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coordinator

Sandrine Maljean-Dubois

CNRS and Aix-Marseille University - Assistant & Rapporteur

assistante & rapporteure

Alice Monicat-Delire

Contractual Ph.D. Candidate (normalienne) at Aix-Marseille University

steering committee

(by alphabetical order)

Laurence Boisson de Chazournes

University of Geneva, Switzerland

Duncan French

University of Lincoln, United Kingdom

Louis Kotzé

North-West University, South Africa

Sara Seck

Schulich School of Law, Marine & Environmental Law Institute, Canada

Margaret Young

Melbourne Law School, University of Melbourne, Australia

Mingzhe Zhu

University of Antwerp, Belgium & China University of Political Science and Law, China

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Christine ESTÈVE

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christineesteve1@gmail.com

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researcher in international law,
were associated.

1.

state of play

Introduction

"... the Court also recognizes that the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn."[1]

This formula, from the International Court of Justice in 1996, has taken on its full meaning.

Climate change, erosion of biodiversity, land-system change, freshwater misuse, disruption of biogeochemical flows, ocean acidification... The threats to our environment and, by extension, to our health, have never been so numerous or serious. Because of their long-term consequences, not to mention their irreversibility, they impact present humans and non-humans, as well as future human and non-human generations. We must now recognize that this has become a question of survival.

Threats to the environment are also, for most part global. Migratory birds and mammals, radioactive clouds, oil spills, acid rain, chemical products or heavy metals do not respect borders and ignore customs officers, with impacts cascading into the entire earth system. We have entered the *Anthropocene* epoch. Although there are a few earlier occurrences of the term (e.g., widely seen as early as the 1920s by Vladimir Ivanovich Vernadsky, a Russian scientist and founder of biogeochemistry, who invented the notion of the biosphere and understood that life was a geological force capable of transforming the Earth), the term was used in the late 1980s by the American biology professor Eugene F. Stoermer. It was then popularised in the early 21st century (2002) by the recently deceased Nobel laureate and meteorologist Paul Crutzen.

Anthropocene is a neologism constructed from the ancient Greek *anthropos*, "human being" and *kainos*, "new", which is the suffix for a geological epoch. The term literally means the "age of human", and characterises a new epoch in the history of the Earth that follows the *Holocene,* an interglacial period, that has been a relatively stable and harmonious period following the last glacial period of the Pleistocene that lasted about 11,000 years. What sets the Anthropocene apart from the Holocene, is that humans have become a telluric force and are now able to change the earth system and to impact planetary integrity. In other words, humans would have become a major geological force, like volcanoes and earthquakes, that are upsetting earth

Note 1 Advisory opinion of 8th July 1996, Legality of the Threat or Use of Nuclear Weapons, ICJ Reports 1996, p. 226, par. 29. See also ICJ Reports 1997, p. 3, para. 53.

system equilibrium in profound ways. Of course, not all humans have equally contributed to the Anthropocene, nor are humans equally impacted by it: indeed, those most responsible are often least vulnerable and those least responsible are often most vulnerable.

The concept of Anthropocene invites us to change our view of the planet, seen as a complex system that is undergoing systemic, long-lasting transformations with an uncertain outcome, to the extent that it takes into account the interconnectedness of all the biological and human elements that together constitute a single system. The natural system and the social system are inseparable and form a new system, where the Descartian divide is dissolved and where humans become an integral part of the Earth system, not master of it. The Anthropocene allows us to situate our thinking on a new temporal (geological time) and geographical (global) scale.

The Anthropocene is a time of uncertainties, marked by large-scale, largely irreversible but also unpredictable, changes. Changes are non-linear once "planetary boundaries" (Steffen, 2015) or tipping points (Lenton, 2019) are crossed. The Anthropocene demonstrates, to a greater extent than even before, the interdependent nature of earth system governance challenges, and therefore, also the need for increased international cooperation, as well as the need for law, and in particular for international law, to function more optimally in light of the deepening socio-ecological crisis and of the multiscalar interdependency of earth system processes, constituents and elements.

In this context, the main response to environmental threats has been the development of international environmental law. This field of international law is concentrated on 'obligations of States to respect and protect the natural environment'.[2] However, despite impressive normative developments, mainly since the 1970s, and some successes (such as the ongoing restoration of the ozone layer), international environmental law has been largely unable to halt the increasing impacts of human activities on planetary integrity, notably since the start of the 'Great Acceleration' in the 1950s, which is believed to be a distinct marker of the Anthropocene epoch.

The deficiencies of international environmental law, especially when considered through the lens of the Anthropocene, lie at several levels. First, with few exceptions, the substantive norms

Note 2 Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court's Judgement of 20 December 1974 in the Nuclear Tests (New Zealand/France) Case (Order) ICJ Reports 1995 p. 288 [64].

of international environmental law, including those that shape its objectives, are not sufficiently ambitious to limit human behaviour in a way that could safeguard planetary integrity. International environmental law remains unable to achieve deep structural reforms because it lacks normative ambition at a time when precisely as high as possible a level of such ambition is urgently required. Second, international environmental law is still considered to be predominantly state-centric, especially insofar as it mostly revolves, like the broader corpus of international law from which it derives, on the state being the prevailing "pre-eminent international legal person" (Sands and Peel, 2018), and relies on state apparatus and inter-governmental processes for its creation, legitimacy, amendment and enforcement (Tarlock, 1992). In other words, states still remain, formally at least, the principal architects, agents and actors of international environmental law. Its state-centrism means that international environmental law has, among others, not yet managed to fully embrace the "complex architectures of Earth system governance" (Biermann and Kim, 2020) or "earth system governmentality" (Lövbrand et al, 2009), in a way that would sufficiently enable it to respond to complex, integrated, multi-scalar earth system governance challenges. Third, international environmental law is seen to be predominantly aimed at promoting human interests, health and well-being, and is therefore criticized for being too anthropocentric, which effectively shuts out alternative ways of seeing, knowing, being and caring for the entire vulnerable living order. One reason for its structurally entrenched anthropocentrism is that international environmental law fully embraces, as its foundational directing and ethical fulcrum, the principle of sustainable development which, in its prevailing neoliberal guise, has now been exposed for the predatory, socio-ecologically destructive principle that it is (e.g., Kotzé, 2019). International environmental law's tendency to privilege (some) humans through its privileging structures of oppression to the detriment of a non-human world, a world that ironically it was designed to protect in the first place, is a significant concern and the focus of intense debate among critical legal scholars (e.g., Grear, 2014). Fourth, related to the foregoing concern, international environmental law has been described as being reductionist, a description which critically reflects on its tendency to focus on a one-dimensional "environment" that consists of separate, unconnected parts in distinct geographical locations, as its regulatory object, instead of more fully embracing the earth system as its regulatory object (Kotzé, 2020). In other words, international environmental law does not yet embrace a planetary system perspective despite clear and obvious reasons emanating from, for example, earth system science and frameworks such as the planetary boundaries that

it should do so sooner rather than later (French and Kotzé, 2021). Some of the results of international environmental law's reductionist focus include that it emphasizes the untenable separation of humans and "nature", a concern that is also related to the abovementioned issue of anthropocentrism.

Significant developments of international environmental law

- Common understanding/consensus on global environmental degradation and need of international cooperation/law.
- Emergence of a set of due diligence obligations/obligation of states to prevent environmental damage (the 'no-harm' rule) as the foundation of international environmental law - customary nature.[3]

Note 3 International Court of Justice, Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, ICJ Reports 2010, p. 14.

- Significant quantitative development of treaty-based obligations (there are 1300 multilateral treaties on environment according to the International Environmental Agreements database of the University of Oregon) either sectoral (biodiversity, climate change, marine pollution, chemicals...) or cross-sectional (access to information, impact assessment...) – with in mirror an impressive quantitative development of treaty bodies (Conference of the Parties, scientific bodies, financial mechanisms, secretariats...).
- Abundant soft law (COP decisions, major international declarations and action plans like the Rio Declaration on environment and development adopted in 1992, the sustainable development goals (SDGs), resolutions adopted by international organisations ...) and close entanglement of soft law with treaty-based obligations.
- International environmental law has long recognized the need to enhance the voices of at least some of those who are uniquely situated due to both their special vulnerability to environmental harm, and their lack of power arising from the failure of states to respect and protect their human rights (see for example the 1992 Rio Declaration principes 20, 21 and 22; the recognition of the principle of intergenerational equity in international environmental and interna-

tional sustainable development law, with the most commonly cited definition of sustainable development being that of the 1987 Brundtland Commission: *"meeting the needs of the present without compromising the ability of future generations to meet their own needs"*; the recognition of the importance in international environmental and sustainable development law of the principles of intragenerational equity and common but differentiated responsibilities (and capabilities), thus acknowledging that all states are not similarly situated and should not be treated as such; the explicit recognition of the importance of giving special priority to the needs of the least developed and most environmentally vulnerable states in Rio Principle 6).

