

From Rocks to Rights: Constitutional Imperatives for Geo-Heritage Preservation in India

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ABSTRACT

In an era where environmental discourse is predominantly centred around forests, wildlife, and biodiversity, the silent erosion of geological heritage remains largely overlooked. Recent instances of quarrying and infrastructure expansion encroaching upon scientifically significant landforms reveal a troubling paradox that even though India recognizes its geo-heritage, yet it lacks an effective legal framework to protect it. Geo-heritage, comprising unique geological formations, fossil records, and landforms, represents an irreplaceable archive of Earth's evolutionary history. Unlike other environmental resources, these features are inherently non-renewable; their destruction results in a permanent loss to science, culture, and future generations.

Against this backdrop, this paper seeks to reconceptualize geo-heritage preservation as a constitutional imperative rather than a mere policy concern. It analyses the extent to which constitutional provisions and judicial principles can be invoked to protect geo-heritage in the absence of specific legislation. By situating geo-heritage within the broader framework of environmental constitutionalism, the paper advocates for a more comprehensive and inclusive approach to environmental protection, one that recognizes the intrinsic and scientific value of geological resources alongside biological diversity. Adopting an eco-centric perspective, the paper argues for a shift in environmental constitutionalism that recognizes the intrinsic value of both living and non-living components of the environment. It ultimately calls for a more inclusive constitutional interpretation and stronger legal mechanisms to ensure that India's geological legacy is preserved as part of its natural and constitutional heritage.

KEYWORDS: Geo- heritage, Environmental Constitutionalism, Geological Conservation, Constitutional Law, Sustainable Development

1. INTRODUCTION

Geo-heritage sites are sites of rare and unique geological and geomorphologic significance. They encompass geological formations, landforms, fossil deposits, and other abiotic features that possess scientific, educational, and cultural value, with mineralogical, petrological, as well as paleontological significance. These sites represent the physical record of the Earth's evolutionary history, offering critical insights into geological processes, climatic transformations, and biological evolution.

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Accordingly, they form an irreplaceable archive of the Earth's evolutionary processes, offering insights into climatic shifts, biological evolution, tectonic movements, and environmental transformations over millions of years.

India, owing to its vast and varied geological history, is endowed with a rich repository of such geo-heritage sites, including ancient rock systems, volcanic provinces, fossil parks, caves, and distinctive geomorphological formations. Notable examples include the Lonar Crater in Maharashtra, formed by a meteorite impact; the Eocene-age Shivalik Fossil Park in Himachal Pradesh; and the Deccan Traps, showcasing extensive volcanic activity. These sites are of immense value not only to the scientific community but also to society at large, as they contribute to education, cultural identity, and sustainable development through avenues such as geo-tourism. Geo-tourism, in particular, promotes environmental awareness, provides economic benefits to local communities, and fosters a sense of stewardship towards natural heritage.

Yet despite their immense significance, these geo-heritage sites have not received adequate recognition within India's legal and policy framework, often being overshadowed by the emphasis on biodiversity conservation and wildlife protection. Environmental governance in India has traditionally prioritized the protection of biodiversity, forests, and wildlife, often overlooking the importance of non-living components of the natural environment. This limited focus has led to inadequate policy measures and resource allocation for the conservation of geological sites.

The threats to geo-heritage in India have further intensified in recent decades due to rapid industrialization, infrastructure development, unregulated mining, quarrying, and urban expansion. In many instances, geological formations of considerable scientific value have been irreversibly damaged or destroyed. For example, heritage rock formations near Hyderabad have succumbed to real estate development, and illegal fossil trading has emerged as a significant issue in fossil-rich regions. The situation is further exacerbated by unregulated tourism, lack of public awareness, and inadequate enforcement mechanisms, leading to the degradation of geo-relics such as fossils and fragile rock structures. Unlike renewable environmental resources, geo-heritage is inherently non-renewable; its loss is permanent and irreversible. This underscores the urgent need for a robust legal framework to ensure its preservation.

At present, India lacks a dedicated statutory regime for the protection and management of geo-heritage. While certain geo-heritage sites have been identified and notified by administrative bodies such as the Geological Survey of India, these measures remain limited in scope and lack enforceability. Existing environmental legislation, though broad in its ambit, such as the Environment (Protection) Act, 1986, and the Forest Conservation Act, 1980, does not explicitly address geological conservation, resulting in a fragmented and insufficient approach to the protection of geo-heritage.

