Beyond Sustainability: Challenges for Environmental Law in a the Era of Uncertainty

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ABSTRACT: It is growingly accepted that the Planet has entered into a new geological era, the Anthropocene. Even if it is controversial to assess the changes in the Earth System brought by this geological transformation, it seems clear that the increasing exchange between society and its biophysical support gives as a result a global ecosocial network of astonishing complexity. Consequently, it has been concluded that the Anthropocene would be a more unstable geological period compared with the Holocene, with escalating plausibility of nonlinear disruptive events.

International institutions and governments of states continue to produce environmental regulations, inspired in a constitutional framing of the global environmental crisis. This approach is largely based in the concept of sustainable development, which implies a negation of planetary change and ignores the growing uncertainty of planetary processes, according to the complexity of interactions of human agency and planetary evolution in the Anthropocene. The occurrence of nonlinear events is at odds with a

political and legal vision which is essentially static, because of the confidence in some kind of technological fix of global environmental crisis. This paper is focused on the inability of sustainability to capture the implications of the narrative of planetary transformation, and explores the concept of resilience as alternative.

KEYWORDS:

Sustainability; Resilience; Anthropocene; International Environmental Law

1. Introduction

The global response to the environmental crisis started with the United Nations Conference on the Environment in Stockholm in 1972.[1] Its 50th anniversary is the occasion to reflect upon the fundamental threads knitting the texture of international environmental law, which were envisaged to some extent in that foundational moment.[2] In my opinion, since Stockholm, international environmental law—and then national replicas as well—has been based in a constitutional approach, even accepting that its constitutional claims are often discussed, denied or ignored.[3]

The constitutional identity of the international legal response to the global environmental crisis is developed through two main characteristics. Firstly, there is the aspiration to reach a global compact equivalent to some extent to a traditional modern

[1] See Keller, H. (1999). Klimaregime an der Schwelle zum 21. Jahrhundert. Durchbruch dank ökonomischer Instrumente oder Aushöhlung durch Flexibilisierung?, *Umweltrecht in der Praxis / Le Droit de l'environnement dans la pratique*, p. 356.

[2] See Untawale, M. G. (1990). Global Environmental Degradation and International Organizations, *International Political Science Review*, 11(3), p. 380.

[3] See Bodansky, D. (2009). Is There an International Environmental Constitution, *Indiana Journal of Global Legal Studies* 16(2), p. 565-584.

constitution—the difference between achieving this through a single document or through a complex of fundamental laws is not important here.[4] Secondly, there is the attempt of generating core values justifying international action and national obligations in the line of the global constitutionalism.[5] According to this, the Stockholm Declaration was the first of a series of paraconstitutional international documents in the international environmental law.[6] Regarding the core values of international environmental law, the apparition and consolidation of sustainable development as overarching teleological concept has been crucial.[7] As it is known, sustainable development was incorporated as a fundamental notion of international environmental law into the Rio Declaration (1992), and inspired the Sustainable Development Goals (SDGs) as main orientations of the global community since 2015.[8]

Against the backdrop of the burgeoning of international environmental law on the basis of sustainable development during the last two decades, the narrative of the Anthropocene has been consolidated in the domain of Earth System Science.[9] This narrative is based in the idea that the anthropic transformation of the Earth System

[4] See Kotzé, L. J. (2012). Arguing Global Environmental Constitutionalism, *Transnational Environmental Law* 1, p. 199; and Kotzé, L. J. (2019). A Global Environmental Constitution for the Anthropocene?, *Transnational Environmental Law* 8(1), p. 23ff.

[5] See Peters, P. (2015). Global Constitutionalism, Gibbons, M. (ed.), *The Encyclopedia of Political Thought*, Bognor Regis: Wiley-Blackwell, p. 1-4.

[6] See Beyerlin, U. (1995). Staatliche Souveränität und internationale Umweltschutzkooperation – Gedanken zur Entwicklung des Umweltvölkerrechts, Beyerlin, U. et al. (eds.), *Recht zwischen Umbruch und Bewahrung. Festschrift für Rudolf Bernhardt*, Berlin, Heidelberg, New York: Springer, p. 941; and Kiss, A. & Shelton, D. (1993). *Manual of European Environmental Law*, Cambridge: Cambridge University Press, p. 10.

[7] See Ebbeson, J. (2009). Introduction: dimensions of justice in environmental law, Ebbeson, J. & Okowa, P. (eds.), *Environmental Law and Justice in Context*, Cambridge, New York: Cambridge University Press, p. 1.

[8] See the Principle 1 of the Rio Declaration on Environment and Development (A/CONF.151/26 (Vol. I)); and the Resolution adopted by the General Assembly on 25 September 2015 (ReA/RES/70/1—Transforming our world: the 2030 Agenda for Sustainable Development).

[9] The term was initially put in circulation in Crutzen, P. J. & Stoermer, E. F. (2000). The "Anthropocene", *Global Change Newsletter* 41, p. 17-18. Since then it has been widely adopted by the Earth Science System community.

achieved in the past two centuries is so relevant that leads to a new geological era.[10] This fundamental assumption is split into two visions about how anthropic transformation works and what we should expect of the change of geological era. On one hand, there is an ecomodernist approach that assumes that anthropic geological change implies the possibility of manipulating the Earth System as it happens with the introduction of agriculture in limited ecosystems.[11] On the other hand, there is a less optimistic view according to which anthropic transformation of the planet results in a messy scenario, defined by uncertainty and instability.[12] The former vision is to some extent an end-of-history narrative, while the latter implies to draw conclusions of the historization of the planet, according to the traditional perspective of geology.[13]

This paper is intended to show that the constitutional vision inspiring international environmental law since the Stockholm Declaration is fundamentally attached to an end-of-history liberal perspective and is accordingly incompatible with a changing Earth System in the context of a new geological era.[14] In my opinion this is important to both the constitutional form and the constitutional substance of legal-political structures of thought of current (international) environmental law. However, I will concentrate on the

[10] See Crutzen, P. J. (2002). Geology of mankind, *Nature* 415, 2002, p. 23.