Weaknesses of international law

- An international society still marked by the primacy of sacrosanct state sovereignty (even if it is not absolute) and consent - a less advanced legal system than national systems. Fundamental character of the principle of State's sovereignty and the right to exploit natural resources - rejection of the common heritage of mankind approach in other areas than the one covered by Part XI of UNCLOS - overexploitation of the commons (oceans, outer space).

- International environmental law is often not normatively ambitious – instead of relying on the best available science knowledge it reflects a political compromise/the lowest common denominators between states with different levels of development and different concerns. This leads to the vague and indeterminate nature of most rules (open-textured) of international environmental law, and to tempered obligations (for instance, Convention on biological diversity, article 6, *"Each Contracting Party shall, in accordance with its particular conditions and capabilities: (a) Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, inter alia, the measures set out in this Convention relevant to the Contracting Party concerned; and (b) Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies"* [we emphasize]) While the reference to "as appropriate" could reflect the need to account for Indigenous rights and governance systems, beyond this, the political compromise was and remains

necessary to address the history of colonial exploitation and the current reality in which developed countries have contributed the most to global environmental degradation and benefited economically from it, while developing countries (and in particular the least developed countries), who have contributed the least to global environmental harms, yet also lack capacity and access to technology to develop sustainably. At the heart of this compromise is also a dispute over whether it is possible to address environmental problems without simultaneously alleviating poverty and embracing sustainable development - perspectives from the global south on international environmental law has suggested that even the meaning of "environment" is the subject of dispute (Mickelson, 2007). The compromise is embedded in international environmental law principles, such as Principle 11 of the Rio Declaration according to which environmental standards in developing countries need not be as high as those in developed countries. Yet an environmental human rights or environmental justice view of this issue would suggest that those who are most vulnerable to environmental harms would disagree that they are less entitled to be free from environmental degradation, and are equally entitled to human dignity.

- International environmental law is perceived as a set of instruments designed to serve a predetermined goal and framed in a managerial language. Social equity and political-economic aspects are often ignored. International environmental law still fully embraces -neoliberal, exploitative-sustainable development as its keystone principle in an uncritical way. International environmental law follows a "business as usual" liberal and anthropocentric approach, unsuited to enhancing the ecological transformation of production and consumption patterns. Entanglement with (neo)colonialism. At the end of the day, complicity of international environmental law in causing and exacerbating climate injustices (most of the time inadvertently). International law primarily sees nature as a resource for wealth generation to enable societies to continually develop, while environmental degradation is treated as an economic externality to be managed by special regimes (Natarajan and Khoday, 2014). Though international economic regime incorporates rules on environmental protection, more radical and substantial changes are in need.

- International environmental law's failure to recognize powerful non-state actors as having direct obligations under international environmental law and poor regulation of envi-

ronmentally destructive business activities, especially by transnational corporations or state-owned oil, gas and coal companies (i.e., carbon majors).

- No overtly ecocentric instrument. No instrument focused on protecting Earth system integrity in a comprehensive or meaningful way. Fails to deal with novel normative challenges of the Anthropocene.
- Compartmentalization/fragmentation of international law and institutions "in silos" (climate/biodiversity/ozone/desertification/chemicals…) and potential conflicts in their implementations (for instance deep-sea mining versus energy transition, increasing needs in rare metals versus biodiversity conservation, or deployment of renewable energy versus biodiversity conservation or bioenergy versus food security). International environmental law as a body of law has not been designed to govern interrelated earth system governance challenges (Young, 2021). Its fragmented regimes often merely lead to problem shifting (for instance substitution of HFCs for CFCs to save the ozone layer but with significant climate impacts).
- Force of other potentially conflicting regimes (international trade law, international investment law…).
- Limited effectiveness and implementation of international environmental law into national laws.

Recent evolutions and way forward

- Threats are worsening - climate change is yet a reality, with irreversible worldwide consequences - planetary boundaries are being crossed and tipping points are passing - risks of cascade/domino effect - increasing pressures for the development of geoengineering;
- Ongoing (Global Biodiversity Framework post-2020; BBNJs) and recent launch of negotiations on plastic pollution addressing the full life cycle of plastics (rather than just waste or marine pollution);
- Mobilisation of civil society and in particular of youth (Friday for future, Extinction Rebellion…), and new space created for youth, Indigenous and women's voices in climate and other treaties;
- Growing role of the judiciary - impressive developments in climate litigation before domestic courts where non-binding

goals or promises are used in judicial argumentation - one of the means of resistance against legal regressions (for instance, in Brazil about the alteration of protected areas in the Amazon, ADI 4717, Supreme Federal Tribunal, 15 February 2019);

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- Legal developments in the human right to a clean, healthy environment; growing connexions between international environmental law and human rights - environment/human rights co-benefits (see for instance Inter-American Court of Human Rights' Advisory Opinion on the Environment and Human Rights, 2018);
- Evolution of international human rights law as it relates to business responsibilities (2011 UN Guiding Principles, and embedding in OECD RBC instruments), combined with clarification of human rights and environment relationship (2018 Framework Principles; ongoing UN negotiations on a binding treaty on business and human rights) and call from states for non-state actor contributions (Global Compact, Non-State Actor Zone of the Paris Agreement, Agenda of action of the Convention on biological diversity) - creates a potential for transformative change as is beginning to be evident in 2021 Royal Dutch Shell climate litigation;
- Legal developments in rights for nature (rivers, mountains, etc.); related developments in rights of non-human species (including animals) and their legal personhood;
- Sustainable development agenda and in particular sustainable Development Goals as a «governance through goals» mechanism that could eventually have some positive effects;
- Move to the development of planetary/earth system based paradigms for law e.g., earth system law.

2.

challenges
and possible scenarios
for the future

The four scenarios we suggest are based on a worst-case/best-case spectrum (WCBC); the worst case being the state of a world following or aggravating current trajectories - the Uninhabitable Earth Scenario - and the best case being the state of a world respecting the planetary boundaries and great biological balances without sacrificing principles of democracy (both formal and substantial), justice and equity - the Planetary Turn. Between these two, we have framed two scenarios of undesirable global ecological transformations. The first one implements Ecology without respect for Equity/Justice - the Ecological Dualism - while the second enforces Ecology without respect for Democracy - the Ecological Dictatorship.

These four scenarios are not projections, but schematic accounts of what the future on Earth and our societies might look like in 2050-2100. They do not pretend to be the work of experienced futurists, but the modest attempt of the legal community to project itself into future worlds and to draw out the implications of these different narratives for international law. Indeed, each scenario aims to emphasize a specific challenge that international law will face in the Anthropocene (ecological integrity, democracy, justice and equity). Of course, the reality is much more complex and uncertain and may combine elements of the four different narratives.

Our approach is voluntarily normative. We are convinced that *Building Tomorrow* in the face of the Anthropocene requires a real paradigm shift, a renewed ethic - a *Planetary Turn* - which would underpin a radical transformation of international law and herald the advent of Planetary Law. That is why, even if options and solutions are left open for discussion (Part 3), the *Planetary Turn* (Scenario 4) is presented not only as of the best-case scenario but as what we assume to be the only desirable path to follow in the Anthropocene.

The Uninhabitable Earth Scenario
The Worst Case Scenario

Global environmental governance has failed to promote and enforce the ecological transformation of human activities.

In 2050, human pressure on natural resources and biological balances has continued to increase. Global agricultural demand has increased by 50-60%, global human water demand by 25 to 40 %, and primary energy supply has grown by 50-70% (UNEP, 2019). Global materials use has doubled from 79 Gt in 2011 to 167 Gt in 2060 (OECD, 2019).