In this context, the Constitution of India provides a compelling normative framework for environmental protection that can be extended to include geo-heritage. The Indian judiciary has played a pivotal role in advancing environmental constitutionalism by interpreting constitutional provisions in a manner that prioritizes ecological preservation. However, judicial discourse has largely concentrated on the protection of living components of the environment, with limited explicit recognition of geological heritage. This gap highlights the need to extend the scope of constitutional and judicial protection to encompass geo-heritage preservation as an integral element of the environmental constitutionalism of India.

2. REVIEW OF LITERATURE

• International Literature

Henriques, M.H. & Brilha, J. (2020) conducted comparative studies on legal instruments across Europe, identifying best practices for integrating geo-heritage protection into environmental legislation.

Brilha, J. (2015) proposed criteria for the assessment and management of geo-heritage, highlighting the necessity for international guidelines that could influence national legal structures.

Gray, M. (2013) introduced the concept of geodiversity, arguing that legal frameworks should integrate geo-conservation principles to ensure the protection of geological features alongside biodiversity.

• Indian Literature

Chakraborty, T. & Sinha, R. (2022) critically examined state-level initiatives for geo-heritage management in India, concluding that fragmented legal approaches are insufficient without a cohesive, dedicated national legal framework.

Geological Survey of India Report (2020) highlighted the significance of geo-heritage sites identified across India, stressing the urgent need for legislative measures to prevent degradation due to urbanisation and industrial activities.

Sarkar, S. (2018) explored the Indian context of geo-conservation, recommending the establishment of a national policy framework that legally recognises and protects geo-relics.

Bose, P. & Ghosh, A. (2016) analysed the gaps in India's legal system concerning geo-heritage protection, pointing out the absence of specific legislation akin to laws for biodiversity conservation.

3. RESEARCH OBJECTIVES

The Paper would strive to address the following objectives:

1. To evaluate the current legal framework in India concerning the protection of geo-heritage and identify existing gaps.
2. To examine the need for geo-heritage preservation as a constitutional imperative rather than a policy concern.
3. To examine the constitutional provisions that support the inclusion of geo-heritage within India's environmental protection framework.
4. To evaluate the effectiveness of key environmental judicial doctrines in preventing irreversible damage to geological formations and geo-heritage.
5. To propose stronger legal mechanisms and constitutional interpretations aimed towards preserving India's geological legacy as part of its natural heritage.

4. RESEARCH HYPOTHESIS

The Paper shall strive to test the following hypotheses:

1. That the current legal framework in India concerning the protection of geo-heritage contains significant gaps that hinder effective conservation.
2. That geo-heritage preservation is more effectively ensured when regarded as a constitutional imperative rather than solely a policy concern.
3. That constitutional provisions in India provide a robust foundation to support the inclusion of geo-heritage within the country's environmental protection framework.
4. That the key environmental judicial doctrines in India are effective in preventing irreversible damage to geological formations and geo-heritage.

5. That stronger legal mechanisms and constitutional interpretations will significantly enhance the preservation of India's geological legacy as an integral part of its natural heritage.

5. RESEARCH METHODOLOGY

The research methodology adopted in the research project is mainly constituted of doctrinal method of research. The population of the research is that of the territory of India. The sources relied are mostly secondary sources, including articles, reports and research works.

6. CONSTITUTIONAL FOUNDATION OF GEO-HERITAGE PRESERVATION IN INDIA

The Indian Constitution provides a broad and dynamic framework for environmental protection through the combined operation of Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties. Over time, judicial interpretation has transformed these provisions into a powerful mechanism for environmental governance. This evolving constitutional framework is sufficiently expansive to accommodate the protection of geo-heritage, even in the absence of a specific statutory regime. By interpreting the concept of “environment” in an inclusive manner, the Constitution enables the recognition of geological features as an integral part of the natural environment deserving protection. Accordingly, the articles of the Indian Constitution which can be expanded in their interpretation to include geo-heritage preservation are examined in detail below:

6.1. Under Article 21: People’s Right to Life and Environment

Article 21 of the Constitution guarantees the right to life and personal liberty, and its judicial interpretation has significantly expanded its scope to include environmental rights. The Supreme Court has consistently held that the right to life encompasses the right to live in a clean and healthy environment, free from ecological degradation. This interpretation has transformed environmental protection into a justiciable right, allowing individuals to seek judicial remedies against environmental harm. The Court’s reasoning is grounded in the understanding that environmental quality is intrinsically linked to human dignity and well-being.

