system, definitively politicized even in its last dimension: the vertical and atmospheric one "conquered" by anthropogenic emissions (Caney 2012).

The denomination of the climate as "hyper object" underlines this new space-temporal collocation of the human condition, difficult to understand through the traditional heuristics of empirical observation (Morton 2013).

The overall consideration of the climate system as the only space of atmosphere, hydrosphere, cryosphere, lithosphere and biosphere produces further legal consequences.

Within each individual State, the holder of the public function of protecting the climate system (as indicated by the UNFCCC) can obviously only be the State itself and therefore its organs, given that the State holds not only territorial sovereignty but also permanent sovereignty over natural resources (Greco 2021). This is recalled by various sources of international law, including articles 1 and 2 of the Chicago Convention of 1944 and the International Law Commission, a permanent subsidiary body of the UN, in the document First Report on the Protection of the Atmosphere (A/CN.4/ 667), of February 14th , 2014. This function of protection and custody works for the exclusive benefit of humanity, i.e for the well-being, freedoms and rights of each one, as stated in the UNFCCC (*Preamble* and art. 3) and is confirmed by countless sources including art. 25.1 of the "Universal Declaration of Human Rights of the UN" of 1948, the UN Resolution 1803 AG of 14.12.1962, Principles 1 and 21 of the "UN Declaration of Stockholm 1972 on the human environment" (inserted in the *Preamble* of the UNFCCC), and above all art. 1.2 of both the "UN Covenant on Civil and Political Rights" and the "UN Covenant on Economic, Social and Cultural Rights", both from 1966.

Evidence on the correspondence between the custody of territories and resources, on one hand, and the well-being of people, on the other, also comes from EU law (cf. on the relationship between Chicago Convention of 1944 and sources on climate change, and the Court of Justice of the EU case C-266/16, opinion Advocate General Wathelet, on the matter of sovereignty over natural resources).

Therefore, the State and its organs are subject to the duties of protecting the climate system, corresponding to the territory of its sovereignty. Within the law of each State, this duty is regulated differently, but the purpose of protection is always the same: the safeguarding of spaces in function of the protection of human beings. Think of the American doctrine of the Public Trust, art. 225 of the Brazilian Constitution, art. 20a of the German Basil Law, art. 2051 of the Italian Civil Code or art. 714 of the French Civil Code (Greco 2021).

In conclusion, the climate system contains a series of productive elements of qualifications and effects, subject to legal discipline.

3. State sovereignty and "planetary boundaries"

As we have seen, climate change is described as a "common concern of humanity". This means that the problem of climate change is identified in a planetary humanitarian projection, not reducible only to specific subjects, interests or rights. For this reason, some argue about the need to recognize the existence of a "human right to a healthy planet" ("one Planet on Right initiative" 2021), while others propose to build a real "Earth system law" (Kotzé and Kim 2019). The planetary logic of legal discussion about climate change is confirmed by science, in particular with the approach of the "planetary boundaries" and the "Safe and Operating Space" (S.O.S.). Identifying and quantifying planetary boundaries not to be crossed with helps to prevent human activities from causing irreversible changes in the thermodynamic stability of planet Earth, even when these activities are locally legitimized by the law of States. It also makes possible to verify whether the social welfare objectives of the States are compatible with the thermodynamic equilibrium of the Earth system. Therefore, the planetary scenario also highlights the dysfunctionality about the concepts of political and territorial unity of state sovereignty with respect to the thermodynamic unity of the climate system. This dysfunctionality undermines some foundations of international law and of individual States. The finding concerns, in particular, about state sovereignty over natural resources, environmental law and the Tort Law. The legal category of the permanent sovereignty of people and States over their natural resources is imposed in the second half of the twentieth century, for two reasons (Banai 2016): to strengthen national self-determination after decolonization, allowing the territory to be freed from property rights of foreign investors and States, acquired during colonial rule; to promote the exploitation of nature for local economic development. In other words, it did not pursue environmental objectives of nature conservation, but the opposite (Brilmayer and Klein 2000-2001).

Climate change is forcing the States to redefine this perspective. In fact, it poses the classic "dilemma of common aversions" to all States (Weiss and Burke 2011). All them have a common interest in avoiding the catastrophic consequences of global warming and climate change. In this perspective, state territory and nature should no longer be conceived as objects of national selfish interests. They should become tools for achieving the stability of the whole planet and therefore of each State. Ultimately, sovereignty over resources would become the object of a "reflective" global interest. Since the security of state resources derives from the security of the whole planetary space. Only global cooperation between States would make it possible to realize the common goal for the benefit of each one's national interests. However, this need for cooperation is contradictory, for three reasons. First, it still depends on the sovereign will of each State and therefore remains captured by the economic, political and strategic interests of the State, even in the short term. Secondly, it must be taken into account the different historical contribution of individual States in anthropogenic emissions. This difference prevents us from qualifying in a unitary and homogeneous way not only the state responsibilities towards the thermodynamic stability of the entire planet but also the relationship between the national exploitation of natural resources and the level of economic and

