Legal Research Priorities in Climate Change

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1. Introduction

The Global Priorities Institute at Oxford University, inspired by the effective altruism movement, has created a research agenda to prioritize the research that has the potential to do the most good over the long term (https://globalprioritiesinstitute.org/wp-content/uploads/gpi-research-agenda.pdf). Similarly, our project seeks to identify Legal Research Priorities in concrete fields of law and regarding concrete issues in each field, based on objective criteria. This discussion paper analyzes the field of climate law as a priority area and identifies specific research areas within climate law. The existential risks confronting humanity are of particular concern to the effective altruism movement (Toby Ord, The Precipice: Existential Risk and the Future of Humanity, 2020).

There is considerable research on the science of climate change. Climate change is also an important focus in the field of (international) environmental law. However, the challenge that the climate crisis represents for law is multifaceted and requires interdisciplinary research in a wide variety of legal disciplines. Climate law needs to expand beyond the realm of environmental lawyers.

2. Methodology

Our methodology can be divided into three analytical frameworks:

(1) Whether the issue is important, tractable, and neglected (ITN);
(2) Whether legal research can affect the far future (longtermism), via a set of primary criteria:
    a. human **extinction** risk mitigation;
    b. **trajectory** changes; and
    c. **speeding up** progress.
(3) A non-exhaustive list of secondary criteria, which may have a different weight in different areas of legal research, to focus on questions that:
    a. Take into account empirical and normative uncertainties, with a view to avoiding lock-ins;
    b. Lead to concrete solutions, rather than asking abstract questions;
    c. Are relevant in different areas of legal research;
    d. Unlock new research opportunities;
    e. Affect the near-term and long-term future;
    f. Have direct practical implications;
    g. Are not specific to a particular jurisdiction;
    h. When uncertainty is high, focus on exploratory questions;
    i. When urgency is high, focus on more concrete questions;
    j. When uncertainty and urgency are high, focus on both concrete and exploratory questions (e.g. climate change, AI, pandemics)

We apply these criteria to a specific cause (e.g. climate change) to see how they work in practice. Based on the practical application, we then go back to refine the criteria in light of what we learned in the practical application exercise.

3. Is Climate Law Research important, tractable, and neglected?

Climate law is more **neglected** than climate science in many respects. Indeed, significant resources are dedicated to climate science (https://80000hours.org/problem-profiles/climate-change/). Nevertheless, recent EA voices consider climate change to be a high priority (https://forum.effectivealtruism.org/posts/BwDAN9pGbmCYZGbgf/does-climate-change-deserve-more-attention-within-ea). The degree of neglect for climate legal research can be measured in a variety of ways: (1) Academic articles; (2) Academic journals focused on climate law; (3) Books; (4) Climate law courses in law schools; and (5) Climate law researchers. All five variables can also be measured in terms of geographic scope: to what extent is there geographic representation from different parts of the globe? However, the degree of neglect will necessarily change over time. (Think of the expansion of trade law courses, publications, journals, and expertise that occurred after the creation of the WTO in 1995.)

Legal research on climate change is **neglected** to varying degrees. Many fields of law have only begun to become engaged in the climate issue. The main areas of legal research on climate change are US law, energy law, public international law (trade, investment, intellectual property, environmental, human rights, migration), civil liability law (domestic and international), criminal law, public health law, emissions trading regulation, securities law, agricultural law, and constitutional law. The overwhelming majority of legal research on climate change in these areas is from the last ten years. There is very little comparative law, which is probably because comprehensive domestic climate legislation is a very recent development. Finance and securities law applied to climate change is also very recent. Tax law is mostly neglected, with the exception of the specific tax policy of carbon or fuel taxes.

Climate law research tends to **neglect** interdisciplinary research beyond a brief contextual discussion of climate science and environmental economics. There is a paucity of interdisciplinary research linking climate law to psychology, neuroscience, human cognition and behavioral economics (with exceptions: https://law.illinois.edu/faculty-research/faculty-profiles/arden-rowell/), although a considerable body of research in these scientific fields has been applied to climate change. Interdisciplinary collaboration on law and policy design is the most promising category of legal research in the area of climate change.

Climate law research also **neglects** some geographic regions more than others, particularly in developing countries. A global perspective on climate law is critically important. Developing a global perspective will require international collaboration between researchers in developed and developing countries, as well as a substantial increase in comparative law research.

While the **tractability** of these problems of law and policy depends on political will and implementation, the development of well thought out legal and policy proposals is an eminently doable first step. Interdisciplinary research is also doable, but it requires a restructuring of research incentives at universities and publishing opportunities. Academic journals and book publishers tend to serve narrower disciplinary categories that make truly interdisciplinary collaboration difficult to place.

