The Role of Science in Climate Change Litigation

Climate change litigation is rapidly spreading, with more than 1800 cases filed so far around the globe. Increasingly, climate science has been playing a crucial role in these cases, providing supporting evidence and helping to address issues such as 'attribution' and 'risk assessment'.

At the 26th UN Climate Change Conference (COP26) held in November 2021, science has been included as an integral part of the 'Glasgow Climate Pact' as the Parties recognised 'the importance of the best available science for effective climate action and policymaking'. Some of the key aspects linked to "The Role of Science in Climate Change Litigation" were discussed at an international workshop jointly organised by the Italian Sant'Anna School of Advanced Studies (SSSA, Pisa), and the British Institute on International and Comparative Law (BIICL, London) in July 2021. The event was part of the official "All4Climate - Italy 2021 " initiative of the Italian Ministry of Ecological Transition, which aimed to promote 2021 as the Year of Climate Ambition, and brought together climate scientists, legal scholars and legal practitioners from Italy, the UK, France, the US, and Singapore.

As current mitigation measures are far away from the goal of stabilising the concentration of greenhouse gases in the atmosphere, litigation is emerging as one possible solution to this problem. Courts and tribunals are flooded with lawsuits; these legal initiatives are an exercise of active democracy that could help accelerating concrete mitigation actions. An even more solid alliance between science and law could be key to delivering actionable results.

From the scientific point of view, there is overall consensus that global warming is happening, and that it is due to anthropogenic emissions of greenhouse gases, as asserted by the Intergovernmental Panel on Climate Change (IPCC) with more than 95% of probability. The global average temperature is continuing to increase; today, it is about 1.2°C hotter compared to the beginning of the 20th century. The speed of the warming is particularly worrying. More specifically, the warming is mainly due to carbon dioxide linked to the burning of fossil fuels, as well as methane from intensive farming. The impacts are felt globally: warming is altering profoundly many aspects of the climate system, it modifies the global circulation and precipitation patterns, increases glacier melting, induces a sea level rise, and intensifies the hydrologic cycle, leading to a surge in extreme weather events.

The adverse effects of climate change on natural ecosystems and different socio-economic sectors are already seen throughout the world: think of this summer heat waves and droughts that caused fires in the Mediterranean area and over the west coast of North America, such as in Canada where temperatures reached a high of 50°C and detrimentally affected people, animals, and ecosystems. Think also of the flood events that affected Belgium and Germany, or those that displaced thousands of people in Tamil Nadu, India. The current human-induced perturbation probably does not have any precedent in interglacial periods during the most recent million years, and the planet can be affected by it for hundreds of years in the future if no decisive, more ambitious action is taken.

Science also gives us hope: there are real possibilities to keep global warming below what is considered a 'danger threshold' of 2°C. The latest report by the IPCC published in August 2021 confirms this message, provided that we drastically limit the greenhouse gases that we will put in the atmosphere in the forthcoming years. More explicitly, we must limit the accumulated emissions to below 1,800 Giga-tons: exceeding this value would cause the warming to be above the 2°C level agreed in the 2015 Paris Agreement. Considering that in 2019 (the last year before COVID started affecting transportation and economic growth), about 45 Gt of greenhouse gases were injected in the atmosphere, and that this year we expect to overshoot that level, it is clear that in about 40 years, in 2060, global warming will reach the 2°C degrees if we do not accelerate de-carbonisation. Efforts will have to be even greater if we want to keep 1.5°C within reach. The Paris Agreement acknowledges that this stricter threshold would significantly reduce the risks and impacts of climate change. As the Parties recognised in the Glasgow Climate Pact, limiting global warming to 1.5°C requires reducing global carbon dioxide emissions by 45 per cent by 2030 relative to the 2010 level, as well as deep reductions in other greenhouse gases.

Climate litigation can help accelerating de-carbonisation, and reducing the emissions so that we will keep the total amount of

accumulated greenhouse gases below 1,800 Gt.

Judges who are dealing with them are fully conscious that they must consider climate science. Indeed, there is already strong evidence that Courts throughout the world accept the scientific evidence that society and the planet are facing a vast systematic danger in global emissions. Even the defendants usually accept what the scientific community has reached consensus on. However, defendants dispute what this means in terms of their legal responsibilities. For example, in cases that involve government actors, the findings of the IPCC are not disputed by governments, but what is still not agreed is what individual countries must do in order to do 'their part' to prevent dangerous climate change; or for corporate actors, whether they are responsible for climate-related damages.

The SSSA-BIICL workshop discussions highlighted three sets of key challenges that Courts have been facing and have been trying to address: those related to communication, those related to the use of science in climate cases from a 'procedural' (or 'practical') perspective, and those related to the use of science in climate cases from a 'substantive' perspective.