social development of the individual States. Third and lastly, the management of climate change is not only in the hands of States.
Global actors such as multinational companies, investment bank, international and supranational organizations are involved in climate governance directly or indirectly. The State is conditioned by these dynamics.
Consequently, the category of state sovereignty over natural resources remains dysfunctional with respect to planetary needs. A similar dysfunction is also reported with reference to state environmental law. Climate change is not a simple environmental problem. It identifies a multidimensional and systemic reality, which involves all human actions and their interconnections.
On the contrary, environmental law is built only on the evaluation of single or cumulative impacts of certain human actions and on compensation for damage as the only tool to repair the ecosystemic imbalances of the territory. In this regard, the IPBES, in its *Glossary*, speaks of "Institutional Fail": *a)* legal, given that the regulations simultaneously provide mechanisms to support damage (such as fossil subsidies) and methods of its repression (such as "the polluter pays"); *b)* market, since all economic activities activate production and consumption in the constant of negative externalities, social costs and transaction costs related to climate change; *c)* organizational, deriving from information and relationship asymmetries between the different actors (public, companies, regulators), involved in the "trap of institutional complexity" (the complexity of the micro decisions that contribute to the negative macro effects (Bolognesi and Nahrath 2020); *d*) informal, dictated by the loss of trust in institutions due to the inconclusive negotiations based on the presumption that economic and ecological interests are equally balanced and expendable. UNEP, UNDP and EU have studied specific profiles of the manifestation of this failure. However, with regard to the phenomenon of climate change, the detectable insufficiencies of environmental law deserve to be observed on two further levels: the one within the environmental discipline itself, which can fail in terms of compliance, implementation, enforcement, efficiency, efficacy and effectiveness (Carducci et al. 2020); the external one, consisting in the fact that environmental law does not deal with climate change from a planetary perspective. In particular, from the literature that analyzed this last profile, at least the following four recurrent limits stand out: *a*) the "chronic disturbance" on ecosystems, due to the sum of impact assessments, regulated by law for separate space-time sectors (obviously functional to the times and places of the intervention interests of human action), in the impossibility of an integrated analysis of the medium and long term; *b*) the "tyranny of small decisions", denounced by William E. Odum, consisting in the fact that the law segments the biospheric reality (with related attributions of matters, competences and sectoral balancing), separating it from other terrestrial interactions; *c)* the "tyranny of localism", based on the presumption that participatory local legitimation satisfies knowledge of planetary perspectives; *d)* the imitative or bureaucratic reproduction of rules and procedures for assessing environmental impact, indifferent to the complexity of the biodiversity of places and the interconnections between all the components of the climate system (Greco 2021).
On the other hand, climate change represents a complicated challenge due to the widespread nature of both: the causal responsibility of atmospheric changes from greenhouse gases and the distribution of impacts on the climate system. Climate

change has no borders and involves all the elements of the planet Earth, none excluded. This planetary characteristic explains the difficulty of framing the phenomenon within the juridical categories of causality, tort and damage.

First, the causal chain between global warming and climate change is not linear. It does not consist of individual behaviors, events and consequences. Thermodynamic causality is intertwined by innumerable variables and by the feedback loops of the various components of the climate system.

The UNFCCC formalizes some elements of this causality. More specifically, the Convention defines four levels of causality, indicated in the *Preamble* and in art. 1. The first level derives from the human activities of greenhouse gas production. These activities are believed to have already «*substantially increasing the atmospheric concentrations of greenhouse gases*», causing the first negative effect: the alteration of the natural greenhouse effect. The second causal link depends on it: «*an additional warming of the Earth's surface and atmosphere*», which, in turn, causes climate change that operates «*in addition to natural climate variability*». Finally, global warming and additional climate change are identified as a negative influence on "natural ecosystems and humankind", with "«*natural ecosystems and humankind*», with «*significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare*». The negative influence, so defined in 1992, was updated in 2015, with decision no. 1/ CP21 of the UNFCCC, and has been elevated to an «*urgent and potentially irreversible threat*».

Within this causal chain, the UNFCCC does not offer a definition of the corresponding damages. Art. 8 of the Paris Agreement introduces the formula «*loss and damage*», distinguishing between those «*associated with the adverse effects of climate change, including extreme weather events and slow onset events»* and those «*associated with climate change impacts*». There would seem to exit two types of damage manifestations, such as effects directly caused by climate change and negative indirect effects caused by impacts resulting from climate change. Among other things, this differentiation would now seem to be confirmed also by articles 3 and 9 of EU Regulation n. 2020/852, in the part which identifies the six «*environmentally sustainable*» necessary to achieve the 17 SDGs of the UN 2030 Agenda and, above all, to combat climate change. In fact, these articles define «*environmentally sustainable*» economic activities that simultaneously satisfy a double condition: contribute "substantially" (therefore directly) to the achievement of one or more of the six environmental objectives; do not "significantly" (therefore indirectly) damage any of the remaining targets (so called DNSH). With the EU Regulation n. 2021/241, this design has also been extended to state policies.

In any case, neither the "loss and damage" formula of the Paris Agreement nor those of articles 3 and 9 of EU Regulation n. 2020/852 coincide with the category of environmental damage, understood as a single event that has already occurred as a result of a specific action, or with those of tort, governed by different legal systems. The concrete contents of climate damage are constantly evolving and depend on the progress of scientific knowledge (Greco 2021). In other words, the identification and attribution of certain impacts to global warming or climate change is reserved for science. This determines the mismatch between legal categories and scientific explanations. Just think about the difference between empirical evidence and

scientific evidence of the damage, which can be explained by the fact that the delayed time frame of visible confirmation of the consequences of climate change, determined for example by thermal phenomena, does not make the causal chain disappear. But an analogous observation can be made regarding the geographical diversification of the manifestations of the damage (less evident in mid-latitude countries, directly perceptible in the tropics), which does not for this reason express different levels of severity of the phenomena.

Moreover, the establishment of the Intergovernmental Panel on Climate Change (IPCC), wanted by the States, has been read as an international formalization with the approach of the "science first" to politics and climate law (Howe 2014). In this perspective, the IPCC can be framed within art. 31.2 letter b) of the Vienna Convention on the Law of Treaties: «*any instrument which was made by one or more parties in connection with the conclusion of the treaty and accepted by the other parties as an instrument related to the treat*».

