REVISITING PRECAUTION IN DOMESTIC CLIMATE CHANGE LITIGATION

BY

J. MICHAEL ANGSTADT*

As domestic climate change lawsuits proliferate, norms and principles of international environmental law increasingly inflect their arguments and reasoning. In this Article, I use the precautionary principle, which is frequently employed to justify climate action despite scientific uncertainty, to explore the nature and implications of this phenomenon. I suggest that the evolution of climate litigation, climate science, and the precautionary principle itself collectively demand renewed examination of the justification and effect of using the precautionary principle in domestic climate litigation.

In Part II, I highlight the simultaneous increase in domestic climate change lawsuits and embrace of the precautionary principle. I trace this trajectory, and I emphasize that the precautionary principle has continued to evolve alongside climate lawsuits. As I note, climate change disputes were historically grounded in climate science that was itself marked by considerable uncertainty. Over time, however, the litigation landscape has evolved, in part reflecting climate science improvements and novel forms of argumentation. Simultaneously, the framing of climate lawsuits has expanded, and it now includes non-climate aligned suits that, like the precautionary principle, emphasize the uncertainty of climate change science. Therefore, in Part III, I urge that the precautionary principle's use in climate change lawsuits might be seen to have evolved through three distinct phases: (1) early efforts to leverage the principle's proactive, protective effect; (2) recent, widespread use; and (3) current developments which merit further consideration of its implications and benefits.

Ultimately, in Part IV, I suggest that the precautionary principle is likely to hold continued value as domestic climate litigation further evolves. However, I advocate two opportunities to maximize its benefits. First, noting considerable diversity in how the

*Assistant Professor of Environmental Studies (Environmental Law & Policy), Colorado College. The author thanks Aidan Daly, Will Funk, Gillian Lasher, Evan Rao, Aidan Santos, and Ceilidh Shea for related research and coding assistance.

precautionary principle is interpreted and its implications are understood, I suggest that future academic research can beneficially explore the effect of the precautionary principle, while judges and other legal practitioners can more explicitly specify how it is interpreted and applied in specific domestic contexts. Second, noting that the precautionary principle is closely related to considerations of scientific uncertainty, I advocate and explore means to better integrate insights from scientists, attorneys, and judges who operate at the science-law interface in complex climate change lawsuits.

I. INTRODUCTION

Domestic climate change litigation is proliferating,[1] and individual cases increasingly exhibit a sensitivity to global[2] and transnational[3] considerations. As of 2023, a major litigation database documented 2,341 domestic climate change cases, and these are remarkably diverse in geography and framing.[4] Additionally, the text of climate change opinions increasingly bears a transnational character, as judges

[1] *See, e.g.*, JOANA SETZER & CATHERINE HIGHAM, GLOBAL TRENDS IN CLIMATE CHANGE LITIGATION: 2023 SNAPSHOT 2–3 (2023).

[2] *See generally* Jacqueline Peel & Jolene Lin, *Transnational Climate Litigation: The Contribution of the Global South*, 113 AM. J. INT'L L. 679, 680–81 (2019).

[3] *See generally* Emily Barritt, *Consciously Transnational: Urgenda and the Shape of Climate Change Litigation*, 22 ENV'T L. REV. 296, 297 (2020).

[4] SETZER & HIGHAM, *supra* note 1, at 11.

recognize the guidance of global environmental agreements,[5] rulings in other jurisdictions,[6] and the opinions of fellow jurists.[7]

Just as global climate discourse is inflecting domestic climate change opinions, courts and judges are shaping the transnational regulation of systemic climate challenges. Judges engage with, interpret, and shape the development and application of international environmental law (IEL) principles. As litigants frame and judges decide climate lawsuits which reference IEL concepts including precaution, intergenerational equity, and polluter pays, they simultaneously support the interpretation and application of IEL. Therefore, the domestic reference to IEL underscores the decentralized nature of contemporary global climate governance and the importance of courts[8] and judges[9] in this domain.

While reference to IEL norms and principles in domestic climate litigation is now well-established, researchers are beginning to further explore the implications of this practice. Domestic climate lawsuits represent venues for innovation, as litigants connect climate lawsuits to human rights and other considerations,[10] leverage scientific insight,[11] and embrace expert testimony[12] to support cases. In this way, IEL

---

[5] Brian J. Preston, *The Influence of the Paris Agreement on Climate Litigation: Legal Obligations and Norms (Part I)*, 33 J. ENV'T L. 1, 1–3 (2020).

[6] Geetanjali Ganguly, *Judicial Transnationalization*, *in* RESEARCH HANDBOOK ON TRANSNATIONAL ENVIRONMENTAL LAW 301, 301–02 (Veerle Heyvaert & Leslie-Anne Duvic-Paoli eds., 2020).

[7] Natasha Affolder & Godwin E.K. Dzah, *The Transnational Exchange of Law Through Climate Change Litigation*, *in* RESEARCH HANDBOOK ON CLIMATE CHANGE LITIGATION 207, 207–08 (Francesco Sindico et al. eds., 2024).

[8] *See generally* Louis J. Kotzé et al., *Courts, Climate Litigation and the Evolution of Earth System Law*, 15 GLOB. POL'Y 5 (2023) (noting courts' position "at the heart of earth system law" and advocating for greater respect of courts as shapers of climate governance).

[9] *See generally* J. Michael Angstadt & Hyeyoon Park, *Climate Litigation and Norm Dynamics: What's the Role of Domestic Judges?*, GLOB. ENV'T POL. (forthcoming).

[10] *See, e.g.*, Jacqueline Peel & Hari M. Osofsky, *A Rights Turn in Climate Change Litigation?*, 7 TRANSNAT'L ENV'T L. 37, 39–40 (2018) (discussing climate change litigation where human rights have played a central role, including in *Urgenda* (discussed further *infra*) and other prominent cases); Marlies Hesselman, *Domestic Climate Litigation's Turn to Human Rights and International Climate Law*, *in* RESEARCH HANDBOOK ON INTERNATIONAL ENVIRONMENTAL LAW 366, 366–70 (Malgosia Fitzmaurice et al. eds., 2021) (same).

[11] *See* Kirsten Engel & Jonathan Overpeck, *Adaptation and the Courtroom: Judging Climate Science*, 3 MICH. J. ENV'T & ADMIN. L. 1, 27–31 (2013) (providing principles to judges to aid in analyzing cases reliant on climate science).

[12] *See id.* at 2–3 (explaining that judges will need to weigh expert testimony regarding climate change when ruling on climate changes cases). *But see* Larissa Parker et al., *When the Kids Put Climate Change on Trial; Youth-Focused Rights-Based Climate Litigation Around the World*, 13 J. HUM. RTS. & ENV'T 64, 80 (2022) (noting the importance of framing climate lawsuits in personal ways to avoid "a sense of public alienation"); Elizabeth Donger, *Children and Youth in Strategic Climate Litigation: Advancing Rights Through Legal Argument and Legal Mobilization*, 11 TRANSNAT'L ENV'T L. 263, 265 (2022)

principles can perform a paradigmatic function, structuring how the insights of individual cases might be understood and situated in broader societal context. Thus, it is imperative to understand: *What implications might accompany domestic climate change litigation's engagement with IEL principles?* This Article explores this question by foregrounding one example: the precautionary principle and the effect that it exerts on published opinions. While previous efforts have evaluated individual cases where judges have interpreted the precautionary principle or sought to quantify its application, this Article offers a broader assessment of the implications that follow from the precautionary principle's use. It considers when the precautionary principle might be most beneficially leveraged (or avoided) to frame and adjudicate domestic climate lawsuits. Part II briefly summarizes domestic judicial engagement with the precautionary principle. It notes its origin and dominant interpretations, and it highlights the evolving role of domestic courts in invoking and developing the precautionary principle.

Part III explores whether the evolving nature of climate litigation warrants reconsidering what it may mean to invoke the precautionary principle in domestic climate lawsuits. The precautionary principle was first applied in the context of climate change lawsuits in ways that could justify strong adaptation and mitigation measures despite scientific uncertainty, technical barriers, and other sources of imprecision. However, this Part emphasizes that uncertainty may look different in contemporary climate change lawsuits, given scientific advances, improved translation of those scientific findings to law, and novel legal arguments that structure climate lawsuits. In particular, drawing upon recent trends in climate litigation, this Part emphasizes that uncertainty increasingly represents a legal backstop to oppose stricter climate regulation. It accordingly suggests that the domestic role of the precautionary principle in climate litigation might be viewed as evolving from its point of origin, (1) as a nascent, "precaution as protection" posture, (2) to the present mode, where precaution may increasingly be supplanted by scientific precision, and finally (3) to a potential, and perhaps not-so-distant, orientation when litigation grounded in precaution could stand in tension with pro-climate litigation outcomes.

Part IV evaluates how the precautionary principle might best be viewed in the context of domestic climate lawsuits. It begins by exploring how domestic climate lawsuits might best leverage the possibility afforded by the precautionary principle, and it subsequently considers how lawsuits might evolve past reliance upon the precautionary principle. In doing so, this Part suggests two potential approaches. First, by exploring the framing of lawsuits that invoke the precautionary principle, it advocates (1) explicit attention by academics

("The scale of the threats to the biosphere and all its lifeforms—including humanity—is in fact so great that it is difficult to grasp for even well-informed experts.").

to the precautionary principle and its implications and (2) more explicit specification by litigants and judges of the intended interpretation of the precautionary principle within specific cases and contexts. Second, it advocates the value of directing greater attention to the science-litigation interface. There, the Part suggests that participants can collaboratively reduce the need for reference to the precautionary principle in future climate lawsuits: scientists can articulate science in more litigation-relevant fashion, law students and practitioners can better interrogate scientific knowledge and uncertainty, and judges can be supported in evaluating science-based claims and disputes.

Though this Article focuses its analysis upon the precautionary principle, it supports broader efforts to understand how domestic courts can best contribute to anticipatory climate governance. Likewise, it supports greater understanding of how domestic judges' increasing attention to IEL might be understood in the context of evolving domestic climate litigation. Finally, it supports ongoing analysis of how scholars and practitioners can collaboratively contribute at the interface of domestic and international environmental law.

II. RECOGNIZING THE PRECAUTIONARY PRINCIPLE: ITS EMERGENCE, EVOLUTION, AND DOMESTIC ADOPTION

Domestic courts[13] and judges[14] are increasingly referencing the norms and principles of IEL in opinions, and this integration of the domestic and global is particularly manifest in the context of domestic climate change lawsuits. Within this space, the precautionary principle represents a key example of bidirectional exchange and evolution. Domestic climate lawsuits provide an opportunity to adopt insights (1) from the international context, where the precautionary principle was first elaborated, while (2) simultaneously providing a point for outward elaboration from the domestic context, where the precautionary principle has evolved through its interpretation and application.

A. Emergence of the Precautionary Principle

The necessity of the precautionary principle has been advocated and enshrined in numerous IEL agreements. While the precautionary principle emerged from domestic contexts,[15] its elaboration has primarily occurred through instruments adopted by the United Nations.

---

[13] *See* Carl Bruch, *Is International Environmental Law Really "Law"?: An Analysis of Application in Domestic Courts*, 23 PACE ENV'T L. REV. 423, 425 (2006) (discussing how domestic courts interpret and apply international environmental law).

[14] *See* Ganguly, *supra* note 6 (discussing judges' use of and role in developing international environmental law).

[15] *See* PATRICIA BIRNIE ET AL., INTERNATIONAL LAW & THE ENVIRONMENT 154–58 (3d ed. 2009) (detailing international emergence and formulation of precaution).

In particular, Principle 15 of the Rio Declaration on Environment and Development (Rio Declaration) outlines the obligations and effect of the precautionary principle: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."[16]

The precautionary principle (or approach, as it is referenced elsewhere) has evolved in recent fashion, even within the (itself comparatively nascent) subfield of IEL. The IEL conception of precaution primarily emerged in the mid-1980s and was rapidly adopted thereafter into international agreements.[17] Its emergence appears to reflect recognition that traditional IEL obligations, which require action to protect the environment based on scientific evidence and available knowledge, could actually create inertia to action in the face of imperfect or incomplete information.[18]

The dominant formulation of the precautionary principle is broad, both in terms of its appearance and its articulation. In addition to its appearance in Principle 15 of the Rio Declaration, precaution inflects multiple other international agreements, including the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)[19] and other regional agreements.[20] Commentators have noted the expansiveness inherent in articulations of the precautionary principle; in some instances, they have lauded its applicability to global environmental issues while preserving sufficient latitude to respond to other challenges.[21] Its formulation is also sufficiently broad to engage with intergenerational considerations. In this context, the precautionary principle may arguably be read to obligate engagement with long-term environmental challenges that "could take years (sometimes even decades) to materialize," even in the absence of scientific certainty.[22]

Uptake and application of the precautionary principle remains dynamic. Like other IEL norms and principles that have emerged and evolved throughout the past fifty years, some argue that the

---

[16] U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26 (Vol. 1), annex I (Aug. 12, 1992).

[17] PHILIPPE SANDS ET AL., PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 230 (4th ed. 2018).

[18] *Id.*

[19] Convention on International Trade in Endangered Species of Wild Fauna and Flora, Mar. 3, 1973, 993 U.N.T.S 243.

[20] SUMUDU A. ATAPATTU, EMERGING PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 204–05 (2006); ELOISE SCOTFORD, ENVIRONMENTAL PRINCIPLES AND THE EVOLUTION OF ENVIRONMENTAL LAW 86–87 (2017).

[21] *See* ATAPATTU, *supra* note 20, at 204.

[22] *Id.*

precautionary principle "not only fail[s] to constitute a group of settled legal concepts in international law, but . . . var[ies] substantially as [a] policy idea."[23] This dynamism creates space for interpretation, contestation, and, in turn, evolution.

B. Evolution of the Precautionary Principle

In the approximately forty years since the precautionary principle initially emerged, tremendous dynamism and evolution have characterized both the emerging corpus of IEL norms and the broader landscape of global environmental governance.[24] As a result, the precautionary principle has evolved (a) conceptually, (b) horizontally, as its application in international regulatory settings has expanded, and (c) vertically, as its application by domestic courts has increased.

First, the interpretation and content of the precautionary principle itself has continually evolved. This contextual dynamism has received considerable attention from both scholars and practitioners. Atapattu highlights at least two such research emphases, noting efforts to distinguish (1) the precautionary principle from related principles, such as the prevention principle,[25] and (2) different applications of the precautionary approach itself.[26] For instance, while the precautionary principle is frequently conceptualized as imposing substantive obligations on parties to relevant agreements, some researchers suggest that the precautionary principle is primarily procedural, requiring practitioners to consider actions in the absence of perfect information, but not specifying a particular outcome.[27] Elsewhere, scholars continue to consider the status and legal effect of the precautionary principle, suggesting variously that it may properly be viewed as a "general principle[]" of IEL, an obligation that can impute "more specific rights and duties on states," or perhaps something else.[28] These debates are

---

[23] SCOTFORD, *supra* note 20, at 78.

