Progressive Application of Science in the ITLOS Climate Related Advisory Opinion

Introduction

Across the globe, climate change litigation is no longer a niche concern; it is accelerating at an unprecedented pace. As of 2023, an impressive 2,666 climate-related cases have been filed across 65 jurisdictions, with the United States accounting for the majority (Global trends in climate change litigation). However, this surge is not confined to national courts: climate disputes are increasingly making their way into regional and international legal arenas.

Among the most significant developments is a request for an advisory opinion submitted on 12 December 2022, by the Commission of Small Island States on Climate Change and International Law (COSIS). This pivotal case, before the International Tribunal for the Law of the Sea (ITLOS), sought an advisory opinion on states' legal obligations to protect the marine environment from the harmful effects of climate change (*para 3, AO – ITLOS*). It stands as one of four such climate-related requests currently under review by regional and international courts — a clear indicator of how climate law is evolving beyond traditional frameworks.

The advisory opinion (AO) rendered by ITLOS under the framework of United Nations Convention on the Law of the Sea (UNCLOS), in May 2024, is the first of its kind concerning sea level rise and other catastrophic impact related to sea as a result of anthropogenic greenhouse gas (GHG) emissions to the climate system. It has been over a year since the advisory opinion, the expectation remains significant that this AO will shape climate change litigations domestically and globally. Against this backdrop, this blog examines ITLOS's progressive use of science in its AO, and explores very briefly its relevance to the pending advisory proceedings before the International Court of Justice (ICJ) and the Inter-American Court of Human Rights (IACtHR). This blog does not aim to critically examine the scientific reasoning employed by ITLOS, nor does it offer an alternative interpretation. Instead, it aims to outline the Tribunal's systemic use of science in its climate advisory opinion and to offer personal reflections as I come from an Island State that faces some of the challenges similar to those raised by COSIS.

Progressive Use of the Science in the ITLOS Advisory Opinion

Science played an integral role in ITLOS's AO, enabling the Tribunal to address critical aspects of the legal questions before it — notably, the scientific evidence linking anthropogenic greenhouse gas (GHG) emissions and its impact on sea. This section highlights key elements concerning science considered in the Tribunal's AO and briefly reflects on its relevance to the other pending AOs before ICJ and IACtHR. Notably, the Tribunal acknowledged that questions it had to address contained very scientific aspects (ITLOS, para 46). Evidently, submissions by the participants to the proceedings addressed scientific aspects concerning the questions in a greater deal, and either made reference to or submitted a significant number of scientific materials related to climate change and Ocean (ITLOS, para 46).

In light of this, ITLOS underscored that States must take all "necessary measures" to control marine pollution associated with anthropogenic GHG emissions and said that what constitutes necessary measures "should be determined objectively" taking into account the "best available science" (ITLOS, para 243). Among others, one of the sources of science widely used in ITLOS AO is Intergovernmental Panel on Climate Change (IPCC) materials. In Resolution 43/53, UNGA endorsed the birth of the IPCC as a joint initiative by the World Meteorological Organization and the United Nations Environment Programme. The purpose of the IPCC is to provide "internationally coordinated scientific assessments of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies" (UNGA 43/43, para 5). This inception reflects the endorsement of States of the

necessity to establish a body dedicated to scientific studies and compilation of scientific findings on the subject of climate change and environment.

There are many sources of scientific data and knowledge. Often the question is which one is dependable. Hence a systematic process of assessing these sources becomes a requirement. In the case of the IPCC's scientific analysis, it undergoes a structured use of confidence levels and likelihood metrics in its findings, which are considered to ensure clarity and transparency in its scientific communication (ITLOS, para 48-50). The combination of technically robust and comprehensive reports, rigorous review processes, and formal endorsement by State parties shows consensus among the States and these are the reasons presented by ITLOS with regard to IPCC's assessments (ITLOS, para 48-51). This intricate process appears to grant credibility and reliability to the IPCC assessments. Also most of the States' submissions affirm this and none of the submissions has challenged the authority of the IPCC assessment on climate change (ITLOS, para 48-51).

