

Research Article



Sustainable Tourism in Indonesia's Ring of Fire: Toward Ecological Justice and Green Energy

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Abstract: Indonesia's Ring of Fire holds vast renewable energy and geotourism potential, but this potential can only be optimized through legal governance that is ecologically just. Current governance remains dominated by a sectoral, fragmented regulatory framework that not only causes disharmony but also exacerbates conflicts of interest between energy, tourism, and environmental sectors. This study develops an integrated legal and policy framework based on ecological justice and Pancasila justice, positioning them as complementary paradigms for reconciling development goals with environmental sustainability and social equity. Using a normative legal method that combines statutory interpretation, conceptual approaches, and case analysis of geothermal and geotourism projects. The results show that, first, Indonesia's Ring of Fire holds significant potential for sustainable tourism and renewable energy, yet progress is constrained by fragmented regulations, limited community participation, and the absence of ecological justice in the legal framework. Second, these challenges highlight the urgent need for comprehensive governance transformation that integrates energy, environment, and tourism under a unified legal framework, recognizes nature as a legal subject, and empowers local communities as primary agents of sustainable development. Third, the proposed policy framework promotes sustainable tourism through legal reform, collaborative governance, and ecological justice by revising and harmonizing Tourism, Energy, and Environmental Laws.

Keywords: Ecological; Energy; Geotourism; Sustainable;



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INTRODUCTION

Indonesia, as an archipelagic state with a unique geological character, is situated along the ring of fire, the most volcanically active region in the world.¹ This geographical zone holds immense potential not only in terms of renewable energy sources such as geothermal, hydropower, and biomass, but also for the development of geological tourism (geotourism) that capitalizes on the beauty of volcanic landscapes, hot springs, and high-biodiversity conservation areas.² However, this significant potential exists alongside severe ecological vulnerability, including volcanic eruptions, earthquakes, landslides, soil erosion, and anthropogenic environmental degradation. If not managed through the lens of ecological justice, such exploitation

¹ Bojana Aleksova and others, 'Preliminary Evaluation of Geosites for Nature-Based Tourism in Mavrovo and Šar Planina National Parks, North Macedonia', *International Journal of Geoheritage and Parks*, 13.3 (2025), 473–88 <https://doi.org/10.1016/j.ijgeop.2024.11.013>

² Aleksandar Antić and others, 'The Application of the Show Mine Assessment Model on Underground Mining Heritage and Mine Tourism in Switzerland', *The Extractive Industries and Society*, 24 (2025), 101730 <https://doi.org/10.1016/j.exis.2025.101730>



may exacerbate environmental crises and social inequality. Current management remains sectoral, fragmented among competing interests energy, forestry, tourism, and others without a unified framework.³

Harnessing geothermal energy and developing geotourism offer new sources of revenue and employment, particularly in remote areas.⁴ Nevertheless, governance of the ring of fire presents complex challenges: High ecological vulnerability to natural disasters such as earthquakes, volcanic eruptions, and landslides; Land-use conflicts and marginalization of local and Indigenous communities; and Overlapping sectoral regulations between forestry, geothermal, mining, tourism, and environmental laws which generate new problems related to ecological degradation and justice.⁵

To ensure that these vast natural assets are utilized for the greatest benefit of the people, as mandated by the Constitution, Indonesia requires a strong legal and policy foundation that promotes sustainability and ecological justice.⁶ Several key legal instruments provide explicit mandates for this, including; Law No. 32 of 2009 on Environmental Protection and Management, Article 3 (a, f), which requires environmental management to preserve ecological function and ensure intergenerational justice; Law No. 30 of 2007 on Energy, Article 3, which stipulates that energy governance must be sustainable and environmentally sound; Law No. 41 of 1999 on Forestry, Article 4, which affirms that forests must be managed for the maximum welfare of the people based on sustainability principles; and also Law No. 10 of 2009 on Tourism, which mandates that tourism development must uphold the principles of sustainability, environmental conservation, and community empowerment.⁷