[11] Geoengineering is a significant topic regarding this claim of planetary manipulation. See Tavares, P. (2014). Stratoshield, Klingan, K. et al. (eds.), *Textures of the Anthropocene. Vapor*, Berlin, Cambridge: Haus der Kulturen der Welt, MIT, p. 66. In fact, Paul Crutzen has proposed some ways of manipulating the atmosphere to govern the climate. See Crutzen, P. J. (2006). Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?, *Climatic Change* 77, p. 211-219.

[12] See Clark, N. (2017). Politics of Strata, *Theory, Culture & Society* 34(2-3), p. 226.

[13] Modern geology implies a revolutionary conception of time, which starts with the publication of Charles Lyell's *Principles of Geology* (1830-1833), which set the scene for the formulation of the theory of evolution by Charles Darwin in *The Origin of Species* (1859). The conception of the planet changed radically, as creationism was abandoned and a modern scientific conception, based on observation, shaped it as an object of study. New conceptions of time have been generated throughout the nineteenth century, including the emphasis in the direction of time linked to the irreversibility of events in accordance with the second law of thermodynamics. See Schneider, E. D. & Sagan, D. (2005). *Into the Cool. Energy Flow, Thermodynamics and Life*, Chicago, London: The Chicago University Press, p. 145.

[14] See Jaria-Manzano, J. (2021). La constitución es un campo de batalla. Apuntes sobre el constitucionalismo global en el antropoceno, *Persona e Amministrazione* 8(1), p. 816ff.

most obvious challenge, i. e. the possibility of sustainability and sustainable development in an unstable and uncertain scenario under the influence of nonlinear disruptive events.

2. The constitutional vision of international environmental law

As stated previously, I assume that international environmental law begins with the Stockholm Declaration in 1972, whose 50th anniversary is commemorated this year.[15] In the context of awareness of the transformations (unwanted or harmful) of the environment caused by human beings, which has been taking place since the 1960s, the United Nations Conference on the Human Environment (1972), despite the affirmation of the interdependence between human beings and the environment, adopted an anthropocentric, modern and liberal framing for the environmental crisis.[16] Certainly, the Declaration showed a deep concern about the moral challenges that the anthropic transformation of ecosystems present to the international community according to the growing awareness of a global environmental crisis.[17] However, starting from the liberal assumptions of Stockholm, the evolution of international environmental law has

[15] See Alder, J. & Wilkinson, D. (1999). *Environmental Law & Ethics*, London: Macmillan, p. 112-113.

[16] See, for example, the references to management in principle 13 and planning in principle 14 in the Declaration of the United Nations on the Human Environment (Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972, A/CONF.48/14/Rev.1).

[17] The Declaration of Stockholm began with the following statement:

> Man is both creature and moulder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when, through the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights the right to life itself.

The awareness about the human capacity of transforming its environment is linked here to a certain acceptance of the necessity of reflecting on the hegemonic patterns of behaviour in the global society. Afterwards, this necessity has not been assumed in the mainstream discourse of international environmental law, despite some attempts of arousing this debate as notably the Earth Charter.

assumed a managerial point of view regarding the global environmental crisis, framing the response of the international community within the traditional heritance of modern liberal constitutionalism.[18]

In this context, the protection of the environment is conceived as an instrument to guarantee the enjoyment of human rights, designed to provide a space of self-determination for individuals.[19] In fact, the Stockholm Declaration can be considered the seminal document on the recognition of environmental rights.[20] From that moment on, the right to the environment emerges and is consolidated as the initial conceptual pattern to frame the environmental crisis in the political and legal context of contemporary societies.[21] Different constitutions include such a right—the Portuguese Constitution in 1976 and the Spanish Constitution in 1978.[22] This trend is generalized since the nineties of the last century.[23] Nicholas Robinson have stated recently the centrality of the right to the environment in the future of international environmental law.[24]

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[18] See Conca, K. (2016). The Changing Shape of Global Environmental Politics", Nicholson, S. & Jinnah, S. (eds.), *New Earth Politics. Essays from the Anthropocene*, Cambridge, London: The MIT Press, p. 26-27.

[19] Particularly, the Principle 1 proclaims:

> Man has 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, and he bears a solemn responsibility to protect and improve the environment for present and future generations. In this respect, policies promoting or perpetuating apartheid, racial segregation, discrimination, colonial and other forms of oppression and foreign domination stand condemned and must be eliminated.

[20] See Bosselmann, K. (2008). *The Principle of Sustainability. Transforming Law and Governance*, Farnham, Burlington: Ashgate, p. 121.

[21] See Karpen, U. (1988). Zu einem Grundrecht auf Umweltschutz, Thieme, W. (ed.), *Umweltschutz im Recht*, Berlin: Duncker & Humblot, p. 21.

[22] See Jaria-Manzano, J. (2011). *La cuestión ambiental y la transformación de lo público*, Valencia: Tirant lo Blanch, p. 1986ff.

[23] See op. cit., p. 192ff.

[24] See Robinson, N. A. (2021). Depleting Time Itself: The Plight of Today's "Human" Environment, *Environmental Policy and Law* 51(6), p. 366.

In this context, the environmental crisis is understood, ultimately, as a societal challenge which ultimately stimulates the improvement of the forms of social organization and the advancement of technology, without questioning the ideal of autonomy encapsulated in (human, fundamental) rights. In fact, this constitutes the foundation of the hegemonic (liberal) political culture, related with the capitalist world-economy which determines in the end the structure and the values of the international order.[25] In fact, the construction of the idea of individual self-determination is strongly linked to the development of capitalist economy and, particularly, to the surplus of energy derived from the massive use of fossil fuels, which are in the end a limited good.[26]

However, there is a conflict between promoting greater protection of the environment against the predatory dynamics that derive from the massive exploitation of natural resources to satisfy the growing welfare demands of human societies (right to a healthy environment) and the fact that these demands have not been satisfied for a good part of the planetary population (right to development).[27] The idea of sustainable development provides conceptual dispositive designed to satisfy both demands, providing a global axiological horizon for the response of contemporary societies to the environmental crisis.[28]

This essentially liberal approach to the environmental challenges has endorsed the possibility of managing the planet in a sustainable way in order to provide a certain standard of living for all human beings according with the idea of individual self-

[25] See Jaria-Manzano, J. (2003). Legitimidad técnica y legitimidad democrática en la toma de decisiones administrativas que afecten al medio ambiente, *Revista Aranzadi de Derecho Ambiental* 3, p. 111.