[24] *See, e.g.*, Fariborz Zelli & Harro van Asselt, *The Institutional Fragmentation of Global Environmental Governance: Causes, Consequences, and Responses: Introduction*, GLOB. ENV'T POL., Aug. 2013, at 1, 2–3 (2013) (noting that global environmental governance increasingly reflects a "patchwork of international institutions" with differences in character, spatial scope, and predominant subject matter (quoting Frank Biermann et al., *The Fragmentation of Global Governance Architectures: A Framework for Analysis*, GLOB. ENV'T POL., Nov. 2009, at 14, 16)).

[25] ATAPATTU, *supra* note 20, at 206.

[26] *Id.* (citing Simon Marr for distinction between "action-guiding" approaches that examine the response contemplated by the precautionary principle and "deliberation-guiding" approaches that explore the effect of lack of evidence or information on processes).

[27] *See* PIERRE-MARIE DUPUY & JORGE E. VIÑUALES, INTERNATIONAL ENVIRONMENTAL LAW 58–62 (2d ed. 2018).

[28] SCOTFORD, *supra* note 20, at 77.

longstanding,[29] broad, and frequently reflective of how its application and meaning might manifest in specific venues[30] and regimes.[31] However, for purposes of this Article, it is important to note that several considerations are relevant to the use of the precautionary principle in climate change litigation. These include (1) whether the precautionary principle permits differentiation of state obligations based on their capabilities, and (2) whether the precautionary principle, when it demands action in a particular circumstance, necessitates considering a response's cost or its cost-effectiveness.[32] In response to these questions, Atapattu suggests that "a plain reading of Principle 15 seems to indicate that to the extent that one does not have the necessary capability . . . , one does not have to take precautionary action."[33]

While some researchers continue to debate the application and effect of the precautionary principle, others have documented its horizontal diffusion in international contexts, where adoption of the principle has expanded considerably.[34] Scholars note numerous international agreements that incorporate precepts of the precautionary principle, whether through indirect reference to the obligations of Rio Declaration Principle 15 or by direct reference to the precautionary principle itself.[35] Examples of an indirect approach to precautionary obligations can be found within the 2000 Cartagena Protocol on Biosafety to the Convention on Biological Diversity[36] and the Stockholm Convention on Persistent Organic Pollutants,[37] both of which highlight the precautionary state obligations imposed by Rio Principle 15.[38] In contrast, and with particular relevance to this Article, the United

---

[29] *See generally* David Hughes, *The Status of the 'Precautionary Principle' in Law*, 7 J. ENV'T L. 224 (1995) (illustrating historical evaluation of the legal effect of the precautionary principle).

[30] Veerle Heyvaert, *Facing the Consequences of the Precautionary Principle in European Community Law*, 31 EUR. L. REV. 185, 185–86 (2006).

[31] Daniel Bodansky, *Deconstructing the Precautionary Principle*, *in* BRINGING NEW LAW TO OCEAN WATERS 381, 381–82 (David D. Caron & Harry N. Scheiber eds., 2004).

[32] ATAPATTU, *supra* note 20, at 209.

[33] *Id.*; *see also* SANDS ET AL., *supra* note 17, at 232 (providing examples of formulations that appear to provide more lenient thresholds, including by relaxing threshold requirements of "serious" and "irreversible" harm).

[34] *See, e.g.*, Joaquim Francisco de Carvalho et al., *Precautionary Principle, Economic and Energy Systems and Social Equity*, 38 ENERGY POL'Y 5399, 5399–400 (2010) (chronicling international adoption of the precautionary principle during the latter half of the twentieth century).

[35] *Id.*

[36] Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Jan. 29, 2000, 2226 U.N.T.S. 208 [hereinafter Cartagena Protocol].

[37] Stockholm Convention on Persistent Organic Pollutants, art. I, May 22, 2001, 2256 U.N.T.S. 119.

[38] Cartagena Protocol, *supra* note 37 ("*Reaffirming* the precautionary approach contained in Principle 15 of the Rio Declaration on Environment and Development . . . ."); *id.* (affirming that the Parties are "[m]indful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development").

Nations Framework Convention on Climate Change (UNFCCC)[39] directly obligates state parties to "take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects."[40] As many accounts indicate, the reasons for leveraging the precautionary principle in these contexts remain contested, as do the meaning of the principle and its effect on global climate governance.[41] Collectively, however, direct and indirect references to the precautionary principle indicate the expanding influence of these objectives within international agreements.

C. Domestic Application of the Precautionary Principle

International agreements have supported elaboration of the precautionary principle, and scholarship examining those agreements has further supported the approach's development and interpretation. Simultaneously, the precautionary principle is gaining domestic traction. This elaboration has occurred both within domestic legislative venues and, increasingly, in domestic courts and their published judicial opinions.

First, many domestic statutes from various jurisdictions reference the need for a precautionary principle or approach. Examples of domestic references to precaution can be found in jurisdictions as geographically diverse as the member states of the European Union[42] and Australia.[43] Furthermore, the precautionary principle can inflect the character and prescriptions of domestic law, even where it does not explicitly appear in statutory text.[44] Elsewhere, I and others suggest that domestic laws provide additional settings to elaborate and interpret the precautionary principle and afford toeholds that judges can use to incorporate the concept within domestic legal opinions.[45] Therefore, it is

---

[39] United Nations Framework Convention on Climate Change, art. III, ¶ 3, May 9, 1992, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[40] *Id.*

[41] *See, e.g.*, A.W. Harris, *Derogating the Precautionary Principle*, 19 VILL. ENV'T L.J. 1 (2008) (exploring the relationship between evolving conceptions of scientific consensus and the effect of precaution in international instruments).

[42] Arie Trouwborst, *Prevention, Precaution, Logic and Law: The Relationship Between the Precautionary Principle and the Preventative Principle in International Law and Associated Questions*, 2 ERASMUS L. REV. 105, 108 (2009).

[43] Deborah C. Peterson, *Precaution: Principles and Practice in Australian Environmental and Natural Resource Management*, 50 AUSTL. J. AGRIC. & RES. ECON. 469, 476–78 (2006).

[44] *See, e.g.*, JOEL A. TICKNER ET AL., THE PRECAUTIONARY PRINCIPLE IN ACTION: A HANDBOOK 3 (1st ed. 1999) ("In the United States, the precautionary principle is not expressly mentioned in laws or policies. However, some laws have a precautionary nature, and the principle underlay [sic] much of the early environmental legislation in this country . . . .").

[45] Angstadt & Park, *supra* note 9.

imperative to acknowledge the presence, and potential significance, of precautionary language in domestic climate legislation.

Alongside statutory appearances of the precautionary principle, many domestic judges now reference, incorporate, and affirm precautionary obligations in their opinions. I and others have found that this trend is particularly apparent in the context of domestic climate lawsuits,[46] but it also appears and stirs controversy across various other legal fields.[47] Judicial references to IEL norms and principles within published climate opinions can reflect numerous factors and motivations. As a result, these references can take multiple forms, including: (1) explicit domestic reference to international formulations of the precautionary principle, (2) implicit domestic references to international precautionary formulations, and (3) paired references within judicial opinions that incorporate both domestic and international formulations of the precautionary principle.[48] Each of these mechanisms can be observed with respect to the precautionary principle in climate change opinions.

First, many domestic courts have directly and explicitly referenced precautionary obligations in their climate change rulings. These references function in two directions. For one, domestic references to the precautionary principle can strengthen and promote compliance with international agreements, including the Paris Climate Agreement.[49] In another, judicial references to the precautionary principle can develop and reaffirm the principle's domestic implications and contours.[50] In jurisdictions where the precautionary approach has already been accepted, these judicial opinions can reaffirm such obligations.[51]

Further, as the precautionary principle evolves, direct references to the principle can themselves support fuller elaboration and acceptance. A clear illustration is provided by *Gippsland Coastal Board v. South*

---

[46] *Id.*

[47] *See, e.g.*, Alexandra Seifner & Anthony W. Fox, *Why Does the Precautionary Principle Suffice for Blood Regulation?*, 35 PHARM. MED. 281 (2021) (healthcare regulation); INTERPRETING THE PRECAUTIONARY PRINCIPLE (Timothy O'Riordan & James Cameron eds., 1994) (discussing global adoption of and pushback to the precautionary principle).

[48] Angstadt & Park, *supra* note 9.

[49] Preston, *supra* note 5, at 16 (referencing the *Urgenda* District Court opinion affirming "the obligation to take precautionary measures in view of the State's obligation to exercise care").

[50] *See* Angstadt & Park, *supra* note 9.

[51] *See, e.g.*, Corte Suprema de Justicia [C.S.J.] [Supreme Court], Sala. Civ. abril 5, 2018, M.P: L. Villabona, Radicación 11001-22-03-000-2018-00319-01 (Colom.), *translated in* FUTURE GENERATIONS V. MINISTRY OF THE ENVIRONMENT AND OTHERS: UNOFFICIAL TRANSLATION OF EXCERPTS FROM THE SUPREME COURT DECISION 2–3 (Dejusticia trans., 2018) https://perma.cc/5FQN-D4QD (providing space to affirm *amicus* claims that, "[w]hile we are late in acting with purpose to arrest global warming, the precautionary principle still counsels us to act now to avert calamitous climate change before every last detail is fully known (or fully appreciated)").

Gippsland Shire Council.[52] There, the Victorian Civil and Administrative Tribunal acknowledged a request to "take a precautionary approach,"[53] clarifying that "we take this to be a reference to the precautionary principle."[54] Later, the panel elaborated their understanding of what a precautionary approach would require in the context of Victoria[55] before applying such an approach to the given dispute and determining that its provisions would support a decision to not approve a project.[56]

Second, even when climate change opinions do not explicitly reference the precautionary approach, many judges implicitly incorporate its core precepts. One example of such implicit reference is provided by *Friends of the Irish Environment v. Ireland*,[57] which explored a potential role for carbon extraction technologies, noting that "[i]n that context it must, of course, be recognized that matters such as the extent to which new technologies for carbon extraction may be able to play a role is undoubtedly itself uncertain on the basis of current knowledge."[58]

In line with what a precautionary approach would dictate, the jurists noted that this uncertainty, by itself, "is no reason not to give some estimate as to how it is currently intended that such measures will be deployed and what the effect of their deployment is hoped to be,"[59] and that such uncertainty can be acknowledged in accompanying estimates.[60]

Third, many domestic judges make paired reference to the domestic statutory and international treaty formulations of the precautionary principle or approach in their climate change opinions, allowing both levels of reference to mutually reinforce one another. One clear example of such incorporation can be observed in Colombia's *Atrato River Decision T-622-16*.[61] There, the judges undertook a detailed examination of the precautionary principle's articulation in Principle 15 of the 1992

---

[52] *Gippsland Coastal Bd v S Gippsland Shire Council* (2008) 31 VPR 12, 20–22 (Austl.).

[53] *Id.* ¶ 41.

[54] *Id.*

[55] *Id.* ("The precautionary principle requires, amongst other matters, a gauging of the consequences and extent of intergenerational liability arising from a development or proposal and if found to be warranted, appropriate courses of action to be adopted to manage severe or irreversible harm.").

[56] *Id.* ¶ 53.

[57] *See* Friends of the Irish Env't v. Ireland [2020] IESC 49 (Ir.).

[58] *Id.* ¶ 6.46.

[59] *Id.*

[60] *Id.*

[61] Corte Constitucional [C.C.] [Constitutional Court], noviembre 10, 2016, Sentencia T-622/16 (Atrato River Case), Gaceta de la Corte Constitutional [G.C.C.] ¶ 7.35 (Colom.), *translated in* DIGNITY RTS. PROJECT, DEL. L. SCH., CENTER FOR SOCIAL STUDIES ET AL. V. PRESIDENCY OF THE REPUBLIC ET AL. (Thomas Swan et al. trans., 2019), http://files.harmonywithnatureun.org/uploads/upload838.pdf.

Rio Declaration.[62] Immediately thereafter, the judges emphasized the domestic statutory and jurisprudential incorporation of the precautionary principle, noting that:

> This idea, in turn, was expressly included in the first article of Law 99 of 1993 . . . . In fact, this law confers great importance on the precautionary principle, stating that the formulation of environmental policies, while considering the results of the scientific research process, must prevail in an orientation aimed at precaution and avoiding the degradation of the environment.[63]

Identifying both international and domestic foundation for the precautionary principle enabled the Constitutional Court to weigh and invoke both bases, noting that the effect of the precautionary principle is contested in international settings, but "[a]t the local level, both constitutional and administrative jurisprudence have embraced this principle as a crucial provision of environmental law,"[64] and that "[i]n constitutional jurisprudence there are several examples of its application."[65] The justices weighed these grounds for precautionary ruling, noting various domestic bases that further support such approaches.[66] Ultimately, they elected to regulate mining in line with a precautionary approach, given that it "is an activity that has the potential to affect the environment and the sustainability of natural resources."[67]

III. INTERROGATING PRECAUTION: EVOLVING IMPLICATIONS OF ITS APPLICATION

The previous Parts demonstrate that the precautionary principle is well-established in the framing and resolution of domestic climate litigation. Recognizing this integration raises a broader, related question: What implications accompany its widespread incorporation, and how have these implications changed over time? I suggest that, just as the incorporation of the precautionary principle has evolved over time, so too may its implications. Therefore, it is useful to consider whether invoking the precautionary principle in domestic litigation should be seen as evolving from its original role as a protective measure, aimed at supporting meaningful action despite scientific and technical uncertainty. Recent scientific advances, coupled with an enhanced capacity to incorporate scientific knowledge into domestic climate

---

62 *Id.*

63 *Id.*

64 *Id.* ¶ 7.36.

65 *Id.* ¶ 7.37.

66 *Id.* ¶ 7.38 ("Additionally, in judgments T-1077 of 2012 and T-672 of 2014, it was reiterated that the precautionary principle can be used to protect the right to health.").

67 *Id.* ¶ 7.41.

litigation, suggest that continued reliance upon a precautionary approach in climate litigation may imply greater uncertainty than presently exists.

A. Historical Application: Precaution as Protection

While the precautionary principle has been incorporated and referenced in numerous domestic climate opinions, its early appearances represented spaces for underscoring the tension between (1) a need for urgent action to adapt to—or mitigate against—climate harms and (2) the time required for the scientific community to generate consensus about the causes and implications of climate change. Yet, in early stages of climate-relevant litigation, a major challenge has simply been finding appropriate ways to leverage the precautionary principle. In one early instance, a case protesting approval of a wind farm on the basis of its potential effects to wildlife, members of the Victorian Civil and Administrative Tribunal demonstrated this challenge, grappling with the relevance of the precautionary principle.[68] After acknowledging the principle's effect, the panelists ultimately declined to enjoin issuance of a permit, a request that was grounded in the potential effects of wind farm construction on bird mortality.[69] Perhaps somewhat ironically, the panelists concluded that there was insufficient data regarding bird strikes to justify invoking the precautionary principle.[70]

In another Australian opinion examining construction of a controversial shipping terminal, the Victorian Civil and Administrative Tribunal grappled with the appropriateness of invoking the precautionary principle in a climate case.[71] This time, plaintiffs urged the tribunal to reject a proposed shipping terminal based on the precepts of the precautionary principle and the accompanying uncertainty in scientific assessments of what effects might result from the facility's construction.[72] However, again, the tribunal found the principle to be inapposite, this time concluding that there was no substantial scientific uncertainty regarding the effects of the terminal's construction.[73]

Over time, however, examples of domestic climate change opinions more receptive to the precautionary principle have emerged. In more successful applications, its use has frequently reflected what might be characterized as a "precaution as protection" posture: litigants, and the

---

[68] *Thackeray v Shire of S Gippsland* (2001) VCAT 922, ¶¶ 8.3, 8.6 (Austl.).