In this context, geo-heritage assumes considerable importance, as geological formations and landforms play a crucial role in maintaining ecological balance and environmental stability. Activities such as unregulated mining, quarrying, and infrastructure development often result in the destruction of these formations, leading to long-term environmental consequences such as soil erosion, groundwater depletion, and increased vulnerability to natural disasters. Such degradation not only affects the physical environment but also undermines the conditions necessary for a dignified human life. Therefore, the preservation of geo-heritage can be interpreted as falling within the ambit of Article 21, as its destruction may constitute a violation of the fundamental right to a healthy environment.

6.2. Under Article 48A: State’s obligation towards the Environment

Article 48A, introduced by the 42nd Constitutional Amendment, imposes a duty on the State to protect and improve the environment and to safeguard forests and wildlife. Although it is a Directive Principle and not directly enforceable, it plays a vital role in shaping legislative and policy decisions. The judiciary has frequently relied on Article 48A to reinforce the State’s obligation to adopt measures for environmental conservation, thereby bridging the gap between non-justiciable principles and enforceable rights.

The scope of Article 48A is not confined to biological elements of the environment but extends to the broader ecological system, including its physical and geological components. Geological formations,

fossil deposits, and unique landforms constitute an essential part of the natural environment and contribute to scientific knowledge, ecological processes, and cultural heritage. A purposive interpretation of Article 48A therefore supports the inclusion of geo-heritage within its ambit. Despite this, the practical implementation of environmental policies has largely prioritized forests and wildlife, often neglecting geological conservation. This imbalance highlights the need for a more holistic understanding of environmental protection, one that fully integrates geo-heritage into the constitutional mandate imposed upon the State.

6.3. Under Article 51A(g): Citizens' Duty towards the Environment

Article 51A(g) establishes a fundamental duty on every citizen to protect and improve the natural environment, including forests, lakes, rivers, and wildlife. Although Fundamental Duties are not enforceable in a court of law, they serve as an important moral and constitutional guide for both citizens and the judiciary. Courts have frequently invoked this provision to emphasize that environmental protection is a shared responsibility, requiring active participation from individuals as well as the State. The relevance of this duty becomes particularly evident in the context of geo-heritage, which is highly susceptible to human-induced damage. Geological sites are often subject to vandalism, unauthorized fossil collection, and unregulated tourism, all of which contribute to their degradation. In such circumstances, the role of citizens becomes critical in ensuring the preservation of these sites. By interpreting Article 51A(g) broadly, it is possible to extend the duty of environmental protection to include geological heritage. This not only promotes public awareness but also encourages community involvement in conservation efforts, thereby strengthening the overall framework for geo-heritage preservation.

7. JUDICIAL FOUNDATION OF GEO-HERITAGE PRESERVATION IN INDIA

In the absence of a comprehensive statutory framework specifically addressing geo-heritage preservation in India, the judiciary has emerged as a crucial institution in shaping environmental governance. Through purposive interpretation of constitutional provisions and the incorporation of international environmental principles, courts have developed a rich body of jurisprudence that indirectly supports the protection of geo-heritage. Although geo-heritage has not been explicitly recognized as a separate legal category in most judicial decisions, the doctrines and principles evolved in environmental case law provide a strong and adaptable foundation for its preservation. Judicial intervention has thus played a vital role in bridging legislative gaps and ensuring that natural resources, including geological formations, are protected from irreversible harm.

7.1. Early Judicial Intervention: Quarrying and Environmental Protection

One of the earliest instances of judicial engagement with environmental degradation arising from human activities can be seen in *Rural Litigation and Entitlement Kendra v. State of Uttar Pradesh*, widely known as the Dehradun Quarrying Case. In this case, the Supreme Court addressed the adverse environmental impact of limestone quarrying in the Mussoorie hills. The Court ordered the closure of several quarries after finding that the mining activities were causing significant ecological damage, including deforestation, landslides, and disruption of water resources.

Although the judgment did not explicitly refer to geo-heritage, its implications for geological conservation are significant. Quarrying operations often involve the destruction of unique rock formations and geological structures that hold scientific and educational value. By prioritizing environmental protection over economic interests, the Court implicitly recognized the importance of

preserving natural landscapes in their original form. This case marked a turning point in Indian environmental jurisprudence, as it established the principle that environmental concerns could justify restrictions on industrial and developmental activities. It also demonstrated the judiciary's willingness to intervene proactively in matters involving ecological degradation, thereby laying the groundwork for future cases involving geo-heritage preservation.