[26] See Carducci, M. (2021). Cambiamento climatico (diritto costituzionale), Sacco, R. (ed.), *Digesto delle Discipline Pubblicistiche. Aggiornamento*, Milan: Wolters Kluwer Italia, p. 56.

[27] See López-Nieto, F. (1986), *Manual de actividades molestas, insalubres, nocivas y peligrosas*, Madrid: Tecnos (2th edition), p. 18.

[28] See Dobson, A. (1998), *Justice and the Environment. Conceptions of Environmental Sustainability and Dimensions of Social Justice*, Oxford: Oxford University Press, p. 60.

determination of the Western constitutional tradition, i.e. without attempting a major socioeconomic transformation of the global community.[29] Sustainable development is the central concept of this approach, involving a "largely technical response to environmental problems and the inclusion of the environment in economic decision making."[30] In fact, the evolution of environmental protection policies everywhere seems to show that sustainable development is today, above all, a concept captured by the hegemonic actors of the financial phase of global capitalism, who have managed to present, in this way, an "environmentalist" profile.[31]

Since the Rio Declaration, this idea has become the overarching principle of international environmental law, culminating in the sustainable development goals of the United Nations.[32] The SDGs define an ethical commitment of the international community according with a certain idea of how to tackle the global environmental crisis, rooted in the hegemonic ideas of international law according to the "Country and Western Tradition".[33] However, this idea seems to be wrong when this crisis is defined in terms such as those proposed by the Anthropocene narrative.

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[29] See Jaria-Manzano, J. (2014). Derechos y medio ambiente, Noguera Fernández, A. & Guamán Hernández, Adoración (dirs.), *Lecciones sobre Estado social y derechos sociales*, Valencia: Tirant lo Blanch, p. 583ss.

[30] See Connelly, J. & Smith, G. (1999). *Politics and the Environment. From theory to practice*, London, New York: Routledge, p. 201.

[31] Ibid.

[32] The Principle 1 of the Rio Declaration on Environment and Development proclaims the following:

> Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

With this proclamation, the international community culminated the process of incorporation of sustainable development into its core values, starting with the Brundtland Report in 1988 (*Report of the World Commission on Environment and Development: Our Common Future* (1987): http://www.un-documents.net/our-common-future.pdf, accessed March 14, 2022).

[33] See Twining, W. (2009). Law, justice and rights: some implications of a global perspective, Ebbeson, & Okowa, *Environmental Law and Justice in Context* cit., p. 77.

The liberal thought is deeply embedded in the Christian tradition and this connection is strongly anchored in the modern concept of constitution.[34] Indeed, the constitution is conceived both as a code and as a contract, establishing an ahistorical playing field for individuals, according with a fossilized political conception.[35] The salvific event is materialized in the liberation of the individual human being from traditional ties and the creation of a space of personal self-determination protected against the interference of power, according with the idea of social contract.[36] This is inseparably linked to the original establishment of the constitution, which we owe to a creating subject, the constituent sovereign power, which establishes fundamental rules of coexistence, i.e. the code.[37] This narrative contains the whole meaning of the normative constitution on which both political theory and the Constitutional Law of Modernity are developed.

In my view, international environmental law is based on the assumption of a stable legal (constitutional) framework, linked to the recognition and protection of a series of rights defining a space of self-determination for the individuals, which ultimately requires the guarantee of legal certainty, a central issue in the modern legal culture.[38] Even if there is no single document which can be described as an international environmental constitution, international environmental law responds to this fundamental idea, linking rights, written fundamental law and legal certainty.[39] Of all the implications of this

[34] See. Preuss, U. K. (1993). Constitutional Powermaking for the New Polity: Some Deliberations on the Relations between Constituent Power and the Constitution, *Cardozo Law Review* 14, p. 640.

[35] See Jaria-Manzano (2021), p. 805.

[36] Hauriou, M. (1910). *Principes de droit public*, Paris: Dalloz, p. 218, points out the parallelism between the biblical alliance and the modern constitution.

[37] See Jaria-Manzano, J. (2020). *La constitución del Antropoceno*, Valencia: Tirant lo Blanch, p. 108ff.

[38] See Benda, E. (2001). El Estado social de Derecho, Benda, E. et al., *Manual de Derecho Constitucional*, Madrid: Marcial Pons (2nd Spanish edition by López Pina, A.), p. 493.

[39] See Jaria-Manzano, J. & Borràs, S. (2019). Introduction to the *Research Handbook on Global Climate Constitutionalism*, Jaria-Manzano, J. & Borràs, S. (eds.), *Global Climate Constitutionalism*, Cheltenlham, Northampton: Edward Elgar, p. 3ff, arguing for an open constitution in the context of the Anthropocene.

constitutional horizon of international environmental law, I will focus on the assumption of stability implied in the idea of *sustainable* development as core goal or principle. In my opinion, this conception is hardly compatible with the changing circumstances of the Earth System, particularly when human history is entangled with natural history in the Anthropocene narrative creating an *unstable* scenario where nonlinear transformations are to be expected.

3. The Anthropocene as awareness of the historical nature of the Earth System

The Earth System Science, as far as focused on planetary change, brings to the present the historization of the Earth, early developed by modern geology. In short, the historization of the Earth culminates with the assumption of the beginning a new geological era, when the traditional protagonist of history, the human being (the *Anthropos*), also becomes a geological force.[40] The linear view of time that the West adopts with Christianity moves from the realm of revelation—the apocalypse and the end of time—into the realm of history—the myth of progress—and from there to the natural sciences—the evolution of species. In the end, in the context of Earth System Science, the Anthropocene unifies human history and natural history in a single narrative, bringing together geological time and historical time.[41]

For a more traditional approach, focused on a single constitutional document, see Kotzé L. J. (2019). A global environmental constitution for the Anthropocene's climate crisis, op. cit., p. 69.