[69] *Id.* ¶¶ 8.8, 10.12.

[70] *Id.* at ¶ 8.6.

[71] *Terminals PL v Greater Geelong* (2005) 21 VPR 308, ¶ 140 (Austl.).

[72] *Id.*

[73] *Id.* ("We support the philosophy behind the precautionary principle and its application in situations where there is a level of scientific uncertainty with respect to a proposal. We find there is no such uncertainty in the present circumstances.").

courts interpreting the arguments presented in court, lean on the precautionary principle to enable climate-protective rulings, even amidst remaining scientific uncertainty. These "precaution as protection" applications have taken at least three forms: (1) courts employing the precautionary principle to support meaningful review of climate-relevant actions, (2) courts using the precautionary principle to indirectly uphold climate protective outcomes, and (3) courts using the precautionary principle to directly and explicitly engage with the substantive climate-relevance of domestic actions.

First, courts have used the precautionary principle to support more robust review of climate-relevant actions. For example, in *Gray v. Minister for Planning & Ors*,[74] a 2006 opinion issued by the New South Wales Land & Environment Court (NSWLEC), the court referenced and engaged with several principles of environmentally sustainable development (ESD), including the precautionary principle, when reviewing a proposed coal mine's environmental assessment.[75] The case considered whether the precautionary principle should apply to review of a proposed mine, broadly, and, more specifically, whether the precautionary principle should necessitate consideration of so-called "scope 3" emissions that would result if the mine were constructed.[76] In its opinion, the NSWLEC found that a precautionary approach suggested that an environmental review should broadly consider associated effects[77] and evaluate the extent to which scientific uncertainty exists[78] when determining the adequacy of that review.[79]

Second, courts have leveraged the precautionary principle when issuing orders that urge climate protective actions in disputes that are not explicitly framed in terms of climate. For instance, in 2019, the Supreme Court of Pakistan reviewed an order issued by the Lahore High Court preventing construction and expansion of cement plants.[80] The proposed projects had considered environmental conditions beyond climate change, and filings primarily emphasized consideration of

---

74 *Gray v Minister for Planning & Ors* (2006) NSWLEC 720 (Austl.).

75 *Id.* ¶ 131.

76 *Id.* ¶ 115.

77 *Id.* ¶ 131 ("Amongst several matters identified as necessary to include in environmental assessments to inform the precautionary approach . . . [,] long term, ongoing or cumulative impacts of a project including the use and disposal of associated products and by products should be assessed." (internal citations omitted)).

78 *Id.* ¶ 133 ("What is required is that the Director-General ensure that there is sufficient information before the Minister to enable his consideration of all relevant matters so that if there is serious or irreversible environmental damage from climate change/global warming and there is scientific uncertainty about the impact he can determine if there are measures he should consider to prevent environmental degradation in relation to this project.")

79 *Id.* ¶ 135.

80 D.G. Khan Cement Co. Ltd. v. Gov't of Punjab, (2021) SCMR 834 (Pak.).

effects to local hydrology and other non-climate impacts.[81] However, the review recognized, among other factors, the contributions that such cement plants would make to climate change.[82] Ultimately, the Court used its opinion to broadly affirm the resonance of the precautionary principle in both its domestic[83] and global[84] capacity. Finally, by considering the project in alignment with the precautionary principle, the Court was able to link what might otherwise seem a localized dispute to far more systemic considerations of environmental and climate health.[85]

Third and finally, domestic court opinions have directly engaged precautionary considerations of climate change. A clear example is the widely-referenced *Urgenda Foundation v. State of the Netherlands*[86] decision. In *Urgenda*, the Supreme Court of the Netherlands explicitly employed the precautionary principle to justify its order compelling the government of the Netherlands to undertake climate-protective actions.[87] The Court wrote: "[t]he fact that full scientific certainty regarding the efficacy of the ordered reduction scenario is lacking does not mean, given the due observance of the precautionary principle, that the State is entitled to refrain from taking measures. *The high degree of plausibility of that efficacy is sufficient*."[88] Throughout the opinion, the Court repeatedly invoked the precautionary principle to justify action in light of potential harm,[89] to support more stringent action than might otherwise be required,[90] and to impose a particularized obligation upon the Netherlands' government even though climate change will result

---

[81] *Id.* ¶ 16 ("In the facts of the case, the Provincial Government was obliged to take a precautionary approach . . . till, inter alia, a detailed hydrogeological study assessing the potential of groundwater resources for industrial purposes of the project area is carried out.").

[82] *Id.* ¶ 17.

[83] *Id.* ¶ 16 (noting that the precautionary principle, coupled with domestic obligations, requires protecting "the fundamental rights of the public and in this case right to life, sustainability and dignity of the community surrounding the project . . . till such time that the Government is of the view that the project has no adverse environmental effects").

[84] *Id.* ("Enlargement of an existing cement plant in a negative area attracts the well-established principle of international environmental law called the *Precautionary Principle*, reflected in Principle 10 of the Rio Declaration . . . .").

[85] *Id.* ¶¶ 18–20.

[86] HR 19 december 2019, JB 2019, 135 m.nt. HWW (De Staat der Nederlanden /Stichting Urgenda) (Neth.).

[87] *Id.* § 5.7.3 ("[E]ach state has an obligation to take the necessary measures in accordance with its specific responsibilities and possibilities.").

[88] *Id.* § 2.3.2 (emphasis added).

[89] *Id.* § 5.3.2 (justifying actions in alignment with the "duty of the state to take preventive measures to counter the danger, even if the materialisation of that danger is uncertain").

[90] *Id.* § 7.2.10 ("The precautionary principle therefore means that more far-reaching measures should be taken to reduce greenhouse gas emissions, rather than less far-reaching measures.").

from many actors' contributions.[91] As analysts have noted, opinions that directly embrace the precautionary principle to engage with substantive aspects of environmental law frequently do so alongside other ESD principles, including considerations of distributive and intergenerational justice.[92] Therefore, the precautionary principle offers a valuable roadmap for "identifying when climate risks require serious policy responses, [even though it] provides less guidance about the extent of the response."[93] Accordingly, as climate litigation proliferates, it is valuable to explore the evolving implications of using the precautionary principle to guide domestic policy.

B. Present Context: Precaution as Common Element

As the previous Part emphasizes, the precautionary principle has shaped domestic climate change lawsuits in several ways: by introducing procedural considerations to climate-relevant cases, by supporting consideration of other environmental matters in cases that could affect the climate, and by obligating the direct consideration of substantive, climate-relevant factors. Collectively, these various means of incorporating the precautionary principle have entrenched it in numerous cases and legal contexts. This is true where the precautionary principle features centrally in climate lawsuits. It is also true where its presence is more implicit.

In some settings, the precautionary principle has been deeply woven into the fabric of domestic climate opinions. A clear example is in Australian courts, particularly specialist planning tribunals and environmental courts. There, precautionary language has become well established and grounded, as discussed above.[94] However, alongside these more explicit and central references to the precautionary principle, many cases across legal contexts now appear to implicitly reference precaution. For instance, in the United States, precautionary consideration has begun to appear through alignment with the provisions of other statutes, even though it is not explicitly embraced in those contexts. For instance, in an action challenging a "no jeopardy" finding under the U.S. Endangered Species Act (ESA),[95] the U.S. District Court for the Eastern District of California acknowledged the necessity of ruling despite scientific uncertainty.[96] As the opinion noted,

---

[91] *Id.* § 5.7.3 ("[E]ach state has an obligation to take the necessary measures in accordance with its specific responsibilities and possibilities.").

[92] R. Henry Weaver & Douglas A. Kysar, *Courting Disaster: Climate Change and the Adjudication of Catastrophe*, 93 NOTRE DAME L. REV. 295, 334 (2017).

[93] Daniel A. Farber, *Coping with Uncertainty: Cost-Benefit Analysis, the Precautionary Principle, and Climate Change*, 90 WASH. L. REV. 1659, 1662 (2015).

[94] *See supra* text accompanying notes 52–56, 68–79.

[95] Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2018).

[96] Nat. Res. Def. Council v. Kempthorne, 506 F. Supp. 2d 322, 372–73 & n.30 (E.D. Cal. 2007).

"some degree of speculation and uncertainty is inherent in agency decision-making, even in the precautionary context of the ESA."[97] Collectively, these direct and implicit references to the precautionary principle in climate lawsuits suggest that it has gained widespread domestic recognition.

C. Evolving Context: Is Precaution Beneficial?

While the precautionary principle is well-established and longstanding in international agreements,[98] its emergence in domestic litigation has been more recent. As shown above and elsewhere, however, it has gained rapid embrace as a framing device, both in claims brought to courts and in the opinions rendered by those courts.[99] At the same time, the evolving context surrounding climate change lawsuits raises a relevant question: is reference to the precautionary principle still beneficial and necessary when litigating and adjudicating domestic climate change disputes? I believe that there are at least three reasons to consider this question. First, and most centrally, the nature of climate science has evolved, suggesting that there may now be less uncertainty in the scientific assessments that support climate litigation than was historically the case. Second, climate litigation has evolved, and new types and framings of claims suggest that uncertainty may be less intrinsic to lawsuits than was historically the case. Finally, a documented increase in "climate backlash litigation" (lawsuits that seek to counteract "pro-climate" lawsuits) suggests that the uncertainty emphasized by the precautionary principle could impede efforts to promote strong climate action through the courts. This Section briefly examines these three considerations.

First, climate change litigation, like environmental law more broadly, is distinguished by its technical and scientific character. Law and governance efforts are complicated by the temporal and scientific complexity of climate science; these, in addition to climate change's "numerous and widespread contributors, and disparate geographic impacts . . . [have] repeatedly intersected with political and legal processes to frustrate the development of effective mitigation laws and policies."[100] The science-law interface poses challenges in the context of climate change in at least two ways. First, the attorneys and judges

---

[97] *Id.* at 365 (quoting Oceana, Inc. v. Evans, 384 F. Supp. 2d 203, 219 (D.D.C. 2005)); *see also id.* at 350–57.

[98] UNFCCC, *supra* note 40, art. 3.3 ("The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures . . . .").

[99] *See* Angstadt & Park, *supra* note 9 (demonstrating the frequency of references to the precautionary principle in climate change litigation opinions).

[100] KARL S. COPLAN ET AL., CLIMATE CHANGE LAW: AN INTRODUCTION 1 (2021).

engaged in addressing climate change lawsuits have struggled with its scientific complexity, and jurisdictions have explored means to address these limits.[101] As one former federal judge wrote, generalist judges facing complex scientific cases may lack the necessary "knowledge and training to assess the merits of competing scientific arguments."[102] Relatedly, attorneys' and judges' formal legal training equips them to weigh evidence and competing legal arguments, but not underlying scientific claims.[103] Some of these challenges are particularly resonant within the domain of climate law.[104] For example, regional and local climate projections often bear more uncertainty than global scale predictions, yet these same "downscaled" climate projections are typically most relevant to lawsuits that are grounded in specific disputes and settings.[105] In response, the international community has pursued efforts to provide policymakers, lawyers, and other practitioners with impartial scientific guidance and a clearer understanding of what uncertainty means in the context of such assessments. For example, the Intergovernmental Panel on Climate Change has regularly issued assessment reports in accordance with clearly structured authorship and review procedures that aim to promote comprehensive and transparent science.[106] While these scientific assessments have not overcome the intrinsic governance

---

[101] *See* J. Michael Angstadt & Maddison S. Schink, *Specialist Environmental Courts and Tribunals: A Systematic Literature Review and Case for Earth System Governance Analysis*, EARTH SYS. GOVERNANCE, Sept. 2023, No. 100192, at 1, 1–3 (explaining how different jurisdictions have explored varying approaches to equip judges to engage scientific complexity). Varying approaches include providing judges with special training, appointing special masters to aid judges in resolving technically complex cases, and establishing specialist environmental courts or benches that are tailored to the particularities of environmental disputes. *Id.*; *Climate Judiciary Project*, ENV'T L. INST. https://perma.cc/UZK9-8NDW (last visited Mar. 6, 2025) (providing resources to address this knowledge gap among generalist judges).

[102] Andrew W. Jurs, *Science Court: Past Proposals, Current Considerations, and a Suggested Structure*, 5 VA. J.L. & TECH. 1, 21 (2010) (quoting former D.C. Circuit Chief Judge Bazelon).

[103] *See* DANIEL A. FARBER & CINNAMON P. CARLARNE, CLIMATE CHANGE LAW 34 (2d ed. 2018) ("For those of us who are not experts in climate science, there are limits to the degree with which we can confidently form independent judgments about the validity of the models now being used . . . . Having done what we can to understand the basis for their judgments, at some point we must also give weight to the consensus among so many climate scientists regarding climate change projections.").

[104] Kirsten Engel & Jonathan Overpeck, *Adaptation and the Courtroom: Judging Climate Science*, 3 MICH. J. ENV'T & ADMIN. L. 1, 1–2 (2013).

[105] *Id.* at 17–18, 26–27.

[106] *See, e.g.*, Intergovernmental Panel on Climate Change [IPCC], *Appendix A to the Principles Governing IPCC Work: Procedures for the Preparation, Review, Acceptance, Adoption, Approval and Publication of IPCC Reports*, Apr. 15–18 1999, https://perma.cc/CPZ6-UHK4.

challenges inherent to climate change, they have "proven influential in bringing and keeping states at the negotiating table."[107]

While acknowledging the broad challenges to incorporation and interpretation of climate science in domestic climate lawsuits, a growing certainty accompanies many aspects of climate science. Farber and Carlarne highlight the "broad convergence of all available models and observational evidence and the substantial degree of agreement among the experts" as compelling justifications to accept the essential consensus regarding the nature and degree of projected anthropogenic climate change.[108] This consensus has emerged alongside key advances in climate science itself. These include improved accuracy and accessibility of large-scale models,[109] the emergence of artificial intelligence and other modeling supports,[110] and attention to downscaling and local climate dynamics.[111] Finally, and with relevance to climate litigation, rapid advances are occurring in attribution, a field of climate science which can help to establish and disambiguate causal linkages between emissions, climate change, and specific outcomes.[112] Researchers have urged that reliance upon past climate modeling practices has constrained the success of climate litigation,[113] while suggesting that a broader embrace of attribution and other emergent methods could support lawsuits that more effectively establish causality.[114] Collectively, these advances suggest that the science underpinning domestic climate lawsuits is growing steadily more certain. As confidence in the anthropogenic nature of climate change contributions increases,[115] and the capacity to connect specific outcomes of climate change to causal inputs strengthens, the need to account for uncertainty in climate lawsuits may decrease.

