

The Crime of Air Pollution in International Law: Concept and Protection Mechanisms

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Abstract:

This study examines the offense of atmospheric environmental pollution by clarifying its conceptual scope and distinct characteristics, as well as analyzing the international legal framework governing its protection. Furthermore, it highlights the pivotal role of international conferences and multilateral conventions, alongside the contributions of specialized regional and international organizations, in strengthening the protective regime of the atmospheric environment. Adopting a descriptive-analytical methodology, the study concludes that while international law has significantly advanced a legal framework to combat air pollution, achieving effective protection remains fundamentally contingent upon enhancing international cooperation and ensuring the concrete enforcement of state obligations.

Keywords: Offense of Atmospheric Pollution, International Legal Protection, Atmospheric Environment, Multilateral Environmental Agreements, International Environmental Law.

الملخص:

يهدف هذا المقال إلى دراسة جريمة تلويث البيئة الهوائية من خلال بيان مفهومها وخصائصها، وتحليل الإطار القانوني الدولي المنظم لحمايتها. كما يسلط الضوء على دور المؤتمرات والاتفاقيات الدولية، فضلاً عن إسهامات المنظمات الإقليمية والدولية المتخصصة في تعزيز حماية البيئة الهوائية. واعتمدت الدراسة على المنهج الوصفي التحليلي، وانتهت إلى أن القانون الدولي أسهم في تطوير منظومة قانونية لمواجهة تلوث الهواء، إلا أن تحقيق حماية فعالة يظل مرتبطاً بتعزيز التعاون الدولي وضمان التنفيذ الفعلي للالتزامات الدولية.

الكلمات المفتاحية: جريمة تلويث البيئة الهوائية، الحماية الدولية، البيئة الهوائية، الاتفاقيات الدولية، القانون الدولي البيئي.

Introduction

The atmospheric environment constitutes an essential pillar for the sustenance of life on Earth, playing a vital role in preserving ecological equilibrium, safeguarding human health, and advancing sustainable development. However, rapid industrial and technological advancement, alongside intensified human activities, has exacerbated atmospheric pollution. This phenomenon has generated severe environmental, health, and economic ramifications that transcend national boundaries, necessitating concerted international action to establish legal frameworks capable of protecting the atmosphere and mitigating sources of pollution.

Within this framework, international law has assumed a pivotal role in strengthening the legal protection of the atmospheric environment. This has been pursued through international conferences,

multilateral environmental agreements, and the sustained efforts of international and regional organizations aimed at advancing mechanisms for international cooperation to combat transboundary air pollution.

The significance of this study lies in its examination of one of the most critical environmental crimes threatening both humanity and ecosystems. It scrutinizes the international legal framework governing the offense of atmospheric pollution and evaluates the efficacy of international mechanisms in mitigating this threat and reinforcing environmental protection.

Accordingly, this study addresses the following central problem: **To what extent has international law succeeded in establishing effective protection for the atmospheric environment by criminalizing acts of pollution and developing international instruments to combat them?**

This research aims to clarify the concept and characteristics of atmospheric pollution as an environmental crime, analyze the governing international legal frameworks—highlighting the roles of key international conventions and conferences—and evaluate the contributions of specialized international and regional organizations to this protective regime.

To achieve these objectives, the study adopts a descriptive approach to detail relevant international legal rules, alongside an analytical approach to evaluate international instruments and institutional efforts directed at protecting the atmosphere from contamination.

To systematically address the central problem, the research is structured into two main sections:

Section I: The Concept and Legal Nature of the Crime of Atmospheric Pollution

Section II: The International Legal Protection of the Atmospheric Environment

Section I: The Concept and Characteristics of the Crime of Atmospheric Pollution

The crime of atmospheric pollution represents one of the most prominent forms of environmental offenses that have increasingly drawn the attention of domestic legal systems and international conventions, given the severity of its impact on human health and ecological systems. To delineate its legal contours, it is essential to define its conceptual framework and establish its distinguishing characteristics—a process crucial for establishing the scope of criminalization and highlighting its specificity relative to traditional crimes. Accordingly, this section is divided into two subsections: the first explores the conceptual foundation of the crime of atmospheric pollution, while the second elucidates its key defining characteristics.

Subsection I: The Concept of the Crime of Atmospheric Pollution

Defining the crime of atmospheric pollution serves as an essential prerequisite for establishing the boundaries of criminal liability within the realm of air protection. A clear conceptual framework aids in identifying specific acts that constitute unlawful transgressions against the atmosphere and distinguishing them from other environmental offenses.

Part 1: The General Definition of Crime

Comparative legal frameworks traditionally refrain from codifying a rigid statutory definition of "crime," leaving this task to legal doctrine and jurisprudence. From a foundational legal perspective, a crime is defined as an act or omission prohibited by law, to which a statutory penalty is attached¹.

¹- Mohamed Zaki Abu Amer, *Criminal Law: General Part*, University Publications House, Alexandria, Egypt, 1990, p. 35.

From a sociological perspective, a crime is conceived as any act that conflicts with the collective interest and prevailing notions of justice within a society. Alternatively, it is characterized as a breach of established customs or a violation of a community's moral standards and norms, necessitating the imposition of a sanction upon the perpetrator².

As a human phenomenon, crime has also been described as the gratification of a human drive through non-normative means—methods not pursued by an ordinary individual under standard circumstances—arising from anomalous factors influencing the perpetrator at the moment of the infraction³.

