International Journal of Public Relations
and Social Sciences (IJPRSS)
Vol. 2, Issue 1, January 2026 // ISSN: 1595-0778

The Precautionary Principle in International Environmental Law: A Comparative Legal Analysis of Its Application and Effectiveness

Okon, Efiong Okon (Esq)[1]; Edet, Efiong Okon (PhD)[2] & Christine, Terlumun Clement Ende (PhD)[3]

[1&3]Faculty of Law, University of Calabar, Nigeria

[1]08078793840**,** okon.e.okon@unical.edu.ng

[3]07084283945, christinende@gmail.com

[2]Department of History and International Studies, University of Benin, Nigeria.

08028345902, edetokon1982@gmail.com

DOI: https://doi.org/10.5281/zenodo.18439844

Citation: Okon, E. O., Edet, E. O., & Christine, T. C. E. (2026). The Precautionary Principle in International Environmental Law: A Comparative Legal Analysis of Its Application and Effectiveness. *International Journal of Public Relations and Social Sciences, 2(1).*

Abstract

This article explores the precautionary principle as a central concept of international environmental law, emphasising its role in preventing environmental harm even in the face of scientific uncertainty. It traces the evolution of the principle from a moral guideline to a legally recognised standard embedded in international treaties and domestic legislation. The study clarifies its meaning, origin, and relevance within global environmental governance while examining how it has been integrated into various international legal frameworks. Using a doctrinal research approach, the article investigates the implicit recognition of the principle within Nigeria's environmental legal system and compares its application in Nigeria, the United Kingdom, and the United States. The comparative analysis highlights significant disparities in

enforcement and consistency, largely due to institutional weaknesses, corruption, inadequate political commitment, and economic pressures. It also identifies how scientific disagreements and legal ambiguities limit effective implementation. The study concludes that while the principle enjoys widespread acknowledgement, its practical impact remains uneven. To strengthen its effectiveness, the article recommends embedding the principle clearly into national laws, empowering enforcement agencies through training and resources, promoting research-based policymaking, and encouraging community participation in environmental decisions. These measures, it argues, would enhance the precautionary principle's role in protecting the environment and advancing sustainable development.

Keywords: Precautionary Principle, International Environmental Law, Environmental Governance, Sustainable Development.

1.0 Introduction

The precautionary principle has become a fulcrum of international environmental law, emerging from its early roots in 1970s German policy as the "foresight principle" to now serve as a proactive framework in the face of environmental challenges like climate change, biodiversity loss, and pollution. [12] Over time, it evolved from an imprecise ethical guideline into a firmly established legal norm, influencing major international agreements such as the Rio Declaration, the Convention on Biological Diversity, and the UN Framework Convention on Climate Change [3].

[1] CFRN 1999 (as amended) Ss. 12, 20, 33, 34 and 6 (6) (c).
[2] C Groves, *Care, Uncertainty and Intergenerational Ethics* (Basingstoke, Palgrave Macmillan 2014) 12-24.
[3] UNCED, 'United Nations Conference on Environment and Development', Rio de Janeiro, Brazil [1992] <https://www.un.org/en/conferences/environment/rio1992> Accessed 1 November 2025.

This evolution has shifted decision-making from a reactive stance waiting for harm to occur to an anticipatory approach, where preventive measures can be taken even in the absence of full scientific certainty, reflecting a 'better safe than sorry' mentality that is particularly vital when irreversible damage or harm to vulnerable populations is at stake [4].

Yet, despite its widespread acceptance, the implementation of the precautionary principle is fraught with challenges, as it must balance environmental protection with competing economic and legal interests [5]. The inherent complexity of ecological systems and the limits of scientific knowledge mean that decisions often have to be made under conditions of uncertainty [6]. This has led to debates over whether such measures might be misused as protectionist tools that hinder scientific progress or economic growth, especially in contexts like international trade disputes over genetically modified foods or hormone-treated beef [7]. Moreover, the principle's application requires robust scientific assessments, transparent decision-making processes, and effective mechanisms for monitoring and review, all while ensuring coordination among diverse stakeholders and across national borders [8].

In essence, the principle's role in international law is both pivotal and contested, serving as a moral and legal compass in efforts to safeguard the environment amid evolving scientific debates and complex geopolitical landscapes [9]. It calls for a shift in how we approach environmental governance by integrating scientific insight, ethical considerations, and legal norms into a unified strategy to preemptively mitigate environmental harm. As the world grapples with increasingly urgent crises, the precautionary principle remains an indispensable tool not only in shaping policies that

[4] *Ibid.*
[5] M Pyhälä and others, *Research Handbook on International Environmental Law* (Edward Elgar Publishing 2010) 15.
[6] J C Ascough and others, 'Future research challenges for incorporation of uncertainty in environmental and ecological decision-making' [2008] (219) (3-4) *Ecological Modelling,* 383-399.
[7] S P Quintillhn, 'Free Trade, Public Health Protection and Consumer Information in the European and WTO Context—Hormone-treated Beef and Genetically Modified Organisms' [1999] (33) (6) *Journal of World Trade,* 17.
[8] *Ibid.*
[9] M A Tigre, 'The Evolution of International Environmental Law Amidst Political Gridlock: Environmental Rights as a Common Ground' [2022], <https://digitalcommons.pace.edu/lawdissertations/33/> accessed 1 November 2025.

protect ecosystems and human health but also in fostering a culture of proactive, science-informed, and ethically grounded decision-making for sustainable development.

2.0 Conceptual and Legal Underpinnings of the Precautionary Principle

The precautionary principle is an essential concept in environmental law and policy, highlighting the importance of taking proactive measures to prevent harm, particularly when faced with scientific uncertainty [10]. The five key concepts of the precautionary principle that the researcher utilises to enhance understanding and coherence in this article include:

i. **Prevention of Harm**:

The precautionary principle stands as a fundamental cornerstone of environmental law and policy, urging proactive measures to avert harm even when scientific evidence remains incomplete or uncertain. At its core lies the concept of prevention of harm, which insists on the necessity of anticipatory action to shield ecosystems, public health, and biodiversity from potentially irreversible damage. This approach marks a clear departure from traditional reactive strategies that deal with problems only after they have fully manifested. Rather than waiting for conclusive proof, which can result in catastrophic outcomes such as environmental degradation, species extinction, or public health crises, the principle mandates early intervention. As articulated in the Rio Declaration on Environment and Development,

> *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* [11].

