

# ENVIRONMENTAL CRIME AND THE GEOPOLITICS: PROVING RESPONSIBILITY IN GLOBAL CHAINS OF POWER

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## ABSTRACT

**Purpose:** Environmental crime today represents one of the most complex forms of modern criminal activity, as it transcends the boundaries of classical law and encompasses economic, political, and scientific dimensions. The paper aims to explore how these interconnections shape legal and institutional responses to environmental offenses and to highlight the growing importance of scientific evidence in proving responsibility.

**Design/Methods/Approach:** The paper is based on a qualitative and analytical approach, combining theoretical, legal, and ethical perspectives. It does not include empirical measurement or field data but analyzes the role and potential of scientific methods, such as forensic ecology, satellite monitoring, and data analysis, in establishing environmental responsibility. The approach is conceptual and comparative, focusing on international cases, institutional frameworks, and the epistemological limits of scientific evidence.

**Findings:** The analysis shows that environmental crime functions as a transnational and institutionalized phenomenon, in which responsibility is often diffused among corporate and governmental actors. Control mechanisms remain fragmented, and the causal links between actions and consequences are frequently indirect or obscured. Based on a review of legal frameworks and international practice, the study concludes that proving responsibility requires the integration of scientific verification models, stronger institutional cooperation, and a global approach to environmental accountability.

**Originality/Value:** The conclusion is based on the thesis that researching and proving environmental crime requires a new paradigm founded on scientific integration and the ethics of responsibility, in which scientific institutions, states, and international organizations share joint accountability for preserving sustainable justice and global security.

**Keywords:** environmental crime, resources, responsibility, scientific approaches, geopolitics, sustainability, environmental forensics

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## INTRODUCTION – ENVIRONMENTAL CRIME AS A CIVILIZATIONAL CHALLENGE

The contemporary world faces a form of criminality that transcends all previous boundaries of law and politics. Environmental crime is no longer a marginal phenomenon but a central symptom of the global order in which economy, technology, and power have lost their limits, while responsibility has remained local and fragmented. The destruction of natural systems has become a by-product of a development model still based on the unlimited exploitation of natural resources, rather than on sustainability. In this context, crime is manifested not only as a conscious violation of the law but as a systemic pattern of action embedded in the very logic of global production and consumption.

Whereas in the past environmental offenses had clearly defined perpetrators, today’s forms of pollution and degradation represent collective and diffuse processes involving states, corporations, international financial institutions, and markets. The boundary between what is legal and what is legitimate is becoming increasingly blurred: what is formally permitted is often morally and ecologically unacceptable. This raises a fundamental question — how can responsibility be proven when guilt is dispersed, when harm develops slowly, and when the system is simultaneously both the cause and the judge?

Environmental crime is therefore not merely a matter of law but a question of civilizational self-awareness. It reveals the relationship of society toward knowledge, truth, and responsibility. In a world where environmental consequences are globalized while legal norms remain national, a deep gap emerges between cause and sanction. Science possesses all the instruments to identify the source of harm, yet law lacks the strength to transform that truth into justice. Politics, on the other hand, often instrumentalizes both science and law to postpone confrontation with reality.

The purpose of this paper is to examine the scientific, legal, and ethical foundations of establishing responsibility for environmental crime in the global context. The focus is not on individual cases but on mechanisms that enable impunity and the transfer of environmental harm from weaker to stronger actors. The paper is based on the hypothesis that, under contemporary conditions, environmental crime can be proven only through the integration of three systems of truth: scientific, legal, and ethical, since each of them alone has limited reach.

The paper seeks to demonstrate that establishing environmental responsibility is not merely a technical process but an act of moral and political courage. For truth to have the power of proof, it must



be public, verifiable, and accountable. Scientific data without institutional support remain a mute testimony, while law without science remains a formal procedure devoid of substance. In this union, science becomes a moral instrument, law a social framework, and responsibility – the common foundation of survival.

## SCIENTIFIC EVIDENCE AND THE LIMITS OF TRUTH

Proving responsibility for environmental crime today depends on the ability of science to identify and verify traces of harm within complex natural and social systems. In this process, scientific evidence ceases to be merely a technical instrument and becomes a form of social truth — a truth that must withstand both laboratory verification and public scrutiny. Environmental offenses cannot be viewed through classical cause-and-effect frameworks, as their dynamics are nonlinear. Pollution accumulates, effects appear with delay, and responsibility becomes lost within a chain of companies, institutions, and jurisdictions.