From a strictly legal standpoint, a crime is defined as material conduct engaged in by a human being that runs counter to the law⁴. It is further defined as an act punishable under statutory law, or an act or omission explicitly criminalized by legislation with an assigned penalty⁵. It is likewise conceptualized as positive or negative conduct (commission or omission) that violates a penal provision⁶.

Consequently, while these varied perspectives approach the concept of crime from distinct analytical angles, they converge on the premise that a crime constitutes unlawful conduct subject to legal accountability—making the formal legal definition the most precise framework for categorizing specific legal offenses.

Part 2: Definition of the Crime of Atmospheric Pollution

Numerous definitions have been advanced regarding environmental crime, each reflecting a distinct analytical perspective. Broadly speaking, a crime is defined as any act statutorily prohibited that arises from a culpable mental state (*mens rea*) and carries a legally prescribed penalty⁷.

Environmental crimes, more specifically, are conceptualized as any action or omission that results in harm to the natural environment or public health, whether committed intentionally or through negligence⁸.

An environmental crime is further defined as any affirmative action or omission—whether intentional or non-intentional—committed by a natural or legal person that directly or indirectly impairs any component of the environment⁹.

Consequently, an environmental crime may manifest as an ordinary domestic offense when committed by an individual who violates provisions governing ecological balance—such as the unlawful discharge of pesticides. Alternatively, it may take the form of corporate non-compliance,

²- Samia Aziz and Maziya Aissaoui, "Crime from a Sociological Perspective: Causes and Effects," *Journal of Studies in the Psychology of Deviance*, Vol. 06, No. 01, 2021, p. 129.

³- Ouchtar Maryam, *Crime: Its Concept and Social Dimensions, Drug Crime as a Model*, Master's Thesis in the Anthropology of Crime, University of Abou Bakr Belkaid, Faculty of Arts, Humanities and Social Sciences, 2007/2008, p. 3.

⁴- Sahi Fawzia and Boukabous Abdelkader, "The Phenomenon of Crime: Concept, Causes and Forms," *Abhath Journal*, Vol. 7, No. 1, 2022, p. 84.

⁵- *Ibid.*, p. 84.

⁶- Hassan Ibrahim Obeid, *A Concise Guide to Criminology and Penology*, Dar Al-Nahda Al-Arabiya, Cairo, 1991, p. 13.

⁷- Abdullah Mohammed Shafi Oweida Al-Ajmi, "Environmental Crime: A Comparative Study," *The Legal Journal (A Journal Specialized in Legal Studies and Research)*, Vol. 20, No. 3, 2024, p. 926.

⁸- Daif Abdelhadi and Ben Sadek Ahmed, "Environmental Crimes and the Penalties Prescribed for Them under Algerian Legislation," *Al-Madani Journal for Humanities and Social Sciences*, Vol. 07, No. 1, 2026, p. 37.

⁹- Ashraf Hilal, *Environmental Crimes between Theory and Practice*, 1st ed., Dar Al-Nahda Al-Arabiya, Egypt, 2005, p. 36.

wherein industrial or agricultural enterprises fail to adhere to statutory thresholds and permissible emission standards for environmentally harmful substances and gases.

This contemporary formulation has proven far more practically effective than traditional legal frameworks. It is logically untenable to subsume offenses arising from modern technological advancements and unprecedented industrial conditions under classical criminal constructs such as theft, homicide, or assault. This distinction stems from the unique characteristics inherent to environmental offenses and their associated domains.

In this context, the doctrinal approach formulated by Dr. Nouredine Al-Hindawi provides a compelling framework. He defines environmentally criminalized conduct as any unlawful act or omission by a natural individual or corporate entity that causes material or indirect damage to environmental components, thereby depriving individuals of their fundamental human right to live in a clean and unpolluted environment¹⁰.

Owing to the interconnected nature of ecological systems and the diversity of environmental components, legal doctrine has largely struggled to settle upon a singular, universally accepted definition of environmental crime. As a result, the majority of legal literature favors analyzing the structural legal framework of the offense, delineating its various forms, and identifying its constituent legal elements (*actus reus* and *mens rea*).

In light of the foregoing, the crime of atmospheric pollution can be defined as the breach of a statutory obligation to protect the air, manifested through unlawful conduct (an act or omission) that causes actual harm or creates a risk of harm to the environment or public health, carrying a prescribed penal sanction. Put simply, it constitutes any positive action or failure to act that unlawfully infringes upon the collective right to clean air by violating legal rules governing air pollution control, resulting in—or presenting a risk of—harm to human health or the ecosystem, thereby triggering criminal liability for the offender.

Subsection II: Distinctive Characteristics of the Crime of Atmospheric Pollution

The crime of atmospheric pollution exhibits specific legal characteristics that distinguish it from conventional offenses. These unique attributes stem from the physical nature of its subject matter (*res subjecta*) and the expansive spatial reach of its harm, necessitating an examination of the primary legal features that define its distinct status within criminal law doctrine.

Part 1: Definitional and Evidentiary Complexity

Offenses impinging upon the atmospheric environment are heterogeneous and structurally complex. This variation arises from the diverse modes of infringement upon atmospheric elements and natural air composition, as well as the broad spectrum of polluting mechanisms and operational conditions involved. Offences against the atmosphere may be direct or indirect, overt or covert, instantaneous or continuous, and intentional or non-intentional (*culpable*). Furthermore, emission sources may be stationary—such as industrial chimneys and thermal power plants—or mobile, such as motor vehicles, maritime vessels, and aircraft. This operational diversity presents significant challenges to standardizing the constituent elements (*elementi delicti*) of the offense with traditional precision. Additionally, because atmospheric air is a shared natural resource that is naturally colorless, odorless, and tasteless, atmospheric contamination frequently remains invisible to the

¹⁰- Khaled Mostafa Fahmy, *The Legal Aspects of Environmental Protection from Pollution in Light of National Legislation and International Conventions: A Comparative Study*, Dar Al-Fikr Al-Jami'i, Egypt, 2011, p. 365.

naked eye. In many instances, detection relies entirely upon specialized laboratory analyses and scientific instrumentation, thereby increasing the complexity of establishing legal proof (*probatio*) and defining the crime's precise material parameters¹¹.