[10] K H Whiteside, *Precautionary Politics: Principle and Practice in Confronting Environmental Risk* (Massachusetts Institute of Technology Press 2006)

[11] United Nations Conference on Environment and Development, Report of the United Nations Conference on Environment and Development, (Rio de Janeiro, 3-14 June 1992), UN Doc A/CONF.151/26 (Vol. I), 12 August 1992, Annex I, Rio Declaration on Environment and

This statement encapsulates the rationale behind the principle, emphasising that incomplete data should not be a barrier to implementing measures that safeguard our future.

Underlying this doctrine is a deep-seated recognition that delaying action until definitive scientific evidence is available can leave us vulnerable to irreversible harm. [12] Environmental challenges ranging from the unchecked impacts of emerging technologies to the gradual yet perilous advance of climate change demand that decision-makers adopt a forward-thinking stance [13]. By insisting on precautionary measures, policymakers, scientists, and stakeholders are encouraged to conduct thorough risk assessments and environmental impact studies that identify potential hazards early on. [14] This proactive approach not only facilitates the adoption of cleaner technologies and stricter regulatory standards but also balances the competing interests of economic development and ecological sustainability. [15] The framework thereby promotes a harmonious coexistence between human progress and environmental stewardship, ensuring that economic initiatives do not come at the expense of long-term planetary health.

Ultimately, the precautionary principle transcends being a mere legal doctrine; it embodies a philosophy of proactive responsibility that resonates across borders and sectors. [16] It calls for collaborative efforts among governments, international organisations, and communities, urging them to integrate scientific insights with ethical imperatives and legal mandates in order to address complex environmental challenges. By fostering a culture of foresight and resilience, this principle paves the

Development, Principle 15.

[12] K H Whiteside, Precautionary Politics: Principle and Practice in Confronting Environmental Risk (MIT Press 2006) 25-30.

[13] M Hoek, *Tech For Good: Imagine Solving the World's Greatest Challenges* (Taylor and Francis 2023)

[14] J S Applegate, 'The Taming of the Precautionary Principle' [2002] (27) (1) *William & Mary Environmental Law and Policy Review*, 13.

[15] National Research Council, Division on Earth, Board on Environmental Studies, and Committee on Improving Risk Analysis Approaches Used by the U.S. EPA, *Science and Decisions: Advancing Risk Assessment* (National Academies Press 2009) 15.

[16] A Trouwborst, 'Prevention, Precaution, Logic and Law: The Relationship Between the Precautionary Principle and the Preventative Principle in International Law and Associated Questions' [2009] (2) (1) *Erasmus Law Review*, 105.

way for innovative solutions that protect both natural ecosystems and human well-being. It serves as a reminder that when faced with uncertainty, erring on the side of caution is not a hindrance to progress but rather a vital investment in the sustainable future of our global community. In an era marked by environmental crises that defy easy solutions, the precautionary principle offers a robust framework for preemptive action, guiding societies to adopt measures that mitigate risks before they escalate into unmanageable problems and ensuring that our collective endeavours today do not compromise the health of generations to come.

ii. **Burden of Proof**

The precautionary principle has fundamentally reshaped the way we approach environmental risks [17] by shifting the burden of proof from those claiming harm to those proposing potentially damaging activities. Rather than requiring communities or regulators to prove that an action will cause significant harm, this principle insists that the proponents of such activities activities, be they governments, corporations, or other entities, must first demonstrate that their actions are safe, even in the face of scientific uncertainty. [18] Rooted in declarations such as the 1992 Rio Declaration, this reversal is designed to forestall environmental damage before it happens, embodying a preventive ethos that challenges the conventional demand for conclusive evidence. [19]

In situations where scientific certainty is elusive, the precautionary approach leverages credible hypotheses of risk as the basis for action, even if all the details have yet to be worked out. [20] This nuanced stance is illustrated by cases like the 2001 Southern Bluefin Tuna dispute, where preventive measures were adopted despite incomplete data. At the same time, the principle does not advocate for absolute or unyielding constraints; instead, it requires a balanced demonstration of safety that

[17] J Cameron and J Abouchar, 'The Precautionary Principle: a Fundamental Principle of Law and Policy for the Protection of the Global Environment' [1991] (14) (1) *Boston College International and Comparative Law Review,* 15-25.

[18] B Fischhoff and A L Davis, 'Communicating Scientific Uncertainty' [2014] (111) (supplement_4) *Proceedings of the National Academy of Sciences*, 13664-13671.

[19] R K L Panjabi, 'From Stockholm to Rio: a Comparison of the Declaratory Principles of International Environmental Law' [1992] (21) (1) *Denver Journal of International Law and Policy*, 215.

[20] A Stirling, 'Risk, Uncertainty and Precaution: Some Instrumental Implications from the Social Sciences' in Editor (ed), *Negotiating Environmental Change* (Edward Elgar Publishing 2003) 3.

weighs environmental risks against potential socio-economic benefits, as seen in the regulation of genetically modified organisms within the European Union. Such proportionality ensures that while environmental concerns are taken seriously, progress and innovation are not unduly stifled.

