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Geographical Indications and Protection of Ecosystems: A Nature-Based Solution to Sustainable Development

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Abstract

The relationship between intellectual property protection and environmental sustainability has gained increasing recognition in contemporary legal scholarship. Geographical Indications (GIs), as a category of intellectual property, establish a direct link between product quality and geographical origin. This connection inherently depends upon ecological conditions such as soil quality, climate, biodiversity, and traditional knowledge systems. The present article examines how GI protection contributes to ecosystem conservation and sustainable development through legal, economic, and environmental mechanisms. The study analyses the Geographical Indications of Goods (Registration and Protection) Act, 1999, constitutional environmental principles, and international legal instruments including the TRIPS Agreement and the Convention on Biological Diversity. It argues that GI protection operates as a nature-based solution that encourages conservation of biodiversity, promotes sustainable agricultural practices, and strengthens community participation in environmental governance. The article further suggests legal and policy reforms for integrating environmental considerations into GI governance frameworks.

Keywords: Geographical Indications, Ecosystem Protection, Biodiversity, Sustainable Development, TRIPS, Traditional Knowledge, Environmental Law

1. Introduction

Environmental degradation, climate change, and biodiversity loss present serious challenges to global sustainable development. Modern environmental governance increasingly emphasizes legal frameworks capable of balancing economic growth with ecological conservation. In this context, Geographical Indications (GIs) emerge as an important legal mechanism linking intellectual property protection with environmental sustainability.

A Geographical Indication identifies goods as originating from a specific geographical region where particular qualities or characteristics are essentially attributable to natural or human factors associated with that region.[1] These factors frequently include climate conditions, soil composition, biodiversity, and

[1] Dev Gangjee, *Relocating the Law of Geographical Indications* (Cambridge University Press 2012) 18.

traditional knowledge systems. Consequently, preservation of environmental conditions becomes essential for maintaining the distinctive characteristics of GI products.

India possesses rich biodiversity and traditional knowledge systems reflected in numerous registered GI products such as Darjeeling Tea, Banarasi Saree, and Kanchipuram Silk. These products depend upon ecological conditions and traditional production practices that are environmentally sustainable in nature.

The present article examines whether GI protection can function as a nature-based legal solution contributing to ecosystem conservation and sustainable development.

2. Concept and Legal Framework of Geographical Indications

Geographical Indications constitute an important category of intellectual property rights recognized at both international and national levels.

2.1 International Legal Framework

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) provides protection to Geographical Indications under Articles 22 to 24.[2] Article 22 defines GIs as indications identifying goods as originating in a territory where a given quality, reputation, or characteristic is essentially attributable to its geographical origin.

The Convention on Biological Diversity, 1992 emphasizes conservation of biological diversity and sustainable use of natural resources.[3] GI protection supports these objectives by encouraging preservation of traditional agricultural practices and biodiversity linked to specific geographical regions.

2.2 National Legal Framework in India

In India, GIs are protected under the Geographical Indications of Goods (Registration and Protection) Act, 1999.[4] Section 2(1)(e) defines GI as an indication identifying goods as originating from a definite geographical territory where a given quality, reputation or other characteristic is essentially attributable to its geographical origin.

The Act recognizes the collective rights of producers and aims to prevent unauthorized use of geographical names that mislead consumers.

The legal recognition of the link between geographical origin and product characteristics implicitly recognizes the importance of preserving ecological conditions necessary for maintaining product identity.

3. Relationship between Geographical Indications and Ecosystem Protection

3.1 Ecological Foundations of GI Products

The conceptual foundation of Geographical Indications is intrinsically linked with ecological specificity. Unlike other intellectual property regimes that protect innovation or creativity independent of environmental context, GI protection is dependent upon the existence of a functional relationship between geographical environment and product characteristics. The distinctive quality, reputation, or other attributes of GI products emerge from the interaction between natural and human factors within a defined territorial boundary. These natural factors include soil composition, rainfall pattern, altitude, climatic variability, hydrological conditions, and biodiversity composition.[5] The cumulative interaction of these

[2] Agreement on Trade-Related Aspects of Intellectual Property Rights 1994, arts 22–24.
[3] Convention on Biological Diversity 1992, art 1.
[4] Geographical Indications of Goods (Registration and Protection) Act 1999, s 2(1)(e).
[5] Dev Gangjee, *Relocating the Law of Geographical Indications* (Cambridge University Press, 2012) 21.

ecological elements produces unique product characteristics that cannot be replicated outside the identified geographical region, thereby justifying legal protection.