---

107 Lavanya Rajamani & Jacob Werksman, *Climate Change*, *in* THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 492, 494 (Lavanya Rajamani & Jacqueline Peel eds., 2d ed. 2021).

108 FARBER & CARLARNE, *supra* note 103.

109 *Id.* at 31–32.

110 Tapio Schneider et al., *Harnessing AI and Computing to Advance Climate Modelling and Prediction*, 13 NATURE CLIMATE CHANGE 887, 887 (2023).

111 These rapidly-evolving approaches take the outputs from Global Climate Models (GCMs) and seek to make them relevant in more local scales and contexts. *See Climate Model Downscaling*, NOAA GEOPHYSICAL FLUID DYNAMICS LAB'Y, https://perma.cc/57GY-Q5UJ (last visited May 30, 2024) ("Raw GCM output . . . is not always adequate to address the interdisciplinary questions of interest to stakeholders . . . . [T]he spatial scales represented by the GCM may not be as fine as the end-use application requires . . . .").

112 Rupert F. Stuart-Smith et al., *Filling the Evidentiary Gap in Climate Litigation*, 11 NATURE CLIMATE CHANGE 651, 651 (2021).

113 *Id.* at 653.

114 Lindene E. Patton, *Litigation Needs the Latest Science*, 11 NATURE CLIMATE CHANGE 644, 644 (2021).

115 *See* FARBER & CARLARNE, *supra* note 103 (noting that the confidence threshold for demonstrating the anthropogenic nature of climate change contributions now exceeds the frequently referenced 95 percent threshold cited by evidence law experts "as a way of quantifying the concept of 'proof beyond a reasonable doubt'").

Second, the nature of climate litigation is itself evolving. As climate harms grow more manifest, the nature and framing of climate litigation is shifting. Some of these changes are relevant to how uncertainty may be navigated, addressed, or sidestepped altogether in the framing of domestic lawsuits. For instance, in an annual review of climate litigation trends, Setzer and Higham observe that, rather than framing rulings as reliant upon resolving uncertainty regarding future climate impacts, some new forms of litigation are helping to clarify how various actors can engage with this uncertainty.[116] These new orientations can emerge in lawsuits with both retrospective and prospective framing.

A first grouping of lawsuits, bearing a more retrospective framing, emphasizes current and past climate harms. Such "loss and damage" suits seek compensation to address harms that have already manifested, rather than seeking liability for anticipated or potential future harms.[117] As Tigre and Wewerinke-Singh note, *Asmania et al. v. Holcim*[118] and *Luciano Lliuya v. RWE AG*[119] acknowledged anticipated climate-related harms, yet incorporated claims framed upon observed past damage.[120] For example, in *Asmania*, claims were predicated upon the clearly documented historical sea-level rise, but the case also references the flooding caused by ongoing sea-level rise that will likely impact residents of a low-lying island.[121] Likewise, the *Lliuya* case was rooted in the observed growth of a lake fed by glacial meltwater, hastened by a changing climate, but was framed in terms of an increased risk of glacial lake outburst flooding to a nearby downstream community.[122] In both cases, past harms were used to frame novel claims against major emitters with extraterritorial, transboundary

---

116 SETZER & HIGHAM, *supra* note 1, at 39.

117 *See id.* at 36–37.

118 The litigation in *Asmania* is ongoing. For a brief case history and updates, see *Asmania et al. v. Holcim*, CLIMATE CHANGE LITIG. DATABASES, https://perma.cc/T8XL-W2WJ (last visited Apr. 14, 2025). A press release attached to the litigation details "floods that occurred at the end of 2021—and others which came before them" and identifies damages to plaintiff Asmania, including that "the floods carried a lot of oil and debris with them and damaged the fish farm. In 2021, 300 out of 500 fish perished, and for two months, virtually no tourists came to the island. Asmania could not rent rooms or sell meals." *See* Press Release, HEKS/EPER et al., Groundbreaking Climate Case Against Swiss Cement Company Holcim: An Island Demands Justice (July 12, 2022), https://perma.cc/7DWH-BA3Q. For detailed analysis, see Maria Antonia Tigre & Margaretha Wewerinke-Singh, *Beyond the North-South Divide: Litigation's Role in Resolving Climate Change Loss and Damage Claims*, 32 REV. EUR., COMPAR. & INT'L ENV'T L. 439, 445–46 (2023).

119 Amtsgericht Essen, Dec. 15, 2016, II O 285/15 (Ger.), *translated in* LUCIANO LLIUYA V. RWE AG: DECISION OF THE DISTRICT COURT OF ESSEN (UNOFFICIAL ENGLISH TRANSLATION) (2016) [hereinafter LLIUYA], https://perma.cc/T9DE-NBCE; *see also* Tigre & Wewerinke-Singh, *supra* note 118, at 443–45.

120 Tigre & Wewerinke-Singh, *supra* note 118, at 443–45.

121 *See* HEKS/EPER et al., *supra* note 118.

122 *See* LLIUYA, *supra* note 119; *see also* Tigre & Wewerinke-Singh, *supra* note 118.

implications.[123] While most analytical attention to date has explored the unique framing of these lawsuits, their distinctive temporal orientation also merits discussion. Because the claims are fundamentally predicated upon already-experienced harms, there is less uncertainty regarding the nature and severity of effects—though opportunities certainly remain to contest questions of causation and attribution, as discussed above.[124]

In another emergent area of climate change litigation, cases seek to clarify responsibility and engagement in management decisions, even as uncertainty remains regarding the underlying science of climate change. As one example, *Butler-Sloss v. Charity Commission*[125] represents a UK case that, according to scholars, affirmed to trustees of charitable funds that "aligning their investment decisions with environmental goals such as the Paris Agreement, and therefore with the missions of their respective charities, even if it meant accepting a lower rate of return on the charities' investments, was not a breach of their fiduciary duties."[126] In lawsuits such as these, the precise nature and character of future climate effects are secondary to climate litigation itself. Rather, the disputes center on actions taken or not based on the scientific climate change determinations of other scientific and political bodies. Therefore, suits like *Butler-Sloss* suggest a path where climate change obligations and appropriate professional responses may be contested in court while decentering underlying questions of scientific uncertainty.

The rapid emergence of future generations litigation[127] provides a third example of how the framing of climate litigation is evolving. Even in this space, which seeks to recognize climate change's disproportionate effects on youth, future generations, and the rule of law itself, diversity can be observed in how uncertainty is addressed.[128] As Sulyok argues, future generations lawsuits can be divided into multiple classes. At least two of these conceptual groupings could be seen as highlighting lawsuits

---

[123] Tigre & Wewerinke-Singh, *supra* note 118, at 445–46 (noting the uncertain efficacy of loss and damage claims, but also highlighting a distinction between claims grounded in actual, versus potential climate change effects).

[124] *See* discussion *supra* Section II.C.

[125] Butler-Sloss v. Charity Comm'n [2022] EWHC (Ch) 974 (Eng.).

[126] SETZER & HIGHAM, *supra* note 1, at 39.

[127] For thorough treatment, see Inigo Gonzalez-Roy & Felipe Rey, *Enfranchising the Future: Climate Justice and the Representation of Future Generations*, WIREs CLIMATE CHANGE, May 2019, No. e598, at 1.

[128] Katalin Sulyok, *Transforming the Rule of Law in Environmental and Climate Litigation: Prohibiting the Arbitrary Treatment of Future Generations*, 13 TRANSNAT'L ENV'T L. 475, 479 (2024) ("This all suggests that, despite their deeply ingrained short-termist horizon, democracies must nevertheless become able to safeguard long-term environmental interests to sustain the rule of law and democracy itself in the long run."); *see also* Peter Lawrence, *Justifying Institutions for Future Generations Based on the Mitigation of Bias and Intergenerational Justice*, *in* GIVING FUTURE GENERATIONS A VOICE: NORMATIVE FRAMEWORKS, INSTITUTIONS AND PRACTICE 22, 28–31 (Jan Linehan & Peter Lawrence, eds., 2021) (discussing democratic biases against future generations in climate and environmental matters).

that are fundamentally structured towards adjudicating actual, rather than imminent or anticipated, harm, even though they are framed in terms of future generations. In the first category, inadequate adaptation measures can be seen as constituting "an ongoing breach of human rights."[129] Cases like these, which highlight existing harm, center realized risks and a presentist dimension of ongoing, longitudinal climate injuries. A second category of future generations lawsuits seeks to protect rights "against imminent future environmental risks."[130] Cases including the *Cordella* European Court of Human Rights opinion endeavor to bridge temporality for environmental violations, for instance by highlighting health risks pertaining to longstanding, documented emissions of air pollutants from a factory.[131] If similarly-framed lawsuits were presented in the context of climate change, they could help to connect historical emissions to their anticipated, proximate harms by clearly documenting and quantifying historical emissions. The remaining uncertainty would again primarily manifest with respect to questions of attribution and causation.

A final trend in climate lawsuits is especially relevant to the use and implications of the precautionary principle: an increase in so-called "climate backlash" lawsuits that seek to unwind climate change legal protections. These lawsuits highlight a type of risk that could be amplified by continued emphasis on uncertainty and precaution. Researchers charting the growing climate litigation movement have long recognized the potential risk for "backlash," or competing responses, that it could engender. For instance, analysts have noted the potential for socio-legal backlash in domestic settings,[132] domestic policy that responds unfavorably to litigation grounded in the Paris Agreement obligations,[133] and threats to the perceived legitimacy of the deciding

---

[129] Sulyok, *supra* note 128, at 488. The excerpt references the Australian *Torres Strait Islanders'* litigation, which found in relevant part that "based on the information provided by the authors, that the risk of impairment of those rights, owing to alleged serious adverse impacts that have already occurred and are ongoing, is more than a theoretical possibility," and has "already compromised their ability to maintain their livelihoods, subsistence and culture." Human Rights Comm., Views Adopted by the Committee Under Article 5(4) of the Optional Protocol, Concerning Communication No. 3624/2019, ¶ 7.10, U.N. Doc. CCPR/C/135/D/3624/2019 (2022).

[130] Sulyok, *supra* note 128, at 488 (citing Cordella and Others v. Italy, App. No. 54414 /13 (24 Jan. 2019), https://perma.cc/F6PQ-9ADD).

[131] *Id.*

[132] Jacqueline Peel & Hari M. Osofsky, *Climate Change Litigation*, 16 ANN. REV. L. & SOC. SCI. 21, 32 (2020) (citing Lisa Vanhala, *Social Movements Lashing Back: Law, Social Change, and Intra-Social Movement Backlash in Canada*, 54 STUD. L. POL. & SOC. 113 (2011)) (elaborating concept of socio-legal backlash risk in domestic issue domains); *see also* Martin Lockman, *Climate Entrenchment in Unstable Legal Regimes*, 118 NW. U. L. REV. 98, 101 (2023) (highlighting how policymakers have added instability to American climate law in recent years and ways to work within that system).

[133] Vanhala, *supra* note 132 at § 4.1 (cautioning that litigation aimed at realizing the Paris Agreement 1.5 degree target could engender multiple differing responses and "unanticipated outcomes, including backlash against litigation in some jurisdictions"); *see*

courts themselves.[134] More recently, this consideration of potential unfavorable responses to climate lawsuits has expanded to highlight an increase in actual backlash litigation.

Historically, most climate-related lawsuits, especially in jurisdictions where such lawsuits have enjoyed a longer history, were brought with the aim of strengthening climate regulations and protections. However, in the past decade, researchers have documented a countervailing rise in litigation seeking to weaken climate protections.[135] Such "non-climate aligned" litigation is gaining traction as a response to climate lawsuits and an overall increase in environmental/social/governance regulatory efforts.[136] Researchers now note that climate litigation includes both "pro-regulatory" and "'anti-regulatory' (i.e., non-climate-aligned) cases seeking to delay or obstruct climate action."[137] Though the anti-regulatory cases have so far received comparatively less academic treatment, non-climate-aligned cases have been observed and evaluated in multiple legal contexts, including Europe,[138] Oceania,[139] the United States,[140] and others.[141]

As the range of jurisdictions engaged with non-climate-aligned and climate backlash lawsuits has grown, so too have the bases that support

---

also Andreas Buser, *National Climate Litigation and the International Rule of Law*, 36 LEIDEN J. INT'L. L. 593, 595 (2023) ("Legally dubious and overly ambitious findings by national judges about the content of international climate law could frustrate governments and lead them to withdraw or limit obligations through national reform.").

134 Juan Auz, *Human Rights-Based Climate Litigation: A Latin American Cartography*, 13 J. HUM. RTS. & ENV'T. 114, 127–28 (2022) (reviewing the Inter-American Court of Human Rights' engagement) ("[A]lthough the Inter-American system has made jurisprudential innovations to protect the environment, there is also a risk that if the IAHRS orders very specific climate-related policy choices, this might incite some states in the region to resist its legitimacy, as has occurred in the past. This political challenge adds another layer of complexity to the well-known legal challenges in climate litigation . . .").

135 JACQUELINE PEEL & HARI M. OSOFSKY, CLIMATE CHANGE LITIGATION: PATHWAYS TO CLEANER ENERGY 3 (2015) ("While the majority of the litigation in both the United States and Australia has been brought by pro-regulatory litigants who want to advance climate change regulation, a growing body of antiregulatory cases launched by business groups and the fossil fuel industry has emerged in response to decisions like *Massachusetts v. EPA* and the regulation it has spawned as well as proactive action by state governments.").

136 SETZER & HIGHAM, *supra* note 1, at 4.

137 *Id.*

138 JOANA SETZER ET AL., CLIMATE LITIGATION IN EUROPE: A SUMMARY REPORT FOR THE EUROPEAN UNION FORUM OF JUDGES FOR THE ENVIRONMENT 11 (2022), https://perma.cc/FC9Y-8W8L.

139 Susan Glazebrook, *Climate Change and the Courts: Balancing Stewardship and Restraint*, JUDICATURE INT'L, Sept. 2023, at 1, 4 (highlighting the growth of climate-related strategic lawsuits against public participation, or "SLAPP suits").

140 *Id.*

141 For instance, advocates have observed an increase of SLAPP suits in sub-Saharan Africa and cautioned about a lack of statutory safeguards in many such jurisdictions. *See SLAPPs in sub-Saharan Africa*, MEDIA DEFENCE, https://perma.cc/QC5S-HE4W (last visited June 14, 2024).

these claims. From the perspective of evaluating implications that the precautionary principle may hold for domestic litigation, this merits further consideration. In particular, three observations emerge regarding how precautionary approaches in climate lawsuits might enhance non-climate-aligned argumentation. First, once the decision to address climate change has been reached and the question becomes how to weigh contrasting priorities, precaution may fail to provide guidance. Second, precaution in climate litigation may prove unhelpful by enabling litigation discourse to continue to imply uncertainty where it does not remain. Third, domestic climate discourse grounded in precaution could unintentionally bolster the defenses of those facing liability in climate change dissent lawsuits.