The objectives of the Paris Agreement have not been achieved. The global temperature has risen by 2,4°C by 2040-2060 and 4.4°C by 2080-2100, compared to 1850-1900 (SSP5-8.5, IPCC, 2021), crossing the 2°C "planetary threshold". As a consequence, the Earth system has been irreversibly pushed onto "a "Hothouse Earth" pathway" (Steffen et al., 2018): the rise in global temperature is not only unstoppable but irreversible and self-powered with disastrous consequences including sea-level rise and flooding of coastal cities, worsening drought and water shortage, increased risks to food production, unprecedented heat waves - particularly in the tropics -, increased frequency and intensity of tropical cyclones and extreme weather conditions, irreversible loss of biodiversity, notably in coral reef and the Amazon rainforest ecosystems.

Despite some improvements in some indicators related to human development, the Sustainable Development Goals have not been met by 2030. On the contrary, most indicators related to the environment and natural resources show that the situation has worsened on a global scale.

From this pessimistic perspective - or some would say realistic given the current trajectories - several sub-scenarios could emerge, varying according to the degree of anticipation of the ecological crisis and the preferred adaptation strategies.

The Next Frontier sub-scenario

The Next Frontier Sub-scenario is based on the negation of planetary boundaries as a limit to the capacity of human societies, and the market economy, to expand and grow indefinitely. It ignores scientists' calls to drastically reduce human environmental footprint (sobriety) to stabilize the Earth System. In this scenario, the Anthropocene is no longer an era of crisis but of opportunity for power and business to thrive.

Humanity has continued its geographic expansion, to conquer the last unoccupied non-land and non-earth territories, namely the Sea (high sea, deep sea, frozen sea i.e the Arctic), Space, the Earth's Subsoil (underground life) and the last uninhabited land on Earth, the Antarctic. These conquests have been triggered by new possibilities offered by science, technology and innovation as well as climate change. Among other examples, the melting of the ice pack has opened up new trade routes and access to new gas fields in the Arctic. Antarctica, as well, has ceased to be a sanctuary for science and biodiversity conservation since the renegotiation of the 1991 Madrid Protocol to the Antarctic Treaty on Environmental Protection to allow mining activities and encourage the development of mass tourism on the continent.

Policymakers and economic private actors have systematically justified these conquests in the name of progress and the need to adapt our societies to the evolving state of the global environment. Despite the IUCN moratorium, depleting terrestrial metal deposits and increasing needs for these metals to ensure the development of a digital and low-carbon economy have convinced the international community to allow and encourage deep-sea mining activities in the High Sea, affecting underwater ecosystems (loss of habitats, sediment storms, vibratory pollution…) and endangering entire species. Concerned about the «artificialization of the oceans», scientists call for a moratorium on offshore habitat construction while the need to relocate climate refugees and stateless people has led to the creation of true floating cities, like the Oceanix Project (UN Habitat), most often carried out in the framework of public-private partnerships. On land, to maintain their way of life and the current labour organization, several regions exposed to high temperatures and deadly heatwaves have built underground cities.

The environment is hostile to non-enhanced humans and non-genetically modified organisms. Despite the scepticism of most environmentalists and the reluctance of civil society, technology is promoted and used by the few richest countries and the most powerful multinational companies to reshape both the Earth system (geoengineering) and Life on Earth (biotechnology, genetic engineering, robotics, AI).

With the development of metaverses, the digital world has taken over the way we live and work (virtual trade, virtual tourism, virtual entertainment…), further distancing people from each other and from nature without breaking unsustainable energy and material consumption patterns, generating more and more waste and pollution.

Aware of the irreversible degradation of the environment and the inhabitability of the Earth, some States have launched important public-private research programs to colonize Space, engaging a new race/struggle between global powers.

The Permanent State of Emergency sub-scenario

The Permanent State of Emergency assumes the absolute absence of anticipation/preparation for ecological risks in the Anthropocene (toxic smog, heat waves, mega-fires, storms, scarcity of resources, food insecurity, energy shortages, new pandemics…).

Because they have not been able to prevent the ecological crisis globally, governments are forced to manage the economic, social and health externalities, resulting from it, on a day-to-day basis.

All around the world, governments have adopted rationing policies for basic necessities, energy and freshwater**.** Despite technical progress (improved seeds, machinery and fertilizers) the production cannot meet the demand for food, energy and other ecosystem services. The collapse of agricultural production and soaring commodity prices put countries in the South at risk of increased hunger and challenge global solidarity. In developed countries, meat and fresh vegetables have become luxury products.

In the regions most exposed to extreme heat, work productivity has plummeted in outdoor or non-air-conditioned workplaces, impacting economic growth. Obsolete power systems are on the verge of collapse under the pressure of climate change (drought, heat) and increasing demand, leading to "more frequent, widespread and enduring power grid failure, handicapping the economy" and hospital systems, even in the US (Army War College, 2019). The mortality rate among those most vulnerable to heat (the elderly, people suffering from asthma or cardiovascular disease, etc.) has risen sharply. In tropical regions, rising temperatures have favoured the proliferation of mosquitoes carrying infectious diseases. Malaria is gradually spreading in the northern regions, while the melting permafrost has released new viruses and pathogens. The world has entered the century of pandemia, putting health systems under increasing pressure, with the consequences we have experienced during the Covid-19 crisis. Because of the massive use of antibiotics, reaching the aquatic environment, human illness due to antibiotic, and antimicrobial-resistant infections has become a primary cause of death.

In many cities, air quality has further deteriorated. Causing more than 3.5 million premature deaths per year, most of them occurring in China and India, air pollution has become the world's top environmental cause of premature mortality before dirty water and lack of sanitation (OECD, 2012).

Export quotas or restrictions for strategic resources and goods (including medicines and vaccines) and the systematic use of lockdown policies to deal with extreme heat, pollution peaks or pandemics disrupt global trade and national economies (disruption of supply chains), with significant impacts on employment and public finances.

Everywhere, the effectiveness of governments is measured by their ability to meet people's primary needs (water, food, energy) and to protect them from the adverse effects of the ecological crisis, especially on health.

The Collapse sub-scenario

The «Collapse» sub-scenario foresees the inability of States to adapt to the ecological crisis and the subsequent collapse of international society and world order, with an emphasis on threats to peace and security.

Revolutions, triggered by ecological crisis, inequalities, and failure of States to protect their population have fostered the collapse of Nations States and the advent of extreme decentralization or even, in some regions, the experimentation of anarchy. Big organizations broke down into smaller decentralized units, adopting more ecological forms of living or at the opposite more chaotic and less sustainable ways of life, depending on the context.

Impoverished or deprived of resources (both technology and finance) due to a massive transfer of wealth from the public to the private sector, encouraged by neoliberal policies (privatisation, reduction in tax rates, etc.), the States have gradually delegated to private actors the management and implementation of the ecological transition, including in its most strategic aspects. Some powerful companies have taken advantage of this situation to privatize power. On land as well as on the high seas, private companies willing to compete with States have created private cities, exercising real power over the populations beyond the reach of constitutional and international law - see, for instance, the Seasteading Institute manifesto for the creation of private floating cities with political autonomy (Friedman and Taylor, 2012).

With the collapse of Nation-States and the advent of a "non-State world", lethal and disruptive technologies have become more accessible to terrorists and criminal actors, posing renewed threats to security (National Intelligence Council, 2012).

Where Nation-States remain, competition over strategic resources, inhabitable and fertile lands could trigger large-scale inter-States conflicts. These conflicts could also be fuelled by a non-cooperative approach to the global ecological transition (diversion of waterways, concentration of wealth, monopolization of strategic natural resources or environmentally sound technology etc.). In addition, the ecological crisis further destabilizes fragile countries, which are often also the most vulnerable to climate change, exposing people to internal armed conflicts, civil wars, terrorism and related human rights violations in a context of great political instability. As a consequence, this scenario assumes even more extensive migration of people(s) ("Anthropocene refugees") within and between states, creating further challenges for the state, international law, but also non-state transnational governance.