This research is **important** because it addresses an existential threat for biodiversity and humanity, as well as a threat to human civilization. While there is some debate regarding the extent to which climate change represents an existential threat in and of itself (https://www.effectivealtruism.org/articles/niel-bowerman-could-climate-change-make-earth-uninhabitable-for-humans/), it is a factor that is interconnected with other factors, such as pandemics and international conflict, which together qualify as a serious existential risk. This makes the application of legal research to the climate crisis the quintessential issue of intergenerational justice. In this regard, the very aspects of climate law that make it important are also relevant to the second analytical framework.

4. How can climate law affect the far future?

Human **extinction risk mitigation** is a core goal of climate change mitigation and adaptation. While it is closely related to the extinction of other species that humans depend upon, we focus on the risk of human extinction in this assessment. The risk of unstoppable and catastrophic climate change is now a clear and present danger. How bad it will get and how long that will take remain uncertain, but human extinction is a possible outcome. The interaction of climate change with other existential issues magnifies the risks. The climate crisis increases the risk of pandemics from the expansion of the habitable range of disease vectors (such as mosquitos and ticks) and organisms released from melting permafrost. The climate crisis also increases the risk of armed conflict, which could involve biological and nuclear weapons.

There are several climate-related risks that increase the risk of armed conflict. The financial system could suffer a climate-driven collapse in asset prices, as climate-related financial risks continue to rise with temperatures and sea levels. Climate change may have contributed to the war in Syria, which produced a flood of migrants that set the stage for Brexit and other destabilizing political movements in the EU. The effects of the climate crisis will only accelerate from this point on, with killer heat waves, floods, drought, and famines leading to the politically destabilizing consequences of mass migrations, financial crises and political upheaval. 4

The links between climate change, migration and conflict are complex. The effects of climate change on subsistence farmers could produce waves of climate migrants from India that would dwarf the flows seen thus far from Syria. The combined effect of the climate crisis and shrinking revenues from fossil fuels in Russia could increase security concerns. The climate crisis will be devastating to Brazil, Indonesia, South Africa and Nigeria as well. Climate change is likely to increase economic inequality between and within these and other countries. Moreover, in some of the countries most exposed to climate change, including India, Indonesia, and Nigeria, insurance penetration is less than 1 percent, making them more vulnerable financially. The climate crisis is an important cause of a biodiversity crisis that is a major contributor to economic damage, through environmental damage to key resources such as fish and water. History demonstrates that catastrophic climate change is likely to deepen existing divisions in society. Civilizations are not insulated from environmental change.

Climate law is an instrument for **speeding up progress** on emissions reductions and adaptation to catastrophic effects of climate change, at multiple levels: international, national, subnational, and municipal. There is only a 66 per cent chance that warming will be limited to 3.2°C by 2100 (range 3.0–3.5°C) if all unconditional Nationally Determined Contributions under the Paris Agreement are implemented. There is an urgent need to speed up mitigation and adaptation, through a comprehensive process of law reform. The law can **speed up progress** in reducing GHG emissions and creating incentives to invest in adaptation.

The core goal of climate law is to **change the trajectory** of the climate crisis, from one that leads to unmanageable climate change to one that leads to manageable, albeit catastrophic, climate change. The range of probabilities points to a global increase of the average temperature of between 2.6 C (4.7 F) and 4.8 C (8.6 F) between 2000 and 2100. Climate change could cause abrupt changes, including to the Atlantic meridional overturning circulation (AMOC), Arctic sea ice, the Greenland ice sheet, the Amazon forest and monsoonal circulations. Melting of the Greenland and Antarctic ice sheets may accelerate into a sudden loss of large amounts of ice, leading to dramatic changes in sea level and ocean circulation. Under a high emissions scenario, up to 630 million people live on land below year 2100 projected annual flood levels of 2 metres, the majority in developing countries across Asia. Science can show us how to mitigate climate change, how to adapt to climate change and point to factors that make one country, or one population, more vulnerable than another.

However, the degree of climate change and the speed with which it takes place will depend on political will and technological developments, as well as an unforeseeable magnitude of shifts in the climate system. We have plenty of evidence of the range of global warming to expect, based on different emissions scenarios. We also have plenty of evidence of the potential consequences of different trajectories, for humanity, biodiversity, human migration, and sea level rise. Law has a critical role to play in changing this trajectory, for example by providing law and policy roadmaps for political leaders. In the last section of this assessment, we discuss several research questions that demonstrate the various ways that legal research is critical to addressing the climate crisis.