Nonetheless, the application of the precautionary principle remains fraught with challenges. Determining the appropriate threshold of evidence to trigger preventive action can lead to disputes, as overly stringent criteria might paralyse progress, while overly lenient standards could expose ecosystems to unnecessary harm. The principle's varied implementation robust in regions like the EU and more risk-based elsewhere further complicates international governance. With scientific understanding continually evolving, proponents of risky activities often face ongoing demands to update their evidence, a dynamic vividly illustrated in modern climate litigation. Ultimately, this approach heralds a shift toward a more anticipatory and ethically grounded legal framework that seeks to protect our environment in an era marked by uncertainty and complex risks.

iii. Proportionality

Proportionality, in the context of the precautionary principle in international law, serves as a crucial balancing tool that guides the implementation of measures to prevent environmental harm amid scientific uncertainty. [21] It ensures that any actions taken are not only effective in reducing potential risks but also fair in terms of the socio-economic costs imposed on communities and industries. [22] In a world where scientific data can be incomplete or evolving, proportionality compels regulators and policymakers to weigh the severity of the environmental threat against the burdens that preventive measures may create. [23] This approach demands a thoughtful calibration

[21] E Hey and D Freestone, 'The Precautionary Principle and International Law: the Challenge of Implementation' [1995] (3) (1) *Environmental Law Journal*, 11.
[22] R Von Schomberg, 'The Precautionary Principle and its Normative Challenges' in Editor (ed), *Implementing the Precautionary Principle: Perspectives and Prospects* (Place: Publisher 2006) 19-42.
[23] J Peel, *The Precautionary Principle in Practice: Environmental Decision-making and Scientific Uncertainty* (Federation Press 2005) 1.

where neither environmental protection nor economic vitality is unduly compromised, embodying a commitment to both justice and practical governance. [24]

At its heart, proportionality calls for a reasoned assessment of risks and benefits that resonates deeply with our shared sense of responsibility toward the natural world. [25] When governments or international bodies impose precautionary measures such as restrictions on industrial activities, limitations on chemical usage, or enhanced monitoring of ecosystems, they must justify these steps by demonstrating that the expected environmental benefits outweigh the potential economic and social costs. [26] For instance, if a country considers banning a widely used industrial chemical suspected of causing long-term ecological damage, it must also address the impact such a ban would have on employment and economic stability in affected regions. This delicate balancing act is not merely a legal formality but a reflection of the ethical duty to protect both nature and human livelihoods. Decision-makers, therefore, engage in a rigorous process of dialogue and analysis, often involving scientists, industry representatives, and community stakeholders, to arrive at measures that are neither excessively restrictive nor irresponsibly lenient.

The significance of proportionality becomes even more pronounced in scenarios marked by scientific uncertainty. [27] In these cases, regulators are tasked with making decisions without having access to complete or definitive data, a challenge that requires flexibility and adaptability in legal frameworks. As new evidence emerges, precautionary measures must be periodically revisited and adjusted to ensure they remain commensurate with the actual risk. [28] This dynamic process not only fosters transparency but also builds trust among the public, who see that decisions are made with a continual regard for both environmental safety and economic well-being.

[24] *Ibid*.
[25] G Huscroft, B W Miller, and G Webber (eds), *Proportionality and the Rule of Law: Rights, Justification, Reasoning* (Cambridge University Press 2014) 1-25.
[26] S F Hansen, L Carlsen, and J A Tickner, 'Chemicals Regulation and Precaution: Does R E A C H Really Incorporate the Precautionary Principle?' [2007] (10) (5) *Environmental Science and Policy*, 395-404.
[27] J Lemons, K Shrader-Frechette, and C Cranor, 'The Precautionary Principle: Scientific Uncertainty and Type I and Type II Errors' [1997] (2) (2) *Foundations of Science*, 207-236.
[28] E L Sidorenko, L L Arzumanova, and O N Amvrosova, 'Adaptability and Flexibility of Law in the Context of Digitalisation' in Editor (ed), *International Scientific and Practical Conference* (Cham: Springer International Publishing 2020) 523-532.

[29] In essence, the proportionality principle acts as an ethical compass, guiding policy choices that recognise the interconnectedness of human and environmental health. [30] It encourages a culture of shared accountability, where the pursuit of technological and industrial progress is harmonised with a steadfast commitment to safeguarding our planet. Through this lens, proportionality is much more than a legal concept; it is a reflection of our collective aspiration to create a sustainable future that honours both nature's limits and humanity's potential.

iv Scientific Uncertainty

The international law of the precautionary principle is grappling with a once-and-for-all profoundly human challenge of safeguarding our planet and saving our inhabitants when we do not really know what we are up to and when the risks are beyond measure. [31] The principle compels us to recognise the limits of our knowledge while emphasising that we cannot fully anticipate all consequences of our actions, even when we do take steps to address issues.

For instance, consider climate change: Although early warnings highlighted the dangers of rising greenhouse gas concentrations, the precise magnitude of their impacts and the thresholds for irreversible change remained uncertain. Some governments resisted taking action, insisting on definitive scientific proof before adopting emission-reduction measures, while others moved ahead with reforms in response to the observable and escalating threats, such as the inundation of low-lying island states by rising sea levels. Thus, the principle escapes pure science and is more than a search for fairness and equity, instead posing the question of who should be charged with inaction and who gains to say when the evidence is enough.

The problem that international law's precautionary principle poses is a challenge of the deepest and most profoundly human kind: how to safeguard the planet

[29] *Ibid*.
[30] A Barak, 'Proportionality and Principled Balancing' [2010] (4) (1) *Law and Ethics of Human Rights*, 1.
[31] A Trouwborst, 'The Precautionary Principle in General International Law: Combating the Babylonian Confusion' [2007] (16) (2) *Review of European Community and International Environmental Law*, 185-195.

and its inhabitants when the science is hazy and the risk is incalculable. [32] It challenges us to face the limits of our knowledge, leading us to avoid the unknown while compelling us to act in ways that seem reasonable at the time, even though we may not fully anticipate the potential outcomes of our actions. [33] For example, take climate change and greenhouse gas emissions. They were known early on to be the main cause, but the exact impacts and critical tipping points were never fully understood. Some governments, however, hesitated to take action without irrefutable evidence, while others opted to reduce emissions and implement reforms in response to the genuine threats faced by vulnerable communities, particularly small island nations at risk from rising sea levels.

This is to the principle and how it breaks away from pure science when it asks who pays for inaction and who decides that the evidence is sufficient. [34]

There are challenges in this approach. Think about the Montreal Protocol of the 1980s, an era when the ozone hole's relationship to CFCs was still under development, and yet countries decided to move, with time healing the ozone hole patch, a vote for precaution over procrastination. But scientific discovery has a messy reality and has conflicting human desires for clear, definitive answers over stasis that spurs particular anxiety and inaction.