At the global scale, multilateralism has failed. Unable to meet the new challenges, the WTO has become an «empty shell». Environmental treaties have been unilaterally terminated, especially those protecting ecosystems and biodiversity by limiting human activities (Ramsar Convention, Bonn Convention on Migratory Species, Convention on biological diversity...). The COPs are now a vague memory of the global environmental governance that once existed. State sovereignty is expressed in an exacerbated way wherever it remains. Nationalism and the balance of power have once again become the rule in a multipolar and fragmented world. The United States and what is left of the European Union are no longer able (or willing) to presume roles in global leadership. The Arctic, Central Europe, South Asia and the Pacific concentrate the main geopolitical tensions between the four giants: China, India, Russia and the US. The number of failed states is dramatically increasing all around the world.

The Ecological Dualism Scenario Ecology without Environmental Justice

Environmental awareness has grown steadily in the global North. Developed countries have encouraged the ecological transformation of their production system, decreasing GHG emissions, waste and pollution drastically. Ambitious biodiversity conservation policies have led to the preservation and restoration of a large number of terrestrial and aquatic ecosystems on their own territory.

Climate change remains a civilisational threat to humanity at the global level. In the absence of financial and technological support from developed countries, developing countries have refused to change their development models, favouring human development objectives, including poverty reduction. As a consequence, the concentration of GHGs in the atmosphere continues to rise.

Developed countries are, on the whole, managing to adapt to climate change thanks to ambitious adaptation policies and breakthrough green technologies. In contrast, the most vulnerable to climate change are paying a heavy price for developed countries' historic emissions, prolonged inaction and failure to meet

their commitment to finance and transfer the technologies needed to engage the Global South in a global ecological transition.

Whenever they come into conflict, ecological preferences of the North take precedence over the rights of minorities and local populations in the Global South - including the right to a clean and healthy environment. The low-cost supply of metals needed to develop a low-carbon economy in the North is at the expense of the environment and the people of the South (land-use change, relocation of populations, destruction of ecosystems...). In some regions, the emergence of new and/or extension of existing ecological sanctuaries (natural parks for instance) challenges the right of local populations and indigenous peoples ("naturalization" of inhabited lands through eviction or criminalization) reactivating the colonial bias of biodiversity conservation policies, especially in Africa (Blanc, 2020).

Ecological risks and solutions are unevenly distributed. Access to a clean, safe and healthy environment is a privilege for the richest. Both in developing and developed countries, low-income communities, that mostly overlap with minorities, are living in ecologically devastated areas or "sacrifice zones" (Lerner, 2012), far from ecological smart cities populated by the elites.

The world is divided into those who benefit and those who suffer, both from the crisis and from the ecological transition. International law reflects the preferences of the privileged rather than Humanity as a whole, at the expense of the principle of fairness. Environmental protection has not benefited all but has deepened instead existing inequalities and gaps between States - North and Global South - and between people within states - rich and poor, majority and minorities...), with a significant impact on migrations.

In this dual world, the main challenge would be to reaffirm and ensure the effectiveness of principles of equity and solidarity. If not, the Global South could decide to no longer play by the rules of the existing international law and to create another body of norms that govern South/South cooperation.

Finally, we must add that the emergence of ecological sanctuaries is not inherently problematic, because there are good ecological reasons to concentrate conservation efforts on regional biodiversity hotspots. This is especially true when the interests/rights of non-human species are accommodated. However, there must be full participation and consent by affected human communities, access to compensation and other benefits, in accordance with the foundational principles of equity and justice driving these projects. Similar discussions should attend the quest for 'Half Earth' and other global conservation efforts.

The Ecological Dictatorship Scenario : ecology without Democracy

As time passes and urgency increases, mainly due to the inaction of most political leaders, citizens have begun to doubt the capacity of democratic regimes to initiate ecological transformation. This legitimate concern has been widely instrumentalized on social networks, fueling conspiracy theories and anti-elite rhetoric, precipitating the collapse of the old Western democracies, already weakened by the crisis of the representative system. On the other hand, China's successful ecological transformation has been held up as a model for the entire world.

Authoritarian environmental governance appears more effective, thus more appealing, to governments and people around the world. The temptation of law-and-order parties has reached the environmentalists and the youth, blaming democracy for taking too much time or for accepting too many compromises rather than taking urgent and strong actions to tackle climate change and biodiversity collapse.

In liberal countries, the ecological state of emergency has justified, out of necessity, unprecedented attacks on democracy, both formal (political regime) and substantive (human rights). The foundations of the liberal regime (freedom and property) have been widely questioned. In the absence of a genuine environmental education policy, "behavioural" measures have multiplied (restrictions, quotas, bans, lockdowns...), reducing individual freedom to a trickle. Property is now conditional on respect for environmental integrity and is no longer recognised as an absolute and sacred right. Digital technologies are deployed to maintain the new ecological order. Digital commerce and the widespread use of QR codes are used to monitor all consumer behaviours. China's social credit system has spread around the world, taking the form of ecological bonuses/maluses.

In some countries, the ecological urgency has also been instrumentalised by dictatorial regimes, military and paramilitary groups to further attack democracy, violate human rights and persecute minorities. The argument of the tension between overpopulation and resource depletion, obscuring the issues of overconsumption and unequal distribution of resources, provides a breeding ground for genocidal discourse all around the world.

Environmental integrity and health have become the key evaluation criteria for the regimes in place, at the huge cost of democracy, freedom and human rights.

The Planetary Turn Scenario : the Best Case scenario

In 2022, the combination of the publication of the 6th IPCC report, the war in Ukraine, unprecedented severe heatwaves and mega-fires, followed by massive citizens' protests (68 million people on the same Saturday in early September at the call of NGOs and youth movements) were like a wake-up call. Under pressure from NGOs, a "global citizens convention" was organised and came to very radical conclusions and recommendations. The European Union and the United States have taken a drastic path towards rapid decarbonation of their economies and were quickly followed by most countries through a domino effect. At the climate COP 27, nationally determined contributions and climate finance flows were considerably enhanced. There were a rapid acceleration of mitigation efforts, and rapid and deep emissions reductions. In the same breath, bold and innovative decisions were taken at the biodiversity COP 15, with strong objectives and targets, substantial financial commitments and a sound review mechanism. As a result of new regulations and pressures from consumers, companies were quick to adapt and the economy and society have been profoundly transformed in a few years. Biodiversity has proven its resilience and the rate of decline has slowed considerably. On land and sea, biomass has started to increase again. Climate change has been slowed down and, through voluntary reforestation and large-scale use of nature-based solutions, it is hoped to keep warming below 1.6 degrees by the end of the century. The world has been carbon neutral since 2049. Ambitious adaptation policies and strong international cooperation help to limit the consequences (serious disruptions could not be avoided) of climate change. Industry, agriculture and food have also been profoundly transformed. Many chemical products have been abandoned. As a result of a new international treaty, plastic production has collapsed and plastics have been phased out from 2040. The ozone layer is fully restored. Our development model has been rethought to be more ethical and sustainable, combining the concept of planetary boundaries with the complementary concept of social boundaries. The agroecological transformation of food systems has been engaged on a global scale, particularly in the Global South based on the Zero Budget Natural Farming model, successfully tested in India (Dorin, 2021) ensuring access to healthy and nutritious food for most people on Earth. Health, safety and the quality of life have increased all around the planet. In cities, air quality has increased considerably for all, symmetrically reducing the premature mortality rate of urban populations. Greening urban spaces have been

proven to be an effective way to combat episodic heat waves. The human development index improves everywhere. The relationship between scientists and politicians has been re-thought. Citizens are deeply involved everywhere and deliberative democracy has been strengthened, positively impacting the ambition of climate and environmental policies. Even if all is not perfect, humanity lives now in a safe and just space.

This new path has been called the Planetary Turn, as an alternative path for environmental protection (and international law). It marks the return of state intervention, after a phase of relying on market mechanisms by several MEAs. It institutes the effective participation and representation of the most vulnerable within global governance, which in the past had been largely dominated by private economic interests and MNEs. It reintegrates the economy into society and society into the Earth system, putting an end to the neoliberal myth of infinite growth in a limited world. It finally recognises the plurality of ways of knowing and inhabiting the Earth, giving a real place to traditional and grassroots knowledge at the global level, breaking with the hegemony of Western expertise. The Planetary Turn is a radical transformation, both ecological and decolonial, allowing us to meet the challenge of sustainability, global justice and democracy in the Anthropocene.