5. Does climate law research meet sufficient secondary criteria?

a. Empirical and normative uncertainties & avoiding lock-ins

The range of outcomes from different emissions scenarios represents an empirical uncertainty. The effects of different legislative approaches to mitigation and adaptation also represent an empirical uncertainty. We are already locked in to irreversible global warming consequences, such as a sea level rise, but there is still time to limit the degree of harm. Normative uncertainty refers to the uncertainty of which moral/political view is correct.

b. Lead to concrete solutions, rather than asking abstract questions

The urgency of the climate crisis requires concrete solutions to reduce emissions, increase carbon sinks, and spur adaptation.

c. Are relevant in different areas of legal research

Climate law interacts with multiple areas of legal research, domestically and internationally: environmental law, energy law, public international law (trade, investment, intellectual property, environmental, human rights, migration), civil liability law (domestic and international), criminal law, public health law, emissions trading regulation, securities law, agricultural law, tax law, and constitutional law. Climate law also interacts with multiple priority areas of legal research: pandemics (new pathogens and geographic expansion of existing pathogens), intergenerational equity (more severe consequences for future generations from current failures), artificial intelligence (for mitigation and adaptation), nuclear security (from increased risk of conflict), and animal welfare (due to extinctions and dietary changes to reduce emissions).

d. Unlock new research opportunities

Our apparent inability to address the climate crisis urgently requires innovative approaches to climate law research, particularly interdisciplinary collaboration with political science, cognitive sciences and behavioral economics. Climate law research can and must unlock new research opportunities.

e. Affect the near-term and long-term future

Many jurisdictions are in the process of enacting comprehensive climate legislation, or have recently done so. Analyzing and improving these laws is a near-term task, as is urgently addressing mitigation and adaptation. At the same time, actions we take now will affect the long-term future.

f. Have direct practical implications

Climate law will have direct practical implications for human life and health, the stability of the global financial system, international security, biodiversity, and the durability of human civilization. The climate crisis affects every aspect of human endeavor.

g. Are not specific to a particular jurisdiction

Climate law must be global in scope, but must also adapt to legal systems and local contexts in particular jurisdictions. It is for this reason that research must come from all regions of the planet.

h. When uncertainty is high, focus on exploratory questions

With climate law, there are several sources of uncertainty, including: (1) effects of climate change over time; (2) how to overcome cognitive biases in climate regulation; and (3) the extent to which law can influence the relationship between climate change and the related issues of migration, pandemics, financial crises, political instability, and armed conflict. First, the precise effects of climate change over time are uncertain, because there are many variables at play and predictions require examining the distant past and predicting the future. Second, cognitive science has not traditionally informed policy and law making, so it is unclear how law can overcome cognitive impediments to addressing the climate crisis. Third, the complexity of analyzing the collection of inter-related civilization and extinction risks individually gets multiplied exponentially when trying to address them together.

i. When urgency is high, focus on more concrete questions

Despite uncertainties surrounding climate law and the future progression of the climate crisis, the urgency to take action is high, because the longer we delay in reducing emissions, the higher the risk of extreme consequences will be. The global average atmospheric carbon dioxide in 2018 was 407.4 ppm. The last time that atmospheric CO2 was this high (over 3 million years ago), sea level was 15–25 meters (50–80 feet) higher than today. Atmospheric CO2 is projected to exceed 900 ppm by 2100 if current trends continue. There is sufficient certainty of the causes (GHG emissions) to focus on concrete questions of how to use law to reduce emissions quickly.

j. When uncertainty and urgency are high, focus on both concrete and exploratory questions

Climate change, like AI and pandemics, combines uncertainty with urgency. As noted above, this requires a focus on concrete issues (how to legislate effective emissions reductions) and exploratory questions (how to use cognitive science to make climate law more effective).

6. Specific research questions in climate law

The following is a preliminary list of a legal priorities research agenda for climate law. For all, interdisciplinary approaches would make them more novel research questions.

- Development of **model tax codes** to completely overhaul domestic tax laws and international tax treaties based on climate crisis priorities, such as the elimination of subsidies for fossil fuels and the rationalization of clean energy subsidies based on economic feasibility and sound policy. This should be informed by research in political science, climate science, economics, and cognitive sciences.

- Climate change and **national security laws**. Climate change has implications for national security that vary from country to country, including direct effects on military installations and resilience of soldiers in the field (https://media.defense.gov/2019/Jan/29/2002084200/-1/-1/1/CLIMATE-CHANGE-REPORT-2019.PDF) and indirect consequences of increased risk of armed conflict and climate-motivated migration. Countries already restrict migration based on national security concerns as well as based on public health risks in the case of pandemics, all of which are likely to grow as the climate crisis progresses. In addition, the climate crisis is likely to cause greater political instability, leading to increased national security risks. How should countries balance national security needs with climate laws and policies?