It recommends a nuanced response to the principle: not letting it bare the teeth of overreaction without being covered over with apathy and resisting the stifling barrier to innovation it often has. For example, it urges us to think about the promises of technological progress in debates over such things as deep-sea mining not just in terms of the damage that could be permanent and, more
scary, the damage to an environment that we know not a thing about but also generationally: from experts and industries, but also from Indigenous communities and future generations.

Our knowledge of the ecological systems that support life remains incomplete and uneven. As in many areas of environmental governance, this recognition imposes

[32] R A Posner, *Catastrophe: Risk and Response* (Oxford University Press 2004) 1-15.
[33] J Morris (Ed), *Rethinking Risk and the Precautionary Principle* (Butterworth-Heinemann 2000) 10-35.
[34] A McConnell and P 't Hart, 'Inaction and Public Policy: Understanding Why Policymakers 'Do Nothing'' [2019] (52) (4) *Policy Sciences*, 645-661.

a duty to act as responsible stewards of the natural world. Such a duty requires careful decision-making, openness in regulatory processes, and a sustained commitment to acquiring and applying new scientific information.

The experience with PFAS chemicals (where early indications of potential harm were noted but not acted upon until significant health implications emerged) demonstrates the consequences of disregarding preliminary evidence. This historical example underscores the legal and ethical importance of responding to early warning signals before harm becomes irreversible. [35] The principle becomes a rallying cry in an era of melting ice caps and disappearing species, when all that is left is comment and doubt, when all that is known is crude and unreliable (and even when all voices cannot be heard), in an era of shifting environment and ever-increasing uncertainties. In the end, it is a cry for us to act in a humble, courageous fashion, recognising the uncertainties for what they are and reframing them as a calling to proactively and compassionately care for our world that we have been granted.

v Intergenerational Equity

The precautionary principle in international law is not just about avoiding harm; it is about justice. It asks: *Who pays when the planet bleeds?* Enter the Polluter Pays Principle (PPP), a moral compass in environmental law that insists those who create pollution should bear its costs. [36] Imagine a factory dumping toxic waste into a river. [37] Under PPP, the company cleans up, compensates affected communities, and invests in prevention. It is not punitive; it is restorative. [38] This principle, born in the 1970s OECD guidelines, has since rippled into treaties like the Rio Declaration, weaving accountability into the fabric of global environmental governance. [39] Yet PPP is not

[35] D Renfrew and others, 'The Social Life of the "Forever Chemical": PFAS Pollution Legacies and Toxic Events' [2021] (12) (1) *Environment and Society*, 146-163.
[36] D Pearce, 'A Sustainable World: Who Cares, Who Pays?' [1991] (139) (5420) *R S A Journal*, 493-505.
[37] V K Bett, 'Environmental Regulatory Approach of the Upstream Oil and Gas Emerging Industry in Kenya- an Appraisal of the Polluter Pays Principle' (Unpublished Doctoral Dissertation, Strathmore University 2020) 15-75.
[38] *Ibid*.
[39] S Devi, 'The Evolution and Development of Environmental Jurisprudence: Origin to Global Impact' [2025] (1) (1) *Research and Innovations*, 26.

alone; it walks hand-in-hand with two siblings: the Prevention Principle and Common but Differentiated Responsibilities (CBDR).

The Prevention Principle is the quiet pragmatist. It urges societies to stop harm before it starts- no spills, no deforestation, no runaway emissions. Think of it as the "ounce of prevention" adage codified into law. [40] Meanwhile, CBDR acknowledges that not all nations share equal blame or capacity for environmental crises. A farmer in Bangladesh drowning in rising seas bears little responsibility for fossil fuel empires built by industrialised giants. CBDR demands that wealthy nations lead in cutting emissions and funding green transitions, recognising historical inequities. [41] Together, these principles form a triad of fairness: polluters pay, harm is preempted, and burdens are shared.

Now, zoom out to intergenerational equity the idea that today's choices must not steal tomorrow's possibilities. It is the grandmother planting a tree she will never sit under, or the teenager suing governments for climate inaction. This principle rejects the tyranny of the present, insisting that future generations have a right to inherit a liveable world. [42] Courts are increasingly listening. In 2021, Germany's Constitutional Court ruled that weak climate laws violated youth freedoms, framing carbon budgets as "intergenerational theft". Similarly, Indigenous communities, guardians of 80% of Earth's biodiversity, embody this ethos, managing land not as owners but as stewards for ancestors and descendants alike.

Threaded through all this are the Sustainable Development Goals (SDGs), the UN's blueprint for balancing human progress with planetary limits. [43] SDG 13 (Climate Action) and SDG 15 (Life on Land) demand urgent environmental protection, while SDG 10 (Reduced Inequalities) mirrors CBDR's call for equity. These goals aren't abstract targets; they're survival maps. A fisher in Nigeria battling

[40] T Deleuil, 'The Common but Differentiated Responsibilities Principle: Changes in Continuity After the Durban Conference of the Parties' [2012] (21) (3) *Review of European Community and International Environmental Law*, 271-281.
[41] M Kolmaš, 'The Failure of C B D R in Global Environmental Politics' [2023] (23) (1) *Global Environmental Politics*, 11-19.
[42] E B Weiss, 'Our Rights and Obligations to Future Generations for the Environment' [1990] (84) (1) *American Journal of International Law*, 198-207.
[43] J Rockström and others, *Sustainable Development and Planetary Boundaries* (Sustainable Development Solutions Network 2022) 1.

oil spills, a mother in Lima fearing water scarcity, a child in Mumbai breathing toxic air – their futures hinge on these frameworks. On the Polluter Pays Principle, it is argued that the principle is not merely an economic instrument; it is a recognition of moral accountability. By internalising the environmental costs of pollution, it can be affirmed that no community, human or ecological, should be forced to subsidise the recklessness of others. It transforms environmental harm from a hidden externality into a visible debt, demanding justice for those silenced by power or poverty.