Soil composition plays a crucial role in determining nutrient absorption capacity, microbial diversity, and chemical properties influencing product characteristics. The mineral composition, organic content, and fertility structure of soil contribute to biochemical processes affecting flavour, texture, aroma, and durability of agricultural products. For example, the distinctive quality of Darjeeling Tea is attributed to acidic soil conditions, high altitude, and specific climatic patterns prevailing in the Eastern Himalayan ecosystem.[6] Similarly, the characteristics of Kashmir Saffron are influenced by well-drained soil structure, temperature variation, and photoperiodic conditions that regulate crocin concentration responsible for colour and aroma.[7]

Climatic conditions such as temperature variation, humidity levels, sunlight exposure, and seasonal cycles influence plant metabolism and biochemical composition of agricultural produce. Altitudinal variations create microclimatic conditions that shape ecological niches supporting specialized agricultural practices. The interaction between environmental factors and human cultivation practices produces product distinctiveness that forms the basis of GI protection.[8]

Water availability and hydrological conditions also influence GI product quality. Traditional irrigation practices, groundwater recharge patterns, and rainfall distribution affect soil fertility and crop productivity. Unsustainable water extraction or climate-induced water scarcity may disrupt ecological balance and adversely affect product quality.

Biodiversity constitutes a fundamental component of GI ecosystems. Local plant varieties, microorganisms, and ecological interactions contribute to product uniqueness and sustainability of agricultural systems. GI protection recognizes the importance of preserving ecological conditions necessary for maintaining product identity.

Environmental degradation such as deforestation, soil erosion, pollution, and climate change may disrupt ecological equilibrium within GI regions. Such ecological disturbances may adversely affect productivity, quality consistency, and economic sustainability of GI products. Consequently, legal protection of GIs creates economic incentives for conservation of ecosystems because degradation of environmental conditions may diminish the commercial value and reputation of GI goods.[9] In this manner, GI protection indirectly promotes ecological stewardship and sustainable management of natural resources.

3.2 Role of Traditional Knowledge in Environmental Sustainability

Traditional knowledge constitutes an essential component of GI production systems and reflects long-standing interaction between human communities and ecological resources. Indigenous agricultural practices evolve through continuous experimentation and adaptation to environmental conditions, resulting in sustainable production methods that maintain ecological balance.

Traditional farming systems frequently incorporate environmentally adaptive strategies that promote conservation of soil fertility, water resources, and biodiversity. Organic manure derived from plant residues and livestock waste improves soil structure, enhances microbial diversity, and maintains nutrient balance. Crop rotation practices prevent soil nutrient depletion and reduce vulnerability to pests and

[6] Tea Board of India, *Darjeeling Tea GI Registration Application* (GI Registry 2004).
[7] Government of India, *Kashmir Saffron GI Application* (GI Registry 2008).
[8] Daniel Gervais, *The TRIPS Agreement: Drafting History and Analysis* (4th edn, Sweet & Maxwell 2012) 289.
[9] B Bowman, 'Geographical Indications and Biodiversity Protection' (2015) 8 WIPO Journal 65.

diseases. Natural pest control methods minimize dependence on synthetic chemicals that may cause ecological degradation and biodiversity loss.[10]

Traditional irrigation systems often reflect efficient water management techniques adapted to geographical conditions. Community-based water management practices, including rainwater harvesting and collective irrigation governance, contribute to sustainable utilization of water resources.

Traditional ecological knowledge promotes biodiversity conservation by preserving indigenous crop varieties and encouraging mixed cropping systems. Such practices enhance resilience against climatic uncertainties and reduce ecological vulnerability. Unlike industrial agricultural practices characterized by monoculture cultivation, traditional production systems maintain genetic diversity within agricultural landscapes.

Judicial recognition of traditional knowledge as an important component of biodiversity conservation can be observed in Divya Pharmacy v Union of India, where the Uttarakhand High Court acknowledged the importance of protecting biological resources and associated traditional knowledge from commercial exploitation without equitable benefit sharing.[11] The Court emphasized that biological resources and traditional knowledge form part of national heritage requiring protection under environmental governance frameworks.