[40] See Clark, N. (2017). Politics of Strata, *Theory, Culture & Society*, 34(2-3), p. 214-215.

[41] In 1895, Lord Acton gave a lecture in Cambridge where he highlighted the idea that the medieval world was a world that lived in the past, so that there was no difference between past and present. The Modern Age, on the contrary, constitutes a period in which the dominant perspective is that of historical change, which, among other things, lead the development of historiography. This linearity of time in the development of human societies is finally transferred to the planet with the development of geology and integrated in one sole narrative under the idea of Anthropocene. On Lord Acton's ideas about history, see Brinton C. (1919). Lord Acton's Philosophy of History, *The Harvard Theological Review* 12(1), p. 89-112.

In fact, the Anthropocene was prepared by previously coined formulations that pointed out already the entanglement of histories traditionally separated—the social and the natural realms, as the Anthropozoic era proposed by Stopani or the noosphere of Vernadskij.[42] It is clear that the formulation of a new geological era in connection with the development of Earth System Science corresponds to a consolidated trajectory of construction of the Earth as a scientific object in the context of the development of the natural sciences, assuming its historical evolution.[43] The historization of the nature is now linked to the entanglement of nature and society in a global ecosocial complex.[44] This is extremely important, because the constitutional tradition is firmly built upon the modern assumption of the mutual separation of natural and social spheres.[45]

In fact, this dualism, rooted in the core beliefs of the Modernity, is the conceptual mechanism to justify and promote the exploitation of the nature, conceived as pure matter socially indifferent.[46] For this reason, nature is constructed as ahistorical. This assumption lies in the background of the very idea of sustainability, which is ultimately depending on the exceptionally stable conditions of the Holocene.[47] In fact,

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[42] See Crutzen, P. J. (2002). Geology of mankind, *Nature*, 415, p. 23; and Steffen, W., Crutzen, P. J. & McNeill, J. R. (2007). The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?, *Ambio*, 36(8), p. 615.

[43] See Latour, B. (2017), Why Gaia is not a God of Totality, *Theory, Culture & Society* 34(2-3), p. 62.

[44] See Crist, E. (2016). On the Poverty of Our Nomenclature, Moore, J. W. (ed.), *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, Oakland: Kairos, p. 28.

[45] See Mickelson, K. & Rees, W. (1993). The Environment: Ecological and Ethical Dimensions, Hughes, E. L., Lucas, A. L. & Tilleman II, W. A. (eds.), *Environmental Law and Policy*, Toronto: Emond Montgomery, Toronto, p. 3.

[46] See Vaughan, F. (1974). Ecology and the Concept of Nature, Dwivedi, O. P. (ed.), *Protecting the Environment. Issues and Choices – Canadian Perspectives*, Toronto: Coop Clark, p. 10ff. It is extremely significant, in my opinion, how the US National Academy of Science defined 'modernization' as the "*extension of deliberate human control over an increasing range of the environment*". See on this, Clarke, A. (1995). Modernity, Postmodernity & Reproductive Processes ca. 1890-1990, or, "Mommy, where do cyborgs come from anyway", Gray, C. H. (ed.), *The Cyborg Handbook*, New York, London: Routledge, p. 141.

[47] See Colebrook, C. (2017). We Have Always Been Post-Anthropocene: The Anthropocene Counterfactual, Grusin, R. (ed.), *Anthropocene Feminism*, Minneapolis: University of Minnesota Press, p. 18-19.

ecomodernism assumes that, given a rational interaction between society and nature, the latter will remain unchanged and will be able to continue providing the former with the resources it requires.[48] It seems to me that this assumption is depending on a view based on the separation between the human and the non-human, that has its roots in early Modernity and that, in particular, presupposes that the non-human is formless and ahistorical, a mere repository of resources.[49]

Sustainability was developed as idea in the context of modern forestry.[50] The argument was the following: if overexploitation is avoided, then the natural cycles tended to rend a regular yield of resources for society. In this view the possibility of evolution of natural systems or of disruptive events is ignored. However, according to the Anthropocene narrative, (planetary) change becomes an immediate reality and, consequently, natural systems upon which society exists in the global ecosocial complex tend to transform themselves.[51] Therefore, sustainability is contradictory with the historicity of the planet, unless we were able to secure once and for all the planetary conditions, which imply a technological fixing of the global environmental crisis.[52] In the following section, I will analyse the possibility of manipulating the Earth System to

[48] See Dryzek, J. S. (2005). *The Politics of the Earth. Environmental Discourses*. Oxford: Oxford University Press (2nd edition), p. 57.

[49] See Touraine, A. (1992). *Critique de la modernité*, Paris: Fayard, p. 349.

[50] The idea of sustainability is developed, first of all, in England, due to the need to maintain the forests that allow shipbuilding, which is the fundamental means of protecting the country against its enemies. However, the conceptual elaboration took place in Germany with Hans Carl von Carlowitz (1645-1714), who had been trained in England with John Evelyn, a promoter of forest conservation there. Von Carlowitz's work *Sylvicultura oeconomica oder Naturmässige Anweisung zur Wilden Baum-Zucht* introduces the concept of *nachhaltendes* that will change to *nachhaltig* (sustainable) with the subsequent work of Wilhelm Gottfried Moser (1729-1793). See Bosselmann, K. (2008). *The Principle of Sustainability. Transforming Law and Governance*, Farnham, Burlington: Ashgate, p. 17ff.

[51] See Steffen, Crutzen & McNeill (2007), p. 618.

[52] See Fremaux, A. & Barry, J. (2019). The «Anthropocene and Green Political Theory: Rethinking Environmentalism, Resisting Eco-modernism, Biermann, F. & Lövbrand, E. (eds.), *Anthropocene Encounters. New Directions in Green Political Thinking*, Cambridge, New York, Melbourne, New Delhi: Cambridge University Press, p. 181.

achieve sustainability, freezing the conditions of the planet according to human needs (or, at least, the needs of the hegemonic groups of global society).