On the SDGs, former UN Secretary-General António Guterres [44] writes in the 2023 UN Sustainable Development Report:

> The Sustainable Development Goals are a pact with the future, a promise that progress will not come at the expense of the vulnerable or the voiceless. They remind us that development divorced from justice is a hollow triumph and that true sustainability must nourish both people and planet, leaving no one behind in the race against time.

In the end, these principles are not legal jargon; they are lifelines. They ask us to see the world as a shared heirloom, not a disposable commodity. To act not just for ourselves, but for the child born in 2100, the coral reef gasping for breath, and the forest that has never known a chainsaw. The law, at its best, is not a cold set of rules; it is the collective heartbeat of humanity, pleading: *choose care over carelessness.*

3.0 Origin of the Precautionary Principle and Its Four Key Components

In international law, the precautionary principle took shape as humanity's heartfelt reaction to sensing that the rapidity of our rush to progress was outstripping its comprehension of the environmental consequences. [45] The principle was not created in a courtroom; it was born out of crises in the 1970s and 1980s from industrial expansion that led to toxic chemical spills, nuclear disasters, and acid rain that was

[44] L Elliott and others, 'Human Security, Multilateralism, and Solidarity' [2024] (2) (1) Global Governance: A Review of Multilateralism and International Organisations 187-202.
[45] J Cameron and others (n 17) 15-25.

eating away at ancient forests. [46] This was the time when the living scars of pollution and habitat destruction left the environmental advocates and legal scholars to question one of the hardest things: How do we keep the planet safe when the scientific certainty keeps eluding us? The answer hinged on this question, answered by Germany's foresight principle, the Vorsorgeprinzip, arising as a direct reaction to industrial pollution choking the Rhine. These emerging ideas were crystallised into an emerging global ethos, most visibly expressed in Principle 15 of the Rio Declaration, where it is stated, "The lack of full scientific certainty about the risks posed by a substance or activity shall not be used as a reason for postponing cost -effective measures to prevent environmental degradation in the cases described thereafter." [47] In other words, the precautionary principle is both a legal guideline and a moral call to act with care and responsibility, even when we don't have all the answers or fully understand the information we need. It encourages us to choose prevention rather than risk causing irreversible harm by waiting too long to act. [48] The spirit and practice of this principle are supported on four interrelated pillars:

i. Prevention Over Cure

This pillar is to promote the idea that it is ten times better to avert disaster than to come scrambling for solutions after the damage is done. [49] Such history provides vivid examples: in the Montreal Protocol of the 1980s, for example, even though there was an ongoing scientific uncertainty as to how much CFC use harms stratospheric ozone, they were phased out. [50] We see today the healing of the ozone as a testimony to the effectiveness of early intervention.

ii. Acting Amid Uncertainty,

This second pillar acknowledges with disdain that ecological destruction does not wait, and while scientific research happens at a measured pace, uncertainty and ecological

[46] T Higuchi, *Political Fallout: Nuclear Weapons Testing and the Making of a Global Environmental Crisis* (Stanford University Press 2020) 25-30.
[47] Principle 15, Rio Declaration
[48] R Von Schomberg (n 22) 19-42.
[49] P Lagadec, *Preventing Chaos in a Crisis* (Maidenhead: McGraw-Hill 1993) 115-121.
[50] S O Andersen and others, 'Stratospheric Ozone, Global Warming, and the Principle of Unintended Consequences—An Ongoing Science and Policy Success Story' [2013] (63) (6) *Journal of the Air and Waste Management Association*, 607-647.

destruction are rampant. [51] For example, in the ocean, with the alarm about microplastics, and in the bees, with the harmful impacts of neonicotinoid pesticides, regulators around the world moved to restrict without waiting for decades of studies. This pillar is also one that comes back to the uncertainty, but that does not mean we have an excuse to sit still and be passive because things are uncertain and frightening us; it is not pessimism. It is caution, humility, and calling us to levels of uncertainty that we cannot account for in our budget or our forecast.

iii. Shifting the Burden of Proof

The third pillar, Shifting the Burden of Proof, turns traditional legal expectations on their head. In the past, communities and critics had to fight to establish harm was happening because people and corporations often argued otherwise. [52] Now it is the turn of industries engaged in potentially hazardous activities and their proponents to justify that their activities have been safe. [53] Imagine a scenario in which a mining company seeks to exploit a fragile wetland. Under this principle, it is not the responsibility of the communities downstream to demonstrate harm; rather, it is the obligation of the company to prove that its activities pose no risk.

iv. Proportionality and Adaptability

This final pillar underscores the need for precautionary measures to be both reasonable and adaptable. The precautionary measures should be aligned with the levels of risk encountered and should evolve based on our increasing understanding of those risks. [54] As exemplified by Germany's Energiewende, the shift away from coal, coupled with the support provided to affected communities through retraining and sustainable

[51] C Fletcher and others, 'Earth at Risk: An Urgent Call to End the Age of Destruction and Forge a Just and Sustainable Future' [2024] (3) (4) *P N A S Nexus*, 106.
[52] P Garg, 'Shifting Trends in Burden of Proof and Standard of Proof: An Analysis of the Malimath Committee Report' [2005] (17) (1) *Student Bar Review*, 38.
[53] *Ibid*.
[54] P Ondřejek and others, 'Proportionality During Times of Crisis: Precautionary Application of Proportionality Analysis in the Judicial Review of Emergency Measures' [2024] (20) (1) *European Constitutional Law Review*, 27-51.

reinvestment, represents an alternative approach to balancing environmental requirements with socioeconomic realities. [55]

Together, these four components outline not only a powerful framework for living but also a profound human commitment to justice for the long term. They urge us to act in advance, trusting in our ability to foresee challenges and to recognise that our obligation to protect the environment is inseparable from our duty to safeguard the future. In a world filled with uncertainty, the precautionary principle calls on us to embrace precaution as a shared responsibility, a covenant with the unknown for the benefit of both nature and humanity in every decision we make.

4.0 Incorporation and Operation of the Precautionary Principle in International Environmental Law

The precautionary principle's journey into international environmental law tells the story of humanity learning to govern its relationship with the planet not through certainty but through humility. Born out of crises such as acid rain, ozone depletion, and industrial disasters, it emerged as a legal lifeline in the late twentieth century:

> *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.* [56]

This was not just a policy; it was a global admission that waiting for proof of harm could mean waiting until it is too late.