In fact, the IPCC defines the detection and attribution of climate change activities: «*Detection of change is defined as the process of demonstrating that climate or a system affected by climate has changed in some defined statistical sense without providing a reason for that change. An identified change is detected in observations if its likelihood of occurrence by chance due to internal variability alone is determined to be small*»; Attribution is «*the process of evaluating the relative contributions of multiple causal factors to a change or event with an assignment of statistical confidence*» (Bindoff et al. 2013).

In conclusion, the IPCC science reservation conditions the legal qualifications of harm and tort. Not surprisingly, the reference to science is also suggested by the "Oslo Principles on Global Climate Obligations" and by arts. 6-9 of the "Model Statute for Proceedings Challenging Government Failure to Act on Climate Change" (2020) of the International Bar Association.

The centrality of science is also the basis of the precautionary principle, contained in art. 3.3 of the UNFCCC. It is a very detailed rule, whose deontological elements cannot be evaded by decision makers: «*The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties*».

Its contents anticipate the holistic approach that was later recognized by the 2015 Paris Agreement (art. 6.8) and by the aforementioned EU Regulation n. 2020/852.

In practice, the climate precautionary principle must be read in a triple perspective: that of mitigation; that of the definitive stabilization of the climate system, required by art. 2 of the UNFCCC; that of the evolution of scientific knowledge and of the objectives based on the legal instruments introduced by the various COPs. After the Paris Agreement and the IPCC Special Report of 2018 "Global Warming of 1.5°C",

the climatic precaution is supplemented by two new legal elements: the quantitative one limiting global warming between 1.5°C and well below 2°C compared to pre-industrial levels (art. 2); that of the time within which to achieve the thermodynamic equilibrium of the planet (art. 4). In EU law, these two elements are specified by further sources, such as Regulations nn. 2018/842, 2018/1999, 2020/852, 2021/241.
Furthermore, the level of scientific certainty around the effects of climate change, and not only around its causes already defined by the UNFCCC, moves away with the legal approaches to prudential risk assessment, based on the classic distinction between "false positive" (eg accepting liability for a non-existing risk) and "false negative" (eg denying liability for a real risk) (De Jong 2018). Planetary and local climate risks are now out of the question.
This means that the systemic dimension of climate change requires a proactive law approach, different from the reactive one of the traditional Tort Law (Greco 2021).

4. Tragedy of the horizon and metabolic rift

Despite all the complexities described, in the disciplinary mentality of legal rationalism, the components of the climate system are almost always presented and discussed separately from each other (Bosselmann 2010). In this perspective, the problems posed by climate change are addressed to single aspects, rather than as a whole, and the climate emergency itself is interpreted as the sum of distinct, independent and overlapping emergencies. On the contrary, the criticalities are inextricably linked to each other for three reasons: they all influence each other; all are caused by human action; all affect the thermodynamic stability of the planet Earth.
The global initiative called "Scientists' Warning" (https://www.scientistswarning.org/) promotes a unitary understanding of the planetary emergency, presenting it as an ecosystemic (Ripple et al. 2017) and climate (Ripple et al. 2020) emergency.
What does this unity mean from a legal theory point of view?
Generally, legal scholars classify any emergency, including environmental ones, based on four characteristics, directly or indirectly related to the concept of exception. In fact, these would be temporary, sudden and unpredictable events, not necessarily attributable only to human action (otherwise they would be classified as "illegal conduct"); non-transformative of human coexistence (after the emergency, one returns more or less to the previous "normal" situation).
In the face of temporary emergencies, risk management and exceptional powers can be discussed.
The ecosystem and climate emergency is none of this.
Rather than a temporary event, it identifies a planetary condition of irreversible and pejorative critical processes (think, for all, of "global tipping points"); rather than "unpredictable", it has been predicted in various ways for decades; rather than not attributable to human action, it has a prevalently anthropogenic origin; instead of non-transformative, it works exactly the opposite, towards a future no longer analogous to the past of all human history.

In such an unprecedented situation, it no longer makes sense to discuss of individual "risks". The whole world is in danger everywhere and in all components of the climate system. This is why the UNFCCC, in 2015, defined the climate change as a "potentially" irreversible "threat". But not only. The UNFCCC, also in 2015, further stigmatized this "threat" as "urgent".

The time factor adds to the unprecedented nature of the planetary emergency. We have little time to stabilize the Earth's thermodynamic system, otherwise the worsening consequences of climate change will no longer be controllable.

Science has translated this intertwining with time using the mathematical formula E = R *x* U: that is, the emergency derives from the increased risk (R) in the urgency (U) of the limited time available (Lenton et al. 2019). But the new scenario is also described with the formula "Tragedy of the Horizon" (Bolton et al. 2020).

This time factor of the ecosystem and climate emergency conditions all the legal systems of the world on three fronts.

The first front concerns the mismatch between the timing of decisions and the timing of the catastrophic effects of climate change. In fact, the "horizon" of the latter does not coincide with that of the economic and political decision makers. The time cycles of the real economy, financial economy and political action are short if not very short. On the contrary, the catastrophic effects are produced slowly but surely. Consequently, the "tragedy" could consist in making future generations pay for the current absence of decision-making mechanisms adapted to the long timescales of climate effects.

Furthermore, climate stability should be seen as a global asset on a par with financial stability and global trade. This means that it should be removed from the contingent electoral interests of political majorities and from the lobbying of corporations involved in fossil emissions. However, here too the "tragedy of the horizon" emerges.

On one hand, there are no permanent institutions dealing with climate stability with autonomous powers independent of political dialectics and economic interests, and this is the "tragic" fact. Moreover, the impossibility of this independence is made evident by the phenomenon of the so-called "carbon leakage": the relocation of carbon emissions by multinational companies, according to the degree of severity and rigor of the States' climate policies.

