

Science and the Precautionary Principle

The ICJ Advisory Opinion on climate change is based on a smooth synthesis of the science and the law.¹ This engagement did not extend for instance to ascertaining scientific perimeter for possible pathways towards the Paris Agreement's 1.5 temperature goal, including for instance pathways without overshoot, with overshoot, without atmospheric carbon dioxide removal and with such removal. This said, the Advisory Opinion brings the science it relies on into clear focus from the outset, drawing primarily on the work of the IPCC, as the best available science.² The Court's pre-hearing meeting with group of past and present authors from the Intergovernmental Panel on Climate Change (IPCC), intended to enhance the Court's understanding of the IPCC's key scientific findings, is likely to have boosted the Court's confidence with the Advisory Opinion's scientific content.

The Court observes, based on very high confidence IPCC figures, that concentration of the three main greenhouse gases (carbon dioxide, methane and nitrous oxide) are higher now than they have been in at least 800,000 years.³ The Court leaves no doubt that "it is scientifically established that the increase in concentration of GHGs in the atmosphere is primarily due to human activities", whether as a result of emissions or the weakening of carbon reservoirs and sinks including forests.⁴ Further, the consequences are severe and far reaching, affecting natural ecosystems as well as human populations.⁵ They include rising temperatures, melting ice sheets, sea level rise and unprecedented flooding for coastal communities, as well as the heightened frequency and intensity of extreme weather events such as hurricanes, drought and heat waves.⁶ Impacts include devastation of agriculture, displacement of populations, exacerbation of water shortages and the disruption of natural habitats pushing certain species toward extinction, leading to irreversible biodiversity loss.⁷ Importantly, too, the Court draws on the key understanding that the best available science tells us that the "[r]isks and projected adverse impacts and related losses and damages from climate change escalate with every increment of global warming", as the IPCC has found, again with very high confidence.⁸

In addition, the Advisory Opinion embraces the precautionary principle with thoroughness and care, providing valuable guidance on how precaution informs both treaty law and customary international law. Both science and precautionary principle directly infuse the Court's analysis under the Paris Agreement, customary international law and other applicable treaties. For instance, when reading in the requirement for due diligence in States' fulfilment of their Paris Agreement obligations on the setting of NDCs and pursuit of domestic mitigation measures, the Court recalls that the due diligence standard varies according to the circumstances including the level of scientific knowledge, the risk of harm and urgency involved.

The role of the science is also thoroughly interwoven with the Court's analysis of the customary international law duty to prevent harm to the environment. The "best available science" standard

¹ Katalin Sulyok, "On the Science-Coloured Glasses of the International Court of Justice: Harmfulness, Wrongfulness, and Climate Accountability", *Voelkerrechtsblog*, 6 August, 2025. Available at: <https://voelkerrechtsblog.org/>.

² *Obligations of States in respect of Climate Change*, Advisory Opinion of 23 July 2025 [2025] ICJ Reports [72ff].

³ [80].

⁴ [72].

⁵ [73].

⁶ [73].

⁷ [73].

⁸ [254] citing IPCC, *2023 Summary for Policymakers*, p. 14, Statement B.2, [138] and [258-259].

applies here again when determining the risk of significant harm,⁹ and the state of scientific and technological information is one of the elements going to the standard of due diligence attaching to the harm prevention duty.¹⁰ The science on both the probability and the seriousness of possible harm informs the required due diligence standard, which is again “stringent”.¹¹ The Court was unequivocal in the view that where there is scientific uncertainty the precautionary principle also applies: “States should also not refrain from or delay taking actions of prevention in the face of scientific uncertainty.”¹²

Indeed, States need to pursue knowledge sharing and cooperation initiatives, due to climate change's scientific complexity as well as its status as a matter of common concern.¹³ Importantly, they must also share information to help minimise the possibility that a measure taken for purposes of adaptation or mitigation might in itself pose a significant risk of transboundary harm.¹⁴ The Court goes on to say that States are expected to act with “prudence and caution” in relation to technologies for preventing or mitigating harm that pose further risks.¹⁵ The Court is warning here against isolated unilateral action. This could include solar radiation management activities as well as terrestrial marine sequestration of carbon. Depending on the situation, information-sharing will be required where this may affect other States.¹⁶

The Court further alludes to the significance of the science when discussing States' obligations under international human rights law,¹⁷ and under other multilateral treaties including the Desertification Convention, where various intergovernmental scientific bodies play their part.¹⁸ Under the United Nations Convention on the Law of the Sea (UNCLOS) States are to establish appropriate scientific criteria for regulations. In relation to sea level rise the science is crucial, with the IPCC describing sea level rise as “unavoidable” and concluding with a high-level of confidence that risks for coastal ecosystems, people and infrastructure will continue to increase.¹⁹ This leads potentially *inter alia* to forced internal and external displacement of populations,²⁰ even provoking application of the principle of *non-refoulement* if there are substantial grounds for believing there is a real risk of irreparable harm to the right to life, to which the Court draws attention in its human rights analysis.²¹ The science also plays an important role when it comes to the subject of causation in the context of the Court's discussion on the legal consequences of States' conduct causing significant harm to the climate system.

⁹ [278]

¹⁰ [283-284]

¹¹ [283] [293].

¹² [293] quoting Principle 15 of the Rio Declaration. Emphasising and clarifying the role of the precautionary principle, and relating this to environmental impact assessment obligations, Separate Opinion of Judge Charlesworth [2-7].

¹³ [285].

¹⁴ [285].

¹⁵ [286].

¹⁶ [285]

¹⁷ Eg [375].

¹⁸ [331].

¹⁹ [356] citing IPCC, *2023 Summary for Policymakers*, p. 15, Statement B.2.2).

²⁰ [357].

²¹ [378] citing *Human Rights Committee, Teitiota v. New Zealand*, 24 October 2019, UN doc. CCPR/C/127/D/2728/2016, para. 9.11.