Legal recognition of GI products contributes to preservation of traditional knowledge by creating economic incentives for maintaining culturally embedded production techniques. Protection of GI goods encourages continuation of environmentally sustainable agricultural practices and safeguards intangible cultural heritage linked with ecological sustainability.

3.3 GI Protection and Biodiversity Conservation

Biodiversity represents a foundational component of ecological systems supporting GI production. The distinctive characteristics of many GI products depend upon locally adapted plant varieties, endemic species, and ecological interactions contributing to agricultural productivity. Preservation of biodiversity within GI regions therefore becomes necessary for maintaining product identity and ensuring long-term sustainability.

Local crop varieties often possess unique genetic traits enabling adaptation to specific environmental conditions. These genetic characteristics may include resistance to pests, tolerance to climatic variations, and capacity to maintain productivity under ecological constraints. Replacement of traditional crop varieties with commercially standardized hybrid varieties may contribute to genetic erosion and reduce resilience to environmental stress.

The relationship between biodiversity conservation and intellectual property protection has been recognized within international environmental governance frameworks. The Convention on Biological Diversity emphasizes conservation of biological diversity, sustainable utilization of its components, and equitable sharing of benefits arising from use of biological resources.[12] GI protection aligns with these objectives by encouraging conservation of indigenous plant varieties and promoting sustainable agricultural practices.

Indian courts have acknowledged the importance of protecting biodiversity as part of environmental governance. In T.N. Godavarman Thirumulpad v Union of India, the Supreme Court emphasized

[10] FAO, *Traditional Knowledge and Sustainable Agriculture* (Food and Agriculture Organization 2017).
[11] *Divya Pharmacy v Union of India* 2018 SCC OnLine Utt 350.
[12] Convention on Biological Diversity 1992, art 1.

conservation of forest resources and ecological balance as part of sustainable development.[13] Biodiversity conservation contributes to maintaining ecological stability necessary for sustaining agricultural productivity within GI regions.

Similarly, in Intellectuals Forum v State of Andhra Pradesh, the Supreme Court emphasized the importance of preserving ecological resources as part of intergenerational equity.[14] Protection of ecological resources ensures sustainability of natural assets for future generations.

GI protection encourages conservation of traditional crop varieties by providing economic incentives linked with product authenticity. Market recognition of GI products depends upon preservation of geographical characteristics and traditional production methods. Such incentives may contribute to conservation of agrobiodiversity and prevent genetic erosion caused by industrial agricultural expansion.

Biodiversity conservation within GI regions also supports ecosystem services including pollination, nutrient cycling, soil fertility regeneration, pest regulation, and water cycle stabilization. These ecosystem services are essential for maintaining agricultural productivity and ecological resilience. Disruption of biodiversity may adversely affect ecological balance and reduce adaptive capacity to climate change.

Commercialization of GI products may create opportunities for promoting sustainable land use practices that preserve biodiversity while supporting rural livelihoods. Community-based resource management practices associated with GI production often strengthen conservation initiatives and promote equitable distribution of economic benefits.

Thus, GI protection indirectly contributes to biodiversity conservation by encouraging preservation of ecological resources necessary for maintaining product quality, cultural identity, and economic sustainability. The interrelationship between biodiversity conservation and GI protection demonstrates the potential of intellectual property law to function as an instrument supporting environmental sustainability through market-based incentives.

4. Constitutional Principles Supporting Environmental Protection

Indian constitutional jurisprudence recognizes environmental protection as an essential component of the right to life.

4.1 Article 21 and Environmental Protection

The Supreme Court has interpreted Article 21 of the Constitution to include the right to a healthy environment.[15] Environmental protection has been considered necessary for ensuring quality of life and human dignity.

4.2 Directive Principles of State Policy

Article 48A directs the State to protect and improve the environment and safeguard forests and wildlife.[16] Article 51A(g) imposes a fundamental duty upon citizens to protect and improve the natural environment.[17]

These provisions collectively establish a constitutional mandate for environmental protection.

GI protection supports these constitutional principles by promoting sustainable use of natural resources and preservation of ecological balance.