4. The Anthropocene Gap and the ecomodernist perspective

The idea of an Anthropocene gap highlights the inability of human societies and their institutions to understand, analyse and address the implications of the transition to a new geological era.[53] In the context of Earth System Governance, this is provoked by the adoption of an ecomodernist perspective, based on the assumption that if humanity—or, more precisely, a part of humanity that benefits from the process of capitalist accumulation—has been able to cause planetary change, it is in the position to control planetary evolution and determine appropriate conditions for the self-determination of human individuals, using of technologies of planetary manipulation such as geoengineering.[54]

However, as I have underlined in the previous section, the narrative of the Anthropocene is based in the assumption that the planetary conditions change, i.e. that they are changing now. It implies that anthropic activity is integrated into the process of historical evolution of the Earth System and the human species has become a geological force, having a particularly prominent effect on the current planetary transformation.[55] Consequently, the Anthropocene is a new era in the historical evolution of the planet, caused by the accelerated anthropic agency, which is modifying the fundamental

[53] See Galaz, V. (2014). *Global Environmental Governance, Technology and Politics*. Cheltenham, Northampton: Edward Elgar, p. viii.

[54] See Hamilton, C. (2016). The Anthropocene as rupture, *The Anthropocene Review* 3(2), p. 99ff.

[55] See Nicholson, S. & Jinnah, S. (2016). Living on a New Earth, Nicholson & Jinnah, *New Earth Politics…* cit., p. 7.

parameters of the Earth System (the planetary boundaries) to give rise to a life scenario different from that of the Holocene.[56]

Sustainable development and, more generally, sustainability as a core guiding idea of international environmental law is only a sound approach if *a)* a geological change is not happening; or *b)* the geological change can be monitored, controlled and manipulated. If we accept the narrative of the Anthropocene, *a)* is automatically excluded. But are we capable of controlling the evolution of the Earth System? Are we actually able to freeze the planetary conditions in a state convenient for social reproduction in the terms generally accepted in the hegemonic global culture, i.e. the capitalist framework? Is the Anthropocene the geological era characterized by the possibility of humans of controlling the Earth System? The ecomodernists would answer affirmatively to these questions and, consequently, assume *b).*

Thus, if we take for granted that planetary change is actually happening, sustainability seems only possible if we assume that we can control and monitor the Earth System and stabilize its configuration to some state more or less fitted for human development (or some very particular kind of human development).[57] Sustainability is then a concept consubstantially related to an ecomodernist approach, as far as it depends on the ability to establish and preserve certain structural conditions of the Earth System, which allow a stable interaction between society and nature, based on a "rational" exploitation of natural resources, according to the mentioned paradigm of modern forestry. Indeed,

[56] See Rockström, J. et al. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity, *Ecology and Society Home* 14(2).

[57] Various technological solutions have been proposed to control the greenhouse effect and fix the climate, such as the capture of carbon in the atmosphere or the different methods of managing solar radiation. In relation to the latter, it is significant that Paul Crutzen, who contributed decisively to disseminate the term 'Anthropocene', has proposed the injection of aerosols into the atmosphere to increase the reflection of sunlight and, consequently, "cool" the planet, becoming a defender of a technical fixing of planetary change. See Crutzen, P. J. (2006). Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?, *Climatic Change* 77, p. 211-219.

ecomodernism presumes the narrative of Modernity and beliefs in the possibility of dominating the planet.[58] This assumption avoids the implications of interdependence and complexity derived from the complete entanglement of society and nature, of technosphere and biosphere, of production and life, as I will try to show below.

Some may argue that the idea of sustainable development has had a radical significance in the beginning, even "a serious challenge to orthodox political and economic arrangements."[59] As we have seen, this is no longer so, as far as sustainable development has been integrated as a principle in a body of international law, that shows the fundamental consensus of the hegemonic groups in the global economy.[60] This possibility is attractive to the extent that allows to preserve the essential values of the international order, inextricably linked to the conservation of the fundamental features and unbalances of capitalist world-economy.[61]

This is probably the reason why sustainable development has been considered such an attractive idea by large corporations.[62] Therefore, a managerial response to the global environmental crisis is promoted in the context of international law, without questioning the foundations of the capitalist reproduction process.[63] The underlying conviction of this hegemonic approach is that this is a problem that can be solved with technological

[58] As underlined by Dryzek (2005), p. 57ff., both ultraliberal Prometheanism and administrative rationalism rely on the ability of human knowledge to provide tools to dominate the Earth System, pretending a technological fix of the global environmental crisis.

[59] See Connelly & Smith (1999). p. 2.

[60] See Girardi, G. (2014). Pueblos indígenas, ecologismo político y religión, *Papeles de relaciones ecosociales y cambio global* 125, p. 125-126.

[61] See Echeverría, J. (2010). Complejización del campo político en la construcción democrática en el Ecuador", Burbano de Lara, F. (ed.), *Transiciones y rupturas. El Ecuador en la segunda mitad del siglo XX*, Quito: FLACSO (Sede Ecuador), p. 105.

[62] See Dryzek (2005), p. 2.

[63] See Connelly & Smith (1999). p. 201.

innovation and market mechanisms, i.e. that we can manipulate the planet to freeze the conditions of the Holocene.

This perspective is based on the idea that the Anthropocene is nothing more than the opening of a period in which it is possible for humans to manipulate the Earth System through technology.[64] This, in the last resort, reveals the possibility of shaping the planet according to the pretensions of humanity—or rather of the elites of global capitalism—in accordance with the same Faustian pretensions that have been generating the dynamics of planetary degradation of the last two hundred years.[65]

However, it is true that a distinction must be made between sustainability and sustainable development, as Klaus Bosselmann argues particularly well.[66] Nevertheless, being the cause is largely different from being in charge, and that seems to be happening with the global society in the Anthropocene, as far as it is emerging a certain consensus regarding the unstable character of the new geological era. That leads to the conclusion that human agency in planetary change is not producing a human control of planetary evolution.[67] Accordingly, sustainability as such is incompatible with the changing world announced by the narrative of the geological transformation and the beginning of the Anthropocene, unless we can manipulate the planet.