7.2. Expansion of Article 21 and Environmental Rights

The judicial expansion of Article 21 has been instrumental in establishing environmental protection as a fundamental right. In a series of cases under *M.C. Mehta v. Union of India*, the Supreme Court interpreted the right to life as encompassing the right to a clean and healthy environment. This interpretation has had far-reaching implications, as it allows individuals to seek judicial remedies against environmental harm, thereby making environmental protection enforceable.

The Court's reasoning is based on the recognition that environmental degradation directly affects human health, safety, and quality of life. In this context, geo-heritage assumes relevance as an integral component of the natural environment. Geological formations contribute to ecological stability, regulate water systems, and influence land use patterns. Their destruction can lead to long-term environmental consequences, including soil erosion, groundwater depletion, and increased vulnerability to natural disasters. By linking environmental protection to the right to life, the judiciary has created a legal framework within which geo-heritage can be protected, even in the absence of explicit statutory provisions.

Furthermore, the *M.C. Mehta* cases introduced the principle of absolute liability for hazardous activities, holding industries strictly accountable for environmental damage. This principle can be extended to activities such as mining and quarrying that threaten geo-heritage sites, ensuring that those responsible for environmental harm are held liable for the consequences of their actions.

7.3. Doctrine of Sustainable Development and Precautionary Principle

The recognition of sustainable development as a guiding principle in environmental law represents a significant milestone in judicial reasoning. In *Vellore Citizens Welfare Forum v. Union of India*, the Supreme Court formally incorporated the concepts of sustainable development, the precautionary principle, and the polluter pays principle into Indian law. The Court emphasized that development must be balanced with environmental protection and that preventive measures should be prioritized over remedial action.

This approach is particularly relevant to geo-heritage preservation, as geological formations are non-renewable and cannot be restored once destroyed. The precautionary principle requires that any activity likely to cause environmental harm be carefully evaluated and, if necessary, restricted or prohibited, even in the absence of conclusive scientific evidence. In the context of geo-heritage, this implies that mining, construction, or tourism activities in or near geological sites must be subject to stringent scrutiny.

The doctrine of sustainable development further reinforces the need to balance economic interests with the preservation of natural resources. Geo-heritage sites often face threats from development projects, particularly in resource-rich areas. By applying the principles laid down in *Vellore Citizens*, courts can ensure that such projects do not compromise the integrity of geological formations and that long-term environmental considerations are given due importance.

7.4. Public Trust Doctrine and State Responsibility

The public trust doctrine, as articulated in *M.C. Mehta v. Kamal Nath*, imposes a fiduciary duty on the

State to protect natural resources for the benefit of the public. In this case, the Supreme Court held that resources such as rivers, forests, and air are held in trust by the State and cannot be exploited for private gain in a manner that undermines public interest. This doctrine has since become a cornerstone of Indian environmental jurisprudence.

The application of the public trust doctrine to geo-heritage is both logical and necessary. Geological formations, like other natural resources, are part of the common heritage of the nation and possess significant scientific, educational, and cultural value. By recognizing geo-heritage as a public trust resource, the State can be held accountable for its preservation and prevented from permitting activities that may lead to its destruction. This doctrine also provides a legal basis for challenging governmental decisions that prioritize economic development over environmental conservation, particularly in cases involving mining or infrastructure projects in geo-heritage areas.

7.5.Environmental Accountability and Liability Principles

In *Indian Council for Enviro-Legal Action v. Union of India*, the Supreme Court emphasized the importance of environmental accountability by holding industries liable for the damage caused by hazardous activities. The Court reinforced the polluter pays principle, stating that those responsible for environmental harm must bear the cost of remediation and restoration.

While this principle is crucial in ensuring accountability, its application to geo-heritage highlights an inherent limitation. Unlike other environmental resources, geological formations cannot be restored once they are destroyed. This underscores the importance of preventive measures and strengthens the argument for the application of the precautionary principle in cases involving geo-heritage. The judgment thus reinforces the need for a proactive approach to environmental protection, one that prioritizes conservation over post-damage compensation.

7.6.Judicial Oversight in Mining and Forest Conservation

The Supreme Court's intervention in cases such as *T.N. Godavarman Thirumulpad v. Union of India* has significantly strengthened environmental governance in India. Through continuous monitoring and the use of the continuing mandamus, the Court has regulated forest conservation and mining activities across the country. It has imposed restrictions on mining in ecologically sensitive areas and emphasized the need for environmental clearances and compliance with regulatory norms.

Similarly, in *Lafarge Umiam Mining Pvt. Ltd. v. Union of India*, the Court examined the process of granting environmental clearances and stressed the importance of environmental impact assessments in decision-making. The judgment highlighted the need to balance development with ecological considerations and underscored the role of expert bodies in evaluating environmental risks.