[13] *T.N. Godavarman Thirumulpad v Union of India* (1997) 2 SCC 267.
[14] *Intellectuals Forum v State of Andhra Pradesh* (2006) 3 SCC 549.
[15] *Subhash Kumar v State of Bihar* (1991) 1 SCC 598.
[16] Constitution of India 1950, art 48A.
[17] Constitution of India 1950, art 51A(g).

5. Judicial Approach towards Sustainable Development and Environmental Protection

Indian courts have developed several principles supporting sustainable development and environmental protection.

5.1 Public Trust Doctrine

The Public Trust Doctrine establishes that natural resources are held in trust by the State for the benefit of the public.[18] The State has a duty to protect ecological resources for present and future generations.

5.2 Sustainable Development Principle

The Supreme Court has recognized sustainable development as a balancing concept between economic development and environmental protection.[19]

GI protection reflects this balance by promoting economic benefits for local communities while encouraging conservation of environmental resources.

5.3 Protection of GI Reputation

In Tea Board of India v ITC Ltd, the Calcutta High Court emphasized protection of reputation and authenticity of Darjeeling Tea as a GI product.[20] Protection of authenticity requires preservation of geographical and environmental characteristics associated with the product.

Judicial recognition of reputation highlights the importance of maintaining ecological conditions necessary for GI identity.

6. Geographical Indications as Nature-Based Solutions

Nature-based solutions have emerged as an important governance approach emphasizing sustainable management, conservation, and restoration of ecosystems to address major environmental challenges such as climate change, biodiversity loss, land degradation, and resource depletion. The concept reflects a shift from purely technological or regulatory responses towards integrated ecological approaches that recognize the interdependence between human development and environmental sustainability. The International Union for Conservation of Nature defines nature-based solutions as actions that protect, sustainably manage, and restore natural or modified ecosystems while simultaneously providing human well-being and biodiversity benefits.[21] Within this framework, legal mechanisms that create incentives for conservation of natural resources acquire increasing significance in achieving sustainable development.

Geographical Indications (GIs) function as a potential nature-based legal solution because the economic value of GI products is intrinsically dependent upon ecological conditions prevailing within a defined geographical territory. The distinctive quality, reputation, or characteristics of GI goods are derived from natural factors such as soil composition, climate, water availability, and biodiversity, along with human factors including traditional knowledge and customary production practices.[22] Consequently, degradation of ecological conditions may directly affect product quality, reputation, and marketability. This functional interdependence between environmental conditions and product identity creates economic incentives for local communities to conserve ecosystems and maintain ecological balance.

GI protection encourages sustainable agricultural practices that are compatible with environmental conservation. Traditional cultivation techniques associated with GI products frequently emphasize organic

[18] *MC Mehta v Kamal Nath* (1997) 1 SCC 388.
[19] *Vellore Citizens Welfare Forum v Union of India* (1996) 5 SCC 647.
[20] *Tea Board of India v ITC Ltd* (2011) 45 PTC 241 (Cal).
[21] International Union for Conservation of Nature (IUCN), *Nature-Based Solutions to Address Global Societal Challenges* (IUCN, 2016) 2.
[22] Dev Gangjee, *Relocating the Law of Geographical Indications* (Cambridge University Press, 2012) 25.

farming, mixed cropping patterns, minimal chemical inputs, and efficient utilization of natural resources. Such practices contribute to maintaining soil fertility, conserving water resources, and preserving agrobiodiversity.[23] By creating market recognition for products derived from ecologically sustainable practices, GI protection strengthens environmentally responsible production systems and reduces ecological harm caused by industrial agricultural intensification.

Furthermore, GI protection contributes to biodiversity preservation by encouraging continued cultivation of indigenous crop varieties and maintenance of traditional agricultural landscapes. Many GI products depend upon locally adapted plant species possessing genetic traits suited to specific environmental conditions. Protection of GI products therefore creates incentives to conserve plant diversity and prevent genetic erosion caused by uniform commercial varieties.[24] Biodiversity conservation within GI regions also contributes to ecosystem services such as pollination, soil regeneration, pest regulation, and climate regulation, thereby supporting long-term sustainability of agricultural production.

From a socio-economic perspective, GI protection strengthens local economies by enhancing market value of region-specific products and promoting rural development. Increased economic returns associated with GI products may reduce pressure for environmentally destructive land-use changes and encourage sustainable livelihood practices. Community participation in management of GI production systems often strengthens collective responsibility towards conservation of ecological resources.[25] The involvement of local communities in maintaining traditional knowledge systems further supports intergenerational transmission of environmentally sustainable practices.