Environmental forensics, toxicology, and remote sensing have become key disciplines in establishing evidence. The analysis of soil, water, and biological samples enables the identification of pollutants as well as the mapping of the spatial distribution of damage. Satellite monitoring and GIS systems make it possible to reconstruct events with a precision previously unattainable: changes in terrain, deforestation, alterations in water color — all such data become material traces. However, precision does not equate to legal certainty. A scientific finding must be transformed into evidence through a process of verification and interpretation, which is simultaneously a methodological and political act.

In the past decade, a new type of evidence has emerged — the algorithmic proof. Through the use of large datasets and machine learning models, it has become possible to detect irregularities in waste trade, energy flows, and industrial production. These models can reveal patterns of criminal behavior before they are formally recorded, yet they raise the question of reliability. When an algorithm becomes a witness, the question arises: who is responsible for its interpretation? Scientific truth, paradoxically, can be lost in the complexity of its own methods.

The essential limitation of scientific evidence lies not in its accuracy, but in the lack of shared standards. Sampling methodologies, validation of results, and interpretation of data vary across states and institutions. This disrupts the continuity of the chain of evidentiary legitimacy — from sample to verdict. In international investigations, even the principles of measurement are often contested, and truth loses its universality, becoming dependent on jurisdiction. Scientific evidence thus becomes a mirror of political power: where institutions possess legitimacy, truth is accepted; where they do not, science becomes an object of doubt.

In this sense, proving environmental crime involves not only measuring damage but also establishing trust in the measure itself. Forensic accuracy and institutional independence must be united in a single system that allows facts to become legal facts. Scientific evidence, without an ethical and procedural framework, remains information without consequence. To have real force, it must be publicly verifiable, repeatable, and accessible. From this arises the concept of epistemological responsibility — the responsibility of science to make truth effective.



## STRUCTURAL PATTERNS AND THE GEOPOLITICS OF RESOURCES

Environmental crime does not arise from the absence of law but from the structure of the global economy, in which profit and power take precedence over sustainability. The exploitation of natural resources has become the foundation of political and financial power and, consequently, a source of systemic injustice. Countries rich in raw materials are often simultaneously the most affected by environmental degradation, as they lack institutions capable of controlling the flows of capital and technology. While benefits are centralized, the consequences are distributed. Such asymmetry makes environmental crime a structural phenomenon - no longer a deviation from the system, but part of its normality.

At the core of this structure lies what can be called ecological rent: the profit gained by actors who control rare resources or the technologies for their extraction. Rent becomes an instrument of global politics: it allows states and corporations to dominate markets while evading responsibility. Peripheral countries, including many in Southeastern Europe, are transformed into zones of ecological compensation: they host waste deposits, supply raw materials, and serve as testing grounds for projects that would not be permitted in developed states. In such a system, crime becomes institutionalized through legal mechanisms such as: public tenders, concessions, and public-private partnerships.

Corporate responsibility, although legally recognized, remains limited in practice. Multinational corporations operate through complex networks of subcontractors and subsidiaries, enabling the dispersion of responsibility. When environmental damage occurs, the perpetrator is usually located at the end of the chain, while the decision-making center remains beyond the reach of local law. This diffusion of guilt represents a typical mechanism of contemporary environmental crime. Formally, everything functions according to regulations, yet the systemic outcome remains the same: nature is degraded, and accountability disappears.

In the last decade, a new form of domination has emerged: informational colonialism. States and corporations possessing satellite, analytical, and laboratory capacities have become monopolists of truth. They determine how pollution is measured, how data are interpreted, and which facts are recognized in international forums. Countries without access to these technologies depend on others' interpretations, thereby losing sovereignty over their own territory and evidence. Science, which ought to be neutral, thus becomes a tool of political supervision.

When all these patterns are connected, a picture emerges of a world in which environmental injustice has a systemic character. Responsibility can no longer be reduced to an individual act, as pollution arises from the multiplication of decisions—investment, logistical, and technological—that are, in themselves, “legal.” This undermines the traditional legal assumption of causality: the crime no longer has a clear beginning or end, only a flow. Such structural causality demands a new logic of proof, one that assesses the contribution of each actor to the total damage rather than seeking an isolated perpetrator.

Viewed from this perspective, the geopolitics of resources is not merely a matter of energy or trade, but of the global distribution of responsibility. States that control sources of information and capital shape the standards of sustainability, while others bear the burden of their implementation. In this sense, the struggle against environmental crime is not a battle against individuals, but against the structure of power that produces inequality as a natural condition.