On the other hand, then, the time "horizon" imposes urgency discouraging the experimentation of new organizational models, dealing with issues that are no longer exclusively human, such as financial and commercial, but ecosystemic ones. Hence the phenomena of path dependency, often qualified in terms of "carbon lock-in", that is, the decision-making inertia of political-energy systems based on fossil fuels.

We are faced with a real final game, where a quantitative result to protect all components of the climate system (keep the global temperature increase no more than 2°C) must be achieved within the time frames suggested by the science (reduction of emissions by 2030 to achieve climate neutrality by 2050 and final stabilization by 2100), with contents that are also final (such as, for example, the irreversible decarbonization of the economy).

The traditional and rational chronopolitics of institutions, based on the quadrinomial forecast-planning-action-execution, is disoriented and displaced. The law can no longer control the time factor in the ways experienced up to now (Lazarus 2010).

On the other hand, the temporal interdependence between law and climate system reflects the interaction between anthropic system and ecosystem, studied by human ecology, bioeconomy and ecological economics, from social ecology, from political analyzes of socio-ecological systems (Greco 2021).
In a word, the "tragedy of the horizon" demonstrates that the metabolic fracture between human action and the rest of nature has determined not only the superimposition of anthropogenic emissions on the natural carbon cycle, but also the dysfunctionality the legal timeframe for the transformation and adaptation of institutions with respect to the urgencies of the climate system as a whole (Greco 2021).
The "Climate First/Development First" dilemma, referring to the 17 SDGs of Agenda 2030, summarizes this unprecedented difficulty of law and politics in the era of planetary emergency.

5. Climate change and Human Rights

The impact of climate change on human rights is now recognized by countless international and supranational formants. It is sufficient to recall the *Joint Statement on Human Rights and Climate Change* of the five UN human rights bodies, dated September 16th, 2019, and the UN OHCHR document *Frequently Asked Questions on Human Rights and Climate Change*, dated 2021.
The climate system also includes the biosphere and therefore cannot fail to condition the legal relations created by the human being within the biosphere. Moreover, the UNFCCC makes this link explicit when it affirms «*to protect the climate system for present and future generations*»; while the Paris Agreement of 2015, in the *Preamble*, recalls that the Parties «*should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity*». The EU Regulation n. 2018/1999 links the protection of human rights also to the energy transition.
Anthropogenic climate change represents a negative phenomenon, which deprives life of benefits and individual human subjects to involuntary passive exposure, moreover in a factual context officially defined as "threat" by UNFCCC.
In this perspective, we now speak of the human right to a stable, safe, balanced climate and to "compatible emissions" (with climate stability). This right becomes the operational condition necessary to keep the other rights effective over time. Without a stable climate, any human rights are threatened. Consequently, claiming the human right to a stable and safe climate identifies the prerequisite to realize all other human rights: from the substantive ones to life, health and the healthy environment to the procedural ones of information and participation in climate and environmental policies.
Now the European Parliament Resolution on the *European Green Deal* dated 15 January 2020 also affirms this point (*https://www.europarl.europa.eu/doceo/document/TA-9-2020-0005_EN.html*). In

fact, in §. 2, we read that «*all people living in Europe should be granted the fundamental right to a safe, clean, healthy and sustainable environment and to a stable climate, without discrimination, and that this right must be delivered through ambitious policies and must be fully enforceable through the justice system at national and EU level*».

In legal theory, the arguments in favor of the existence of the human right to a stable and safe climate are mainly three: textual, moral and rhetorical (Greco 2021).

The first identifies in some existing normative documents, both with a constitutional and international nature, the source of the human right to the climate through the connection of their content with the UNFCCC and the Paris Agreement. Such a hypothesis is feasible if the Constitution contains useful textual references and the State is formally bound to the sources of international climate law. In any case, with it, the human right to the climate is embedded in the formants of national legal systems and can be used in domestic litigations against the State or companies.

The second uses the theme of the State's climatic obligation as an intertemporal moral bond towards its own natural resources and towards future generations. This strategy is more theoretical than practical, but it has the merit to emphasize the problem of intertemporal justice in climate policies. Not surprisingly, it is also inspired by the principle of «*common but differentiated responsibilities and respective capabilities*» (CBDR-RC) of article 3 of the UNFCCC and discusses about "justice", "fairness" and "equity" in climate politics, especially with reference to "climate debts", or better said the debt owed by developed States to developing States due to their disproportionate contribution of emissions to global warming (Boran 2020). The debates on climate justice in comparison with environmental, energy and ecological justice can also be included within this panorama. Indeed, climate justice affects the "planetary boundaries" of the climate system.

Consequently, it does not necessarily coincide with environmental conflicts, referring to individual territories and social contexts. Energy justice, on the other hand, opens up to a sectoral scenario: that of the energy transition, to be considered in terms of equity in the abandonment of fossil sources and equal access to renewable sources, without new inequalities and "energy poverty". Finally, ecological justice ranges from the geopolitical issues of the unequal ecological exchange between north and south of the world to the relationship between human activity and nature. The theories of so-called "*biospheric egalitarianism*" and "*species injustice*" also move to similar ethical premises (Greco 2021).