The linkage between GI protection and sustainable development is also reflected in international policy frameworks such as the Sustainable Development Goals (SDGs), particularly SDG 12 (responsible consumption and production), SDG 13 (climate action), and SDG 15 (life on land). By promoting sustainable production methods, conservation of biodiversity, and community-based resource governance, GI protection contributes to climate resilience and ecological sustainability.[26] In this manner, Geographical Indications may be understood not merely as intellectual property rights but as regulatory instruments capable of integrating environmental conservation with economic development through nature-based approaches.

7. Challenges in Integrating GI Protection with Environmental Governance

Despite the significant potential of Geographical Indications to contribute towards environmental sustainability, several structural and regulatory challenges limit the effective integration of GI protection with environmental governance frameworks. One of the primary limitations lies in the absence of explicit environmental criteria within the Geographical Indications of Goods (Registration and Protection) Act, 1999. The statutory framework primarily focuses on establishing the link between product characteristics and geographical origin without mandating ecological sustainability standards as a prerequisite for registration.[27] Although the definition of GI under section 2(1)(e) recognizes the importance of geographical factors influencing product quality, the legislation does not expressly require demonstration of environmentally sustainable production practices or conservation of ecological resources.

[23] Food and Agriculture Organization, *Linking Geographical Indications to Sustainable Agriculture* (FAO, 2018) 14.
[24] B Bowman, 'Geographical Indications and Biodiversity Protection' (2015) 8 *WIPO Journal* 70.
[25] Kanchana Kariyawasam, 'The Role of Geographical Indications in Sustainable Development' (2011) 13 *Environmental Law Review* 92.
[26] United Nations, *Transforming Our World: The 2030 Agenda for Sustainable Development* (UN, 2015).
[27] Geographical Indications of Goods (Registration and Protection) Act, 1999, s 2(1)(e).

Consequently, GI registration may occur even where environmental degradation threatens long-term sustainability of the geographical resource base.

Another major challenge concerns the limited regulatory monitoring of ecological sustainability after GI registration. The legal framework does not provide detailed institutional mechanisms to periodically assess whether production practices continue to maintain ecological balance within the designated geographical region. The absence of continuous environmental oversight may permit gradual deterioration of soil quality, biodiversity, and water resources due to market pressures and increased commercialization.[28] This gap reflects the broader fragmentation between intellectual property regulation and environmental governance mechanisms, where separate institutional authorities operate without adequate coordination.

Commercialization pressures also pose a significant risk to ecological sustainability of GI products. Increasing market demand for GI-labelled goods may encourage intensification of production practices that prioritize short-term economic benefits over long-term ecological balance. Expansion of cultivation areas, excessive use of chemical fertilizers, monocropping patterns, and resource overexploitation may adversely affect biodiversity and soil fertility.[29] The transformation of traditional production systems into industrial-scale operations may undermine the ecological foundations upon which GI reputation is based. In such circumstances, economic incentives associated with GI recognition may paradoxically contribute to environmental degradation unless appropriate safeguards are implemented.

Climate change further complicates the relationship between geographical characteristics and product identity. Changes in temperature patterns, rainfall variability, frequency of extreme weather events, and shifting agro-climatic zones may affect the environmental conditions responsible for GI distinctiveness.[30] Alteration of ecological characteristics may gradually weaken the link between geographical origin and product quality, thereby affecting legal validity and commercial reputation of GI goods. Climate vulnerability of agricultural systems highlights the need for adaptive governance mechanisms capable of addressing dynamic environmental changes.

Another challenge relates to limited awareness among producers regarding the environmental significance of GI protection. Many producers primarily associate GI registration with market recognition and economic benefits without fully understanding its potential role in promoting sustainable resource management. Lack of technical knowledge regarding sustainable cultivation practices, biodiversity conservation, and climate adaptation strategies may limit the environmental effectiveness of GI protection.[31] Capacity gaps and informational asymmetry often prevent local communities from fully utilizing GI protection as an instrument of ecological governance.

These challenges indicate that the present legal framework governing GIs does not fully integrate environmental sustainability considerations within intellectual property regulation. Strengthening the environmental dimension of GI protection may enhance its potential contribution towards sustainable development and ecosystem conservation.