Despite these clear mandates, the practical implementation of such laws faces persistent regulatory challenges. Overlapping regulations, sectoral egos among institutions, and weak harmonization between central and regional policies have resulted in fragmented and partial utilization of the ring of fire's potential. For instance, massive tourism development without ecological carrying capacity assessments has led to environmental degradation.⁸ Similarly, geothermal projects that

³ Hai-long Zhao, 'Research on the Environmental Science and Sustainable Sport Development the Perspective of Geological Ecology', *Journal of King Saud University - Science*, 35.3 (2023), 102564 <https://doi.org/10.1016/j.jksus.2023.102564>

⁴ Mohamad Sapari Dwi Hadian and others, 'Urban Geotourism Development in the Perspective of Stakeholders', *International Journal of Geoheritage and Parks*, 13.1 (2025), 102–16 <https://doi.org/10.1016/j.ijgeop.2024.12.001>

⁵ Emiru Birhane and others, 'Armed Conflict-Driven Environmental Degradation and Uneven Socio-Ecological Resilience in Tigray, Ethiopia', *Sustainable Futures*, 10 (2025), 101289 <https://doi.org/10.1016/j.sftr.2025.101289>

⁶ Sri Juni Woro Astuti, Sayekti Suindyah Dwiningwarni, and Suryo Atmojo, 'Modeling Environmental Interactions and Collaborative Interventions for Childhood Stunting: A Case from Indonesia', *Dialogues in Health*, 6 (2025), 100206 <https://doi.org/10.1016/j.dialog.2025.100206>

⁷ Srashti Singh, Anugya Shukla, and Kamal Jain, 'Urban Environmental Degradation and Its Associated Determinants: A Geostatistical Approach towards Sustainable Urban Planning and Management in an Indian City', *Journal of Environmental Management*, 394 (2025), 127186 <https://doi.org/10.1016/j.jenvman.2025.127186>

⁸ Kais Mtar and others, 'Evidence from Foreign Direct Investments Moderating the Relationship between Environmental Degradation and Food and Nutrition Security: Insights from Low- and Middle-



exclude local participation have triggered social resistance. Moreover, the limited application of environmental and social justice principles in policymaking has resulted in unequal distribution of resource benefits. In contrast, ecological justice theory emphasizes the importance of justice not only among present human populations (intra-generational justice), but also across generations (inter-generational justice) and towards non-human nature, ensuring that ecosystems are given space and legal guarantees to thrive.⁹

This study posits the normative hypothesis that integrating distributive justice, ecological justice, and Pancasila-based justice into the national regulatory framework establishes a governance system for the ring of fire that is sustainable, equitable, and resilient. To evaluate this hypothesis, the research formulates two principal questions. First, it investigates how distributive, ecological, and Pancasila justice can be operationalized as analytical tools to deconstruct problems of regulatory overlap, land-use conflicts, unequal distribution of benefits, and ecological risks in the Ring of Fire region. Second, it examines how public policies grounded in these justice theories can be translated into coherent legal frameworks, integrated cross-sectoral governance arrangements, and effective implementation strategies consistent with the principles of the Indonesian Constitution.¹⁰

The management of benefits in Indonesia's ring of fire region requires a comprehensive, multidimensional approach, given the area's vast natural resource wealth, tourism potential, and strategic role in supporting the green energy transition. Six key dimensions must be addressed renewable energy potential, sustainable tourism, economic growth, environmental conservation, social justice, and local wisdom. Each dimension contains strategic challenges and carries the potential for significant impacts if not managed holistically.¹¹ In the renewable energy dimension, the primary challenges include a lack of cross-sectoral policy integration, regulatory overlap, and limited infrastructure and green financing mechanisms. These issues have slowed the deployment of geothermal and other renewable energy sources despite these being the region's most promising assets.¹²

In the area of sustainable tourism, challenges arise from excessive exploitation of natural areas without regard to ecological and social carrying capacities, and the

Income Countries', *Journal of Environmental Management*, 393 (2025), 127051 <https://doi.org/10.1016/j.jenvman.2025.127051>