The third argument uses the rhetorical tool of synecdoche to support the existence of an autonomous human right to a stable and safe climate. In fact, with the synecdoche, two legal formulas on the subject of human rights, linguistically distinct but referring to realities physically dependent on each other (the territorial realities of legal orders within the planetary climate system) can be associated by the interpreter to affirm the existence of a new legal category, even if not inserted in an explicit formant. This stratagem is frequent in Civil Law systems and has allowed us to adapt legal words and arguments over the time, based on very ancient sources, such as the Civil Codes. In this perspective, the German theory of *"status oecologicus"* can also be inserted, as a new human condition that is added to the citizen's *"status passivus"* (Brugger 2011). In the democratic constitutional State, citizenship also has a *"status passivus"*, that is a set of duties of mutual solidarity to

promote justice and substantial equality. But what happens when each of us lives in the condition of exposure to the planetary ecosystemic and climatic emergency? The new condition requires that the priority of duties is no longer simply "political", that is, only towards one's fellowmen, as in the normal *"status passivus"*. It becomes "ecosystem", therefore towards the entire climate system. The human right to a stable and safe climate requires the fulfillment of this duty of "ecosystem" solidarity by the State.
On the other hand, the theory of *"status oecologicus"* appears similar to that of the *Microbial State*, with which it is noted that the sovereignty of the State is now dependent on the fate of the ecosystem and of the entire planet Earth (Fishel 2017).

6. Climate change and democracy

We have seen how the climate emergency highlights a series of legal dysfunctions. This observation has also led to discuss about the "organized irresponsibility" of representative democracy itself (Greco 2021).
According to the majority of scholars, the reasons for this difficulty are temporal and spatial in nature and can be summarized in two elements.
The temporal reason derives from the fact that climate change is an exponential process and by accumulation: the effects we are witnessing today derive from past emissions, while the effects of today's emissions will be experienced in the future. Such a process is difficult to govern by representative democracies, which take decisions in the short term according to the contingent electoral consensus, without taking into account the past and without being able to represent the consensus of future generations. This means that democratic deliberations are structurally irresponsible on two temporal fronts (Thompson 2009): towards the past, since they cannot answer for the consensus and mistakes which have produced today's climate problems; towards the future, as they separate those who decide today from those who will suffer the consequences of today's decisions in the future.
The spatial reason depends on the observation that the link between anthropogenic emissions and climatic reactions is an ecosystemic and planetary type. This link attributes relevance to some places or environments on the planet, due to their function of global climate balance (think about Amazon's carbon sink function). These places, however, fall under the sovereign jurisdiction of individual States and these States are not necessarily democratic. Therefore, there is an asymmetry of political regimes with respect to the common importance of some ecosystem functions, with consequent difficulty in building shared methods of discussion and decision on global climate challenges. It is not a coincidence that the debates about "governance of climate change" or "global climate constitutionalism" highlight this contradiction (Boran 2020), while the "polycentric" approaches, such as those proposed by Elinor Ostrom to spread local democracy, or "complex regime" to involve actors other than States, they serve to promote local or sectoral collective action, but do not contribute to democratizing world climate policy (Greco 2021).
Therefore, there is no correspondence between time and spheres of democratic deliberation (both state and local) and the times and places of climate problems

(Boran 2020): in a predominantly undemocratic world, practicing democracy as a global method is illusory.
Other theorists, on the other hand, believe that the dysfunctions of democracy have an epistemic nature. In this perspective, four theses can be remembered: that of Michel Foucault about representative democracies as a form of separation between the human species and the "public", as founded on the primacy of individual vote and therefore of freedom of opinion on the fate of the world with respect to the function ecosystem of any human activity (Greco 2021); that of Timothy Mitchell on the "fossil" nature of modern political representation, unable to free itself from the negative conditioning of the energy system that it helped to legitimize (Mitchell 2011); that of Chien-Yi Lu on the incompatibility between "spontaneous order" of the global market, promoted and guaranteed by liberal democracies, and "necessary order" of the planetary climate system (Lu 2020); that of Boaventura de Sousa Santos on the "extractivist" identity of Western democracy, that is, based on the exchange value of all human actions rather than on their use value with respect to the survival needs of human species (de Sousa Santos and Mendes 2020).
Indeed, liberal democratic representation recognizes and promotes freedom of opinion and pluralism of interests (political, economic, cultural). These conditions do not necessarily favor optimal solutions around climate issues. Lack of scientific competence in decision-makers, ignorance of voters, veto games between opposing interests, disputed role of experts, even denial are all concrete possibilities that a liberal democracy cannot suppress, if not by denying the freedom of opinion and interests, on which it is based.
In the end, it seems that it is precisely the constitutional status of the human subject, legally constructed as a "political" or "stakeholder" individual, rather than as a "biospheric" subject, to feed this short circuit (Greco 2021).
Even the empirical analysis of democracy does not eliminate doubts about the contradiction. On one hand, it demonstrates that democracies contribute most to the provision of global public goods, including that of climate stability (Baettig and Bernauer 2009). On the other hand, it also confirms that the results of policies, measured in terms of emission levels, remain insufficient and that international cooperation between democracies does not eliminate the "free-rider problem" to the advantage of the irresponsibility of non-democratic States. Indeed, the latter, not having to account for their choices to their citizens, can remain indifferent to planetary ecosystem problems, while benefiting from the global advantages of the climate decisions of others (Greco 2021).

7. The legal practice between "tornado" and "abortion" politics

We can complete this review by analyzing what reactions the challenge of the climate emergency produces in the legal practice and whether these reactions share common assumptions of problem analysis.
The comparison offers a scenario of answers, structured around three experiences: the use of the so-called "climate change litigations strategies"; proposals for the recognition of the rights of nature in the Constitutions or other legal sources;

attempts to build transnational legal infrastructures consistent with the logic of "planetary boundaries" (Greco 20021).

These practices converge on three assumptions for the analysis of legal problems relating to the climate emergency.

The first presupposition concerns the space of legal decisions and considers the anarchic nature of international society, that is, the lack of an apparatus hierarchically superior to the States, able to produce unitary planetary reactions to the climate emergency. States remain the subjects appointed to implement law, including international law. However, international norms enter state systems generally through instruments of ratification, and thus also become part of the national legal system. Ultimately, the only effective space for decision on the climate emergency is that of individual States. But how do States act within this space?