8. Policy Recommendations

Effective integration of environmental considerations within GI governance requires doctrinal as well as

[28] Dev Gangjee, *Relocating the Law of Geographical Indications* (Cambridge University Press, 2012) 214.
[29] Laurence Helfer, 'Intellectual Property and the Environment: The Case of Geographical Indications' (2004) 9 *Journal of International Economic Law* 68.
[30] Intergovernmental Panel on Climate Change, *Climate Change and Land* (IPCC, 2019).
[31] Food and Agriculture Organization, *Strengthening Sustainable Food Systems through Geographical Indications* (FAO, 2018) 22.

institutional reforms that align intellectual property protection with ecological sustainability objectives. One important reform involves incorporation of environmental sustainability criteria within the GI registration process. Regulatory guidelines may require applicants to demonstrate that production practices maintain ecological balance, preserve biodiversity, and ensure sustainable utilization of natural resources. Such criteria may strengthen the functional relationship between GI protection and environmental conservation while preventing environmentally harmful practices within designated geographical regions.[32]

Promotion of organic certification and environmentally sustainable agricultural standards for GI products may further enhance ecological benefits associated with GI protection. Encouraging producers to adopt organic farming techniques, reduced chemical inputs, and environmentally responsible production processes may contribute to maintaining soil fertility and biodiversity conservation. Integration of sustainability certification mechanisms with GI labelling may increase consumer confidence while promoting environmentally responsible consumption patterns.

Integration of biodiversity conservation policies with GI regulation may further strengthen environmental governance. Coordination between the GI Registry, biodiversity authorities, and agricultural institutions may promote conservation of indigenous crop varieties and protection of genetic resources associated with GI products. The Biological Diversity Act, 2002 recognizes the importance of conserving biological resources and associated traditional knowledge, which may be harmonized with GI governance frameworks to promote sustainable utilization of ecological resources.[33]

Financial incentives may also play an important role in encouraging adoption of sustainable production practices. Subsidies, grants, or incentive-based programmes may support farmers adopting environmentally sustainable cultivation techniques and climate-resilient agricultural methods. Economic incentives aligned with sustainability objectives may reduce pressure for environmentally harmful intensification of production systems.

Climate adaptation strategies for GI producing regions constitute another important policy dimension. Scientific research institutions and agricultural agencies may assist local communities in developing adaptive cultivation practices capable of responding to changing climatic conditions. Promotion of climate-resilient crop varieties, water conservation strategies, and ecological restoration programmes may strengthen long-term sustainability of GI production systems.[34]

Capacity-building programmes for local communities may improve awareness regarding ecological importance of GI protection. Training programmes focusing on sustainable agriculture, biodiversity conservation, and resource management may strengthen community participation in environmental governance. Participatory institutional mechanisms may promote collective responsibility for preserving ecological resources associated with GI products.

Strengthening institutional coordination between intellectual property authorities and environmental regulatory bodies may enhance coherence in governance frameworks. Integrated policy approaches linking GI regulation with environmental law principles such as sustainable development, precautionary principle, and intergenerational equity may strengthen the role of GI protection as a nature-based legal solution.

[32] B Bowman, 'Linking Geographical Indications with Environmental Protection' (2017) 12 *WIPO Journal* 81.
[33] Biological Diversity Act, 2002, s 36.
[34] UNEP, *Nature-Based Solutions for Climate Adaptation* (UNEP, 2021).

Such reforms may transform GI protection from a purely market-oriented intellectual property right into a multifunctional regulatory instrument capable of promoting environmental sustainability, biodiversity conservation, and climate resilience. Integration of ecological considerations within GI governance frameworks may contribute significantly to achieving sustainable development objectives while preserving cultural and biological heritage associated with geographical regions.

9. Conclusion

Geographical Indications represent an important intersection between intellectual property law and environmental protection. The intrinsic link between product characteristics and geographical origin creates incentives for conservation of ecosystems and biodiversity.

GI protection promotes sustainable agricultural practices, preserves traditional knowledge, and contributes to climate resilience. Integrating environmental considerations within GI governance frameworks can enhance its effectiveness as a nature-based solution for sustainable development.

Therefore, GI protection should be recognized as a significant legal mechanism capable of balancing economic development with environmental sustainability.