The first set of challenges includes the need of further clarification of terms (such as the exact meaning of the agreed temperature goal, or 'foreseeable risks') across different disciplines, and a more widespread communication of accessible scientific data to a wider public, including the legal community. The second set of challenges include the question how litigators can gain access to scientific data and analysis; how litigators and judges can increase their capacities to use those data to support their legal arguments; and how a negative attitude among judges towards the use of science in legal cases can be overcome. Important tools might be scientific training for lawyers/judges, focused interdisciplinary university curricula, and workshops like this one and other events organised by BIICL, SSSA and others around the world. The third set of challenges identified during the discussions are related to substantive legal issues, such as causation, remedies, and attribution.

With regard to attribution - i.e., the identification of who bears responsibility for emissions that have resulted in climate change on the one hand, and how climate change can be linked to certain harm or damage on the other-, the crucial importance of advancing attribution science was highlighted, distinguishing between 'source attribution' and 'extreme event attribution'. 'Source attribution' links emissions to specific actors, which can be either States or large private corporations, and can therefore offer crucial information to establish a causal link between emissions and harm to individuals. 'Extreme event attribution' focuses on how climate change could spur specific events (such as a hurricane or an extreme flood) and can provide insights into 'foreseeable risks' posed by such events.

There are two main scientific approaches that are applied to understand the attribution of harm from extreme events. The first approach is risk-based and aims to estimate how climate change increased the risk of a given harmful event. Considering a flood case, for example, the analysis can show if and by how much climate change has increased the probability of this event happening. The second approach focuses on each single event and aims to assess whether it has become more intense (think, for example, of a tropical storm like hurricane Sandy, or Ida) because of the climate-change induced warming. Work is progressing to understand how best to use and reconcile the two approaches, by analysing the impact of varying carbon dioxide in the actual forecast models used to forecast extreme events. These studies are important to understand how external drivers affect both probability and magnitude of extreme events.

From a legal perspective, there has been a 'rights-turn' in climate change cases in recent years, as more and more cases are brought forward based on human rights. Even though they still represent only a tiny fraction of climate litigation: 112 cases out of more than 1800, these cases are attracting great attention, also because of some important successes such as the Urgenda and Royal Dutch Shell cases. Science has been used in human rights-based climate cases in three main ways. Firstly, to establish the serious risk of human rights violations associated with the projected impacts of climate change. Secondly, to substantiate the content of State and corporate obligations in relation to climate change. Thirdly and finally, climate science is being used to establish a causal link between emissions and human rights violations.

Having a look at past litigation on pollution, environment, tobacco, asbestos and MTBE, it becomes clear that similarities can be drawn between those cases and climate change cases, however, there is also a key difference for climate change: human society, at the moment, cannot get rid of hydrocarbons without very high costs. This poses an unprecedented challenge to lawyers, judges, and the decision makers: to agree on what is the fair share that each State can emit to keep within the agreed temperature goal ('effort-sharing' or 'equity'). Science can provide guidance on the overall amount, as has been discussed in the latest IPCC report, and the interaction between scientists, lawyers and politicians can help defining the 'fair share' amounts.

It is interesting to point out that in the cases filed by State and local authorities in the US against fossil fuel producers, asserting that the companies' conduct was unreasonable or wrongful, none of the cases claimed that a single defendant is entirely responsible for any specific climate impact. Rather, they aimed to quantify proportional 'responsibility' for climate change and argued that the

defendant companies have been profiting from activities that contribute to climate change, intentionally obfuscating climate science, and lobbying to prevent action on climate change.

Several challenges that lawyers must address are evident when looking at those cases: determining what share of responsibility for climate change each defendant bears, demonstrating that climate impacts are foreseeable to a precise enough degree to justify responses, identifying and describing risks of which persons and entities charged with managing risks are, or should be, aware, and determining the extent to which certain extreme weather events were made more likely to occur or made more severe by climate change. Here again attribution science has been used to overcome these challenges, but advocates must still be prepared to defend science at trial, as uncertainties can come up due to confounding variables.

As highlighted in the event, it is noteworthy that the uncertainty regarding the precise impacts of climate change in the Netherlands (for instance, who will be impacted and when) did not pose a barrier to a finding of a duty on the State to protect (Urgenda). This was also the finding of the Court in the Belgian case (Klimaatzaak) and the German case (Neubauer) which also found that the claimants had standing and that the respective States had a duty to protect them from climate harms.

If a Court decides that the State has a duty to protect, a question arises as to what the State must do to discharge that duty. Science can play a key role in this respect by providing guidance on what an individual State's 'fair share' of emissions reductions is to address the climate crisis. This research on effort-sharing methodologies is concerned with the distribution of the global effort to reduce greenhouse gases' emissions between States in order to prevent levels of global warming.

These methodologies, developed by the scientific community, divide the remaining emission space (or carbon budget) between States, based on different interpretations of fairness and equity. Interdisciplinary studies that assess these methodologies through the prism of principles of international environmental law are emerging. More of this research not only by individual research groups, but also by the government or government related agencies, would help to clarify and delineate the legal responsibilities of States.

An increased interaction between the legal and scientific communities, and the promotion of more inter-disciplinary research and education events could help science to provide law with all the data and information required, and law to be more effective in helping to keep global warming under control.

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