On this front, the second assumption of analysis comes into play, referring to the difference between the times of the climate emergency and the times of state legal decisions. It can be summarized by Roger Pielke's theory on the contrast between "tornado politics" and "abortion politics" using scientific knowledge by policy makers (Pielke 2007). Pielke uses this metaphor to explain the relationship between public perception of danger, timing of political decision and the use of science. When people know that a tornado can hit their city, they tend to cooperate and act quickly to protect their life and property. In these situations, then, politicians are induced to take more courageous, even unpopular, choices and to emphasize the primacy of public interests of common salvation, rather than the pressure of particular interests, especially of economic nature. Finally, the fear of imminent danger leads to an increase in public trust in expert knowledge and a dialogue with science. The need for common salvation and the use of scientific knowledge become a priority and hierarchically superior to any other evaluation of political action. "Tornado politics" describes this scenario.

Conversely, when the imminence of the danger is not visible, the "tornado politics" effect does not occur and politics continues to operate as if nothing had happened, both in terms of response times and in terms of dialogue with science, in a context of public opinion not particularly alarmed and demanding. In this scenario, there remains a logic of compromise and regulation of all the interests at stake, without any hierarchy, according to the decisional perspective of balance or "win-win" (Carducci et al. 2020).

A different situation is what Pielke always calls "abortion politics", where the choices take on conflicting and tragic outlines from a moral point of view, since they question not facts of imminent danger, such as the tornado, but rather visions of life and value dimensions of human being in the world. In this second hypothesis, not only unsolvable conflicts and tensions arise, inevitably affecting public decisions and cooperation, but above all the dialogue itself with science becomes conflictual, the acquisitions of which can open scenarios that are not always acceptable from a moral point of view. Consequently, even in "abortion politics" a "win-win" balance is not reached, but not because hierarchical priority is given to public interests of common salvation, but because moral conflict is never balanced and science cannot replace itself to moral questions.

Now, how do global warming and climate change fit into this dichotomy? Do they produce "tornado politics" or "abortion politics"? Unfortunately, the two phenomena, which can be summarized in the empirical observation of the climate emergency, are similar to both "tornado" and "abortion". How?

They are similar to the "tornado", because they identify a real and already existing danger, such as a tornado, but unfortunately not immediately "visible" (unlike the tornado). This distortion of space-time makes the discussions and decisions on the climate emergency more similar to those of "abortion politics", since the dangers are not immediately "visible" such as in a tornado, political and social actors feed moral evaluations. subjective, even before being based on knowledge and dialogue with science, with related scarce public cooperation and actions aimed at compromising in the short term, rather than the pursuit of the public interest of common salvation. In turn, however, the contingent compromise is still unsatisfactory for anyone: both for those who cultivate moral considerations (think about the contrast between movements for climate justice and those who affirm the moral centrality of the economy over nature) and for those who know, through science, the actual "tornado" contents of the climate emergency (think about scientists' criticisms of political inefficiency) (Greco 2021).

The third presupposition concerns the contents of state legal decisions, conditioned by the logic of economic globalization. This logic "captures" the State by imposing the priority of economic and financial interests on the reasons for the thermodynamic stability of the planet Earth. A legal formalization of this scenario is offered by the Energy Charter Treaty (https://www.energycharter.org/), a source of international law that creates a sort of "Energy Constitution", under which the sovereign decisions of States cannot prevail over the investment interests of large multinationals. Some contents of the document make this logic explicit. Article 18 states «*The Contracting Parties recognize state sovereignty and sovereign rights over energy resources. They reaffirm that these must be exercised in accordance with and subject to the rules of international law*», However, the official interpretation given by the States is «*Article 18(2) shall not be construed to allow the circumvention of the application of the other provisions of the Treaty*». However, the official interpretation declared by the States is that" «*Article 18(2) shall not be construed to allow the circumvention of the application of the other provisions of the Treaty*». Is that any other source of international law, including climatic ones, cannot prevail over the Energy Charter and, in particular, over art. 47, according to which «*The provisions of this Treaty shall continue to apply to Investments made in the Area of a Contracting Party by Investors of other Contracting Parties or in the Area of other Contracting Parties by Investors of that Contracting Party as of the date when that Contracting Party's withdrawal from the Treaty takes effect for a period of 20 years from such date*». Also for this reason, the States and the European Union are discussing an adaptation of the Charter to the 2015 Paris Agreement and the Constitutions (Witte 2018).

The aforementioned three legal practices converge in the objective of countering or neutralizing the negative consequences of these three assumptions.

The "climate change litigation strategies" are used all over the world to achieve the objectives of climate change mitigation by States or multinational companies, through judicial decisions. They emphasize the use of science in the courts and the

prevalence of consequentialist over utilitarian arguments. Therefore, their aim is to overcome the impasse between "tornado" and "abortion politics".
The proposals for the constitutionalization or legalization for the rights of nature are mainly inspired by the 2008 Constitution of Ecuador, the first in the world to recognize nature as a legal subject. They are also discussed in Europe (Carducci et al. 2020) and aim to promote and legitimize a biocentric and ecosystemic legal logic, in order to neutralize the forms of "capture" of the State by global economic and financial interests (Greco 2021).
Finally, the hypotheses of transnational juridical infrastructures test new legal methods to put an end to the international anarchy that weakens States in the fight against climate change (Kotzé and Kim 2019).