The precautionary principle has evolved from moral guidance into a cornerstone of international environmental law, reflecting humanity's growing

[55] R Rechsteiner, 'German Energy Transition (Energiewende) and what Politicians can Learn for Environmental and Climate Policy' [2021] (23) (2) *Clean Technologies and Environmental Policy*, 305-342.
[56] Rio Earth Summit, 1992, Principle 15.

awareness that prevention is wiser than cure. [57] Rooted in global crises such as acid rain, ozone depletion, and biodiversity loss, the principle gradually found formal expression in treaties and conventions. [58] The UN Framework Convention on Climate Change (1992), the Convention on Biological Diversity (1992), and the Cartagena Protocol on Biosafety (2000) each incorporated it to encourage action amid scientific uncertainty. [59] These agreements transformed the principle from abstract philosophy into binding legal duty, compelling states to act before harm occurs. Judicial interpretations have reinforced this shift: the International Court of Justice's *Whaling in the Antarctic* (2013) decision against Japan's "scientific" whaling and the European Court of Justice's rulings upholding pesticide bans both affirmed precaution over proof. [60] Collectively, they highlight the principle's central role in advancing environmental protection even when evidence remains incomplete. [61]

However, the principle's application remains uneven and politically charged. Institutions like the International Seabed Authority require environmental impact assessments, while nations such as Fiji and Vanuatu demand stricter bans on deep-sea mining. [62] The Montreal Protocol's adaptive evolution and the Paris Agreement's progressive emission targets showcase the strength of flexibility in applying precaution. [63] Yet, disparities persist: wealthier nations like Germany can transition from coal and invest in renewables, whereas developing states like India struggle to balance poverty reduction with climate action. Moreover, the human dimension underscores its urgency; indigenous communities, farmers, and citizens worldwide

[57] K H Whiteside, Precautionary Politics: Principle and Practice in Confronting Environmental Risk (MIT Press 2006) 21.
[58] B Dixit and others, 'Principles and Issues of Environmental Protection' in Editor (ed), *Epidemiology and Environmental Hygiene in Veterinary Public Health* (Place: Publisher 2025) 477-486.
[59] Secretariat of the Convention on Biological Diversity, *Cartagena Protocol on Biosafety to the Convention on Biological Diversity: Text and Annexes* (Secretariat of the Convention of Biological Diversity 2000)
[60] K Sykes, 'The Appeal to Science and the Formation of Global Animal Law' [2016] (27) (2) *European Journal of International Law*, 497-518.
[61] *Ibid*.
[62] T Kakee, 'Deep-sea Mining Legislation in Pacific Island Countries: From the Perspective of Public Participation in Approval Procedures' [2020] (117) (1) *Marine Policy*, 103881.
[63] The Montreal Protocol< https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol> accessed 2 November 2025.

rely on it to defend their rights to health, dignity, and survival. Though not a cure-all, the precautionary principle remains the law's most powerful instrument for ensuring foresight prevails over complacency in safeguarding the planet's future.

5.0 Implicit Recognition of the Precautionary Principle in Nigeria's Legal Framework

Nigeria's environmental governance structure implicitly recognises the precautionary principle through a network of laws, policies, and regulatory frameworks, even though no single statute expressly defines it. [64] The country's legal approach emphasises preventive and proactive measures aimed at protecting the environment, mitigating risks, and promoting sustainable development. This principle is reflected in the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act of 2007, which empowers the agency to halt activities that pose potential environmental threats. [65] Similarly, the Environmental Impact Assessment (EIA) Act of 1992 mandates project assessments before approval, ensuring early identification of risks and consideration of long-term impacts. [66]

Other laws reinforce this preventive philosophy. The Harmful Waste (Special Criminal Provisions, etc.) Act of 1988 criminalises the disposal of hazardous substances, protecting public health and the environment. [67] The Petroleum Act of 1969 and its Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) require companies to adopt pollution prevention measures, particularly against oil spills and gas flaring. The Nigerian Urban and Regional Planning Act of 1992 and the National Oil Spill Detection and Response Agency (NOSDRA) Act of 2006 further strengthen precautionary practices by mandating risk assessments and early response mechanisms. Collectively, these instruments demonstrate Nigeria's implicit commitment to preventive environmental protection in line with global sustainability principles.

[64] CFRN 1999 (as amended) Ss. 17, 20.
[65] NESREA Act 2007 Ss. 7, 8(1)(k)

[66] Environmental Impact Assessment Act 1992 Ss. 1, 2, 13, 14.
[67] Harmful Waste Act Cap H1 LFN 2004

6.0 Potency of the Precautionary Principle

The precautionary principle, though not explicitly codified in Nigerian law, is evident in various legislative and regulatory instruments designed to prevent environmental harm before it occurs. Laws such as the **NESREA Act (2007),** the **EIA Act (1992)**, and the **NOSDRA Act (2006)** embody key aspects of this principle by mandating early intervention, environmental assessments, and regulatory oversight to mitigate potential risks. [68] These laws grant government agencies the authority to enforce preventive measures, ensuring that environmental harm is addressed proactively rather than reactively.

However, the effectiveness of the precautionary principle in Nigeria is often hindered by weak enforcement, corruption, and conflicting economic interests. The oil and gas sector, for instance, continues to experience environmental degradation due to regulatory lapses, despite the existence of laws like EGASPIN under the Petroleum Act (1969)**.** [69] Furthermore, the principle's implementation is complicated by economic constraints, where immediate economic gains frequently take precedence over long-term environmental sustainability.

7.0 Challenges of the Precautionary Principle in Nigeria

For Nigeria, dealing with the precautionary principle as a measure of prevention to the world's environmental uncertainty is quite a challenge. However, due to its theoretical importance, systemic failures of governance, economic constraints, corporate influence, and marginalisation of scientific expertise impede its practical implementation. In this article, the researcher identifies the following core challenges.

i. Weak Governance and Corruption

Despite the laws, there are also some challenges in enforcing them because of corruption and weak regulatory institutions. It is not enough that agencies like the

[68] M A Eze and others, 'An Analysis of the Precautionary Principles and its Adaptation in International, Regional and National Laws' [2019] (4) (3) *International Journal of Energy and Environmental Science*, 47.