First, it should be emphasized that it is difficult to neatly categorize climate lawsuits,[142] given the complex and multifaceted[143] nature of the disputes. Some cases brought to oppose climate adaptation measures, for instance, have been initiated by environmental[144] or community groups,[145] and they reflect concerns about the associated environmental and social costs that might accompany those projects. In such instances, a precautionary logic may prove unhelpful. The precautionary principle requires that states take protective measures when facing evidence of environmental damage, despite a lack of scientific certainty.[146] However, it does not provide guidance for how to weigh competing priorities when climate-protective actions stand in tension with other environmental protection measures, or when climate-protective actions contrast with those that might support socio-cultural objectives. In other words, once the threshold determination has been made to do something in response to climate change, precaution does not help to choose between competing responses. Therefore, the precautionary principle as a decisional frame may hold diminishing utility as the global community increasingly

---

142 Maria E. Lessa, *Climate Litigation as Strategic Litigation* 1, 6 (May 25, 2024) (conference paper draft presented to the 2024 Law & Society Association annual meeting) (on file with author).

143 *See* Press Release, U.N. Env't Programme, Climate Litigation More Than Doubles in Five Years, Now a Key Tool in Delivering Climate Justice (July 27, 2023), https://perma.cc/2FW3-DALB.

144 Sierra Club v. Kolnitz, No. 16-cv-03815, 2017 U.S. Dist. LEXIS 128462, at *20 (D.S.C. Aug. 14, 2017) (discussing how plaintiff Sierra Club successfully secured preliminary injunction preventing construction of erosion control structures, including temporary plastic sea walls, on Harbor Island and Isle of Palms, due to their anticipated effects to breeding sea turtles listed as threatened or endangered under the Endangered Species Act).

145 Verified Petition, Battery Park City Neighborhood Ass'n v. Battery Park City Auth., No. 16062/2022 (N.Y. Sup. Ct. Dec. 14, 2022) (challenging, on basis of its historical and cultural significance, plans to reconstruct Wagner Park in New York City in support of a broader flood abatement and coastal resiliency project). The claims, while unsuccessful, underscore the complex factors that must be balanced when attempting to respond to anticipated future climate risk.

146 *See* ATAPATTU, *supra* note 20, at 204.

debates not whether, but how, to use domestic legal frameworks to address climate challenges.

Second, non-climate-aligned lawsuits are being framed in diverse jurisdictions. However, they are frequently unified by an effort to infuse litigation with uncertainty regarding the state of underlying climate science, the proper interpretation of that science, and the translation of a scientific consensus into law and policy. Reliance upon the precautionary principle, which itself emphasizes scientific uncertainty, may prove counterproductive in these instances.

Third, and finally, a new frontier is emerging in climate litigation: direct prosecution of those who promote climate denialism. Climate denialism, and deliberate efforts to misrepresent the conclusions and interpretation of climate science, represent frontiers where researchers have long called for more meaningful legal response.[147] In emergent litigation, political entities are bringing lawsuits directly against fossil fuel companies in an effort to impose liability for intentional disinformation.[148] These and other emergent lawsuits, together with the implications that they may hold for climate denialism and scientific progress, contrast with the fundamental challenges of prosecuting such cases. These include the familiar challenges of complexity and contestation within the underlying science[149] and a strong preference to protect speech in American courts.[150] At the same time, researchers highlight the prospect for such claims, if properly presented, to succeed.[151] Unfortunately, those advocating prosecution of intentional misrepresentation of climate science[152] identify the inherent, residual uncertainty in climate science as a barrier to such claims. Researchers have, for instance, argued that "climate science is closer to being an idea than an objective fact,"[153] and they have noted that residual uncertainty

---

147 James Parker-Flynn, *The Fraudulent Misrepresentation of Climate Science*, 43 ENV'T L. REP. NEWS & ANALYSIS 11098, 11099 (2013).

148 Jessica Wentz & Benjamin Franta, *Liability for Public Deception: Linking Fossil Fuel Disinformation to Climate Damages*, 52 ENV'T L. REP. 10995, 10996 (2022).

149 These have been argued to represent a "root cause" of the "climate wars" for decades. *See* Alan D. Hecht, *Resolving the Climate Wars*, 9 SUSTAINABLE DEV. L. & POL'Y 4, 5 (2009).

150 *See, e.g.*, Richard Mandel & Craig P. Ehrlich, *The Prosecution of Climate Change Dissent*, 19 MARQ. BENEFITS & SOC. WELFARE L. REV. 43, 47 (2017) (exploring the challenge of applying federal mail and wire fraud statutes to oil corporation executives in light of purported climate-related representations); *see also* Elizabeth Dubats, *An Inconvenient Lie: Big Tobacco Was Put on Trial for Denying the Effects of Smoking; Is Climate Change Denial Off-Limits?*, 7 NW. J. L. & SOC. POL'Y 510, 535 (2012) (noting how the "cross-pollination of science and politics . . . muddies the First Amendment waters").

151 Wentz & Franta, *supra* note 148, at 11020 (highlighting multiple mechanisms for demonstrating causal connections between disinformation and related legal claims).

152 Parker-Flynn, *supra* note 147.

153 Karl S. Coplan, *Climate Change, Political Truth, and the Marketplace of Ideas*, 2012 UTAH L. REV. 545, 570 (2012) ("At this stage in its development, though, climate science is closer to being an idea than an objective fact . . . . Any attempt to enshrine the climate

might both (a) suggest that the political branches should let public discourse determine truth and falsity and (b) complicate efforts to separate elements of climate science that can be known with absolute certainty from those that retain uncertainty.[154] Given the challenges that accompany efforts to prosecute those who intentionally misrepresent climate science, it is possible that continued, widespread domestic embrace of the precautionary principle could actually provide fodder for those defending themselves in an emergent climate denialism suit. In other words, if even domestic climate activists are flagging residual uncertainty as they frame cases, why would those seeking to guard themselves against charges of misrepresenting climate science not highlight it, too, as they frame their defense?

IV. RETHINKING PRECAUTION: FOSTERING A PROSPECTIVE APPROACH TO LITIGATION

As the preceding Parts show, the rise in domestic climate litigation has paralleled the development of, and domestic reference to, the precautionary principle. At the same time, I have also suggested that the precautionary principle, which historically fostered momentum and a proactive engagement with climate policymaking despite uncertainty, may fall increasingly out-of-step with these efforts. Recently, climate science has resolved many historical uncertainties, climate lawsuits have evolved in ways that place less emphasis on remaining uncertainty, and "backlash litigation" and climate lawsuit defenses have leaned heavily upon those same climate uncertainties. While the precautionary principle will undoubtedly continue to play a critical role in climate governance[155] and climate litigation,[156] particularly at the international level,[157] could we begin to imagine a future where domestic climate lawsuits might less directly invoke an uncertainty-centric backstop? This Part suggests two pathways to such a transition: one focused more explicitly upon the precautionary principle itself, and one focused more broadly on reimagining the praxis of climate change law. In the first, I suggest that scholars could help to better clarify the contours of the precautionary principle, while litigants and judges could increase their precision when specifying how the principle is leveraged.

---

consensus as an incontrovertible truth would be contrary to the foundational First Amendment principle that there is no orthodoxy in the United States polity . . . .").

154 Parker-Flynn, *supra* note 147, at 11115.

155 *See* Andrew Boswell, *Strengthening the Precautionary Principle in the Post-Paris Climate Regime*, 59 ENV'T & POL'Y FOR SUST. DEV. 26, 27, 32 (2017).

156 *See* Lydia Akinyi Omuko, *Applying the Precautionary Principle to Address the "Proof Problem" in Climate Change Litigation*, 21 TILBURG L. REV. 52, 54, 56–58, 64 (2016) (discussing various causal challenges in climate change litigation and the ability of the precautionary principle to address these deficits).

157 *See, e.g.*, Rabbi Elmaparo Deloso, *The Precautionary Principle: Relevance in International Law and Climate Change*, 80 PHIL. L. J. 644, 646 (2006).

In the second, I advocate increased support at the science/law interface, which could help both litigants and judges to better understand what scientific "uncertainty" denotes and might mean. While some of these approaches directly shape litigation strategy, others more structurally shape the dynamics of the courts where climate litigation will be resolved. Collectively, all could improve efforts to more directly address the urgently unfolding climate crisis and enhance environmental law.

A. Increased Clarity and Specificity in Application of the Precautionary Principle

First, lawyers and practitioners can aid in ensuring that the precautionary principle represents a "best fit" for climate lawsuits by giving additional attention to the evolving meaning, implications and effect of the precautionary principle. As noted above,[158] the precautionary principle has exerted considerable influence over international law, inflecting IEL generally,[159] and climate change approaches specifically.[160] While it has fostered rich academic debates[161] that underscore the influence that the principle holds at the international level, this Article—and much recent attention—emphasizes the domestic interpretation and contestation of the precautionary principle and its multilevel influence.[162] Given the tremendous heterogeneity of legal cultures and forms of climate litigation, it is unsurprising that the precautionary principle, like many other norms and principles of IEL, has been leveraged differently in different settings.[163] Yet this diversity of interpretation and application means that the precautionary principle remains murky in its meaning and effect. Accordingly, there is tremendous opportunity (1) for scholars to continue working to clarify the effect of the precautionary principle and to highlight or address its perceived deficits, and (2) for litigants

---

158 *See* discussion *supra* Part I.

159 Ida Lauridsen, *Precautionary Action: Study on the Status and Implications of the Precautionary Principle in International Environmental Law*, 19 E. & CENT. EUR. J. ENV'T L. 95, 118 (2014) ("Many authors accept its status as part of customary international law, and through that, a legally binding principle for all states . . . . Where authors do not agree with this view, they often state that the principle is well on its way of becoming such a binding legal rule.").

160 Deloso, *supra* note 157, at 676 (noting the relevance of the precautionary principle to climate governance, since "[d]ecision-making in climate change is essentially a sequential process under general uncertainty").

161 *See* Lauridsen, *supra* note 159, at 116–17.

162 *Id.* at 113–14 (highlighting that the implication of the precautionary principle to "reverse" the traditional burden of proof has largely been observed and derived from its domestic application in litigation contexts); *see also* Deloso, *supra* note 157, at 694 (emphasizing the connection between "signed commitments of states and their [resultant] domestic policies").

163 Deloso, *supra* note 157, at 8.

and judges to further clarify how, specifically, they are interpreting precautionary obligations within individual instances of litigation.

First, scholars can support the meaningful application of the precautionary principle in domestic litigation by continuing to clarify its implications and effect. As Atapattu and others note, the precautionary principle could be read to imply obligations to undertake multiple distinct, potentially precautionary measures:

> [T]he obligation to conduct an environmental assessment prior to the activity; the obligation to apply the best available technology; and the obligation to apply environmental quality standards that are set at a level below the threshold likely to be hazardous to the environment. Moreover, some treaties adopt the "prior justification procedure" under which an activity or a substance can be prohibited unless evidence can be produced that the activity is not detrimental to the environment.[164]

This diversity in application, and a resulting conceptual breadth, has led to valid debate regarding the precautionary principle, its meaning, and whether it is satisfactory or effective in its current form. While this debate was particularly vibrant in the early 2000s, this Article argues that many considerations surrounding the precautionary principle remain valid and particularly important, given its increasing influence on climate litigation.

Many researchers have argued that the precautionary principle is problematically ambiguous. They have presented several explanations for this ambiguity, including a claim that developing the precautionary principle has neglected other important, related bodies of law and scholarship.[165] While subsequent scholarship has undoubtedly aided in better connecting disparate discourses, questions remain regarding whether a sufficiently coherent precautionary principle exists, or whether multiple potential responses have emerged under the umbrella of the precautionary principle.[166]

Second, in highlighting the many potential interpretations and implications of the precautionary principle, some researchers have suggested that the precautionary principle lacks internal coherence and fails to present meaningful legal guidance. For instance, Cass Sunstein

---

164 ATAPATTU, *supra* note 20, at 208 (internal citations omitted).

165 *E.g.*, Christopher D. Stone, *Is There a Precautionary Principle?*, 31 ENV'T L. REP. NEWS & ANALYSIS 10790, 10791–92 (2001) ("Part of the lingering unclarity stems from the failure of the precautionary principle literature, by and large, to make much connection with the impressive bodies of work on decisions under uncertainty, cost-benefit analysis, and risk management . . . . Even more surprising than the principle's detachment from the pertinent social science literature is its disconnect from mainstream legal literature that could be quite helpful.").

166 *See id.* at 10799 (clarifying that there are "droves of differing versions" as opposed to "the" precautionary principle); *see also* JULIAN MORRIS, RETHINKING RISK AND THE PRECAUTIONARY PRINCIPLE 1 (2000) (highlighting the precautionary principle's status as an "ill-defined concept").

suggested that the precautionary principle is unhelpful "[n]ot because it leads in bad directions, but because, read for all that it is worth, it leads in no direction at all. The principle threatens to be paralyzing, forbidding regulation, inaction, and every step in between."[167]

While Sunstein's account of perceived challenges with ambiguity in the precautionary principle are directed more widely than the context of climate change explored here, they do, nevertheless, present climate-relevant concerns. Writing in 2003, at a time when desirable directions of a global energy transition were contested, Sunstein illustrated the types of challenges that the precautionary principle could struggle to meaningfully address. As one example, Sunstein highlighted the tension between the risks to be averted by emissions reductions objectives and the risks to be encumbered by broader embrace of nuclear energy generation.[168] Many similar tensions are debated today within the context of climate governance. These include (1) tensions between the risks of catastrophic warming and the potential risks that could accompany solar geoengineering projects intended to address those risks,[169] (2) the imperatives and limited funding that accompany tradeoffs between adaptation and mitigation,[170] and (3) the tradeoffs inherent in species management efforts associated with climate-related effects to biodiversity.[171] While the precautionary principle suggests a review process in response to these challenges, it is not clear that the principle would provide guidance that could aid in weighing and balancing potential pathways forward. Acknowledging these balance-

---

[167] Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1003–04 (2003) ("[I]n the relevant cases, every step, including inaction, creates a risk to health, the environment, or both.").

[168] *Id.* at 1024 (exploring risk substitution and other challenges that the precautionary principle struggles to address).

[169] *See, e.g.*, Anna Lou Abatayo et al., *Solar Geoengineering May Lead to Excessive Cooling and High Strategic Uncertainty*, 117 PROC. NAT'L ACAD. SCI. 13393, 13393 (2020); Jennie C. Stephens et al., *The Dangers of Mainstreaming Solar Geoengineering: A Critique of the National Academies Report*, 32 ENV'T POL. 157, 158–60 (2021); Jutta Wieding et al., *Human Rights and Precautionary Principle: Limits to Geoengineering, SRM, and IPCC Scenarios*, 12 SUSTAINABILITY 8858, 8859–60 (2020).