## LEGAL AND INSTITUTIONAL BARRIERS TO PROOF

Proving responsibility for environmental crime faces limitations stemming from the very nature of international law and the structure of the institutions that implement it. Existing norms were not designed for a world in which economic processes are global and harm is diffuse. Law is, by nature, territorial, whereas the causes of environmental disasters are transnational. The Rome Statute of the International Criminal Court recognizes ecocide only within the context of armed conflicts, leaving most actual environmental destruction outside its jurisdiction. In peacetime conditions, the destruction of the environment is still treated as an administrative offense rather than as a crime against humanity.

Although there are many limitations, recent years have seen signs of evolution within the international legal framework. In the last few years, there has been a noticeable shift in international legal practice indicating a gradual transformation in the approach to environmental crime. The proposal to include the crime of ecocide in the Rome Statute of the International Criminal Court (2021–2024), initiated by an independent expert panel under the *Stop Ecocide Foundation*, represents an effort to elevate environmental destruction to the level of a crime against humanity. In parallel, the European Union adopted in 2024 a new Directive on the protection of the environment through criminal law, strengthening the obligation of Member States to incorporate environmental offenses with elements of corporate liability into their national legislation. Additionally, the International Court of Justice, in rulings such as *Costa Rica v. Nicaragua*, has developed a practice of recognizing transboundary environmental damage as a breach of international law. These initiatives demonstrate that, although slowly, the global legal system is moving from an administrative toward a criminal treatment of environmental offenses, opening space for a new paradigm of international responsibility.

An additional problem lies in the fact that the main actors of environmental offenses are not individuals but collective entities—corporations, state agencies, and international consortia. Their actions cannot be reduced to the intent of a single person, nor can responsibility be precisely localized. When pollution results from decisions made by boards, management, or interconnected institutions, the legal system remains without an adequate instrument. Traditional legal concepts of causality, guilt, and intent lose their meaning. Thus, a paradox arises: the larger and more organized the offense, the harder it is to prove.

The lack of a universal definition of environmental crime leads each state to apply its own standards, while corporations exploit these differences as a space for maneuvering. In countries with weak institutions, formal compliance with regulations often conceals the actual absence of protection. Investors, insurance companies, and international financial organizations indirectly participate in the chain of responsibility, yet their role cannot be clearly defined in legal terms. As a result, environmental crime is increasingly described as a “crime without a perpetrator”, where guilt is systemic and consequences are global.

A particular challenge lies in proving the causal link between activity and harm. Environmental processes are slow, multifactorial, and often irreversible. Damage may appear years after the act, in another state's territory, and under the influence of additional factors. Courts accustomed to the logic of direct causality find it difficult to accept models based on probability and statistical correlation. Scientific evidence is often challenged due to alleged methodological relativism, while the legal system adheres to rigid formalism. Within such a framework, responsibility disappears among “multiple possible causes.”

Institutional barriers further deepen this gap. International organizations such as UNEP or UNODC have limited mandates and depend on the political will of member states. National agencies operate within budgetary and staffing constraints and are often influenced by local economic interests. This



creates a situation in which everyone is obliged to protect the environment, yet no one is able to take decisive action. The lack of coordination between scientific institutions, regulatory bodies, and the judiciary leads to evidence being lost in administrative procedures.

The solution does not lie in further multiplying regulations but in their integration. It is necessary to create mechanisms that connect scientific findings, legal standards, and institutional practice into a unified system of proof. In this regard, one can speak of a model of integrated verification, based on three principles: data transparency, mutual recognition of scientific results, and ongoing cooperation between international and national institutions. This establishes a chain of legitimacy—from scientific fact to legal decision. Evidence must be verifiable, accessible, and interpreted within a shared methodological framework, because truth that cannot be used legally loses its meaning.

Ultimately, no regulation can compensate for the lack of ethical will to enforce the law. Political interests and investor pressures continue to play a decisive role in shaping environmental policy. Even when scientific evidence is indisputable, it often remains without consequence if there is no institutional courage to apply it. Therefore, proving environmental crime is not only a legal issue but also a moral question—a matter of institutional integrity and trust in science. Only in societies where truth carries more weight than interest does evidence become the foundation of justice rather than a decoration of procedure.