Having examined the process through which the credibility and reliability of IPCC reports are assessed, it is interesting to see systematic use of science in the ITLOS AO. The Tribunal used the IPCC reports as a means for conforming the threshold of the definition of pollution of the marine environment. "Pollution of the marine environment" is defined in UNCLOS as "the introduction by man, directly or indirectly, of substances or energy into the marine environment" (UNCLOS, Article 1 (1) (4). Drawing from the IPCC findings, the Tribunal concluded that anthropogenic GHG emissions constitute a form of "marine pollution" that meet the threshold under the Article 1(1)(4) of UNCLOS (ITLOS para 161 - 179).

Also the Tribunal elaborates the role of the Ocean in the climate system. It said the ocean is a primary climate regulator on seasonal to millennial time scales (ITLOS, para 55). According to the IPCC the ocean absorbs heat trapped in the atmosphere and protects and slows down surface warming. While performing this, the ocean also stores excess carbon dioxide, which represents major control on atmospheric carbon dioxide (*IPCC, Special Report on the Ocean and Cryosphere in a Changing Climate, Para A.2*) and (ITLOS, para 54). About a quarter of carbon dioxide released by human activities is taken up by the ocean (ITLOS, para 55). By confirming this, the Tribunal further details the impact of this process leading to the substantial damage and irreversible losses to the marine environment. This includes sea level rise, increasing ocean heat content and marine heat waves, ocean deoxygenation and ocean acidification (ITLOS, para 57).

By analysing and establishing nexus among human activities, GHG emissions, global warming, ocean warming and concentration of CO2, and impact of them in the ocean and its environment, the Tribunal further affirmed that to mitigate this, it is necessary to address human-induced greenhouse gas (GHG) emissions by implementing appropriate regulatory and preventive measures (ITLOS, para 59-66).

The core conclusion of the AO could not have been achieved without widely accepted scientific data and analysis to address the complicated but interrelated aspects of marine pollution and anthropogenic GHG emissions. Based on science widely accepted by States, the Tribunal addressed some of the challenges posed by some States, such as the argument that GHG emitted into the atmosphere should not be considered constituting marine pollution. In general, the IPCC reports and analysis have been strong bases for the findings. Drawing from scientific analysis, the Tribunal was able to demonstrate that there are high risks of irreversible harm to the marine environment from such emissions.

The conclusion the Tribunal drew based on this was that, under the Article 194 (1) of UNCLOS, parties to the Convention are obliged to take all necessary measures to prevent, reduce and control marine pollution from anthropogenic GHG emissions. The Tribunal further indicated that these are due diligence duties under the same Article (ITLOS para 243).

In contrast, in the advisory proceedings before the ICJ, science is used as counter-measure by high-emitting States that argued that "situations can arise where several States by separate internationally wrongful conduct have contributed to causing the same damage" (US written statement, para 5.9).

Article 2 of the Draft Article on State Responsibilities requires two conditions to be met to establish State responsibility for an internationally wrongful act, which are: (a) attribution of the conduct to the State in question under international law; and (b) that the conduct constitutes a breach of an international obligation of the State (Draft Article (n 1) Article 2). A number of high-polluting States, including the Kingdom of Saudi Arabia (Saudi) and the United Kingdom (UK) brought the same issue of attribution before the Court highlighting that using currently available scientific methodology, it is unable to attribute climate change to the emission of an individual State (ICJ, State submissions).