[170] Evan Mills, *Weighing the Risks of Climate Change Mitigation Strategies*, 68 BULL. ATOMIC SCIENTISTS, no. 6, 2012, at 67, 74; Mia Landauer et al., *The Role of Scale in Integrating Climate Change Adaptation and Mitigation in Cities*, 62 J. ENV'T. PLAN. & MGMT. 741, 741 (2019) (emblematic of efforts to move beyond a "tradeoffs" framing and towards a more integrative response to climatic stressors).

[171] *See, e.g.*, James W. Pearce-Higgins et al., *A National-Scale Assessment of Climate Change Impacts on Species: Assessing the Balance of Risks and Opportunities for Multiple Taxa*, 213 BIOLOGICAL CONSERVATION 124, 125, 133 (2017); Jennifer Wilkening et al., *Endangered Species Management and Climate Change: When Habitat Conservation Becomes a Moving Target*, 43 WILDLIFE SOC'Y BULL. 11, 12–13 (2019) (supplementing one of the more widely utilized programs for "climatic niche modeling" with easily-accessed online analytical information aimed at "decision-makers" to create conservation and management efforts that effectively incorporated climate change considerations for an endangered species).

related challenges, Sunstein and others have explored potential amendments to the precautionary principle. For instance, it is possible to envision a "weak" version of the precautionary principle which does not imply all potential responses to a climate-related risk, but instead simply shows that "a lack of decisive evidence of harm should not be grounds for refusing to regulate."[172] Additional scholarly attention could also explore how the precautionary principle might best be tailored in the context of the governance challenges of climate change.

A final body of research has explored whether the precautionary principle implies legally justiciable obligations when it is applied. In earlier work, Fisher suggested that many UK and common law courts were resistant to "accept [the precautionary principle] as a justification for substantive and intensive review" because the obligations that it implies fell beyond judicial competence.[173] The domestic litigation landscape has continued to evolve since the publication of these works, and the precautionary principle has continued to receive additional domestic application.[174] Nevertheless, it is valid to consider whether the principle primarily mandates review that courts can perform, and how courts can best be equipped to perform these functions.[175] Researchers could beneficially explore these questions, particularly in the context of climate change governance, by considering whether and how the precautionary principle may be meaningfully engaged by judges. For instance, alongside proposals to reimagine or clarify the precautionary principle, some have suggested the benefits of combining the approach with cost-benefit analysis.[176]

In addition to leveraging academic research to clarify what the precautionary principle *could* or *should* mean in the context of climate litigation, the benefits of the precautionary principle could be maximized by giving more attention to what it *does* mean within individual climate change lawsuits. As the academic literature evidences, even those who directly research the precautionary principle must perform some interpretation when exploring and elaborating its meaning in applied context.[177] As Lauridsen notes, examining state

---

[172] Sunstein, *supra* note 167, at 1012.

[173] Elizabeth Fisher, *Is the Precautionary Principle Justiciable?*, 13 J. ENV'T L. 315, 315–16 (2001).

[174] Lauridsen, *supra* note 159, at 110, 119.

[175] Fisher, *supra* note 173, at 334 (noting that courts must be equipped not just with scientific knowledge but also "an acute awareness of all the complexities of risk regulation" and an ability to "take into account the type of polycentric decision-making that lies at the heart of risk regulation").

[176] Farber, *supra* note 93, at 1721–23 (suggesting options for integrating cost-benefit analysis and the precautionary principle, including by undertaking more holistic analysis, by incorporating the guidance of the precautionary principle into integrated assessment modeling, or by allowing the prescriptions of the precautionary principle to guide policy design at an earlier stage).

[177] *See, e.g.*, Sunstein, *supra* note 167, at 1006–07 ("In 1982, the United Nations World Charter for Nature apparently gave the first international recognition to the principle . . . .

practice and *opinio juris* is complicated by "uncertainty of what the principle actually entails."[178]

In an ideal context, IEL principles including precaution can be leveraged in ways that redress the longstanding contributions of IEL to the marginalization of historically excluded communities.[179] This work would necessitate efforts by domestic judges, especially in contexts where institutions have insufficiently addressed longstanding inequities.[180] However, given concerns about judicial activism, particularly within the context of domestic climate governance,[181] judicial capacity to engage with climate change will be most meaningfully leveraged when claimants can point to a direct breach of a clearly-defined statutory obligation.[182]

Domestic governments can support efforts to clarify precautionary climate litigation by more explicitly specifying whether, and how, they are interpreting and applying the precautionary principle. At the same time, litigants bringing climate lawsuits, and judges deciding those disputes, can provide greater specificity regarding how they are leveraging the precautionary principle, and the effect that they intend it to hold in specific cases. The domestic decisions that have referenced the precautionary principle suggest that many judges have struggled to

---

Notwithstanding official American ambivalence about the principle, there are unmistakable echoes of the principle in American environmental law." (footnote omitted)); *see also* Lauridsen, *supra* note 159, at 118 ("In judicial decisions from international courts and tribunals, the message [regarding the effect and interpretation of the precautionary principle] is not as clear . . . . The problem is that in no judgment is there a clear definition of the principle, or an explanation of how the principle was applied in the case.").

178 Lauridsen, *supra* note 159, at 119 ("[W]hen the different sources in favour of granting the principle a status as part of international customary law seem to refer to different principles, albeit under the same name, is it really a consistent state practice?").

179 Cinnamon P. Carlarne, *Climate Courage: Remaking Environmental Law*, 41 STAN. ENV'T L. J. 125, 133 (2022). Similar discussion of tensions between the emancipatory potential of international environmental law principles and their potential to reify existing power dynamics has been observed at the international level and studied by those exploring Third World approaches to international law. For exemplar discussion and advocacy of principles, including precaution, to support the inclusion of indigenous, Global South, and related perspectives, see GODWIN ELI KWADZO DZAH, SUSTAINABLE DEVELOPMENT, INTERNATIONAL LAW, AND A TURN TO AFRICAN LEGAL COSMOLOGIES 44 (2024).

180 *See, e.g.*, Geoffrey Palmer, *Can Judges Make a Difference? The Scope for Judicial Decisions on Climate Change in New Zealand Domestic Law*, 49 VICT. U. WELLINGTON L. REV. 191, 201 (2018) (discussing how there is a push to use litigation to address the effects of climate change where policies fail).

181 Laura Burgers, *Should Judges Make Climate Change Law?*, 9 TRANSNAT'L ENV'T L. 55, 56–58 (2020) ("[W]hile the role of the judiciary as such remains unchanged, the global climate change litigation trend is likely to influence the democratic legitimacy of judicial lawmaking on climate change, as it indicates an increasing realization that a sound environment constitutes a constitutional matter and is therefore a prerequisite for democracy.")

182 Palmer, *supra* note 180, at 203–04 (outlining the necessary and likely conditions for New Zealand domestic judges to engage with climate change disputes).

clearly articulate what the precautionary principle demands, whether generally or within the context of particular disputes. For example, the *Atrato River Case* acknowledges the manifest importance of the precautionary principle.[183] Yet, at the same time, it appears to grapple with the ambiguity of what, precisely, the precautionary principle mandates:

> However, based on the fact that certain effects are irreversible, this principle points out a course of action that "not only deals with the consequences of acts in its exercise, but mainly requires an active position of anticipation, with an objective of forecasting the future environmental situation in order to optimize the natural environment.[184]

In other opinions, passing reference to the precautionary principle can obscure precisely what the principle obligates[185] or allude to ongoing uncertainty.[186] These shorthand applications of the precautionary principle are understandable, given the precautionary principle's implicit desirability and apparent simplicity.[187] Additionally, brief domestic references to the precautionary principle can benefit broader efforts to demonstrate widespread domestic state practice and acceptance of a precautionary approach.[188] However, both litigants and judges might be mindful of a beneficial opportunity to clarify what the precautionary principle means within domestic legal contexts.

At the same time, some judges' domestic opinions do reflect efforts to clearly demarcate the precautionary principle's implications and

---

[183] *See Atrato River Case*, Sentencia T-622/16, Gaceta de la Corte Constitutional [G.C.C.], § 7.36 ("The precautionary principle stands as a legal tool of great importance, as it responds to the technical and scientific uncertainty that often hangs over environmental issues . . . .").

[184] *Id.*

[185] *See, e.g.*, *Cherry Tree Wind Farm Pty Ltd v Mitchell Shire Council* (2013) VCAT 521, ¶ 122 (Austl.) (noting the Council's claim that "relevant authorities should take a precautionary approach"); *Gippsland* (2008) 31 VPR 12, ¶¶ 41–42 (Austl.) ("The precautionary principle requires, *amongst other matters*, a gauging of the consequences and extent of intergenerational liability arising from a development or proposal and if found to be warranted, appropriate courses of action to be adopted to manage severe or irreversible harm." (emphasis added)); Hanuman Laxman Aroskar v. Union of India & Ors., 2020 SCR 32 (2019), ¶ 96 (India) ("By invoking Precautionary Principle, we direct the Project Proponent to draw up a Conservancy by Plan/Scheme . . . .").

[186] *See, e.g.*, Friends of the Earth and Others v. Secretary of State for Transport [2020] UKSC 52, ¶ 164–65 (UK) (appeal taken from Eng.) (reversing a lower court finding that both the precautionary principle and "common sense" mitigate in favor of admitting scientific evidence despite uncertainty and noting that "[t]he precautionary principle adds nothing to the argument in this context").

[187] It also bears noting that in some legal contexts, including Australia, the precautionary principle has gained received widespread usage in domestic environmental cases. This depth of existing precedent may also obviate the need in such contexts for fuller elaboration of the precautionary principle within individual cases.

[188] *E.g.*, Lauridsen, *supra* note 159.

effect. In one such example, provided by *Taip v. East Gippsland Shire Council*,[189] Mr. Ian Potts of the Victorian Civil and Administrative Tribunal succinctly articulates the meaning of the precautionary principle to the particular dispute; he notes that the approach, as applied, "appears to be an adaptation of the precautionary principle wherein decision making should act on the best available science, knowledge and understanding of the consequences of decisions in the context of increasing uncertainty."[190] The *Taip* opinion then notes how a precautionary approach could be interpreted in the context of the coastal development dispute at issue, stating that "under a precautionary approach a decision should minimize adverse impacts on current and future generations and the environment."[191]

Other opinions have provided exceptionally thorough explications of the precautionary principle. Examples include climate cases that have arisen in recent years in the Mexican courts. In a first example, the Mexican Center for Environmental Law challenged renewable energy tariffs.[192] The case, already noteworthy in its broad reference to international law, devotes over 1% of its opinion, by length,[193] to clearly evaluating the precautionary principle, including as it appears within Principle 15 of the Rio Declaration.[194] Likewise, the Mexican courts also extensively evaluated the precautionary principle within their jurisprudence in a 2021 emergency proceeding of *Greenpeace v. Instituto Nacional de Ecología y Cambio Climático and Others*,[195] a case challenging Mexico's revised nationally determined contributions (NDCs) under the Paris Agreement.[196] The case, which analyzed how the NDCs would interact with principles of environmental non-

---

189 *Taip v E Gippsland Shire Council* [2010] VCAT 1222 (Austl.).

190 *Id.* at app. ¶ 11.

191 *Id.*

192 Centro Nacional de Control de Energía y Secretaría de Energía, Tribunal Colegiado de Circuito en Materia Administravista [TCC], Amparo en Revisión, Décima Época, 4 noviembre 2021, R.A. 58/2021 (Mex.). For an English summary, see *Idheas Litigio Estratégico v Centro Nacional de Control de Energía (CENACE) and Secretaría de Energía (SENER)*, CLIMATE CHANGE LITIG. DATABASES, https://perma.cc/YDF7-H2KW (last visited July 28, 2024).

193 *See* Angstadt & Park, *supra* note 9 (determining this percentage through a qualitative coding analysis conducted in QSR NVivo 17).

194 Centro Nacional de Control de Energía, TCC, R.A. 58/2021.

195 Titular de la Unidad Coordinadora de Asuntos Jurídicos de la Secretaría de Medio Ambiente y Recursos Naturales, Quien Actúa en Representación de la Secretaria de Medio Ambiente y Recursos Naturales por Sí y en Calidad de Presidente de la Comisión Intersecretarial de Cambio Climático, y en Representación de la Dirección General de Políticas para el Cambio Climático [Greenpeace], Tribunal Colegiado en Materia Administrativa [TC], Amparo en Revisión, Décima Época, 15 diciembre 2022, R.A. 159 /2022 (Mex.). For an English summary, see *Greenpeace v. Instituto Nacional de Ecología y Cambio Climático and Others*, CLIMATE CHANGE LITIG. DATABASES, https://perma.cc/GZ7Q-2U8G (last visited July 28, 2024).

196 Greenpeace, TC, R.A. 159/2022 at 78–79.

regression,[197] highlighted the relevance of the precautionary principle,[198] explored interpretation of scientific evidence in the absence of scientific certainty,[199] and affirmed both the international and domestic authorities that support its application.[200] The precautionary principle is treated similarly in *CEMDA v. Comisión Reguladora de Energía* ("CEMDA v. Rise of Legacy Transmission Rates").[201] While the court held that claimants failed to satisfy standing requirements,[202] an earlier opinion in a district-level administrative court provided extensive discussion of the precautionary principle and its implications.[203]

What can be observed about the collective effect of references to the precautionary principle in these diverse judicial settings? First, the precautionary principle has clearly gained a breadth of domestic attention in the context of climate litigation, being referenced in countries as disparate as Australia,[204] Mexico,[205] The Netherlands,[206] and India.[207] To date, these opinions have, understandably, confined their citations primarily to statutes and legal opinions originating within their jurisdiction. However, judges are increasingly engaged in networked exchanges with colleagues from other legal cultures and settings,[208] and they are sensitive to the global context of their climate-related opinions.[209] Similarly, climate litigants are engaged in networked advocacy, building transnational coalitions to advance

---

197 *Id.* at 80–81.

198 *Id.* at 106.

199 *Id.*

200 *Id.* at 108.

201 Derecho a un Medio Ambiente Sano [CEMDA], Juzgado de Distrito en Materia Administrativa [JD], Juicio de Amparo, Décima Época, 12 mayo 2023, 232/2021 (Mex.). For an English summary, see *CEMDA v. Rise of Legacy Transmission Rates*, CLIMATE CHANGE LITIG. DATABASES, https://perma.cc/UBA2-LGJA (last visited July 28, 2024).

202 CEMDA, JD, 232/2021 at 64–65.

203 Audencia Incidental, Juzgado de Distrito en Materia Administrava [JD], Incidente de Suspensión, Décima Época, 26 octubre 2020, 399/2020, páginas 37–39 (Mex.).

204 *Gippsland* (2008) 31 VPR 12, 12 (Austl.).