## THE ETHICS OF SCIENCE AND THE CONCEPT OF SUSTAINABLE JUSTICE

If science is capable of establishing truth and law is capable of formally confirming it, the remaining question concerns the ethical will of society to accept and implement that truth. In this sense, proving environmental crime is not merely a technical or legal procedure but a mirror of the moral state of civilization. Science that uncovers facts without the willingness to assume responsibility for their consequences becomes a tool of power rather than an instrument of understanding. The ethics of scientific responsibility therefore becomes a central issue: is it possible to be both objective and responsible, neutral and aware of the moral impact of one's own knowledge?

The modern scientist, particularly one engaged in environmental investigations, stands between two opposing forces. On the one hand, impartiality, measurement, and demonstrable accuracy are expected; on the other, the scientist's knowledge has political and economic consequences that go far beyond the laboratory. Every data point on pollution, every toxin analysis, and every satellite image of environmental devastation can influence capital flows, investor decisions, or international relations. In this fusion of knowledge and power, science loses the illusion of neutrality and becomes part of the system of decision-making. Within this nexus, responsibility arises — one not prescribed by law but one that defines the moral credibility of the entire scientific order.

The ethics of science, in the context of environmental crime, rests on three fundamental principles. First, transparency of knowledge: all data and methodologies must be publicly available and verifiable, because truth without accessibility becomes a privilege. Second, independence of funding: scientific institutions that depend on the same economic actors whose conduct they investigate lose their credibility. Third, public responsibility of scientists: anyone who possesses knowledge of environmental harm has a moral duty to make that knowledge visible. Silence in the name of career, project, or political convenience is equivalent to participation in concealing a crime.

In this sense, the ethics of scientific responsibility leads to a broader concept — that of sustainable justice. Sustainable justice does not only imply sanctioning offenders but also preventing future harm and



preserving the conditions of life for future generations. While traditional law looks backward, toward guilt and punishment, sustainable justice looks forward, toward consequences and responsibility. It demands that environmental decisions be made in accordance with the principle of intergenerational solidarity: what we do today must also be just toward those yet to come. Within this framework, science and law become joint guardians of the future.

Sustainable justice also requires a new kind of epistemological ethics — an awareness that truth carries a moral cost. To know is to be responsible. A scientist who possesses evidence of degradation and conceals it becomes an accomplice; an institution that knows but remains silent loses its legitimacy. In this respect, scientific evidence ceases to be neutral — it becomes a moral statement about whether society has the strength to face its own truth. Scientific ethics thus moves from the sphere of the individual to that of collective action. When truth becomes a shared value, law gains its essence, and justice becomes sustainable.

The role of the ethics of scientific responsibility, therefore, is to connect three dimensions that have thus far operated separately — knowledge, law, and value. In the union of these dimensions lies the potential for a new civilizational balance. For if science knows, law judges, and morality remains silent, the world becomes a place where truth has no effect. Sustainable justice, as a synthesis of rationality and compassion, is the only framework within which the proof of environmental crime can have meaning — not in order to punish, but to prevent repetition.

## CONCLUSION

### *From Environmental Crime to Global Responsibility*

**Environmental crime represents the deepest manifestation of the imbalance between power and responsibility in the modern world. It is not merely the result of human greed but a reflection of a structural model of civilization that measures progress by the quantity of consumption rather than by the quality of life.** In such a system, nature becomes a commodity and pollution a by-product of profit. While science continues to perfect its ability to measure consequences, society remains unable to transform those consequences into mechanisms of accountability. Crime against nature thus becomes the paradigm for all other forms of injustice—it exposes the logic of a world in which truth exists but lacks the strength to change reality.

Viewed in this light, the proving of environmental crime is not merely a legal act but a civilizational test of maturity. It requires the ability to connect three levels—empirical accuracy, institutional courage, and moral awareness. Science must speak clearly, law must act consistently, and politics must accept the limits imposed by truth. Without this threefold unity, all evidence remains dead data and all laws empty formalities. The true struggle against environmental crime does not begin in the courtroom but in the transformation of how we understand responsibility.

In this sense, this paper begins from the premise that sustainable justice cannot be achieved without a global ethic of responsibility. In a world of interdependent economies, no state can remain ecologically sovereign. Pollution, climate change, and resource depletion recognize no borders; therefore, neither can responsibility. What is needed is a shared legal and moral foundation—a system that recognizes truth independently of power. Such global responsibility does not mean shifting blame onto others but acknowledging that no form of progress has meaning if it destroys the conditions of life.