Part 2: Open-Ended Material Conduct (*Actus Reus*)

Environmental offenses—particularly atmospheric pollution—are characterized by the non-exhaustive nature of their constituent acts and modalities of commission. Legally, the legislature often restricts its statutory intervention to defining the general framework of the offense and prescribing its corresponding penal sanction, delegating the technical specification of prohibited thresholds to competent administrative authorities, executive decrees, or international regulatory standards. Moreover, these offenses are frequently structured as crimes of endangerment (*delicta de periculo*), wherein liability attaches upon the creation of risk without requiring proof of an actual material injury. Alternatively, they may be formulated as crimes of material harm (*delicta de effectu*), necessitating tangible physical outcomes—such as the emission of smoke, toxic particulates, or excessive acoustic disturbances generated by industrial operations or mechanical equipment exceeding statutory allowance thresholds¹².

Part 3: Transboundary Nature

The crime of atmospheric pollution operates independently of political borders or administrative divisions, rendering it predominantly transboundary in character. Pollutants discharged into the atmosphere do not remain confined within sovereign national territories; rather, atmospheric currents and prevailing winds transport them across borders, impacting the territorial domain of neighboring or distant states. Consequently, the ecological and health impacts of atmospheric contamination spread across vast geographical expanses. This transboundary reality has driven the international community to adopt multilateral environmental conventions and enhance inter-state legal cooperation to mitigate air pollution and combat this transnational offense¹³.

Part 4: Diffuse and Indeterminate Class of Victims

Human populations face persistent harm from atmospheric pollution and its attendant health and environmental repercussions. The victim pool of this offense is virtually indeterminate, as airborne contaminants disperse rapidly and indiscriminately affect whole populations—particularly those residing in urban centers, industrial zones, or areas proximate to major point-source emissions. To mitigate these collective harms and safeguard public health, regulatory regimes focus on monitoring atmospheric pollution levels in high-exposure areas subject to industrial and chemical emissions, seeking to control pollution at its source¹⁴.

Section II: The International Legal Protection of the Atmospheric Environment

The inherently transboundary character of atmospheric pollution has demonstrated the inadequacy of strictly national regimes of environmental protection. Consequently, the international

¹¹- Sabrina Tounsi, *Environmental Crime in Light of Algerian Law*, Master's Thesis in Environmental and Urban Planning Law, University of Algiers 1, 2014, p. 20.

¹²- Djedi Ouannassa, *Criminal Protection of the Air Environment: A Comparative Study*, Doctoral Dissertation in Legal Sciences, Specialization: Business Law, Faculty of Law and Political Science, Mohamed Khider University of Biskra, 2016/2017, p. 137.

¹³- Latali Mourad, *The Material Element of Environmental Crime and the Problems of Its Application in Algerian Law*, Master's Research Thesis in Environmental Law, Faculty of Law and Political Science, Mohamed Lamine Debaghine University of Sétif, 2015/2016, p. 27.

¹⁴- Bachir Mohamed Al-Amin, *Criminal Protection of the Environment*, Doctoral Dissertation in Legal Sciences, Specialization: Law and Health, Djillali Liabès University of Sidi Bel Abbès, 2015/2016, p. 25.

community has been compelled to strengthen interstate cooperation by formulating legal norms and establishing institutional mechanisms designed to curb pollution sources and mitigate their adverse consequences. Within this dynamic, international legal protection of the atmosphere has emerged as a cornerstone of contemporary efforts to combat environmental degradation and advance sustainable development. To evaluate the scope and effectiveness of this protective regime, it is necessary to examine the foundational role played by the United Nations System, followed by an analysis of the contributions made by specialized regional and international organizations.

Subsection I: Protection of the Atmospheric Environment within the United Nations Framework

The United Nations serves as the primary legal and institutional framework for formulating international standards governing the protection of the atmospheric environment. Through its landmark diplomatic conferences and multilateral environmental agreements (MEAs), the UN has played a pivotal role in codifying international legal principles and expanding global cooperation against atmospheric hazards.

Part 1: The Role of International UN Conferences in Atmospheric Protection

Global diplomatic summits organized under UN auspices have significantly contributed to establishing the customary and conventional foundations of atmospheric protection law while fostering interstate solidarity. Notable among these are:

I. The 1972 Stockholm Conference on the Human Environment

By Resolution 2398 (XXIII) of 3 December 1968, the United Nations General Assembly convened an international conference to address escalating environmental risks and counter progressive ecological degradation, while aligning socio-economic development with the imperatives of human and environmental protection. The resulting United Nations Conference on the Human Environment took place in Stockholm from 5 to 15 June 1972, bringing together delegates from 113 states, over 400 international organizations, and approximately 6,000 scientific experts—marking the first global diplomatic summit dedicated exclusively to the environment¹⁵.