205 Greenpeace, TC, R.A. 159/2022 at 106.

206 HR 19 december 2019, JB 2019, 135 m.nt. HWW (*Urgenda*) (Neth.), at 18.

207 *See, e.g.*, Court on its Own Motion v. State of Himachal Pradesh, (2013) CWPIL No. 15 of 2010, ¶ 14 (National Green Tribunal Principal Bench 2014) (India) (citing Vellore Citizens' Welfare Forum v. Union of India, AIR 1996 SC 2715 (India)) ("The 'precautionary principle' requires government authorities to anticipate, prevent and attack the causes of environmental pollution. This principle also imposes the onus of proof on the developer or industrialist to show that his or her action is environmentally benign.").

208 Melissa A. Waters, *Mediating Norms and Identity: The Role of Transnational Judicial Dialogue in Creating and Enforcing International Law*, 93 GEO. L. J. 487, 490 (2005).

209 Jacqueline Peel et al., *Climate Change Law in an Era of Multi-Level Governance*, 1 TRANSNAT'L ENV'T. L. 245, 271 (2012) (highlighting judges' consideration of both domestic imperatives and action or inaction in other jurisdictions, and noting that "[i]n addition, courts have shown awareness in their judgments of the global context of their rulings in addressing the challenge of reducing emissions").

strategic climate lawsuits.[210] As a result, opportunities increasingly exist to exchange insights about what the precautionary principle does—and could—mean more holistically. Indeed, some domestic climate opinions already indicate an awareness of litigation in other jurisdictions, and judges reference these other jurisdictions' approaches to key climate law questions and claims.[211] As the precautionary principle gains widespread domestic reference, litigants and jurists alike could embrace similar practices to deepen their respective domestic interpretations of the precautionary principle and its implications.

Second, several jurisdictions, including Australia and India, have achieved some depth of domestic reference to the precautionary principle, with many individual cases citing to pre-existing opinions within those contexts. For instance, Australia's planning tribunals and environmental court opinions make frequent, brief references to the precautionary principle, since its contours and implications have already been well developed in prior opinions.[212] Elsewhere, India's Supreme Court and National Green Tribunal have both affirmed the influence of the precautionary principle, permitting cross-reference and domestic reinforcement.[213] While acknowledging the tremendous diversity that exists across domestic contexts in legal cultures and systems, there is a clear opportunity for judges in additional jurisdictions to gain familiarity with the precautionary principle and its implications and, in turn, to intentionally explore pathways to deepen and thicken its interpretation within additional contexts.

Finally, an often-cited barrier to judicial engagement with climate change is the perception of courts as institutions that are reactive in posture and only able to engage questions as they are presented. While

---

[210] Phillip Paiement, *What of Litigation? Domestic Courts and Lawmaking Processes in Transnational Law*, 33 J. TRANSNAT'L L. & POL'Y (forthcoming) (manuscript at 2) (on file at https://perma.cc/2J38-PLME); Geetanjali Ganguly, Towards a Transnational Law of Climate Change: Transnational Litigation at the Boundaries of Science and Law 239 (Sept. 2019) (Ph.D. dissertation, London School of Economics & Political Science) (on file with e-thesis repository, London School of Economics and Political Science).

[211] *See* Trib., Rome, 13 settembre 2023, n. 39415, A. Sud et al. v. Italy, (It.) (referencing climate jurisprudence from jurisdictions including the UK, France, the Czech Republic, Croatia, Uruguay, Colombia, Pakistan, Nepal, Turkey, Russia, Malta, and Romania); Plan B Earth & Others v. Prime Minister [2021] EWHC 3469 (Admin), ¶¶ 55–56 (Eng.) (referencing cases including Urgenda v. The Netherlands [Netherlands] and Friends of the Irish Environment v. The Government of Ireland [Ireland]); Reference re Greenhouse Gas Pollution Pricing Act, 2021 SCC 11, ¶ 189 (Can.) (referencing Urgenda v. The State of the Netherlands and Gloucester Resources Limited v. Minister for Planning).

[212] *See, e.g.*, *Gray v The Minister for Planning and Ors* [2006] NSWLEC 720, ¶¶ 127–135 (Austl.) (providing extensive analysis and reference to existing Australian jurisprudence regarding the precautionary principle and other principles of environmentally sustainable development ["ESD"], and citing at ¶ 131 to an earlier decision that "refers to numerous sources for the conclusions contained therein" and identifies "the role of environmental assessment as a 'precautionary enabling device'").

[213] *See, e.g.*, State of Himachal Pradesh, (2013) CWPIL No. 15 of 2010, ¶ 14 (National Green Tribunal Principal Bench 2014) (India).

the implications of this reactive posture lie beyond the scope of this Article, framing climate lawsuits broadly can invite judges' engagement with considerations that they might not otherwise undertake. As a result, some researchers have examined efforts to connect climate claims to broad considerations, including precaution and human rights.[214] Therefore, climate law pleadings, not just the resulting judicial opinions, should be seen as important venues for articulating the meaning and implications of the precautionary principle. Strategic lawyers can certainly advance this effort through their networked efforts and filings. Similarly, the ongoing engagement of academics and others in environmental law *amicus curiae* filings,[215] where permitted, represents an additional, longstanding avenue to aid the court in interpreting the meaning and potential implications of the precautionary principle. As these briefs already engage with influential climate lawsuits,[216] they should be viewed as valuable spaces for academic analysts to disambiguate the effect of the precautionary principle in climate lawsuits.

B. Increased Support at the Science/Law Interface

In addition to considering further spaces where the precautionary principle might be clarified, researchers and practitioners could pursue exchange and transdisciplinary engagement at the science-law interface. Here, participants across disciplines can collaboratively resolve perceived uncertainties and consider the effect of remaining uncertainties. As this Article and others demonstrate, there are many reasons that climate policy remains so contested, notwithstanding the overwhelming scientific consensus.[217] Exchanges at the science/law interface might be further supported in at least three ways: through efforts to enable scientists to more effectively engage with climate litigation, by supporting lawyers in interpreting and applying climate

---

214 Hesselman, *supra* note 10, at 373.

215 *See, e.g.*, Susan Hedman, *Friends of the Earth and Friends of the Court: Assessing the Impact of Interest Group* Amici Curiae *in Environmental Cases Decided by the Supreme Court*, 10 VA. ENV'T L.J. 187, 192 (1991); MF Henríquez-Prieto & P Miranda-Nigro, Amicus Curiae *and Ecosystem Services: On Public Interest Interventions to Help Resolve Environmental Controversies*, 36 J. ENERGY NAT. RES. L. 209, 209 (2018).

216 *See, e.g.*, Brief for Jeremiah Chin et al. as Amici Curiae Supporting Plaintiffs' Motion for Reconsideration En Banc, United States of America v. United States District Court for the District of Oregon, No. 24-684 (9th Cir. July 12, 2024), https://perma.cc/PY3A-YE4W.

217 Michelle S. Simon & William Pentland, *Reliable Science: Overcoming Public Doubts in the Climate Change Debate*, 37 WM. & MARY ENV'T L. & POL'Y REV. 219, 225 (noting as key contributing factors: the many scientific uncertainties, the many opaque value judgments that underpin climate change science, and the fact that "the problem posed by climate change can be framed to accommodate a plurality of fundamentally different but equally legitimate perspectives").

science, and by supporting jurists and other court employees who adjudicate complex, science-laden climate law disputes.

First, the scientific community could be given more support and aid in its efforts to meaningfully and precisely provide climate insight to all positions within climate lawsuits. The current wave of climate litigation is being facilitated in part by inspiring scientists who are willing to undertake the arduous work of mediating their science and its implications for litigation[218] and non-expert audiences. As the scientific community increasingly recognizes and embraces this role,[219] a challenge remains in connecting scientific expertise with legal strategy.

How could scientists best be supported in their efforts? Many scientists are themselves motivated by a sense of urgency similar to that of passionate climate lawyers.[220] First, climate scientists might continue to perform important boundary work by explicitly aiming to generate interdisciplinary, litigation-relevant insight.[221] Many benefits could be realized by directing greater attention to disciplinary conventions and emphases within the natural sciences—and the effects that they may bear on climate litigation.[222] In considering how disciplinary perspectives can inflect climate litigation, several strategic responses have been advocated, yet all cohere around the importance of recognizing the effect of scientific disciplinary perspectives and intentionally engaging with them when shaping litigation.[223]

---

[218] Isabella Kaminski, *How Scientists are Helping Sue Over Climate Change*, 6 LANCET PLANETARY HEALTH e386, e387 (2022).

[219] Jessica Wentz et al., *Research Priorities for Climate Litigation*, EARTH'S FUTURE, Jan. 2023, No. e2022EF002928, at 11 (identifying priority research areas that scientists can pursue in support of climate litigation, and urging that "there is a need for both foundational research with broad application and research that is focused on a particular jurisdiction or entity").

[220] *See, e.g.*, Anna Pivovarchuk, *'Scared as Hell': Climate Scientists Risk Jobs, Jail to Save Dying Planet*, AL JAZEERA (June 16, 2024), https://perma.cc/PWJ7-6HQ8; Cara Buckley, *After Refusing to Fly, Climate Researcher Loses His Job*, N.Y. TIMES (Oct. 12, 2023), /https://perma.cc/44NU-2ZQ6

[221] Wentz et al., *supra* note 219, at 11 (acknowledging a need for interdisciplinary research and noting that "[m]any of the evidentiary questions raised in climate litigation are inherently interdisciplinary—for example, estimating a corporate defendant's contribution to climate damages would involve looking at evidence from corporate records and other historical documents as well as various domains of climate change detection and attribution science").

[222] Eric Biber, *Which Science? Whose Science? How Scientific Disciplines Can Shape Environmental Law*, 79 U. CHI. L. REV. 471, 473 (2012) (highlighting the effect of differing emphases between climate scientists and meteorologists as emblematic of "a much broader pattern in environmental law and policy: different scientific disciplines have very different perspectives and often reach very different conclusions about the state of the world and the need for policy intervention based on similar or identical information").

[223] *See generally id.* at 474 (discussing the approach to "take into account the diverse range of values and perspectives already embedded in the scientific disciplines that are relevant for environmental law).

In addition to aiding climate scientists to more intentionally produce litigation-relevant science, attention could be directed to training climate scientists to understand the emphases of climate law and ways to communicate their expert knowledge in litigation-relevant fashion. In one example of this approach, researchers highlighted a "deductive," general-to-specific method that scientific experts used to craft an attribution storyline during the *Juliana v. United States*[224] litigation.[225] As they show, climate scientists can be attentive to how a climate litigation-relevant storyline can acknowledge the legal standards underlying litigation while simultaneously preserving fidelity to the integrity of scientific data and the claims that it can legitimately support.[226]

Second, attorneys could be better-equipped to understand climate science. By helping legal practitioners to understand how scientists interpret and consider climate uncertainty, lawyers and litigants who frame climate lawsuits could more clearly engage with the science that undergirds their disputes. Climate litigation scholarship presents a potential venue for parties to deliberately misrepresent climate science, risks, and uncertainties.[227] However, researchers should also acknowledge the simultaneous, and very real, possibility that those bringing climate lawsuits may simply struggle to understand scientific uncertainty. The increasing volume of climate change litigation suggests that more attorneys will be engaged in the practice of shaping climate law over time.[228]

Recognizing attorneys' diversity of background, experience, and motivation, how can we best equip prospective climate lawyers to bring "good" climate lawsuits[229] that accurately interpret and represent

---

[224] Juliana v. United States, 947 F.3d 1159 (9th Cir. 2020).

[225] Elisabeth A. Lloyd & Theodore G. Shepherd, *Climate Change Attribution and Legal Contexts: Evidence and the Role of Storylines*, CLIMATIC CHANGE, Aug. 2021, No. 28, at 1–2, 9.

[226] *Id.* at 10.

[227] *See, e.g.*, Natahsa Geiling, City of Oakland v. BP*: Testing the Limits of Climate Science in Climate Litigation*, 46 ECOLOGY L.Q. 683, 683 (2019) ("Just as the tobacco litigation forced plaintiffs to contend with industry-funded denial and junk science, climate litigants must confront sophisticated corporate defendants experienced in obstruction and the deployment of junk science."); Maxine Sugarman, *Following the Science: Judicial Review of Climate Science*, 98 WASH. L. REV. 1405, 1416 (2023) ("Climate science is not the only arena where science is becoming increasingly politicized. The result, however, is that courts have become more empowered to make policy decisions when parties offer adversarial or contradictory science." (footnote omitted)); Simon & Pentland, *supra* note 217, at 229 (noting how issue framing shapes perception and engagement with climate science, complicating efforts to find consensus).

[228] *See* Sarah Mason-Case, *On Being Companions and Strangers: Lawyers and the Production of International Climate Law*, 32 LEIDEN J. INT'L L. 625, 630–31 (2019) (discussing the impact of the integration of lawyers from international organizations into discussions on climate change).

[229] Steven Vaughan, *Let's Talk About the Lawyers: Climate Change Litigation, Professional Ethics, and 'Good' and 'Bad' Case Outcomes*, in CLIMATE LITIGATION IN

climate science? One valuable effort could involve expanding the level of climate law and science training that is provided to would-be attorneys. Climate law has increasingly permeated legal education,[230] especially as law students and future generations more broadly are viewed as the best hope for meaningfully addressing the climate crisis.[231] However, the contours of what comprises climate legal education remain ambiguous and contested. In one promising development, recent years have brought attention to the ways that climate change inflects environmental law[232] and law more broadly,[233] and how the resulting legal education should be conducted. More directly, researchers have begun to explore whether the legal dimensions of climate change should be more formally taught in law school settings.[234] As part of this education, some are suggesting that a capacity to interpret climate science represents a competency that is increasingly necessary alongside more traditionally highlighted skills, including "thinking like a lawyer,"[235] legal writing,[236] and the capacity for collaboration.[237] For

---

EUROPE UNLEASHED: CATALYSING ACTION AGAINST STATES AND CORPORATIONS 54, 55 (Ekaterina Aristova & Justin Lim eds. 2024).

[230] *See generally* KIMBERLY K. SMITH, MAKING CLIMATE LAWYERS: CLIMATE CHANGE IN AMERICAN LAW SCHOOLS, 1985–2020 (2024) (explaining the expansion of climate law education); *see also* Michael Mehling et al., *Teaching Climate Law: Trends, Methods and Outlook*, 32 J. ENV'T L. 417, 417 (2020) (asserting that climate law has "evolved from being, at best, a nascent theme featured alongside other sectoral topics in environmental law classes to becoming the subject of its own degree programmes, courses, textbooks, and dedicated journals").

[231] *See, e.g.*, Manuel I. Arrieta, *Climate Litigation: The Future is Now*, 63 NAT. RES. J. 139, 140 (2023) (asserting that it will be younger people who must resolve climate change).

[232] *See, e.g.*, Michael Robinson-Dorn, *Teaching Environmental Law in the Era of Climate Change: A Few Whats, Whys, and Hows*, 82 WASH. L. REV. 619, 625–33 (2007) (explaining approaches to teaching environmental law).