Conclusions: the law in the weather-world

As Tim Ingold (2010) wrote «*knowledge is formed along paths of movement in the weather-world*». This is also applied to the law.
With the climate emergency, the "weather-world" questions about the order of things and words of legal knowledge. The legal subdivisions according to separate categories between the sphere of nature and culture are now inadequate to effectively solve all the problems of the climate system in its planetary dimension. And the awareness of this inadequacy makes our times extremely different from any other previous era of humanity. Law, from an instrument of control and change of reality, is transforming itself into an element dependent on the atmosphere.
The human community, creator of carbon energy and of the rules that legitimized the liberation of its actions from the limits of nature, is no longer the real subject of change. On the contrary, it has become the obstacle to change, due to its intrinsic contradiction that Dipesh Charkrabarty summarizes as follows: «*a collectivity whose commitment to fossil-fuel based, energy-consuming civilization is now a threat to that civilization itself*» (2012).
We must therefore rely on climate and weather as unavoidable references in our decisions.
It is a conceptual earthquake that we can no longer avoid (Crate and Nuttal 2009). What we have made an object well regulated by law, nature-atmosphere, reappears as a subject that imposes relations in all of us. We are now interconnected with the atmosphere precisely because of the need to reduce, to completely replace, anthropogenic emissions of greenhouse gases.
Ultimately, humanity has transformed the atmosphere into a great "common-sphere". This "common", however, is orphaned of adequate legal systems. Here then is that the "good" has turned into a "common evil" ("common concern of humanity"), which forces us to share the threat, in the paradox of not finding unitary solutions on a planetary level.
We thus discover that human law does not conform to the "first law of ecology" (Commoner 1971): everything is connected with everything else. Hence also the law.
But we also discover that climate is not time: while the former is a stochastic modeling based on forecasts and statistical calculations of metadata for temperature

regulation (for this reason the climate is classified as an ecosystem regulation function), time is the dimension built by knowledge and social institutions, based on experiences and representations of the life of human beings. This means that the law, in order to solve anthropogenic climate problems, needs science, especially the predictions of science. Deciding on the basis of forecasts, however, implies questioning the present for the future, that is, it involves our certainties about the social and institutional constructions of time.

This double dissociation between human law and the "first law of ecology", on the one hand, and between atmosphere and human time, on the other, identifies the epochal challenge of law. Faced with this challenge, the function of legal rules can no longer be limited to reduce human impact on the environment. We need a teleological transformation of legal systems, in which the absence of human interference on the planet's climatic stability becomes the *ratio* of every rule, exactly as indicated by art. 2 of the UNFCCC.

References

Baettig, M. & Bernauer, T. (2009). National Institutions and Global Public Goods: Are Democracies More Cooperative in Climate Change Policy?. *International Organization*, 63(2), 281-308 (2009). doi:10.1017/S0020818309090092.

Banai, A. (2016). Sovereignty over natural resources and its implications for climate justice. *Willey Interdisciplinary Reviews: Climate Change*, 7, 238–250 (2016). doi: 10.1002/wcc.383.

Bauman, Z. (2007). *Consuming Life*. Cambridge: Polity.

Bindoff, N.L., Stott, P.A., Achuta Rao, K.M., Allen, M.R., Gillett, N., Gutzler, D. et al. (2013). Detection and Attribution of Climate Change: from Global to Regional. In T.F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, et al. (Eds.), *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (867-952). Cambridge: Cambridge University Press.

Bolognesi, T. & Nahrath, S. (2020). Environmental Governance Dynamics: some Micro Foundations of Macro Failures. *Ecological Economics*, 170(3), 1-30 (2020). doi: 10.1016/j.ecolecon.2019.106555.

Bolton, P., Deprés, M., Pereira da Silva, L.A., Samama, F., Svartzman, R. (2020). *The green swan. Central banking and financial stability in the age of climate change*. Basel: Bank for International Settlements.

Boran, I. (2020). *Political theory and global climate action*. London and New York: Routledge.

Bosselmann, K. (2010). Losing the Forest for the Trees: Environmental Reductionism in the Law. *Sustainability*, 2, 2424-2448 (2010). doi:10.3390/su2082424.

Brilmayer, L. & Klein N. (2000-2001). Land and Sea. Two Sovereignty Regimes in Search of a Common Denominator. *New York University Journal of International Law & Politics*, 33(3), 703-768.

Brown, D.A. & Taylor P. (Eds.) (2015). *Ethics and Climate Change*. *A Study of National Commitments*. IUCN. Gland.

Brugger, W. (2011). Georg Jellineks Statuslehre: national und international. Eine Würdigung und Aktualisierung anlässlich seines 100. *Archiv des öffentlichen Rechts*, 136(1), 1-43.

Campillo Álvarez, J.E. (2008). *Homo climaticus. El clima nos hizo humanos*. Barcelona: Editorial Crítica.

Caney, S. (2012). Just emissions. *Philosophy & Public Affairs*, 40(4), 255-300.

Carducci, M. (2021). Cambiamento climatico (diritto costituzionale). In R. Bifulco, A. Celotto, M. Olivetti (Eds.), *Digesto delle discipline pubblicistiche. VIII Aggiornamento* (pp. 51-74. Torino: Utet giuridica-Wolters Kluwer.

Carducci, M., Bagni, S., Montini, M., Mumta, M. Lorubbio, V., Barreca, A., et al. (2020). *Towards an EU Charter of the Fundamental Rights of Nature. Study*. Brussels: European Economic and Social Committee.

Commoner, B. (1971). *The Closing Circle. Nature, Man, and Technology*. New York: Knopf.

Crate, S.A., & Nuttal, M. (Eds.) (2009). *Anthropology and Climate Change. From Encounters to Actions*, Walnut Creek (Ca): Left Coast Press.

Charkrabarty, D. (2012). Postcolonial studies and the challenges of climate change. *New Literary History*, 43(1), 1-18.