The Stockholm Declaration articulated fundamental principles that affirmed the human right to an environment of a quality that permits a life of dignity and well-being. It urged a halt to the discharge of toxic pollutants and non-biodegradable substances, explicitly calling for the prevention of atmospheric contamination. Furthermore, the conference issued operational recommendations encouraging sovereign governments to monitor climate-altering activities, implement scientific waste management strategies, mandate international organizations to undertake source-attribution pollution studies, and provide developing nations with necessary technical and financial assistance¹⁶.

Regarding atmospheric protection specifically, an analysis of the Stockholm Declaration reveals that while it did not contain an explicit, standalone article dedicated solely to atmospheric air, it established foundational normative principles that underpin international air protection law. Chief among these are the recognition of the fundamental right to a healthy environment, the imperative to safeguard natural resources, and the customary obligation (*sic utere tuo ut alienum non laedas*)

¹⁵- Akroum Adel, "Environmental Protection within the Framework of International Organizations," *Journal of Legal and Political Research and Studies*, No. 12, 2017, p. 72.

¹⁶- Abdel Sattar Younes Al-Hamdani, *Criminal Protection of the Environment*, Dar Shatat for Publishing and Software, Egypt, 2013, p. 307.

requiring states to ensure that activities within their jurisdiction do not cause environmental damage to other states or areas beyond national control—including transboundary atmospheric pollution.

II. The 1982 Nairobi Conference

The United Nations Environment Programme (UNEP) convened a Special Session in Nairobi, Kenya, from 10 to 17 May 1982 to review the implementation of the Stockholm Action Plan and strengthen global, regional, and national environmental protection measures. The resulting Nairobi Declaration emphasized that environmental threats increasingly transcend national jurisdictions, thereby necessitating enhanced international cooperation and the progressive development of international environmental law¹⁷.

The Nairobi Declaration affirmed that transboundary environmental challenges demand structured inter-state consultation and coordinated global action. It explicitly called for promoting the progressive codification and development of international environmental law—particularly through the execution of multilateral agreements—and expanding technical cooperation in environmental management and scientific research¹⁸. Consequently, the Declaration represented a critical step forward in refining international legal norms, bolstering resource conservation, and ensuring the sustainable transmission of ecological assets to future generations¹⁹.

In terms of atmospheric protection, the Nairobi Declaration reinforced the legal framework governing air pollution by highlighting the necessity of harmonizing national strategies to confront transboundary air hazards. Moreover, it advanced a more mature jurisprudence of environmental protection, transitioning international legal discourse from abstract principles toward operational enforcement. It underscored that protecting the atmosphere is not merely an ecological objective, but a binding legal mandate requiring proactive national legislation and preventative regulatory policies.

III. The 1992 Rio de Janeiro Earth Summit

The United Nations Conference on Environment and Development (UNCED), widely known as the "Earth Summit," convened in Rio de Janeiro, Brazil, from 3 to 14 June 1992. Drawing unprecedented global diplomatic participation, the Summit affirmed in its Principle 1 that human beings are at the center of concerns for sustainable development and entitled to a healthy and productive life in harmony with nature²⁰. The conference set forth crucial environmental imperatives, principal among which were the protection of the atmosphere and the stratospheric ozone layer, combating desertification and drought, conserving biological diversity, and safeguarding freshwater resources from industrial contamination²¹.

The Earth Summit produced three major multilateral environmental frameworks: the Convention on Biological Diversity (CBD) aimed at safeguarding endangered species; the United Nations Framework Convention on Climate Change (UNFCCC) designed to mitigate anthropogenic greenhouse gas (GHG) emissions; and the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on Forests. Additionally, the summit adopted Agenda 21—a

¹⁷- Badriya Al-Awadhi, "The Role of International Organizations in the Development of International Environmental Law," *Journal of Law*, Year 9, No. 2, Kuwait University, June 1985, p. 53.

¹⁸- Maamar Ratib Mohammed Abdel Hafiz, *International Environmental Law and the Phenomenon of Pollution: A Step Forward in Protecting the Environment from Pollution*, Dar Al-Kutub Al-Qanuniya, Egypt, 2008, p. 87.

¹⁹- Chaâchoua Kouider, "The Role of International Conferences and Treaties in the Development of International Environmental Law," *Al-Mi'yar Journal*, Vol. 6, No. 2, December 2015, p. 110.

²⁰- Djedi Ouannassa, *op. cit.*, p. 222.

²¹- Maamar Ratib Abdel Hafiz, *op. cit.*, p. 223.

comprehensive global action plan for sustainable development—and the landmark Rio Declaration on Environment and Development²².

Given the present study's focus on atmospheric protection, the UNFCCC stands out as one of the most critical legal instruments in international environmental law. It established the foundational legal architecture for combating air pollution and curtailing global GHG emissions. The ultimate objective of the Convention is to achieve the stabilization of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system. To accomplish this, the UNFCCC codified core normative principles including international cooperation, common but differentiated responsibilities, sustainable development, climate change adaptation, and proactive emission mitigation.

IV. The 2002 Johannesburg World Summit

The World Summit on Sustainable Development (WSSD) convened in Johannesburg, South Africa, under UN auspices from 26 August to 4 September 2002. The summit aimed to evaluate global progress achieved since the Rio Summit, identify persistent environmental deficits, and establish future operational priorities. Discussions centered on assessing implementation mechanisms for prior commitments while setting new regulatory targets—most notably ensuring that, by 2020, chemicals are produced and used in ways that minimize significant adverse effects on human health and the environment²³.