The Planetary Turn is the result of a renewed ethics for international law and cooperation, in the form of shared values and new ideals for the "planetary era". Here, the term "planetary" should be understood as a substitute for "international" and "global/transnational", as it allows us to think about international law and cooperation beyond nation-states, international organisations and global private actors. Embracing the whole planet Earth, it even allows to think beyond human societies, to set up strengthened planetary institutions that ensure the representation and participation of ecosystems (forests, oceans, poles, rivers, soils...) alongside traditional actors (States, OI, companies and NGOs), indigenous peoples, minorities and individuals. Not only the relationship between human and nature has been reinvented and the biological balances respected, but prosperity, justice and equity are fulfilled; human rights are put at the centre and effectively protected, and the rights of nature are finally recognised. The planetary turn embraces a new epistemology, from dominance and exploitation to humility, shared vulnerabilities and reciprocal responsibilities.

3.

questions
and propositions
for the potential
solutions

Ecological Transformation of International Law

Question one

Do we need evolutionary/incremental or revolutionary/radical change in the system?

International environmental law has, in the past, seen various periods of dramatic change – at least in retrospect – though even then it is often stretched over a period of years, rather than as a singular seminal point. To take the era-defining Stockholm conference of 1972, and the active law-making period of the 1970s-1980s as an example, within a period of years, we had begun to develop a body of law in the international arena that could begin to be properly identified and disciplined as specifically environmental in nature. Nevertheless, change was not radical nor revolutionary, but rather evolutionary and incremental. So what do we mean by these terms, and what are "markers" to determine how and whether the necessary change is occurring?

First, these terms are not state of the art but rather general descriptions of the rate, and manner, of change; and significantly, how far they depart from the status quo from which they have come. International environmental law remains deeply embedded within the mores and norms of public international law and reliant on the "traditional" rules of treaty law, State responsibility, etc. We can point to advances within treaty design (the use of simplified amendment procedures; framework treaties; annexes; the role of more flexible compliance mechanisms versus traditional dispute settlement procedures…) but ultimately these amendments are within the envelope of what States are prepared to accept and, importantly, that States continue to view public international law as the conduit for tackling such challenges. Thus, when thinking about incremental versus radical/evolutionary versus revolutionary change, the past tells us a lot about how States will respond in the future despite the enormity of the environmental challenges facing the planet. Moreover, though we can think of occasions when non-treaty responses have been agreed (most notably the proactive use of the Security Council after 9/11 to deal with the threat of international terrorism and the strong legislative role it played in some of the most significant of the resolutions after that), both the present state of the Security Council and the lessons learnt by the use of the Council to act on such issues has probably dented the enthusiasm for law-making by international executive.

Secondly, how do we "mark" whether we are seeing -or would see- the level of change in international environmental law some believe will be required to tackle the planetary threats facing us? Is it about content of the rules (i.e., the level of ambition or prescription), the comprehensive nature of the secondary rules agreed (e.g., on implementation, monitoring, dispute settlement), the broader organisational framework in which they occur, the capacity to bind involuntary states to rules perceived to be of planetary importance (against the concept of consent), or something else? Or a combination of these factors? Again, history would seem to tell us that incremental change is likely even faced with dramatic external change. Of course, the international community has deployed declaratory principles as more expansive -and forward-looking- norms in the past to stretch ambition but the law that lies behind this is rarely of a similar vein in either ambition or content. So, when measuring the level of change, one might sensibly look to content and secondary rules first, before looking "outside" of the treaty itself to the "tertiary" tier of law-making and organisational framework. Whether that matches the level of ambition required is an altogether different question.

Question two

Can the pursuit of 'planetary integrity' become a new global Grundnorm for international law? If anything is done that potentially harms planetary integrity, then that would not be allowed.

International environmental law will have to raise its level of ambition both in terms of the substance and objectives of its norms if it were to stay relevant in the Anthropocene epoch. As an overarching goal, Kim believes that *"[t]he ultimate purpose of international environmental law should clearly be maintaining and restoring the integrity of Earth's life-support system as a precondition for sustainable development"* (Kim, 2016). To this end, particular attention has been paid to the concept of ecological sustainability or integrity, or "the integrity of Earth's life-support systems", which links to the concept of "planetary boundaries", and its establishment as a *Grundnorm* (or foundational norm) of international environmental law (Kim and Bosselmann, 2013 and 2015). It could act as the fulcrum on which the entire body of international environmental law revolves, and which must guide the interpretation and application of international environmental law, as well as the creation of new international environmental law norms. How can such a

Grundnorm be provided for in the framework of a MEA? How can it be made applicable across the board to all MEAS and indeed to all rules of international law? Should the UN Charter be revised in that way?

Question three
Should international law embrace an earth system perspective?

International law mostly focuses on governing an externalised "environment" that can be mastered by humans. In terms of this focus, the "environment", and the need to protect it from human impacts, remain international environmental law's primary objective. Such a reductionist perspective amounts to a linear, one-dimensional and segmented approach to understanding and responding to, what was incorrectly thought to be, discreet, unrelated, localised environmental problems that only occur in specific and disconnected geographic locations.

These "environmental" problems were seen to arise in a state of relative Holocene stability, which posed minimal challenges to top-down, unconnected, mostly state-driven, command-and-control regulatory institutions, that were aimed at tackling negative externalities of transactions instead of also addressing structural issues underlying those human processes that cause socio-ecological damage of the entire earth system. In sum, the architecture of international environmental law, including its core assumptions, orientation, operation and objectives, is not commensurate with the most recent understanding of the many regulatory challenges that arise from within a complex and interlinked earth system in the context of the Anthropocene.

The notion of the earth system and the concomitant need to govern complex interrelated earth system processes, aspects and constituents, are now becoming paramount in the context of the Anthropocene epoch. More fully confronting the intellectual, scientific, and regulatory challenges posed by systems-thinking, the idea of the earth system as an object of study was conceptualised by physicists, geologists and climatologists.

It was only more recently that earth system science insights have been translated into the social science domains of law and governance, notably through the earth system governance framework. Earth system governance is defined as "the sum of the formal and informal rule systems and actor-networks at all levels of human society that are set up in order to influence the coevolution of human and natural systems" (Biermann, 2007). Operating within the planetary context of the Anthropocene,

as they do, and when compared to earlier forms of "environmental management":

... more recent [system] perspectives [such as earth system governance] emphasize instead the complete integration of human and non-human agency in complex socio- ecological systems, from local scales – such as forests or water bodies– up to regional scales, such as the Alpine region, and the entire earth system. A socio-ecological system perspective breaks down conceptual barriers between humans and their 'surroundings' and integrates them in a complex understanding where agency is diffuse, interactions are dynamic, and boundaries become blurred (Biermann, 2021).

While the emergence of conceptual frameworks such as earth system governance shows that some global sustainability scholars (especially political scientists) are starting to grasp the importance of earth system-thinking, the same cannot be said for international law and its lawyers (Kotzé et al. 2022). Practically speaking, international environmental law's non-system approach often leads to the prioritization of one environmental problem over another, and it reinforces the creation of siloed regimes which may lead to problem shifting between planetary boundaries (see Q10) (Kim and Bosselmann, 2013). A recent study clearly highlights how international environmental law struggles to grapple with the coordination of planetary boundaries and the many complex planetary-scale governance challenges emanating from interacting planetary boundaries. There seems to be some agreement about the disconnect between international environmental law and an earth system approach:

... our present framework of environmental law is designed as if its subject matter is dictated by uniformitarianism rather than a set of dynamic, adaptive systems. Complex adaptive systems, because of their highly collectivized, nonlinear, dynamic behavior, defy prediction through classical reductionist method ... Yet we have not designed our environmental law system with this underlying property in mind. Rather, it is mired in a reductionist, linear, predictivist mentality ignorant of underlying complex system behaviors (Ruhl, 1997).

Because IEL has not yet fully embraced the type of systematicity that is demanded by an earth system perspective, it remains unable to adequately respond to complex interrelated earth system governance challenges, ecological dynamism, and the earth system's key characteristics such as its interconnectedness, unpredictability, instability and complexity in the context of the Anthropocene (Kotzé, 2020). Even earth system scientists now acknowledge that "[T]he challenges to ... legal institutions

to deal with the complexities of Earth System management are formidable" (Steffen et al., 2004). That international environmental law needs to urgently re-orientate itself alongside an earth system perspective in order to deal with this formidable challenge seems both logical and critically necessary.