De Jong, E.R. (2018). Tort Law and Judicial Risk Regulation: Bipolar and Multipolar Risk Reasoning in Light of Tort Law's Regulatory Effects. *European Journal of Risk Regulation*, 9(1), 14-33 (2018). doi:10.1017/err.2017.75.

de Sousa Santos, B. & Mendes, J.M. (Eds.) (2020). *Demodiverisy. Toward Post-Abyssal Democracies*. New York: Routledge.

Energy Charter Treaty. https://www.energycharter.org/. Accessed 30 April 2021.

Fishel, S.R. (2017). *The Microbial State. Global Thriving and the Body Politic*. Minneapolis: University of Minnesota Press.

Folkers, A. (2020). Air-appropriation: The imperial origins and legacies of the Anthropocene. *European Journal of Social Theory*, 23(4), 611–630 (2020). doi: 10.1177/1368431020903169.

Glenn, H.P. (2000). *Legal Traditions of the World. Sustainable Diversity of Law*. Oxford: Oxford University Press.

Greco, G. (2021). *Thematic Bibliography in Legal Theory of Climate Change and Comparative Law*. Lecce: Cedeuam-Università del Salento.

Hollo, E.J., Kulovesi, K., Mehling, M. (Eds.) (2013). *Climate Change and the Law*. Dordrecht-Heidelberg-New York-London: Springer.

Howe, J.P. (2014). *Behind the curve. Science and the politics of global warming*. Seattle: University of Washington Press.

Kotzé, L.J. & Kim R.E. (2019). Earth system law: The juridical dimensions of earth system governance, *Earth System Governance*, 1, 1-12 (2019). doi: 10.1016/j.esg.2019.100003.

Ingold, T. (2010). Footprints through the weather-world: walking, breathing, knowing. *Journal of the Royal Anthropological Institute* (n.s.), 121-139.

Lazarus, R.J. (2010). Climate Change Law in and Over Time. *San Diego Journal of Climate & Energy Law*, 2(29), 29-43.

Lenton, T.M., Rockström, J., Gafney, O., Rahmstorf, S., Richardson, K., Steffen, W.. et al. (2019). Climate tipping points — too risky to bet against, *Nature*, 575, 592-595 (2019). doi: 10.1038/d41586-019-03595-0.

Lu, C.-Y. (2020). *Surviving Democracy. Mitigating climate change in a neoliberalized world*. New York and London: Routledge.

Lyster, R. & Verchick, R.R.M. (Eds.) (2018). *Research Handbook on Climate Disaster Law. Barriers and Opportunities*. Cheltenham: Edward Elgar Publishing.

McKinnon, C. (2015). Climate justice in a carbon budget. *Climatic Change*, 133(3), 375-384 (2015). doi: 10.1007/s1058401513826.

Mechler, R., Bouwer, L.M., Schinko, Th., Surminski, S., Linnerooth-Bayer, J. (Eds.). (2019). *Loss and Damage from Climate Change. Concepts, Methods and Policy Options*. Cham: Springer Nature Switzerland.

Mitchell. T. (2011). *Carbon Democracy. Political power in the age of oil*. London and New York: Verso.

Morton, T. (2013). *Hyperobjects. Philosophy and Ecology after the End of the World*. Minneapolis: University of Minnesota Press.

Paavola, J. (2012). Climate Change: Th e Ultimate Tragedy of the Commons?. In D.H. Cole & E. Ostrom (Eds.) *Property in Land and Other Resources* (pp. 417-433).Cambridge (Mass.): Lincoln Institute of Land Policy.

Pielke, R. (2007). *The honest broker. Making Sense of Science in Policy and Politics*. Cambridge: Cambridge University Press.

Pirani, S. (2018). *Burning up. A Global History of fossil fuel consumption*. London: Pluto press.

Ripple, W.J., Wolf, C., Newsome, Galetti, M., Alamgir, M., Crist, E., et al. (2017). World Scientists' Warning to Humanity: A Second Notice, *BioScience*, 67(12) 1026-1028 (2017), doi: 10.1093/biosci/bix125.

Ripple, W.J., Wolf, C., Newsome, T.M., Barnard, Ph., Moomaw, W.R. et al. (2020). World Scientists' Warning of a Climate Emergency, *BioScience*, 70(1), 8–12 (2020). doi: 10.1093/biosci/biz088.

Scientists' Warning. https://www.scientistswarning.org/. Accessed 30 April 2021.

Schlosberg, D. (2007). *Defining environmental justice. Theories, movements, and Nature*. Oxford and New York: Oxford University Press.

Schmitt, C. (1950). *Der Nomos der Erde im Völkerrecht des Jus Publicum Europaeum*. Köln: Greven.

Sieferle R.P. & Marquardt, B. (2009). *Le revolución industrial en Europa y América latina. Intrepretaciones ecohistóricas desde la perspectiva de la teoría de los sistemas de energía y del metabolismo social*. Bogotá: Universidad Nacional de Colombia.

Sindico, F. & Mbengue, M.M. (Eds.) (2021). *Comparative Climate Change Litigation: Beyond the Usual Suspects*. Cham: Springer Nature Switzerland.

Thompson, J. (2009). *Intergenerational justice: rights and responsibilities in an intergenerational polity*. New York: Routledge.

Vanderheiden, S. (2008). *Atmospheric Justice. A Political Theory of Climate Change*. Oxford and New York: Oxford University Press.

Witte, I. (2018). Interactions between International Investment Law and Constitutional Law: Promoting the Dialogue. A European Perspective on Judicial Cooperation and Deference, *Max Planck Yearbook of United Nations Law Online*, 21(1), 467-574 (2018). doi: 10.1163/13894633_021001016.