Regarding atmospheric protection, the Johannesburg Plan of Implementation addressed air quality concerns indirectly by stressing the imperative to reduce chemical pollutants and harmful emissions, thereby contributing to the mitigation of atmospheric contamination and reinforcing environmental protection standards.

V. The 2009 Copenhagen Climate Conference

The United Nations Climate Change Conference (COP 15), held in Copenhagen, Denmark, from 7 to 18 December 2009, represented a pivotal moment in international climate governance²⁴, serving as a continuation of global efforts initiated under the Kyoto Protocol. Bringing together delegates from 192 states, the conference sought to negotiate legally binding emission reduction targets to safeguard ecosystems for future generations. However, sharp geopolitical divergence between industrialized and developing nations prevented the adoption of a unified, legally binding treaty, forcing negotiations to be deferred to COP 16 in Cancún, Mexico, in 2010. Ultimately, while international summits have heightened global awareness of environmental law and sustainable development, the majority of their outputs take the form of soft-law declarations, non-binding principles, and framework programs that lack direct legal enforceability²⁵.

With respect to atmospheric protection, the Copenhagen Summit underscored the urgent necessity of controlling GHG emissions as primary drivers of atmospheric contamination and global climate disruption. Nevertheless, the limited legal outcome of the summit—stemming from a lack of political consensus on binding reduction quotas—highlighted a fundamental reality of international environmental law: achieving effective protection for the atmospheric environment remains

²²- Chaâchoua Kouider, *op. cit.*, p. 110.

²³- Sameh Abdel Qawi Al-Sayed, *International Intervention between the Humanitarian and Environmental Perspectives*, Dar Al-Jami'a Al-Jadida, Alexandria, 2012, p. 248.

²⁴- Mounir Oussir and Prof. Mohamed Hamou, *Environmental Economics*, Dar Al-Khaldounia, Algeria, 2010, p. 220.

²⁵- Chaâchoua Kouider, *op. cit.*, p. 111.

contingent upon concluding clear, hard-law multilateral agreements equipped with quantifiable emission targets, robust implementation mechanisms, and strict compliance monitoring systems capable of deterring acts of atmospheric pollution.

Part 2: The Role of International Conventions in Protecting the Atmospheric Environment

Multilateral environmental and legal conventions serve as the primary legal instruments for structuring global efforts aimed at protecting the atmospheric environment and curbing its sources of contamination. Key among these agreements are:

I. The 1960 Geneva Radiation Protection Convention (No. 115)

As part of the International Labour Organization's (ILO) regulatory mandate over occupational environmental safety, the Radiation Protection Convention was adopted in 1960 to safeguard workers against hazards arising from ionizing radiation. The Convention was formally approved during the 44th Session of the International Labour Conference in Geneva on June 22, 1960, entering into force on June 17, 1962.

The Convention sets forth core statutory obligations, primarily requiring Contracting States to enact the legislative and technical measures necessary to ensure worker safety, minimize exposure to ionizing radiation to the lowest practicable level, and prevent all unnecessary exposure. Furthermore, it mandates the establishment and periodic revision of maximum permissible doses and atmospheric intake concentrations of radioactive substances in accordance with evolving scientific consensus. In addition, state parties must institute continuous monitoring and measurement regimes for workplace radiation levels, deploy technological safeguards to mitigate risk, and regularly assess the efficacy of these protective protocols to guarantee a secure working environment²⁶.

II. The 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy and the 1963 Brussels Supplementary Convention

To structure civil liability regimes for nuclear damage, the Paris Convention on Third Party Liability in the Field of Nuclear Energy was concluded on July 29, 1960, under the auspices of the Organization for European Economic Co-operation (now the OECD)²⁷. Designed to establish an equitable and efficient regime for compensating victims of nuclear incidents, the Convention codified the principle of strict liability (liability without fault) of the nuclear operator, as enshrined in Article 3²⁸. To bolster this framework, the Brussels Supplementary Convention was adopted on January 31, 1963. It reinforced legal protections for injured parties and expanded financial compensation mechanisms while reaffirming the operator's strict liability for damages resulting from the peaceful use of nuclear energy—including harm to persons, property, and the broader environment. Together, these instruments established a comprehensive legal regime governing compensation for nuclear-related environmental harm²⁹.

III. The 1963 Vienna Convention on Civil Liability for Nuclear Damage

The Vienna Convention on Civil Liability for Nuclear Damage was adopted in 1963 under the auspices of the International Atomic Energy Agency (IAEA) to formulate a legal architecture governing civil liability for harm resulting from peaceful nuclear applications. Under Article IV, the

²⁶- Articles 6 and 11 of International Labour Organization Convention No. 115 concerning the Protection of Workers against Ionising Radiations, 22 June 1960.

²⁷- Nadia Omrani, "The Role of International Conventions and Domestic Legislation in Environmental Protection," *Al-Mufakkir Journal*, No. 15, 2017, p. 315.

²⁸- Patricia Park, *International Law for Energy and the Environment*, 2nd ed., CRC Press, 2012, p. 113.

²⁹- Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960, Brussels, 1963.

Convention establishes the absolute liability of the nuclear operator for damage to persons, property, or ecological systems upon proof that such harm resulted from a nuclear incident within the installation or involved nuclear material originating from or dispatched to it. This liability regime extends to incidents occurring during the transport of nuclear materials. Additionally, the Convention obligates operators to maintain insurance or other financial security to guarantee civil liability coverage and ensure victim indemnification³⁰.