[64] See Hamilton, C. (2016). The Anthropocene as rupture, *The Anthropocene Review* 3(2), p. 99ff.

[65] See Grusin, R. (2017). Anthropocene Feminism: An Experiment in Collaborative Theorizing, Grusin (ed.), *Anthropocene Feminism…* cit., p. xi.

[66] See Bosselmann, K. (2008), p. 15.

[67] In the context of uncertainty implied by the complexity and interrelation of planetary processes, which I will develop briefly in the rest of the article, the risks associated with this type of technology are unimaginable. See. Wieding, J., Stubenrauch, J. & Ekardt, F, (2020). Human Rights and Precautionary Principle: Limits to Geoengineering, SRM, and IPCC Scenarios, *Sustainability* 12(8858), 2020, p. 6. Crutzen himself (2006, 216), in the mentioned paper about albedo enhancement, recognizes that unforeseen developments could not be ruled out in relation to the application of the proposed technology to curb global warming, as had been shown in the case of the ozone layer, whose Antarctic hole had occurred suddenly and unpredictably.

I will try to show briefly how complexity and interdependence of the components of the global ecosocial System—i.e. the Earth System—bring forward the possibility of nonlinear disruptive events, producing what has been designed as the Anthropocene gap between social institutions and expectations and the geohistorical evolution of Planet Earth, transformed in the course of its human colonization. In this context, the global institutional players show themselves as unable to draw conclusions of the entanglement of global society with the Earth System and the consequent openness to uncertainty of social processes in a context of planetary change. I will approach this in the next section.

5. Complexity, interconnectedness and uncertainty

Research on Earth System Science tends to point out that, compared to the Holocene, the Anthropocene will be a geological period rather characterized by instability.[68] This instability is related to the interdependence and complexity of planetary processes, which challenge the traditional atomistic vision of modern science and introduce the uncertainty in the course of planetary events.[69]

In fact, quantum physics show how interdependence leads to uncertainty regarding the individual behaviour of the elements of a system and, therefore, of the system as a whole. This was pointed out by Heisenberg's uncertainty principle, according to which the precision in determining the position of a subatomic particle is inversely

[68] See Kotzé, L. J. (2016). *Global Environmental Constitutionalism in the Anthropocene*. Oxford, Portland: Hart, p. 4.

[69] About the origin and the consequences of the atomistic perspective in the context of Galilean revolution, see Dewey, J. (1960).*The Quest of Certainty*, New York: Capricorn, p. 94-95.

proportional to the precision of determining in its mass and speed.[70] This fundamental postulate of quantum mechanics, which constitutes the hegemonic interpretation of the subatomic world, has an impact on the very conception of the world of the discipline that has defined the development of technoscience as the hegemonic pattern of interpretation of experience, i.e. physics. The atomistic world of techno-capitalism seems to be coming to an end.[71]

Secondly, complexity should to be taken into account as well. To begin with, Earth System Science endorses a holistic interpretation of the evolution of the planet, according to the awareness of the interdependence of planetary processes. This perspective is progressively consolidating among the scientific community, as shown by the so-called Gaia Hypothesis, formulated by James Lovelock, which influenced the theoretical articulation of the science of the Earth System itself.[72] Accordingly, the current interpretation regarding the phenomenon of life tends to consider it more as participation in the biosphere than an attribute of individuals.[73] To the extent that the Earth is presented as "an organic living being" it is not possible to sustain the mechanistic and atomistic conception of Western dualism.[74]

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[70] As Dewey points out in op. cit., p. 202, "[t]he element of indeterminateness is not connected with defect in the method of observation but it is intrinsic. The particle observed does not have fixed position or velocity, for it is changing all the time because of interaction".

[71] For the Earth System, it should be noted that it appears as a scientific object from the evolution of different scientific disciplines that hatched between the end of the 1960s and the beginning of the 1970s. In this period, the plate tectonics theory is confirmed, the idea that biological evolution develops from catastrophic events linked to geophysical episodes is accepted, the incidence of extraterrestrial events in the history of the planet is recognized, and, finally, the hypothesis that the Earth works in a systemic way is formulated. That is crucial for arguing the interconnectedness of its elements. See Clark, N., Yussof, K., "Geosocial Formation and the Anthropocene", *Theory, Culture & Society*, 34(2-3), p. 9-10.

[72] In relation to the Gaia Hypothesis, see Lovelock, J. & Margulis, L. (1974). Atmospheric homeostasis by and for the biosphere: the Gaia hypothesis, *Tellus* XXVI(1-2), 1974, p. 2-10. For its importance in the development of Earth System science, see. Hamilton (2016), p. 94-95.

[73] See Vid. Smith, E. & Morowitz, H. J. (2016). *The Origin and Nature of Life on Earth. The Emergence of the Fourth Geosphere*, Cambridge: Cambridge University Press, p. 541.

[74] See Estermann, J. (1998). *Filosofía andina. Estudio intercultural de la sabiduría autóctona andina*, Quito: Abya-Yala, p. 176-177.

The dynamics of complex systems made up of interdependent components tend to be uncertain, as was revealed with the formulation of the so-called chaos theory.[75] In this sense, the effectiveness of climate forecasting models, with climate being one of the key elements in the functioning of the Earth System, remains questionable. This seems to be a clear disclaimer about the ability to produce adequate knowledge of the future evolution of the Planet in the context of the narrative of the Anthropocene, particularly to control climate through geoengineering.[76]

Consequently, Earth System Science points out that the evolution of the planet in the Anthropocene will tend to be less predictable than in the Holocene period. The planet, in fact, given its complexity and the interdependence of its processes, would be prone to produce nonlinear disruptive events, evolving into unpredictable ways to the extent that "the very character of the life-support system" could be altered in a "largely irreversible" way.[77] Moreover, the progressive growth of the social metabolism until reaching a planetary dimension also makes it more complex and more vulnerable, ultimately, to the nonlinear disruptive events that are susceptible to appear in the future planet evolution, which is not only a historic process, but it is also entering into an "era of unpredictability in all Earth systems".[78]

[75] The butterfly effect, which gave rise to chaos theory, was detected by Edward Lorenz when he found, operating a mathematical model for climate dynamics, that a small variation in the initial parameters could lead to extremely different developments. This was represented through the image of the flapping of the wings of a butterfly in Brazil which causes a tornado in Texas. See Taleb, N.N. (2010). *The Black Swan. The Impact of the Highly Improbable*, New York: Random House (2nd edition), p. 179.