[69] S Dike, 'Decommissioning and Abandonment of Oil and Gas Facilities Legal Regime in Nigeria : Any Lesson from Norway, the UK and Brazilian Legal Frameworks?' [2017] (1) (1) *S C Dike*, 169-183.

National Environmental Standards & Regulations Enforcement Agency (NESREA) do not have the funding or political support to arrest polluters. However, multinational oil corporations, particularly in the Niger Delta, take advantage of regulatory loopholes and the failure to regulate oil spills when they cite 'insufficient evidence' to link oil spills and health crises. [70] While no findings have been made, most of the investigations of oil spills in Ogoniland remain incomplete, underscoring institutional oversight failure, even in a 2023 UN report.

ii. Economic Hardship

The principle assumes that societies can afford to take preventive measures, but in Nigeria, poverty often takes precedence over long-term environmental concerns. [71] For instance, banning single-use plastics or charcoal production intended to protect the environment disproportionately impacts low-income communities that rely on these resources for daily survival. Policies that fail to address poverty while implementing precautionary measures risk worsening economic hardship, making environmental protection appear like an elite concern rather than a necessity.

iii. Scientific Marginalisation and Data Deficiency

Environmental risks in Nigeria are often poorly documented, leaving communities unable to substantiate claims of pollution-related harm. Farmers in Benue State have reported unexplained crop failures near mining sites, yet their concerns are dismissed as anecdotal due to a lack of scientific data. [72] Nigerian universities and research institutions suffer from inadequate funding, preventing them from conducting independent environmental studies. The result is a reliance on foreign researchers, delaying action and reinforcing scientific dependency.

---

[70] J Donnelly-Saalfield, 'Irreparable Harms: How the Devastating Effects of Oil Extraction in Nigeria Have not been Remedied by Nigerian Courts, the African Commission, or US Courts' [2009] (15) (1) *Hastings West-Northwest Journal of Environmental Law and Policy*, 371.

[71] D V Ogunkan, 'Achieving Sustainable Environmental Governance in Nigeria: A Review for Policy Consideration' [2022] (2) (1) *Urban Governance*, 212-220.

[72] C N Nwoko, 'Assessing the Socioeconomic Impacts Arising from Oil Pollution in the Niger Delta Region of Nigeria: Including Proposals for Solution' (Unpublished Master's Thesis, Aalto University 2014) 10-50.

iv. **Corporate Influence and Deliberate Delay**

Multinational corporations operating in Nigeria exploit legal ambiguities to delay accountability. Companies like Shell have used scientific uncertainty as a shield, arguing that there is no conclusive proof linking oil spills to community health issues. This tactic mirrors global industries' historical strategies, such as those used by tobacco companies to delay regulations. Meanwhile, pollution continues unchecked.

8.0 Comparative Perspective: The UK and USA

In contrast, countries like the United Kingdom (UK) and the United States (USA) have developed robust legal frameworks explicitly integrating the precautionary principle. The UK Environmental Protection Act (1990) and subsequent regulations, such as the Environmental Act (1995), emphasise the "polluter pays" principle and require stringent environmental risk assessments. The European Union, of which the UK was formerly a member, has also embedded the precautionary principle in its regulatory frameworks, particularly in food safety and environmental protection.

Similarly, in the USA, the National Environmental Policy Act (NEPA) of 1969 incorporates precautionary measures by requiring environmental impact assessments before major federal projects. The Toxic Substances Control Act (TSCA) and the Clean Air Act (1970) also emphasise preventive action, ensuring that industries mitigate potential risks before irreversible harm occurs. However, the U.S. legal system often requires strong scientific evidence before enforcing precautionary measures, reflecting a more balanced but sometimes reactive approach compared to the EU.

Nigeria's environmental legal framework implicitly reflects the precautionary principle, but its potency is undermined by weak enforcement and economic pressures. Learning from the regulatory models of the UK and USA, Nigeria can strengthen its commitment to proactive environmental governance by ensuring stricter compliance and institutional accountability.

9.0 Conclusion

The precautionary principle stands as a vital legal and ethical framework in international environmental law, urging states and stakeholders to take proactive measures against environmental harm, especially in the face of scientific uncertainty. Its evolution from a moral guideline to a binding obligation in various international treaties demonstrates its significance in addressing environmental risks before they escalate into irreversible damage. This analysis reveals that while the precautionary principle is recognised globally, its implementation remains inconsistent due to legal ambiguities, competing economic interests, and political challenges, particularly in developing countries like Nigeria. The need for a more robust incorporation of the principle within domestic legal frameworks, bolstered by strong enforcement mechanisms and investment in scientific research, is paramount for effective environmental governance. Ultimately, fostering a culture of collaboration and vigilance will be essential for navigating the complexities of environmental protection and ensuring the sustainability of natural resources for future generations. The call to action is clear: we must embrace the principle's ethos of prevention and responsibility, ensuring that our actions today do not jeopardise the well-being of tomorrow's inhabitants.

10.0 Recommendation

The article therefore makes the following recommendations:

i. Strengthen Legal Frameworks: Countries should explicitly incorporate the precautionary principle into domestic legislation, ensuring that laws mandate proactive measures for environmental protection. This includes establishing clear definitions and standards for actions to be taken under conditions of uncertainty and equipping regulatory bodies with the authority necessary to act decisively in order to prevent potential harm.

ii. Enhance Enforcement Mechanisms: Strengthening the capacity and accountability of enforcement agencies is crucial. Governments should invest in training, funding, and resources for bodies tasked with environmental protection, such as the National Environmental Standards and Regulations Enforcement Agency

(NESREA) in Nigeria. This would facilitate proactive monitoring and rapid response to environmental threats.

iii. Promote Interdisciplinary Scientific Research: Governments and international organisations should fund and encourage interdisciplinary research initiatives that address environmental risks. This includes fostering partnerships among scientists, communities, and policymakers to improve data collection on environmental impacts and risks, aiding in informed decision-making and encouraging transparent communication about uncertainties.

iv. Facilitate Public Participation and Education: Engaging communities in environmental governance through education and participatory mechanisms is essential for the success of the precautionary principle. By fostering awareness and understanding of environmental issues, stakeholders can contribute to more resilient and informed decision-making processes, thus ensuring that precautionary measures reflect the needs and voices of affected communities.