IV. The 1979 Convention on Long-Range Transboundary Air Pollution (CLRTAP)

Adopted under the auspices of the United Nations Economic Commission for Europe (UNECE) in 1979, the Convention on Long-Range Transboundary Air Pollution (CLRTAP) established the first international legally binding framework to protect human health and the environment against air pollution. State parties committed to gradually reducing and preventing atmospheric contamination through information exchange, consultations, joint research, and the development of national and international regulatory strategies targeting key atmospheric pollutants³¹.

V. The 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol

The Vienna Convention for the Protection of the Ozone Layer was concluded in 1985 following compelling scientific evidence demonstrating that chlorofluorocarbons (CFCs) cause stratospheric ozone depletion. Negotiated under the leadership of the United Nations Environment Programme (UNEP), the treaty was later operationalized by the 1987 Montreal Protocol. The Vienna Convention codified the precautionary principle by obligating Contracting Parties to cooperate in ozone layer protection through scientific research, systematic observation, and data exchange—reflecting the legal maxim that pollution prevention is significantly more effective and less costly than ex-post remediation³².

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and its subsequent amendments provided the operational control measures for the regime. It imposed binding phase-out schedules for the production and consumption of ozone-depleting substances (ODS). Recognizing common but differentiated responsibilities, the Protocol accommodated the specific needs of developing nations by establishing financial assistance mechanisms and technology transfer frameworks. Moreover, it instituted a compliance procedure and established the Multilateral Fund to facilitate full implementation and strengthen global cooperation in stratospheric ozone protection³³.

VI. The 1992 United Nations Framework Convention on Climate Change (UNFCCC)

The 1992 United Nations Framework Convention on Climate Change (UNFCCC) explicitly recognized the global nature of climate disruption, emphasizing the necessity of global cooperation grounded in the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC), taking into account varying socio-economic conditions among states. To operationalize this commitment, state parties undertook to protect the climate system by stabilizing atmospheric greenhouse gas (GHG) concentrations at a level that prevents dangerous anthropogenic interference

³⁰- Mounir Yaïch, *Environmental Protection under the 1972 Stockholm Conference*, Master's Thesis in Public Law, Specialization: Environment and Urban Planning, Faculty of Law, Ben Aknoun, University of Youssef Ben Khedda, Algeria, 2013, p. 93.

³¹- Halloub Hafida and Ben Attia Lakhdar, "The Legal Protection of the Environment between the Rules of International Law and State Violations," *Journal of Legal and Political Thought*, Vol. 7, No. 2, 2023, p. 699.

³²- Nadia Omrani, *op. cit.*, p. 318.

³³- Mohammed Youssef Alwan, *Public International Law*, Dar Wael for Publishing, Jordan, 3rd ed., 2003, p. 34.

with the climate system, thereby safeguarding Earth's atmosphere from the adverse impacts of climate change³⁴.

VII. The 1997 Kyoto Protocol

Serving as an operational extension of the UNFCCC, the 1997 Kyoto Protocol advanced international climate mitigation by establishing legally binding emissions reduction targets for industrialized nations. Annex I parties committed to reducing their aggregate GHG emissions by at least 5% below 1990 levels during the first commitment period, aiming to keep climate change within manageable limits. However, the enforcement of these binding obligations faced severe political and economic friction. Curbing temperature-altering emissions remains a complex geopolitical challenge, given the global economy's deep reliance on fossil fuels as a primary energy source and their intrinsic link to economic development—particularly within petroleum-producing states³⁵.

VIII. The 2009 Copenhagen Accord

The United Nations Climate Change Conference (COP 15), held in Copenhagen from 7 to 19 December 2009, sought to negotiate a binding successor framework to the Kyoto Protocol³⁶. Although non-binding, the resulting Copenhagen Accord constituted a significant political milestone in climate governance. It endorsed the scientific imperative to hold the increase in global average temperature below 2°C to avert severe climate-induced disasters such as droughts and extreme flooding. Furthermore, the Accord underscored international climate finance, securing a commitment from developed nations to mobilize USD 100 billion annually by 2020 via the Green Climate Fund (GCF) to support adaptation and mitigation efforts in developing countries³⁷.

IX. The 2015 Paris Agreement

Adopted at COP 21 in 2015, the Paris Agreement established a comprehensive, legally binding international framework guiding global climate action in the post-2020 era. The Agreement rests upon four core pillars: limiting the rise in global average temperature to well below 2°C above pre-industrial levels while pursuing efforts to limit it to 1.5°C; requiring state parties to submit and regularly update Nationally Determined Contributions (NDCs) every five years under a progression clause reflecting highest possible ambition³⁸; mobilizing financial, technological, and capacity-building support for developing nations; and establishing an enhanced transparency framework (ETF) to monitor compliance and account for progress. By reaffirming the principle of CBDR-RC in light of different national circumstances, the Paris Agreement stands as the primary international legal instrument coordinating global efforts to curb atmospheric emissions, foster climate resilience, and enhance overall protection of the atmospheric environment³⁹.

Subsection II: The Role of Regional and Specialized Organizations in Protecting the Atmospheric Environment

³⁴- Halloub Hafida and Ben Attia Lakhdar, op. cit., p. 700.

³⁵- Nadia Omrani, op. cit., p. 319.

³⁶- Moise Tsayan Demaze, *Geopolitics of Sustainable Development: States Facing International Environmental Problems (The Copenhagen Accord and Its Consolidation through the Cancun Agreement)*, Presses Universitaires de Rennes, 2011, published on the following website: Cairn.info.

³⁷- Halloub Hafida and Ben Attia Lakhdar, op. cit., p. 701.