[76] Particularly, the effectiveness of climate forecasting models in relation to specific extreme events remains doubtful, as pointed out in Schellnhuber H. J. & Martin, M. A. (2020). Climate Change, Public Health, Social Peace, Al-Delaimy, W. K., Ramanathan, V. & Sánchez Sorondo, M. (eds.), *Health of People, Health of Planet and Our Responsibility. Climate Change, Air Pollution and Health*, Cham: Springer, p. 226.

[77] See Reid, W. V. et al. (2010). Earth System Science for Global Sustainability: Grand Challenges, *Science* 330, 2010, p. 917.

[78] See Gillings, M. R. & Hagan-Lawson, E. L. (2014). The cost of living in the Anthropocene, *Earth Perspectives* 1(2), 2014, p. 2.

If we accept this unpredictability, as a consequence of the combination of complexity and interconnectedness, it is doubtful that the planet can be manipulated at will to suit human whim. There is no technical fix.[79] In this context, therefore, it seems that the idea of sustainable development and even that of sustainability are not very consistent, insofar as it is difficult to argue what is likely to change abruptly. In my opinion, this is a definitive objection to sustainable development as fundamental goal of the international environmental law and, more generally, to insist on preserving the hegemonic social practices in the context of the capitalist world-economy.

The fact that the available information is more abundant than ever does not make things easier, as far as it is not able to eliminate uncertainty.[80] To the extent that the uncertain dynamics of a complex system lie the Earth are incompatible with its precise manipulation through technological devices, sustainability and sustainable development lack the ability to frame adequately the challenges raised by the planetary transformation. At the same time, to draw consequences of the implications of uncertainty for social systems and legal (constitutional) arrangements is not an easy task, provided it renders insecure consolidated social practices and beliefs, as legal certainty.[81]

Accordingly, the Anthropocene Gap would imply here the inability of current institutional arrangements to confront the situation and, particularly, the lack of

[79] See Smil, V. (2008). *Energy in Nature and Society. General Energetics of Complex Systems*, Cambridge, London: The MIT Press, p. 380.

[80] See Farré, J., Prades, J. & Gonzalo, J. (2019). Las narrativas del cambio climático, Espluga Trenc, J. (ed.), *El cambio climático y sus metáforas. Cómo dar sentido a las narrativas mediáticas sobre un riesgo difuso y global*. Barcelona: Icaria, p. 34.

[81] In fact, legal certainty would be collapsing at this moment for intrinsic reasons, as far as courts tend to take into considerations a complex (and interdependent) set of legal rules and principles, which render uncertain the future developments of law. See Chang, W.-C. & Yeh, J.-R. (2012). Internationalization of Constitutional Law, Rosenfeld, M. & Sajó, A. (eds.), *The Oxford Handbook of Comparative Constitutional Law*, Oxford: Oxford University Press, p. 1180.

adequacy of the conceptual apparatus to interpret and react to the global environmental crisis. It seems necessary to go beyond the conceptual comfort zone defined by the fundamental principles of environmental law, both internationally and in different states, and to explore new approaches to address the processes of nonlinear transformation that we apparently have to confront. The following pages are devoted to explore an alternative to sustainability, assuming the impossibility to control, monitor and manipulate Earth System to escape its historicity and, particularly, the apparition of nonlinear disruptive events according with the complexity of the ecosocial system which has become the planet with the emergence of the Anthropocene.

6. Beyond Sustainability: exploring resilience for framing the planetary crisis

In the event that we assume that it is not possible to manipulate the Earth System to fix a certain configuration of its fundamental parameters that lasts over time, given the plausibility of unpredictable effects in the planetary manipulation activities aimed at achieving it, it must be concluded, therefore, that it is necessary to seek horizons other than those that have been set by the international community in the context of a fundamentally technocratic and managerial response to the transformation of the planet. If sustainability is unable to provide a conceptual framework for confronting geological change, then it is also inadequate to shape international environmental law in a consistent way to help the global community to navigate the Anthropocene. Consequently, we should explore alternatives.

Tentatively, I believe that resilience is a good candidate to furnish such a guide, since it takes into account the importance of social vulnerability in a scenario where nonlinear disruptive events are plausibly to happen. Moreover, it also avoids overconfidence in human ability to control the evolution of the Earth System. I will explore now how

resilience could help in a way that sustainability cannot, leaving aside the significant consequences from the point of view of the architecture of (international environmental) law implied by the uncertainty of the planetary evolution in the future. Resilience is the ability of a system to perpetuate its dynamic structure in the face of various disruptions, which implies, among other things, a high interconnected diversity, enabling innovation, and decentralized but interconnected decision-making.[82]

In the context of the social systems of the Anthropocene, it would then become "the ability of institutions and governance to grapple with change, surprise and multiple interactions between human-environmental systems".[83] In this sense, it can be considered a much more appropriate concept than that of sustainability in an unstable scenario such as that posed by the Anthropocene, insofar as it emphasizes adaptation to critical situations rather than monitoring and manipulating Earth System. Several works have highlighted the importance of the idea of resilience in the context of global environmental crisis, particularly when it comes to energy transition, which is a key issue in the adaptation of human communities to planetary change.[84]

This emphasis on resilience is based on the acceptance that the changes generated by humans or, more precisely, by the dynamics of the capitalist world economy in the Earth System do not allow the ability of the species to control planetary dynamics, but rather to be aware that they open a period of instability, which presents unforeseeable

[82] See Fernández Durán, R. & González Reyes, L. (2018). *En la espiral de la energía. Vol. II: Colapso del capitalismo global y civilizatorio*, Madrid: Libros en Acción (2nd edition), p. 190.