Sustainable justice also demands a new role for science: not merely to be a witness, but a guardian. Scientific evidence must become a driver of social awareness rather than a document for archives. Truth



holds value only if it produces action. When scientific integrity unites with legal mechanisms and ethical obligation, a space emerges in which ecological truth becomes the foundation of social trust. That trust is essential, for without it neither law nor science can function effectively.

Ultimately, environmental crime cannot be eradicated by punishment but only through a change in the value paradigm. Responsibility is no longer a legal term but a civilizational task. It implies the understanding that every act toward nature is simultaneously an act toward oneself. Proving, in this sense, becomes a metaphor for renewal—an act through which society reaffirms that it still understands the difference between truth and falsehood, between knowledge and its abuse. Only in such a world can we speak of justice that is not transient, but one that preserves the possibility of the future.

### *Case Study: The “Duboko” Landfill and the Social Perception of Responsibility*

To observe abstract concepts of environmental responsibility within a real context, it is useful to analyze specific examples in which global patterns of irresponsibility are reflected on the local level. Such a case is the regional “Duboko” landfill near Užice — one of the most significant waste management projects in western Serbia — which for years has symbolized the conflict between the idea of sustainability and the reality of institutional incapacity. The project was conceived as a model of a modern, regionally organized system supported by international development programs, yet in practice it has proven to be an example of structural environmental vulnerability — a place where technical, institutional, and social limitations intersect.

Research conducted within the rehabilitation and reclamation program of the regional landfill revealed a pronounced gap between the formal management system and citizens’ perception of its effectiveness. Survey data indicate a high level of public concern over potential pollution of air, soil, and groundwater, accompanied by a low level of trust in local and national institutions. Only a small portion of respondents believe that waste is treated in accordance with regulations, while the majority consider that environmental problems persist and are being addressed only “on paper.” This gap between institutional discourse and public perception of risk carries deep epistemological significance: it demonstrates that in societies with low trust, neither scientific nor legal evidence possesses full legitimacy.

The “Duboko” landfill also reveals a complex network of responsibilities characteristic of environmental systems in transitional countries. Waste management is divided among multiple local governments, a regional enterprise, relevant ministries, and financial partners, resulting in fragmentation of authority. Each institution holds a portion of control, yet none bears complete responsibility. In practice, this means that problems persist in a state of “temporary technical solution,” while actual risks remain unregulated. This fragmentation essentially represents a micro-version of the global pattern of diffuse responsibility: formally, a network of regulations exists, but there is no central decision-making body capable of ensuring enforcement.

Technical analyses conducted during the investigative works identified the presence of gas emissions and indicators of potential groundwater pollution. However, these findings did not lead to a clear institutional response. Scientific evidence existed but did not evolve into a legal obligation. This discrepancy between knowledge and action confirms the central thesis of this paper — that in contemporary environmental issues, the main challenge lies not in discovering the truth, but in the willingness to respond to it. Truth without institutional will remains a document, not an instrument of change.

The role of the public in this process is particularly significant. Confronted with institutional distrust, citizens have become carriers of what can be called social forensics — collective testimony about consequences and the fear of risk. Their experiences and perceptions become part of the evidence, not in the legal but in the moral sense. When a community feels that the truth about its environment is inac-



cessible, a sense of loss of control emerges, turning into passive resignation. At that point, institutions lose their legitimacy, and the public ceases to believe in the possibility of justice. Thus, environmental responsibility becomes a question of trust — a form of trust that is harder to rebuild than the physical infrastructure itself.

The “Duboko” case illustrates, in miniature, what in the global context is a universal pattern: a system that strives for sustainability but produces unsustainability; a project that promotes transparency but operates within institutional opacity; scientific analyses that uncover problems but fail to trigger action. It shows that sustainability is not a technical but a political and moral issue. Environmental infrastructure cannot be sustainable if the social infrastructure of trust does not exist.

In conclusion, this local example confirms the general thesis of the paper: **environmental crime does not arise from the silence of scientific ignorance but from the silence of institutions that know but do not act.** “Duboko” is not merely a geographical location but a metaphor for the planet in miniature — a world in which truth, power, and responsibility are disconnected, and their reconnection becomes a condition for survival. This case study, therefore, does not offer a solution but a warning: every landfill, every invisible source of pollution, every silence over a known fact forms part of the same civilizational equation, in which the question of survival depends on the willingness to transform knowledge into responsibility.

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