Would one way to do so be by means of the earth system law framework? The concept of earth system law was first proposed in a 2019 publication (Biermann, 2021). Although the discourse on earth system law is all but mature, interest in this proposal is growing, as the emerging scholarship shows. In essence, the project of earth system law offers an alternative framing for international law to facilitate the type of transformations and governance interventions that are in step with a continuously transforming earth system, and that are required to address the socio-ecological crisis of the Anthropocene.

Earth system law is defined as an innovative legal imaginary that is rooted in the Anthropocene's planetary context and its perceived socio-ecological crisis. Earth system law is aligned with, and responsive to, the earth system's functional, spatial and temporal complexities; and the multiple earth system science and social science-based governance challenges arising from a no-analogue state in which the earth system operates. Earth system law seeks to respond to the earth system's instability and unpredictability and its governance challenges through a continuous norm development process that drives meaningful transformations as well as intra, inter- and trans-disciplinary learning and deliberation (Kotzé et al, 2022). To this end, and in pursuit of desirable planetary futures, earth system law potentially may offer an analytical framework to better understand and respond to the legal dimensions of earth system governance; the normative foundations to govern the full spectrum of earth system relationships in a way that promotes planetary integrity and justice; and the legal means to facilitate transformative earth system governance for long-term sustainability (Kotzé and Kim, 2020). In terms of such a description, earth system law is not so much a new body of law (such as human rights law or trade law that focuses on a specific issue) as it is a vision or imaginary of what international environmental law will have to become to facilitate the legal aspects of earth system governance in the Anthropocene.

In sum, earth system law's principal objective would be to align international law with an earth system perspective. It does so by prompting lawyers and policymakers to discard assumptions of one-dimensional Holocene-nested linearity, predictability, simplicity and harmony on which international environmental law rests; and instead to embrace an alternative understanding

of the role and contribution of international environmental law in governing complex, non-linear, interconnected, multi-scalar and unpredictable earth system governance challenges. Earth system law, therefore, encourages law, lawyers and other social actors to grapple more deliberately with the natural science aspects of the earth system and to translate these into the social science domain in a way that also meaningfully embraces "earth system governmentality" (Lövbrand et al, 2009).

International Law Fundamental Notions and Principles

Question four

Can international law give place to the various meanings of the notion of frontier?

The notion of frontier is a multifaced notion. It needs to be grasped with in light of the environmental challenges humankind is facing. There is a need to overcome the problems arising from our traditional understanding of the notion of frontier as meaning territorial boundary, i.e., territorial boundaries known through the prism of state sovereignty and sovereign prerogatives as defined under the law of the sea. 'Frontier' also evokes man's dominance over nature and as such is a concept criticized by Indigenous worldviews. How will frontiers be challenged in the future (human and non-human migrations; protectionism and return of "economic frontiers"; extraterritoriality of legal rules...)? Are frontiers still relevant in the vision of an earth system as a complex system characterized by interrelations? Does understanding state sovereignty, as protected by permeable boundaries rather than border walls, make it possible to better reflect the interconnected reality of ecological and social systems, and to advocate persuasively for shared responsibility attaching to existing transboundary, transnational, or global relationships?

Indeed, the spatial notion of frontier in environmental law needs to be re-conceptualized. Transformative understandings of state sovereignty become possible if legal analysis challenges the dominant yet unacknowledged understanding of the state, as a bounded autonomous individual, and replaces it with an understanding of the state that reflects feminist and relational critiques (Seck, 2017 and 2021).

The rethinking should also include a reflection on the notion of temporal frontier; we need to adopt a language which gives place to "geological times."

Question five

How sovereignty can evolve to take into account the need to protect the planet?

Facing such pressing challenges, on the verge of crossing irreversible tipping points and experimenting with forceful, brutal and nonlinear transformation into a hostile state of the planet, there is a need to revisit the centrality/dominance of states' sovereignty and its extension to complete, full and permanent state's sovereignty over natural resources. At this stage, it reinforces structural problems of international law. Yet under strain for many reasons (Kingsbury, 1998), the concept of sovereignty has necessarily to be questioned to take account of the full interdependencies of States, and beyond that of peoples, and even of all humanity and its environment. Challenging assumptions about the uniformity of voices within the sovereign state is also part of a relational approach and opens up the possibility of recognizing overlapping sovereignties (e.g., of Indigenous nations where borders do not align with colonial borders) as well as transnational networks of activists dedicated to common concerns (e.g., youth climate movements). Given the existential threats to humanity and other life forms, the conception of State's sovereignty needs to be adapted or tempered to avoid its use as a shield to escape from environmental protection obligations.

Rather, it must be the basis of an individual and collective responsibility to protect and act, translated into positive obligations. Giving their full meaning to fundamental principles of international environmental law could guide state action in this direction if they were to become general principles that truly guide all policies and regulations at the international level (prevention, precaution, sustainability...). The potentialities of new concepts and principles (planetary boundaries, integrity, resilience...) deserve to be explored (see Q2 and Q3).

Question six

How can international law facilitate greater responsibility and accountability to protect the planet?

Do the laws of state responsibility need to evolve? Some developments appear in transborder water governance. However, in climate and biodiversity regimes, it seems that legally binding duties will be scarce for many years. These regimes can nevertheless boost national litigation, and domestic courts may continue to serve as the main fora where states are held responsible for inaction, just as climate change litigation demons-

trates. *Urgenda* Case opens a door of articulating the state's treaty-based obligations (climate, human rights) with unwritten duties, formalising states' duty of care. Perhaps unwritten duties of stewardship can serve as the pathway to renew the notion of state responsibility towards an active form of planetary stewardship, including interspecies and intraspecies concerns.

Regarding corporate accountability, despite the relatively low success rate in climate change litigation, some exciting progress began to emerge. For instance, the *Shell* Case opens the possibility of holding accountable private firms who contribute more to and gain more from the GHGs emissions. Since the beginning of climate negotiation, debates are most commonly framed around the determination of historical emissions and, logically, the NDCs of the states. Meanwhile, progress in science and political economy enable us already to discern which classes/groups are more responsible for the crisis. *Saúl vs. RWE* shows the potential of transnational law in advancing strategic litigation and responsive law. Here again, international instruments have a role to play in crystalising the achievements of domestic courts. Developments in law shall be directed in the way that we can hold the big individual or collective emitters accountable. 'Class' is not a legal entity and therefore cannot be sued, but this difficulty can be alleviated by targeting giant private firms. The most significant barrier to suing private entities is perhaps that emissions have been and continue to be legal.

What does it mean "doing its part"? What is the potential of the due diligence principle to renew and reinforce corporate transnational accountability?

Don't human rights, including the right to a healthy environment, have the potential to strengthen both state and corporate responsibility?

In order to strengthen the accountability of human beings towards nature, the environment or components of it could also be recognized as subjects of law and be entitled to be protected. In the most abstract sense, many jurisdictions have supported the idea of the rights of nature either by legislative acts or in litigation. Also at the very abstract level, human communities could act as trustees to guarantee their rights. However, just like any kind of rights, the nature's rights can only be protected and meaningful only when there are specific, well-designed, and functioning mechanisms that work to ensure certain people must perform in certain ways. These mechanisms can only be functional when their designs take into account local dynamics. Therefore, arguing on the basis of international law before domestic courts can help to localize international com-

mitments, and perhaps eventually translate the rights of nature into specific rights and duties that empower certain groups or justify certain eco-friendly actions. For instance, the court may deduce from the rights of nature the exclusive usufruct of local communities over an area under the conditions that they ensure the maintenance of its biodiversity. Why is international law on the sidelines of this movement recognizing rights of nature? Does it have to promote their development? How could it?

The potential of criminal law should also be explored while remaining aware of its limitations (in particular, its scope limited to illegal activities). Should international law punish ecocide? And/or encourage domestic laws to do so?

Finally, do we need an international environmental tribunal? if so, what should be its main characteristics?

Question seven

How can the voices of those (individuals, non-state actors, and states) who are least responsible for planetary crisis but suffer the most from it be made central to the making of international (environmental) law?