Vanuatu's written comments indicates that this claim by some of the high polluting States is invalid due to the fact that scientifically, it is entirely possible to establish which share of global warming has been caused by the anthropogenic emissions of GHG of a specific State and, thereby, whether such emissions have caused significant harm to the climate system. It would be an important contribution by ICJ if it addresses this issue of science and confirms the argument presented by Vanuatu. This could significantly impact on the rights of vulnerable populations, victim and vulnerable States and inform the legal landscape of future climate action (Written Comment, Vanuatu). Evidently, the advisory opinion just rendered by Inter-Ameircan Court of Human Rights (IACtHR) (on 3 July 2025) details CO_2 emissions attributable to individual States. For example between 1990 and 2024, the United States produced 24.8%, Mexico 1.5% and Brazil 1.2% of cumulative CO_2 emissions. It further stated that other Organisation of American States (OAS) have contributed less to climate change, as their historical cumulative emissions is less than 1% for the period of 1970 to 2022. To highlight a few, for the same period CO_2 emissions Bahamas - 0.005% , Haiti - 0.02% , Suriname - 0.01%, Belize - 0.003%, Belize - 0.03% (IACtHR, para 57).

As I come from an Island State, it is inevitable for me to touch upon the written comments by Melanesian Spearhead Group (MSG) for the reason that MSG presented some of the measures that should be implemented to mitigate, prevent and address the harms caused. This is one of the alternative ways when science cannot answer some of the questions. MSG citing Article 41 of the Draft Article on Responsibility of States for Internationally Wrongful Acts (2001) that, first, the duty to cooperate and to bring serious breaches to an end requires all States to work together in good faith to reduce GHG emissions, at minimum in line with the 1.5°C temperature goal. Second, the duty to not recognize means, at minimum, States must continue to recognise the sovereignty, self-determination, and land and maritime territories of States whose physical viability is compromised by impact of climate change. Third, the duty to not render aid or assistance in maintaining the wrongful situations means that States must not actively support further accumulation of GHG emissions in the atmosphere. As a Result, they must cease subsidies for fossil fuels, as well as any other administrative, legislative, policy, or financial support for activities that contribute to the continued emission of GHGs (Written Comment, MSG).

The ICJ, in addressing these arguments, will set precedent for the vulnerable and victim States to claim loss and damage, and hold high emitting States responsible through the future litigations.

The use of science for its reasoning in the ITLOS advisory opinion is a landmark approach. The AOs before the ICJ and IACtHR are expected to strengthen this approach by further advancing the use of science in their reasoning in respective advisory opinions. In particular,

how the ICJ and IACtHR address the legal consequences question, will be an added contribution for the victims, the States, vulnerable groups and people for their future actions.

Conclusion

The AO rendered by ITLOS stands as a landmark AO in international climate change jurisprudence. The Tribunal not only affirmed that anthropogenic greenhouse gas emissions constitute marine pollution under UNCLOS, but also that States' legal obligations must be based on the progressive scientific developments, especially IPCC assessments. By grounding its reasoning in the "best available science," ITLOS demonstrated that complex scientific evidence can be integrated into legal analysis to interpret treaty provisions and determine state responsibilities. This approach provides the Tribunal with a foundation to conclude that States have to take all necessary measures to prevent, reduce, and control GHG emissions to fulfil their due diligence obligations under Article 194(1) of UNCLOS.

While the ICJ is still to render its advisory opinion, IACtHR just rendered its decision on 3 July 2025. Having analysed the ITLOS AO, it appears to be setting a precedent for the progressive utilisation of science in climate adjudication. The IACtHR AO is an example that utilised science to establish its reasoning and interpretation. When it comes to attributing GHG emissions for individual States to establish legal consequences, high-emitting States emphasise scientific uncertainty, while the position advanced by small island States, particularly Vanuatu and the MSG (among others), affirm that science can calculate emissions of individual States. Therefore, loss and damage attributed to individual States can be calculated. While waiting for ICJ's conclusion on this, the IACtHR concluded that CO_2 emissions can be attributed using existing scientific methodologies. This conclusion not only reinforces the claim by vulnerable and affected States but could also unlock avenues for future litigation, reparations, and accountability frameworks in the global climate regime.

Finally, I recommend that the scientific findings and conclusions issued by international tribunals and courts be actively used to raise awareness among policymakers and frontline climate defenders. This approach is vital to ensuring that communities and vulnerable populations have access to reliable information and knowledge necessary to take informed action in protecting the environment.