³⁸- Mohamed Rahmouni, "The Role of the United Nations Organization in the Development of International Environmental Law," *Al-Quds Open University Journal for Research and Studies*, No. 42, 2 Safar 2017, pp. 296, 306.

³⁹- Ali Fahd Mouj, *Rules of International Law for Environmental Protection in Light of the 2015 Paris Climate Agreement*, Master's Thesis, Middle East University, 2017, pp. 88–89.

The international legal regime governing atmospheric protection is not restricted to mechanisms established under the auspices of the United Nations; rather, it extends to and relies upon specialized international and regional organizations. Within their respective mandates, these institutional actors have significantly advanced the legal frameworks protecting atmospheric air and enhanced institutional cooperation to counter transboundary pollution hazards.

Part 1: The Role of Regional Organizations

Regional organizations constitute a critical structural pillar in atmospheric environment governance by formulating localized legal instruments and facilitating cross-border operational frameworks to combat atmospheric degradation.

I. The Organisation for Economic Co-operation and Development (OECD)

The Organisation for Economic Co-operation and Development (OECD) has played a seminal role in integrating environmental protection principles into macroeconomic policy frameworks. Recognizing the vital imperative of environmental stewardship as early as the 1970s, the OECD established its Environment Policy Committee and codified the groundbreaking "Polluter Pays Principle" in 1972. The Organisation has continually expanded its environmental mandate through Council Recommendations and Decisions aimed at elevating state regulatory performance, rationalizing energy resource utilization, structuring chemical and waste management regimes, and curbing hazardous industrial emissions. Furthermore, the OECD has advanced environmental information systems, broadened public access to ecological data, supported climate mitigation strategies, and integrated environmental considerations into international trade, investment, and sectoral policies. These integrated initiatives foster sustainable development, safeguard public health, and strengthen interstate environmental cooperation, thereby directly contributing to the reduction of atmospheric pollution⁴⁰.

II. The European Union (EU)

The European Union stands as a primary exemplar among regional entities in advancing environmental law and sustainable development. The EU has systematically pursued a preventive environmental policy designed to anticipate and mitigate ecological risks at their source, rather than relying merely on post-hoc remedial intervention⁴¹. To achieve these objectives, the EU has established a comprehensive secondary legal framework comprising Regulations, Decisions, and Directives—enacting over 300 environmental legislative acts while actively participating in the conclusion of broader European and international treaties. Beyond its legislative apparatus, the EU convenes diplomatic forums, formulates environmental action programmes, and contributes directly to international soft law instruments and conventions regarding atmospheric protection and climate governance. Notably, the EU played a leading role in enforcing the Kyoto Protocol's greenhouse gas abatement targets, advocating for adaptation support for developing countries, and driving regional legal initiatives to combat transboundary air pollution⁴².

⁴⁰- Berkan Abdelghani, "The Role of the Organisation for Economic Co-operation and Development in Environmental Protection," *Journal of Studies on the Effectiveness of Legal Rules*, Vol. 06, No. 02, 2022, pp. 53–56.

⁴¹- Salah Sid Ali and Halima Foughali, "The Role of Transnational Entities in Environmental Protection," *Al-Bahith Journal for Academic Studies*, No. 11, June 2017, p. 482.

⁴²- Faraj Al-Hussein and Kharoubi Yasmine, "The Concern of Specialized International and Regional Organizations with Ensuring Environmental Protection," *The Comprehensive Journal of Law*, June 2022, pp. 42–43.

III. The League of Arab States

The League of Arab States has undertaken structured efforts to promote environmental protection and curb pollution across the Arab region. In 1987, the League established the Council of Arab Ministers Responsible for the Environment (CAMRE) to formulate an integrated regional strategy for environmental governance, diagnose ecological crises, and devise appropriate remedial mechanisms. Subsequently, the League adopted the 2005 Cairo Declaration, which codified fundamental principles and strategic targets for the environmentally sound management of hazardous chemicals and waste. Furthermore, Arab ministerial conferences convened in 2007 and 2008 culminated in the landmark Riyadh Declaration, which advocated for the establishment of specialized environmental judiciaries, the strengthening of administrative bodies tasked with environmental protection, and the modernization of comprehensive environmental legislation accompanied by robust enforcement mechanisms⁴³. Nevertheless, the institutional efficacy of the League of Arab States remains comparatively constrained when measured against escalating regional environmental threats—most notably transboundary air pollution, desertification, and pollution-induced public health crises. Addressing these deficits necessitates intensifying inter-Arab legal cooperation and establishing operational compliance mechanisms for environmental stewardship.

IV. The African Union

Serving as the institutional successor to the Organisation of African Unity (OAU), the African Union (AU) has prioritized environmental protection and natural resource management since its inception. The AU played a central role in revising and modernizing regional legal frameworks, such as the African Convention on the Conservation of Nature and Natural Resources. Furthermore, it integrated ecological sustainability into continental socio-economic frameworks—most notably the Lagos Plan of Action—and bolstered regional governance over shared natural resources. In combating hazardous transboundary pollution, the AU adopted the landmark 1991 Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa [30]. Since 2007, climate change mitigation and adaptation have been systematically mainstreamed into the AU's strategic development agenda. Additionally, the Union established specialized risk-management and climate-insurance instruments (such as African Risk Capacity) to enhance the adaptive capacity of African states against climate shocks and environmental degradation, thereby advancing sustainable development goals across the continent.

Part 2: The Role of Specialized International Organizations

Specialized international agencies have emerged as pivotal actors in protecting the atmospheric environment by establishing global normative standards, conducting scientific assessments, and promoting operational frameworks to curb air pollution.