Despite the repeated endorsement of the Rio Principles which point to the need to prioritize the special needs of vulnerable groups, whether individuals, communities, or states, international environmental law has struggled to realize these aims even as many international environmental law treaty regimes increasing open their doors to the active participation of women, children, and Indigenous peoples, among other vulnerable groups (Udo et al, 2022).

The Rio Principles also endorse procedural environmental rights (to information, participation in decision-making, and access to justice) as well as related aspects such as impact assessment (Principles 10 and 17), which are reflected in regional and multilateral treaty law. UNEP's Environmental Rights Initiative supports a rights-based approach to environmental rule of law and works closely with the UN Human Rights Council (OHCHR), including the work of special rapporteurs on human rights and the environment, and toxic substances, among others. The

adoption of a resolution on the right to a clean, healthy and sustainable environment by the UN HRC in 2021 (A/HRC/RES/48/13) is however just one piece of a comprehensive environmental human rights framework (2018 Framework Principles on Human Rights and the Environment) and substantive environmental human rights protections can also arise through the 'greening' of other rights (e.g., rights to life, health, etc.), while procedural environmental human rights extend to rights of freedom of expression and association and the support for environmental human rights defenders. Equity and non-discrimination are cross-cutting considerations, with special attention due to those who are vulnerable to environmental harms either due to innate vulnerability or due to vulnerability that arises from the violation of rights, or both. Among those understood as vulnerable are children, the elderly, the disabled, ethnic, racial or other minorities, women (persons of diverse genders), and the poor. Particular attention to the rights of Indigenous peoples including rights to self-determination is also central to a rights-based approach to environmental protection (2018 Framework Principles). An intersectional vulnerability lens ensures the avoidance of single-axis approaches that may not fully grapple with the power and privilege (Handl et al, forthcoming). The substantive right to a clean, healthy, and sustainable environment may be further subdivided into a right to clean air, a safe climate, clean water, healthy food, non-toxic places, and healthy ecosystems and biodiversity (SR Environment, multiple reports). Key to an environmental human rights approach is the recognition that without a clean, healthy and sustainable environment, it is impossible to fully enjoy human rights; at the same time, the exercise of human rights is essential in order to ensure a clean, healthy and sustainable environment.

International law has evolved to explicitly recognize the collective rights of Indigenous peoples (UNGA Declaration 2007), as well as the rights of peasants and rural peoples (UNGA Declaration 2018). International human rights law has also evolved through the UN Human Rights Council endorsement of the 2011 UN Guiding Principles on Business and Human Rights (A/HRC/17/31) to recognize the independent responsibility of business enterprises to respect all human rights, going beyond compliance with state law, including an expectation that businesses conduct human rights due diligence across supply and value chains. International legal analysis informed by constructivist international relations theory (as well as TWAIL and relational feminist theory) provides tools to understand these developments as normatively significant by taking into account the views of non-state actors (e.g., Indigenous peoples, local communities), transforming instruments that are often misdes-

cribed as non-binding into legally significant international norms (Seck, 2021). Understanding the rights of Indigenous peoples through this lens has particular importance as it elevates the significance of Indigenous laws that, while unique to each nation, commonly adopt a relational approach to human rights that acknowledge the interdependence of humans and nature, recognizing both rights and reciprocal responsibilities (McGregor, 2021). Rights of nature are enacted through Indigenous laws; they emerge from and are embedded in reciprocal responsibilities between people and the planet (see Q6).

Arguably international law already provides the tools to make the voices of those who suffer the most from global ecological crisis central to decision-making in the Anthropocene - the failure, rather, is of the legal community that perpetuates dominant positivist interpretations of international law, as if the views of states were the only ones that mattered. Notably, the resolution on the right to a clean, healthy, and sustainable environment highlights the need for cooperation among states and non-state actors. These observations do not, however, answer the question of how the voices of those least responsible yet most vulnerable can be made central to international lawmaking - is a 'seat at the table' enough (and even if it were, how?), or must international lawyers (also) adopt more inclusive theories and methods of international legal analysis (and if so, how?)? Would it be desirable and feasible to hold a "global citizens convention"? In what manner?

Architecture of International (Environmental) Law

Question eight

In which ways should environmental regimes be challenged?

Shall we keep environmental regimes as they stand (and even address gaps and set up new ones, like on plastic or agriculture), considering them as an important achievement? Do we need to allow them to evolve and improve? In which direction? We could think, among other things, of:

- improving the normative creation process (legislative drafting, prior environmental impact assessment of instruments and need to ensure that costs and benefits are equitably shared worldwide between the rich and the poor/ present and future generations/ humans and non-humans/ men and women, better science-policy interface, more inclusive negotiations, and democratic processes...)

- improving the quality of norms (less symbolic and pedagogical, and more in the strategic guidance, more holistic and consistent; better combination between hard and soft law, better articulation between general/specific customary/treaty-based norms; a quicker response - more adaptive and reflexive law...)
- improving the implementation of norms (dedicate more funding, in particular to help countries in the South, strengthen non-compliance procedures, strengthen the role of national judges by improving their training, specialisation, etc.).

Shall we not constrain laws and policies aiming environmental protection within one specific domain/regime ('in silos' governance), but consider revising fundamental legal principles for the ecological goods?

The revision can be done by both restrictive norms and permissive mechanisms. In terms of the first, what needs to be challenged, as Viñuales has highlighted, is the presumption that private transactions are neutral and harmless, and that intervention is justifiable only when there are immediate adverse outcomes (Viñuales, 2019). The precautionary principle, for example, although already under criticism for being too broad, shall be strengthened and extended to other regimes, such as the international trade and investment regimes. Allowing WTO's member states to adopt measures to protect the environment and human health and life shall not only be one of the general exceptions, but considered as a constitutive part of the trade and investment regimes. In term of permissive mechanisms, it is potential that the trade and labor regimes coproduce some instruments that incentivize local production and consumption, or that are in favor of the autonomous decisions by workers or peasants.

In sum, we cannot solve ecological problems unless eco-considerations are not restricted to environmental regimes, but penetrate into all corners of international regimes. From this point of view, can we not reinforce the usefulness of certain existing principles (sustainable development, prevention, precaution...)? Is sustainable development still sufficient as the *grundnorm* of international environmental law? Or does it need to become the *grundnorm* of international law? Do we need to go back to the 1960s conception of sustainable development? Or do we need alternatives, for instance in promoting new principles (non-regression, resilience, integrity...) as *grundnorms* (see Q2)? How useful can the "planetary boundaries" concept be? And how can the planetary boundaries be legally translated at the international, regional, national and sub-national levels? Can they help us to rethink our legal instruments? Could pro-

moting the *in dubio pro natura* principle be useful? Finally, how to get out of the environmental law paradigm while preserving the acquis? Do we really need here an initiative like the Global Environment Pact?[4]

Question nine

Do we need institutional changes?

While the recent reforms of UNEP (notably the United Nations Environment Assembly becoming its governing body) are a step in the right direction, they are probably insufficient to meet the challenges of the Anthropocene. Can UNEP be upscaled into a more powerful global environmental agency with more financial and human resources, more decision-making and control powers? Are further changes needed at the UN? And what about outside the UN, more broadly in international governance and institutions?

Note 4 UN Report, Gaps in International Environmental Law and Environment-related Instruments: Towards a Global Pact for the Environment - Report of the Secretary-General, 2018, 45 p. <https://wedocs.unep.org/handle/20.500.11822/27070> (accessed 13 April 2022).

Question ten

How can we overcome the silos' approach of international law?

The late 19th and early 20th Century ideal of the rule of law insists that equality before law and legal certainty can be best guaranteed when law forms a coherent system without conflict that dictates judgements and leaves very little room for casuistry. Contrary to this ideal, the diversification and expansion of international law has produced and continue to produce conflicting and even incompatible rules, principles, and institutional practices. Fragmentation arises logically from the principle of 'autonomy of treaties', according to which every treaty is independent of all other treaties. The fragmentation of the international legal order is even increasing, due to the twofold movement of expansion and diversification of international law. In international law, *"normative conflict is endemic"* as stated by an International Law Commission's report.[5] The situation is even worse in international environmental law, without a global en-

Note 5 ILC, Fragmentation of International Law: Difficulties arising from the Diversification and Expansion of International Law, Report of the Study Group of the International Law Commission Finalized by Martti Koskenniemi, A/CN.4/L.682, § 486. 13 April 2006.

vironmental organization supervizing or even unifying the hundreds of autonomous institutional arrangements existing. It also makes it difficult to grasp/integrate environmental issues in all international policies and instruments, beyond the environmental field, and thus to initiate the transformative thinking necessary in Anthropocene. In recent years, important environmental issues as forests, biodiversity, ozone, ocean acidification, and so on, have in most cases been overshadowed by the issue of human-induced climate change, yet both are equally important, if not fundamental to the ongoing future of human populations and even planetary life. Indeed, planetary boundaries are closely connected and this should be duly reflected in policies and legal tools. Global environmental threats are highly complex, multi-sector, multi-scale problems. An effective response will inevitably require a complex, multifaceted response, combining the expertise and mandates of different policy processes and regimes.