- Design of climate law and policy based on the **science of human cognition**, in order to make law more effective in solving the climate crisis, including by inducing individual action and by enabling cooperation. Our current responses to climate change are irrational. Recent advances from a variety of fields, including behavioral economics, cognitive psychology and neuroscience, bring us closer to understanding human thought processes in relation to climate change. Cognitive biases can prevent humans from dealing effectively with climate change, indirectly influence political views, and influence acceptance of scientific evidence on climate change.

- **Design of international institutions** to maximize the impact of emissions reductions and adaptation assistance, taking into account the feasibility of unilateral, bilateral, regional, plurilateral, and multilateral agreements and the use of hard law and soft law approaches.

- How to address **regulatory capture of intellectual property laws** and thereby improve access to climate mitigation and adaptation technologies, particularly climate ready crop genes and medicines for climate-related disease propagation. Intellectual property rights that favor the producers of climate-ready GMO crops over the users of this technology will hamper adaptation efforts and worsen the impacts of climate change on farmers. Similarly, pharmaceutical patents that favor patent owners can increase prices and reduce access to medicines to treat new diseases and old diseases with expanding ranges, both of which are likely to result from the climate crisis. In this scenario, regulatory capture of intellectual property laws will hamper adaptation.

- Financial regulation needs to address **climate-related risks to the financial system**, including banks and insurance companies, and **harness financial and insurance markets** to mitigate emissions and adapt to the effects of climate change. Climate change poses risks to financial markets, particularly in the less mature capital markets in developing countries. Global warming poses risk management challenges for the financial sector in two principal ways: (1) extreme weather events (such as floods, droughts, hurricanes, blizzards, and

wildfires) and (2) health (such as diseases, pandemics, and food shortages). These two categories are not mutually exclusive. For example, extreme weather events can cause food shortages and spread diseases. However, reducing emissions reduces air pollution, which in turn reduces associated health risks.

Climate change also presents opportunities for the financial sector. The financial industry can contribute to mitigation through cap-and-trade markets. These markets reduce the growth of new emissions and encourage better mitigation strategies for countries. They can bring innovations to the targeted industries that are not related to the emissions themselves. The insurance industry can contribute to both mitigation and to adaptation. Insurance and reinsurance companies take a long-term view of the types of risks associated with climate change. These companies can measure those risks. They can create incentives for their clients to mitigate and adapt to those risks.

- **Comparative climate law**. Many jurisdictions are now passing domestic climate legislation. It would be useful to compare approaches in order to determine which approaches work best, to determine to what extent legislative effectiveness depends on local context, and to improve all climate laws with the research results.
- **Geoengineering regulation** will be necessary at the international and national levels. Geoengineering refers to the deliberate, large-scale manipulation of the climate (https://blogs.ei.columbia.edu/2018/03/20/geoengineering-climate-law-book/). The regulation needs to be informed by science. International agreements will be difficult to achieve in the current geopolitical environment and will require creative approaches to overcoming multilateral negotiation gridlock. This issue intersects with the topic of **design of international institutions** More research is needed regarding the extent to which existing norms could address geoengineering risks (https://www.ecologic.eu/sites/files/project/2015/documents/290-08-cbd-ts-66-en.pdf). Another issue is how to address **regulatory capture** of regulation of the risks of climate manipulation technology. Geoengineering regulation research intersects with research on AI regulation (AI is likely to be used in climate manipulation technology), research on regulatory capture of intellectual property rights for climate crisis adaptation technologies, and liability for climate change damage (in this case, from the unintended side effects of geoengineering).
- **Liability for climate change damage** will become increasingly important in the field of torts and, indirectly, for securities regulation that requires disclosure of risks related to climate change. Cognitive science on hindsight bias is also relevant, since it influences the ability of judges and juries to determine whether a defendant should have foreseen an outcome, such as flood damage caused by a combination of failure to reduce emissions and failure to implement adequate adaptation to climate change (https://intelligence.org/files/CognitiveBiases.pdf). This research topic insects with the topic of design of climate law and policy based on the **science of human cognition.**
- **Rights of indigenous peoples, climate change regulation, and natural resource development.** More legal research is needed on how to avoid conflicts between the rights of indigenous peoples, climate change regulation, and natural resource development. Canada has recently struggled with this issue in relation to the construction of a gas pipeline through Wet'suwet'en territory (https://www.bbc.com/news/world-us-canada-51636831), but many countries with indigenous populations around the world will need to address these interconnected issues in the years to come. This area of research intersects with **comparative climate law**, since a comparative analysis of different national approaches to this issue would help to improve governance in this area.