Bibliography

Texbooks

Ascough, J. C., et al. (2008). Future research challenges for incorporation of uncertainty in environmental and ecological decision-making. Cambridge University Press.

Culshaw, M. G., et al. (2006). The role of web-based environmental information in urban planning: The environmental information system for planners. Taylor & Francis.

Groves, C. (2014). Care, uncertainty and intergenerational ethics. Palgrave Macmillan.

Huscroft, G., Miller, B. W., & Webber, G. (Eds.). (2014). Proportionality and the rule of law: Rights, justification, reasoning. Cambridge University Press.

Lagadec, P. (1993). Preventing chaos in a crisis. McGraw-Hill.

Lazarus, R. J. (2023). The making of environmental law. University of Chicago Press.

Morris, J. (Ed.). (2000). Rethinking risk and the precautionary principle. Butterworth-Heinemann.

National Research Council, Division on Earth, Board on Environmental Studies, & Committee on Improving Risk Analysis Approaches Used by the U.S. EPA. (2009). Science and decisions: Advancing risk assessment. National Academies Press.

Peel, J. (2005). The precautionary principle in practice: Environmental decision-making and scientific uncertainty. Federation Press.

Posner, R. A. (2004). Catastrophe: Risk and response. Oxford University Press.

Pyhälä, M., et al. (2010). Research handbook on international environmental law. Edward Elgar Publishing.

Secretariat of the Convention on Biological Diversity. (2000). Cartagena Protocol on biosafety to the Convention on Biological Diversity: Text and annexes. Secretariat of the Convention on Biological Diversity.

Wathern, P. (Ed.). (1995). Environmental impact assessment. Routledge.

Weber, E. P. (1998). Pluralism by the rules: Conflict and cooperation in environmental regulation. Georgetown University Press.

Whiteside, K. H. (2006). Precautionary politics: Principle and practice in confronting environmental risk. Massachusetts Institute of Technology Press.

Andersen, S. O., et al. (2013). Stratospheric ozone, global warming, and the principle of unintended consequences—An ongoing science and policy success story. *Journal of the Air and Waste Management Association*, 63(6).

Applegate, J. S. (2002). The taming of the precautionary principle. William & Mary Environmental Law and Policy Review, 27(1).

Arsad, R. (2023). Obstacles and challenges in law enforcement against corruption in public services. *Russian Law Journal*, 11(3).

Asheim, G. B. (2010). Intergenerational equity. Annual Review of Economics, 2(1).

Ata-Agboni, J. U., et al. (2023). Federalism and local government system in Nigeria: A critical assessment. *Journal of Good Governance and Sustainable Development in Africa*, 7(4).

Barak, A. (2010). Proportionality and principled balancing. Law and Ethics of Human Rights, 4(1).

Bleeker, A. (2009). Does the polluter pay? The polluter-pays principle in the case law of the European Court of Justice. European Energy and Environmental Law Review, 18(6).

Cameron, J., & Abouchar, J. (1991). The precautionary principle: A fundamental principle of law and policy for the protection of the global environment. Boston College International and Comparative Law Review, 14(1).

Canfa, W. (2006). Chinese environmental law enforcement: Current deficiencies and suggested reforms. *Vermont Journal of Environmental Law*, 8(3).

Conde, M., et al. (2023). Slow justice and other unexpected consequences of litigation in environmental conflicts. Global Environmental Change, 83(1).

Côté, R., et al. (1998). The evaluation and hazard classification of toxicological information for workplace hazardous materials information system material safety data sheets. Regulatory Toxicology and Pharmacology, 27(1).

Davis, R. W. (2006). The environmental information regulations 2004: Limiting exceptions, widening definitions and increasing access to information? Environmental Law Review, 8(1).

Deleuil, T. (2012). The common but differentiated responsibilities principle: Changes in continuity after the Durban Conference of the Parties. Review of European Community and International Environmental Law, 21(3).

Elliott, L., et al. (2024). Human security, multilateralism, and solidarity. Global Governance: A Review of Multilateralism and International Organisations, 2(1).

Online Resources

Montreal Protocol. (n.d.). The Montreal Protocol. United Nations Environment Programme. Retrieved 2 November 2025, from https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol

Tigre, M. A. (2022). The evolution of international environmental law amidst political gridlock: Environmental rights as a common ground. Retrieved 1 November 2025, from https://digitalcommons.pace.edu/lawdissertations/33/

United Nations Conference on Environment and Development [UNCED]. (1992). United Nations Conference on Environment and Development, Rio de Janeiro, Brazil. Retrieved 1 November 2025, from https://www.un.org/en/conferences/environment/rio1992

Unpublished Works

Bett, V. K. (2020). Environmental regulatory approach of the upstream oil and gas emerging industry in Kenya: An appraisal of the polluter pays principle (Unpublished doctoral dissertation). Strathmore University.

Dike, S. (2017). Decommissioning and abandonment of oil and gas facilities legal regime in Nigeria: Any lesson from Norway, the UK and Brazilian legal frameworks? (Unpublished manuscript).

Donnelly-Saalfield, J. (2009). Irreparable harms: How the devastating effects of oil extraction in Nigeria have not been remedied by Nigerian courts, the African Commission, or US courts (Unpublished manuscript). Hastings West-Northwest Journal of Environmental Law and Policy.

Kassah, S. (2020). A study of factors influencing development of unofficial waste disposal sites in developing countries: A case study of Minna, Nigeria (Unpublished doctoral dissertation). University of Central Lancashire.

Nwoko, C. N. (2014). Assessing the socioeconomic impacts arising from oil pollution in the Niger Delta region of Nigeria: Including proposals for solution (Unpublished master's thesis). Aalto University.