In this context where polycentric governance is a matter of fact, what must be done to achieve the total ecologization of international law? Which tools could avoid problem shifting between regimes and improve the consistency of international law and policies (overarching norms? principles and objectives like the SDGs? ecologization of human rights? institutional coordination?...)? How can we avoid difficulties in implementing international environmental law facing stronger sets of rules (trade, investment, law of the sea...)?

Can addressing the environmental needs of the Anthropocene become a governing principle of treaty interpretation – i.e., all treaties need to be interpreted (by states, by judicial organs, by international organizations) by taking into account the needs of the Anthropocene? Could this become a new clause in VCLT Article 31 (covering MEAs but also the whole range of treaties, including UN Charter, investment treaties, WTO agreements, etc.)?

In a way, will the fragmentation of international law, a situation in which the law is not a coherent system but a casserole composed by various competing norms (Combacau, 1986), be an opportunity to 'ecologize' other regimes? In appearance, the fragmentation undermines the certainty of the international rule of law. However, at the same time, it allows for a certain amount of flexibility and paves paths of institutionalizing eco-awareness in many different regimes by cause lawyering, strategic litigation, responsive judgements, and decentralized lawmaking process. Historically speaking, ecological losses have not been the primary concern of international law, which makes many rules designed to protect the environment seemingly incompatible with the existing 'system'. On the contrary, when

the veil of neutral coherence of system is penetrated, we open more room for collectively experimenting how to institutionalize eco-awareness into the compilation of rules that are deemed to be competing.

« Transversal »
Levers of Transformation

Question eleven

How international law can promote the science-policy governance interface and the dialectical relation between science and policy?

At the global level, two science-policy organisations have been created so far (the IPCC on climate change and the IPBES on biodiversity and ecosystem services) and the set up of a new one on chemicals and waste has just been decided by the UN Environment Assembly. Are they functioning adequately? Sufficiently including social sciences, indigenous and traditional knowledge, lay-persons know-how? How can we reinforce the interface to make policy decisions more science-based? Do we need a science-policy interface on the planetary boundaries instead of sectoral approaches? What about the alternative model of the Earth Commission? Could it be helpful/complementary despite its limits (non-democratic)?

How could COPS benefit from better scientific guidance? Do they have to open the law-making process? Enable broader stakeholder's participation?

How can international law and institutions promote environmental education?

Question twelve

Can a tax be levied on transnational transactions and used to fund rewilding and environmental protection at agreed-upon biodiversity hotspots?

(where this rewilding/environmental protection is done in full consultation and with the consent of local communities)

Such a tax could help internalise externalities and better account for the harms of transnational corporate activity. It would need support from national sovereigns as well as institutional international legal mechanisms. Lessons learned from previous efforts (eg UNFCCC Clean Development Mechanism) could

alleviate some of the problems of the past.

What about taxing the 1% (or even 10%) by wealth who contribute 50% of GHG emissions, and/or simply prohibiting luxury activities beyond a certain threshold? Why can't international law grapple with overconsumption by the rich? Must it?

Question thirteen

How technology can become a lever of transformation, emancipation and justice?

The Anthropocene invites us to take a critical look at technology, equidistant from techno-optimistic and technophobic discourses. Indeed, technology, both as a set of techniques and a discourse on these techniques, is not neutral. It determines and conveys a relationship to the world (mastery of Nature, *hubris*), to others (hierarchisation of peoples and civilisations), and a conception of the economy and development (growth and productivism), all inherited from the dominant western thinking, which have precipitated humanity into the Anthropocene.

That being said, the debate on the role of technology is not whether we will need technology or not, whether technology will be part of the solution or not, but whether we want to take the risk of pinning all our hopes on technology, and thereby allowing its unlimited development, in the absence of certainty that technology will effectively solve the ecological crisis but in the knowing of the real social, environmental and ethical risks involved in the new "frontier technologies" (artificial intelligence, biotechnology, geoengineering...). What place should international law give to these technologies? What discourse should it have on it to enable the advent of the planetary era?

It has been assumed that technological choices and development (technological path) should be left mainly to the "invisible hand" of the market while the role of states and the law should be limited to actively promoting technology and creating "enabling environments" for innovation and technology diffusion. Yet, in the context of the Anthropocene, we must question the role of law and in particular international law in defining technological choices and trajectories that determine our future socio-technical systems and development models. For instance, is the development of geoengineering desirable or would it serve as a perfect alibi to inaction (the Next Frontier Scenario)? Will it sooner or later become inevitable to reshape the Earth System? If so, what forms of geoengineering and how can this development be supervised to avoid unintended environmental or social harms? Do we need new international treaties to ban or regulate geoengineering development (like the proposed

International Non-Use Agreement on Solar Geoengineering)? This questions more broadly the role of international law in assessing and selecting technologies: should international law intervene in technological development? What technology should it promote or hinder? according to which criteria? through which instruments (treaty, code of conduct, standards…), which procedures (environmental and social impact assessment, accreditation, control…)?

Technology development and transfer are levers for implementing MEAs. In the context of fragmentation of international environmental law, technological solutions may conflict with other environmental objectives. For instance, as mentioned before, hydrofluorocarbons (HFCs), used as a substitute for chlorofluorocarbons (CFCs), prohibited under the Montreal Protocol, have been shown to exacerbate global warming, revealing a conflict of technological solutions between the ozone and the climate regimes. This raises the question of how to define "environmentally sound" technology in international law (see Agenda 21, Chapter 4). But can technology be perfectly "environmentally sound"? To which extent? The debate opened by the European Union within the framework of the green taxonomy, concerning the role to be given to nuclear and gas in the ecological transition, illustrates the difficulty of answering this question in the presence of member States' strategic interests.

Finally, one should raise the question of equitable access to technological solutions. Technology is concentrated in the hands of private actors (mostly multinational companies) of the Global North. International law has proven to be totally inadequate to implement the effective transfer of environmentally sound technologies to developing countries (non-binding technology transfer clauses in MEAs, failure of the code of conduct on technology transfer, absence of exceptions to the intellectual property protection regime for environmentally sound technologies…). Without equitable access to technology, without the participation of Southern countries and vulnerable populations in determining future technological choices, the ecological transition will maintain/aggravate existing inequalities both between and within States, with the consequences described in the Ecological Dualism Scenario. What regime could international law implement to promote equitable access to technological solutions? Could technology be considered as part of the common heritage of mankind? On the contrary, would the monopolization and the uneven access to strategic technology motivate unlawful practices (forced technology transfer, indus-

trial espionage, reverse engineering...)?

Couldn't technology sharing be an alternative paradigm to technology transfer in order to ensure equitable access and effective participation of the Global South and indigenous people to the determination of our common technological future? Should science, technology and innovation (STI) become more collaborative on a global scale? How can 'alternative ways of knowing', including traditional and indigenous knowledge, be integrated and valued in the production of knowledge and solutions for 'triple planetary crisis' (UNEP)?

What could be the future outline of a 'Principle X. Eco-Technology Sharing' as a substitute for 'Principle 9. Technology Transfer' (Rio Declaration, 1992)? How would trade law and the WTO have to evolve to implement technology sharing?

Annex 01

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Annex 02

Disclaimer and persons interviewed

The White Paper has been brought together following several intensive discussions, and with interviews with prominent figures in the field. The White Paper is the product of these discussions, and whilst each author may have written things differently and/or give different focus to different elements, we collectively have signed off the report as a whole.

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adi-ila2023-anthropocene@gmx.fr