[83] See Galaz (2014), p. viii.

[84] See Guerry, A. (2016). A reflection on some legal aspects of decision control in the energy transition process: a comparison of France and Germany, Jaria i Manzano, J., Chalifour, N. & Kotzé, L. (eds.), *Energy in Nature and Society. General Energetics of Complex Systems*, Cheltenham, Northampton: Edward Elgar, p. 202.

challenges to human communities.[85] Change is happening and there is no chance to stop it. In this sense, the emphasis on mitigation is shifting to the emphasis on adaptation climate change policies, as it becomes clear that the anthropogenic modification of global climate system tends to produce extreme episodes.[86]

Assuming this, the technocentric and managerial approach of international (environmental) law to the global environmental crisis is to be overcome, implying not necessarily a technophobic reaction, but an insight beyond the dominant forms of social reproduction, generated in the context of late technocapitalism.[87] There is a need for adaptation to unpredictable scenarios.[88] Here the idea of resilience could be an inspiring concept, that can help communities to think and act beyond the structures of global economy, built upon a base of the predictability of social arrangements, particularly, of law, the technical manipulation of the reality, and economic exploitation of resources. The sociolegal response to Anthropocene should go beyond capitalist order and, consequently, be built on a foundation other than sustainability.[89]

Here is where resilience as a framing concept for social reorganization connects with one of the most salient questions regarding planetary transformation: its justice implications.[90] The capitalist world economy is not only the main force beyond the

[85] See Vidas, D. et al. (2015). International law for the Anthropocene? Shifting Perspectives in Regulation of the Oceans, Environment and Genetic Resources", *Anthropocene* 1, p. 11.

[86] See Peel, J. & Osofsky, H. M. (2015). *Climate Change Litigation. Regulatory Pathways to Cleaner Energy*. Cambridge, Nova York, Melbourne, Delhi, Singapur: Cambridge University Press, p. 189.

[87] See Clover, J. & Spahr, J. (2017). Gender Abolition and Ecotone War, Grusin (ed.), *Anthropocene Feminism…* cit., p. 162.

[88] See Dalby, S. (2014). Rethinking Geopolitics: Climate Security in the Anthropocene, *Global Policy* 5(1), p. 8.

[89] See Jaria-Manzano, J. (2021). Di-vision: The making of the "Anthropos" and the origins of the Anthropocene, *Oñati Socio-Legal Series* 11(1), p. 166ff.

[90] Environmental justice raised as a grassroots response of poor (and racialized) communities to the unequal distribution of environmental harm and the lack of inclusiveness of environmental policies in the late seventies. Since then it has evolved into a fundamental concept providing foundation to several local communities in environmental conflicts, as well as the claims of the Global South against the inequitable basis of the international (environmental) law. Accordingly to this approach, new claims for justice have

planetary transformation, but it is based in the production of structural unbalances and injustices in the global society.[91] Resilience is thought here as an alternative to sustainability and, consequently, to a response of the international community to environmental crisis according with the parameters of capitalist world-economy.

In fact, there is a gap between the SDGs and the reality of global capitalist accumulation, with planetary change affecting the most vulnerable people, as far as the drivers of the Anthropocene are the same as the drivers of global inequality.[92] The most salient phenomenon of the planetary transformation is climate change, "which is a manifestation of corrective injustice, because those who bear the greatest climate change-induced harms (including indigenous peoples and small island states) have been unable to obtain compensation or redress for their injuries" and "is inextricably linked to broader social injustice, including an economic order that systematically exacerbates poverty and inequality while exceeding the limits of the planet's finite ecosystems".[93] In this sense, resilience is linked in my argument to inclusion, though I cannot develop this here in detail. In a rough way, it can be stated that shifting from the technocapitalist sustainability to local-based resilience is a way to decolonize knowledge, providing tools to human communities to react before change and to overcome global injustice.[94]

emerged in contemporary environmental debates, as ecological justice, climate justice or energy justice. See Jaria-Manzano, J. (2020). Environmental Justice in EU Law and Policies: A Fundamental Challenge, Campins Eritja, M. (ed.), *The European Union and Global Environmental Protection. Transforming Influence into Action*, London: Routledge, p. 167ff.

[91] See González, C. G. (2015). Environmental Justice, Human Rights, and the Global South, *Santa Clara Journal of International Law* 13, p. 154ff.

[92] See Baskin, J. (2019). Global Justice and the Anthropocene: Reproducing a Development Story, Biermann, & Lövbrand (eds.), *Anthropocene Encounters…* cit., p. 160.

[93] See González, C. G. (2021). Racial capitalism, climate justice, and climate displacement, *Oñati Socio-Legal Series* 11(1), p. 113.

[94] See Chandler, D. (2018). *Ontopolitics in the Anthropocene: An Introduction to Mapping, Sensing and Hacking*. London: Routledge, p. 214.

I have outlined serious objections to the idea of sustainability as fundamental conceptual tool to frame global environmental crisis, as far as it is presented as a geological change. I believe that resilience is a good alternative to shape social reaction to the consequences of the Anthropocene, as an era prone disruptive nonlinear events. Furthermore, in my opinion, resilience is a concept that legitimates local knowledge and decentralized responses, bolstering decolonization and confronting injustice. Nevertheless, I think that it is not possible to operate a simple substitution of sustainability for resilience in the current structure of international (environmental) law, even if it is structured in some kind of Post Westphalian form.[95] A fragmentary, porous and dynamic idea of constitution is also necessary, because the challenges of the Anthropocene do not affect only the content, but the very form of the law.

[95] On Post Wesphalian governance in environmental international law, see recently Haas, P. M. (2022). Stockholm+50: A Look Ahead in International Environmental Politics, *Environmental Policy and Law* 52(1), p. 7-8.