These cases are particularly relevant to geo-heritage, as many geological sites are located in areas that are rich in mineral resources and therefore vulnerable to mining activities. The principles established in these judgments provide a framework for regulating such activities and ensuring that geo-heritage sites are not sacrificed in the pursuit of economic development.

8. GEO-HERITAGE PRESERVATION AND INDIAN ENVIRONMENTAL CONSTITUTIONALISM

The development of environmental constitutionalism and jurisprudence in India reflects a gradual shift from an anthropocentric approach, which prioritizes human interests, to a more eco-centric perspective that recognizes the intrinsic value of nature. This transformation has been driven largely by judicial innovation, which has expanded the scope of constitutional provisions to address emerging

environmental challenges. Courts have increasingly emphasized the importance of ecological balance, intergenerational equity, and sustainable development, thereby broadening the conceptual understanding of environmental protection.

Despite the significant contributions of the judiciary to environmental protection, the recognition of geo-heritage remains largely indirect and incidental. Traditionally, non-living elements of the environment have received limited attention in legal discourse, as they are not directly associated with biodiversity or human survival. Most judicial decisions have focused on forests, wildlife, and pollution control, with limited attention to non-living components of the environment. This lack of explicit recognition creates challenges in enforcing protection for geo-heritage sites, as they may not always be prioritized in environmental decision-making.

However, the adaptability and expansiveness of the existing environmental jurisprudence provides sufficient scope for the inclusion of geo-heritage within its ambit. By adopting a more holistic and eco-centric approach, courts can explicitly recognize geological formations as an integral part of the environment and extend legal protection to them. By applying the established principles of environmental constitutionalism in a purposive manner, the courts can bridge the existing legal gap and ensure that India's geological heritage is preserved for future generations. Such recognition would not only strengthen the legal framework for geo-heritage preservation but also contribute to a more comprehensive understanding of environmental protection.

An eco-centric approach acknowledges that geological formations possess inherent scientific, educational, and cultural value. Their preservation is essential not only for maintaining ecological integrity but also for ensuring that future generations have access to these natural resources. As environmental constitutionalism continues to evolve, it provides a strong theoretical and legal basis for recognizing geo-heritage as an integral component of the environment deserving constitutional protection.

9. CONCLUSION

The analysis undertaken in this article demonstrates that geo-heritage preservation in India, though inadequately addressed within the existing statutory framework, is firmly supported by the broader scheme of constitutional environmentalism. Geological formations and geo-relics, as integral components of the natural environment, possess immense scientific, cultural, educational, and ecological value. Their non-renewable character and susceptibility to irreversible damage necessitate a legal approach that prioritizes prevention, conservation, and sustainable management. However, the current legal regime, characterized by the absence of a dedicated legislative framework and limited policy focus, remains insufficient to effectively safeguard these invaluable resources.

The Constitution of India provides a strong normative foundation for addressing this gap. The judicial expansion of Article 21 has firmly embedded the right to a clean and healthy environment within the ambit of the right to life, thereby making environmental protection an enforceable fundamental right. When read in conjunction with Article 48A, which mandates the State to protect and improve the environment, and Article 51A(g), which imposes a corresponding duty upon citizens, a comprehensive constitutional framework emerges. Although these provisions do not explicitly refer to geo-heritage, their broad and purposive interpretation allows for the inclusion of geological resources within their scope. This framework, if effectively utilized, has the potential to bridge the current legal vacuum and ensure the protection of India's geological legacy

Furthermore, the judiciary has also played a pivotal role in strengthening environmental governance through the development of key doctrines such as the precautionary principle, the polluter pays principle, and the public trust doctrine. In the context of geo-heritage, where damage is often irreversible, these doctrines assume particular significance and collectively impose obligations on the State and private actors to ensure that environmental concerns are not subordinated to economic interests. Besides these, the principles of sustainable development, intergenerational equity, and ecological balance, as evolved through judicial interpretation, reinforce the constitutional necessity of preserving geo-heritage for both present and future generations.

In light of these considerations, geo-heritage preservation must be understood as a constitutional imperative rather than a matter of policy discretion. While India possesses a strong constitutional and judicial foundation for environmental protection, the inclusion of geo-heritage within this framework requires greater clarity, recognition, and action. A holistic and integrated approach, combining legal reform, judicial engagement, institutional efficiency, and public participation, is essential to ensure that India's geological heritage is preserved as a vital part of its natural and constitutional legacy for generations to come.

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