[233] *See, e.g.*, Nicole Graham, *Teaching Private Law in a Climate Crisis*, 40 U. QUEENSL. L.J. 403–09 (2021) (examining private law's role in a world with a changing climate).

[234] Danielle Ireland-Piper & Nick James, *The Obligation of Law Schools to Teach Climate Change Law*, 40 U. QUEENSL. L.J. 319, 322 (2021) ("Universities have a general obligation to contribute to the public good, and the public good is served by supporting the community to respond appropriately to climate change. Law schools can achieve this by educating law students about climate change and its consequences." (footnote omitted)). For instance, a major effort of the International Union for the Conservation of Nature's Academy of Environmental Law includes a repository of course syllabi for climate law courses from institutions around the world. The submissions are illustrative of the breadth of this topic area, both in terms of the scope of material covered and the diversity of contributions within the collection. *See Climate Law Teaching Resources*, IUCN ACAD. OF ENV'T L., https://perma.cc/58GB-3NSG (last visited March 31, 2025).

[235] *See* Cheryl B. Preston et al., *Teaching "Thinking Like a Lawyer": Metacognition and Law Students,* 2014 BYU L. REV. 1053, 1054–56 (2014) (discussing the relationship between legal education and metacognition).

[236] *See, e.g.*, Philip N. Meyer, *What's Wrong with Legal Writing? Teaching Law Students the Art of Infusing Creativity into Words*, A.B.A. J., Oct.–Nov. 2021, at 34 (asserting that creative storytelling can part of effective legal writing); Claire R. Kelly, *An Evolutionary Endeavor: Teaching Scholarly Writing to Law Students*, 12 LEGAL WRITING: J. LEGAL

instance, the authors of a recent climate change law textbook, all bearing connections to the Elisabeth Haub School of Law at Pace University, note that their faculty has "discussed whether and how to include coverage of climate change *in every course taught at the school*."[238] Perhaps even more valuably, these efforts increasingly focus on the benefits that could result from equipping law students to better understand other fields' contributions and insights.[239] In a deviation from the specialized state of legal education, these efforts highlight the programs that could help emerging lawyers engage with climate science,[240] promote climate-focused lawyering skills,[241] and explore opportunities to equip law students with these skills.[242] This broad-scale reimagination of the intersection between climate science and legal education could require time to fully entrench itself, since the law students receiving this reimagined training would first need to enter legal practice to effectuate change. Nevertheless, this "pipeline" approach could support efforts to better equip lawyers to engage with the uncertainty in climate change litigation.

Third, it could prove beneficial to better support the judges, justices, and other court staff who will increasingly be expected to interpret and resolve claims of scientific uncertainty. The challenges associated with asking judges to resolve technical and science-laden cases are not unique to climate, and longstanding debates about best practices for supporting judges can be observed in areas as disparate as criminal law[243] and technology law.[244] However, the challenges are

---

WRITING INST. 285–92 (2006) (describing a legal writing curriculum focused on scholarly legal writing).

237 *See generally* Janet Weinstein et al., *Teaching Teamwork to Law Students*, 63 J. LEGAL EDUC. 36 (2013) (describing an interdisciplinary approach for teaching legal collaboration).

238 Coplan et al., *supra* note 100, at 3.

239 Mehling et al., *supra* note 230, at 434 ("Climate law—just like environmental law—calls on its students to contend with epistemic challenges that far transcend the traditional legal skillset . . . . [and] arguably underline a need for training aimed at enhancing the ability to synthesise and apply insights from related fields, such as climate science, economics, political science, other social sciences and the humanities." (footnotes omitted)).

240 Mehling et al., *supra* note 230, at 431 (advocating, rather than imparting certain units of climate-related knowledge, the ability to "navigate the subject matter as it evolves during in their careers").

241 Sue Silverman, *Confronting the Climate Crisis: Incorporating Climate Change into Legal Research Instruction*, 116 L. LIBR. J. 181, 190 (2024).

242 Mehling at al., *supra* note 230, at 438 ("[V]arious suggestions have been made to overcome these barriers, [including] extending credit for participation in natural and social science courses.").

243 Stephanie L. Damon-Moore, *Trial Judges and the Forensic Science Problem*, 92 N.Y.U. L. REV. 1532, 1550, 1555 (2017) (examining change in law regarding use of forensics in the courtroom).

244 Stewart Dalzell, *Judging Technology: An Eighteenth Century Institution Meets Twenty-First Century Cases*, 30 CREIGHTON L. REV. 1107, 1110–11 (1997).

particularly acute in the climate realm, given the urgency of the issue and the reality that "most judges are generalists and may not have the expertise to fully review scientific determinations without additional resources."[245] In the United States, these dynamics are compounded by the 2024 overturn of *Chevron v. Natural Resources Defense Council*.[246] This shift away from deference to reasonable agency statutory interpretations in the absence of clear Congressional mandates[247] reconfigures judicial discretion and underscores the pressure that judges will face to appropriately interpret climate science and policies. Finally, the politicized nature of climate policy and governance suggests that judges may increasingly be expected to perform these complex, interpretive functions while simultaneously correcting for broader democratic struggles and misinformation in the climate governance space.[248] As detailed elsewhere, some judges are enthusiastically embracing this role and responsibility.[249]

How might judges be better equipped to negotiate the scientific complexities and challenges posed by a need to effectively interweave scientific interpretation and legal analysis in local disputes that possess a simultaneously global character? First, academics and practitioners alike can support the creation and embrace of opportunities for cross-jurisdictional judicial exchange and training. While civil society practitioners have long pursued informal exchanges,[250] similar interactions have been increasingly identified between the judges[251] who are tasked with resolving climate disputes and facilitating these exchanges. Such efforts, while not without political controversy,[252]

---

245 Sugarman, *supra* note 227, at 1410.

246 Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc., 467 U.S. 837 (1984), *overruled by* Loper Bright Enters. v. Raimondo, 603 U.S. 369 (2024).

247 Amy Howe, *Supreme Court Strikes Down* Chevron*, Curtailing Power of Federal Agencies*, SCOTUSBLOG (June 28, 2024, 12:37 PM), https://perma.cc/X4DW-PULM.

248 Katrina Fischer Kuh, *The Legitimacy of Judicial Climate Engagement*, 46 ECOLOGY L.Q. 731, 763 (2019) ("Courts can be a resource to help correct the pathologies of public debate-distorting, industry-funded scientific posturing. This suggests another reason why it is reasonable to view judicial review of climate cases as . . . another way in which courts can add value to the democratic process.").

249 ASIAN DEV. BANK, CLIMATE CHANGE, COMING SOON TO A COURT NEAR YOU: REPORT SERIES PURPOSE AND INTRODUCTION TO CLIMATE SCIENCE, at viii (2020) (quoting Brazilian Justice Antonio Herman Benjamin, who argues that "[w]e should include courts in the climate change picture because we have no other option. No substitute exists for the court system. If judges are in charge of deciding all sorts of conflicts about life, death, love, human rights, and national security, it makes no sense to leave climate change outside the courtroom").

250 Louis J. Kotzé, *The Transnationalization of Environmental Constitutionalism*, *in* RESEARCH HANDBOOK ON TRANSNATIONAL ENVIRONMENTAL LAW, *supra* note 6, at 175–79.

251 Simone Benvenuti, *Access to Justice in Environmental Matters: Which Role for the European Networks of Judges?*, 11 J. EUR. ENV'T & PLAN. L. 163, 169 (2014) (exploring, in part, the contributions of the European Union Forum of Judges for the Environment).

252 Letter from United States Senator Ted Cruz to Ms. Jordan Diamond, President, Environmental Law Institute (February 23, 2024), https://perma.cc/C9G5-4J62 (requesting

acknowledge that "the difficulties confronting ecological law can't be understood by one appointed authority or court alone."[253] One such example is the Environmental Law Institute's Climate Judiciary Project, which aims to provide "objective judicial-educational programming about climate science and how it is emerging in the law."[254] Its efforts include both virtual resources (a resource library and repository of publications and curricula) and in-person/virtual events.[255] Collectively, this and other efforts provide inroads for knowledge exchange and dissemination that enable judges to perceive the systemic character and effect of their decisions.[256]

While cross-jurisdictional judicial exchange and knowledge-dissemination hubs offer one potential inroad for judicial support, another option is to explicitly require or encourage judges to gain environmental expertise. One area where this practice may already be observed is in the context of specialist environmental courts and tribunals. Here, across jurisdictions, "[q]ualifications for serving as part of an environmental court and tribunal frequently require training in environmental science and other technical fields."[257] However, the specific requirements vary considerably by jurisdiction,[258] underscoring the breadth of approaches that may be used to equip judges with the technical acumen to engage with climate and other environmental challenges.[259]

V. CONCLUSION

Given the unfortunate reality, urgency, and complexity of climate change, it is imperative that a far-reaching multilevel governance

---

information about judicial engagement by the Environmental Law Institute and Ann Carlson through the Climate Judiciary Project).

[253] Abhisekh Rodricks & Chayanika Chatterjee, *The Evolution of a Rights Based Approach to Wholesome Environment Under the Principles of International Law*, 3 INT'L J.L. MGMT. & HUMANS. 1054, 1055 (2020).

[254] Sandra Nichols Thiam et al., *Weathering the Storm of Global Climate Litigation: Enabling Judges to Make Sense of Science*, 54 GEO. J. INT'L L. 563, 591 (2023).

[255] *Climate Judiciary Project*, ENV'T L. INST., https://perma.cc/Q6BL-HVCZ (last visited Nov. 15, 2024).

[256] Thiam et al., *supra* note 254, at 591–92 (noting that the Project operates "outside the context of any specific case" and enables judges to "learn from and ask questions to scientists about their areas of expertise")

[257] Kenneth J. Markowitz & Jo J.A. Gerardu, *The Importance of the Judiciary in Environmental Compliance and Enforcement*, 29 PACE ENV'T L. REV. 538, 545 (2012).

[258] J. Michael Angstadt, *Can Domestic Environmental Courts Implement International Environmental Law? A Framework for Institutional Analysis*, 12 TRANSNAT'L ENV'T L. 318, 335 (2023).

[259] *Id.* (showing that national-level environmental court judges across jurisdictions are required to possess a range of environmentally-related credentials to secure initial appointment, as well as to complete continuing environmental education with varying degrees of formality to maintain their appointments).

response include the courts, and particularly judges at national and subnational levels.[260] In this context, innovative argumentation and informed adjudication will best empower domestic judges to thread the delicate balance between judicial restraint and meaningful engagement alongside other venues of climate policymaking. As this Article has shown, the precautionary principle, a key concept of IEL, has evolved from its initial domestic appearances, particularly in Western Europe in the 1970s,[261] to its incorporation into key international agreements in subsequent years,[262] and finally to a concept that has simultaneously achieved considerable international recognition and domestic application.[263] These parallel developments have brought domestic climate lawsuits and the precautionary principle into more frequent contact, and the precautionary principle now appears with increasing regularity in the domestic judicial opinions of numerous jurisdictions.[264]

While the general trend has been increased reference to the precautionary principle in domestic climate opinions, this Article shows that the modes and implications of incorporation have evolved over time. As it suggests, early references to the precautionary principle were set against the backdrop of tremendous uncertainty regarding climate change and its causes and effects. Precaution offered a way to advance climate lawsuits despite these potential impediments. Over time, the emergence of a near scientific consensus regarding the causes and potential effects of climate change, coupled with tremendous scientific advances that better address and characterize longstanding uncertainties, have reduced climate uncertainty. Additionally, new tools and legal arguments have widened the scope of climate litigation in ways that reduce the earlier effect of uncertainty, while emergent climate backlash lawsuits seek to amplify and embrace uncertainty. Furthermore, as this Article shows, practitioners and academics alike continue to grapple with what, precisely, the precautionary principle means and requires in a domestic legal context. For all these reasons, it is valuable to consider the implications of continued emphasis of the precautionary principle, as it is presently understood, in climate change lawsuits.

How can the clear trend towards continued, and increasing, use of the precautionary principle in domestic climate litigation be reconciled with the many considerations that accompany its reference? This Article

---

260 *See* Susan Glazebrook, *The Role of Judges in Climate Governance and Discourse*, 28 WAIKATO L. REV. 3, 4, 15, 19, 25–27 (2020) (detailing the role and limitations of the courts in responding to the climate crisis).

261 ATAPATTU, *supra* note 20, at 204–05 (citing Scott Lafranchi, *Surveying the Precautionary Principle's Ongoing Global Development: The Evolution of an Emergent Environmental Management Tool*, 32 B.C. ENV'T AFFS. L. REV. 678 (2005)).

262 *Id.*

263 *See* Lauridsen, *supra* note 159, at 1, 26, 28 (discussing the implications of the precautionary principle for international law).

264 Angstadt & Park, *supra* note 9.

suggests several responses, including (1) ongoing academic attention to the implications of the precautionary principle and ways to address its ambiguity and other deficits, (2) more explicit efforts by litigants to understand and define how the principle is operationalized within cases and country contexts, (3) work to support scientists in mediating knowledge and addressing uncertainty for climate litigation contexts, (4) training law students to engage with and interpret scientific information, and (5) better equipping domestic judges to evaluate scientific claims grounded in uncertainty.[265]

In many ways, these challenges and prescriptions are emblematic of larger challenges associated with the dominant western institutions and approaches that currently address most environmental law challenges.[266] However, domestic reference to the precautionary principle is particularly deserving of attention, given its increasing uptake, continued ambiguity, and the degree to which it exemplifies the increasingly transnational character of domestic climate litigation. This Article does not make a normative claim regarding the desirability of using the precautionary principle in domestic climate litigation. However, it does aim to highlight the potential procedural justice benefits that the precautionary principle could bring to climate lawsuits, as well as the attention and clarification that could optimize these benefits. In all, this foundational analysis can support future efforts to examine local/global interactions in environmental law, and additional research could complement existing work by exploring the interaction of domestic climate lawsuits and other IEL concepts, including intergenerational equity[267] and common but differentiated responsibilities and respective capabilities.[268] Finally, this Article highlights the benefit of future studies that explore how the precautionary principle is operationalized and interpreted in ongoing climate lawsuits.

---

265 *See* discussion *supra* Part III.

266 Louis J. Kotzé & Rakhyun E. Kim, *Earth System Law: The Juridical Dimensions of Earth System Governance*, EARTH SYS. GOV., Mar. 2019, No. 100003, at 3–6 (problematizing environmental law's "inability to achieve deep structural reforms," anthropocentrism, and reductionism, among other deficits).

267 *See generally* Daniel Bertram, *'For You Will (Still) Be Here Tomorrow': The Many Lives of Intergenerational Equity*, 12 TRANSNAT'L ENV'T L. 121 (2023).

268 *E.g.*, Patrícia Galvão Ferreira, *'Common But Differentiated Responsibilities' in the National Courts: Lessons from* Urgenda v. The Netherlands, 5 TRANSNAT'L ENV'T L. 329, 330, 335 (2016).