I. The World Meteorological Organization (WMO)

Established in 1947, the World Meteorological Organization (WMO) has played a seminal role in identifying and highlighting the ecological risks associated with the depletion of the stratospheric ozone layer, providing crucial technical support for global protective measures. These efforts culminated in the adoption of the 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol. Furthermore, the WMO co-founded the Intergovernmental Panel on

⁴³- Djedi Ouannassa, op. cit., pp. 243–244.

Climate Change (IPCC)—a network encompassing over 2,000 scientific experts—and played a central role in facilitating international climate conventions and regulating transboundary air pollution, thereby significantly strengthening global governance over atmospheric protection⁴⁴.

II. The World Health Organization (WHO)

The World Health Organization (WHO), established in 1946 and operational since 1947, constitutes one of the foremost international institutions engaged in environmental protection, operating through the direct nexus between ecological health and human well-being. The Organization systematically evaluates the public health impacts of air, water, and soil pollution, formulating evidence-based air quality guidelines and safe exposure thresholds. Additionally, it conducts epidemiological research, offers advisory services, and executes field programs to prevent environment-related pathologies and foster ecological health⁴⁵. Since 1971, the WHO has intensified its environmental focus by establishing specialized units to monitor water quality, public sanitation, and environmental pollution control, alongside adopting initiatives targeting chemical safety, food security, and radiation risks. Working in close synergy with the United Nations Environment Programme (UNEP), the WHO formulates environmental health criteria, assists member states in drafting national regulatory policies, and evaluates pollution abatement programs—directly contributing to public health preservation and the mitigation of atmospheric contamination⁴⁶.

III. The International Atomic Energy Agency (IAEA)

The International Atomic Energy Agency (IAEA)—established in 1956, operational since 1957, and headquartered in Vienna—is an autonomous specialized agency within the United Nations system. The IAEA is mandated to accelerate and enlarge the contribution of atomic energy to peace, health, and prosperity, while establishing rigorous nuclear safety standards to protect human health, property, and the environment against radiological hazards⁴⁷. The Agency formulates binding safety codes, promotes scientific research, facilitates expert technical exchange, and provides equipment and materials for peaceful nuclear applications. Crucially, it administers a safeguards regime designed to verify that nuclear materials are not diverted to military purposes. Following major radiological catastrophes—such as the atomic bombings of Hiroshima and the Chernobyl disaster—the IAEA played a key role in developing multilateral conventions on civil liability for nuclear damage and expanding international legal cooperation to mitigate the risks of nuclear accidents and atmospheric radioactive contamination, thereby enhancing environmental protection and international peace and security⁴⁸.

Conclusion

This study demonstrates that the offense of atmospheric pollution constitutes one of the most perilous environmental crimes, given its profound impacts on human health, ecological systems, and sustainable development, as well as its inherently transboundary nature, which renders national legislative responses insufficient without robust international legal cooperation. Through multilateral

⁴⁴- Faraj Al-Hussein and Kharoubi Yasmine, *op. cit.*, pp. 44–45.

⁴⁵- Djedi Ouannassa, *op. cit.*, p. 246.

⁴⁶- Moubarak Alouani, “The Role of Specialized International Organizations and Non-Governmental Organizations in Protecting the Environment from Pollution,” *Al-Fikr Journal*, No. 13, 2017, pp. 584–603.

⁴⁷- Karima Boughezoula, “The Role of Intergovernmental International Organizations in Environmental Protection,” *Vol. 13, No. 2, 2025*, pp. 220–221.

⁴⁸- Mohsen Abdel Hamid Afkirin, *International Environmental Law*, Dar Al-Nahda Al-Arabiya, Cairo, 2006, p. 387.

conferences, international conventions, and the active engagement of regional and specialized organizations, international law has significantly contributed to establishing frameworks aimed at curbing atmospheric pollution and safeguarding the air quality. Nevertheless, the ultimate efficacy of this international legal apparatus remains contingent upon the willingness of states to fulfill their international obligations and strengthen oversight and compliance mechanisms.

Key Findings:

Distinctive Juridical Character: The offense of atmospheric pollution possesses unique legal characteristics that distinguish it from traditional crimes, notably its transboundary dimension, diffuse victimhood, and the evidentiary complexity of identifying perpetrators and establishing causation.

Normative Codification: Multilateral conferences and international treaties have successfully codified core principles and foundational rules governing atmospheric protection, fostering enhanced international environmental governance.

Institutional Support: Regional and specialized international organizations perform a pivotal role in advancing global standard-setting and providing technical and scientific assistance to help states address atmospheric degradation.

Implementation Deficits: International legal protection of the atmospheric environment continues to encounter structural challenges that undermine its efficacy, primarily arising from uneven state compliance and varying commitment to international environmental law norms.

Policy Recommendations:

Strengthening International Compliance: Enhance state adherence to international conventions protecting the atmospheric environment while establishing effective monitoring, reporting, and enforcement mechanisms.

Bolstering Regional Cooperation: Deepen international and regional synergy to abate harmful atmospheric emissions, facilitating the transfer of clean technology and the exchange of scientific expertise.

Harmonizing Municipal Law: Modernize domestic legal frameworks to align with international legal obligations, while enforcing stricter legal liability standards for acts causing atmospheric pollution.

Fostering Environmental Education and Innovation: Intensify efforts aimed at expanding public environmental awareness and incentivizing scientific research and technical innovation in air pollution mitigation and atmospheric governance.

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