⁹ Muhammad Suhrab, Chen Pinglu, and Ningyu Qian, 'Green Road to Sustainability: Impact of Urbanization on Environmental Degradation and the Mitigating Effect of Infrastructure Investment in Belt and Road Initiative Economies', *Sustainable Futures*, 10 (2025), 101080 <https://doi.org/10.1016/j.sftr.2025.101080>

¹⁰ Muhammad Kamran Khan and Jan K. Kazak, 'Energy Poverty and Environmental Degradation in South Asian Countries with the Role of Poverty, Globalization and Institutional Quality: Static Panel Data Approach', *Environmental and Sustainability Indicators*, 27 (2025), 100841 <https://doi.org/10.1016/j.indic.2025.100841>

¹¹ Mustafa Rehman Khan and others, 'Analyzing the Impact of Socio-Economic Factors on Environmental Degradation: Empirical Insights from Emerging Economy', *Sustainable Futures*, 10 (2025), 100967 <https://doi.org/10.1016/j.sftr.2025.100967>

¹² Simranjeet Singh and others, 'Integrated Optimization and Environmental Application of Chlorohydrolase-Positive Bacterial Isolates for Enhanced Atrazine Degradation and Genotoxicity Assessment', *Journal of Environmental Chemical Engineering*, 13.6 (2025), 119234 <https://doi.org/10.1016/j.jece.2025.119234>



absence of legally binding sustainability standards.¹³ As a result, rather than delivering long-term economic benefits, tourism development risks damaging ecosystems and marginalizing local communities. From an economic growth perspective, the region faces an inequitable distribution of benefits, the dominance of large corporate actors, and the exclusion of local stakeholders. This dynamic often erodes traditional, community-based, and sustainable economic structures. Environmental sustainability is also under considerable pressure due to energy exploration and infrastructure development. Regulatory fragmentation and weak enforcement mechanisms have compromised the protection of conservation zones, customary forests (hutan adat), and water catchment areas. On the dimension of social justice, significant concerns emerge when local communities are excluded from planning and decision-making processes. This exclusion fosters social conflict, distrust toward state institutions, and the erosion of customary rights and land tenure systems.¹⁴

Local wisdom which is crucial for long-term sustainability is often sidelined in policy formulation. When neglected, the region risks losing cultural heritage and traditional governance practices that could otherwise serve as a foundation for resilience and sustainability.¹⁵ A critical evaluation highlights that while a comprehensive body of law already exists, the implementation gap remains significant. Rather than producing harmony, overlapping regulations frequently generate fragmentation, particularly where sectoral interests collide.¹⁶ For instance, the push for renewable energy development under Law No. 30/2007 often clashes with conservation obligations in Law No. 41/1999 on Forestry and Law No. 32/2009 on Environmental Protection. This creates uncertainty for investors and weakens enforcement capacity at the local level. The problem is not an absence of legal instruments, but their fragmented and inconsistent application.¹⁷

It is therefore crucial to map the interactions between key dimensions to identify where conflicts and synergies arise. The greatest tensions emerge at the intersection of renewable energy vs. social justice (e.g., geothermal projects displacing indigenous communities), and tourism vs. environmental conservation (e.g., large-scale tourism projects degrading protected ecosystems).¹⁸ These conflicts are not isolated but

¹³ Elahe Khosravi, Ali Gholizadeh, and Saba Saneinia, 'Bridging the Digital Divide: Exploring Digitalization's Role in Sustainable Tourism for BRI Countries', *Journal of Environmental Management*, 394 (2025), 127420 <https://doi.org/10.1016/j.jenvman.2025.127420>

¹⁴ Iban Diaz-Parra and Jaime Jover, 'Overtourism, Place Alienation and the Right to the City: Insights from the Historic Centre of Seville, Spain', *Journal of Sustainable Tourism*, 29.2–3 (2021), 158–75 <https://doi.org/10.1080/09669582.2020.1717504>

¹⁵ Vincent Nijman and others, 'Quantifying Illegal Rosewood Trade, Seizures and Forestry Law Enforcement in Indonesia', *Applied Geography*, 176 (2025), 103509 <https://doi.org/10.1016/j.apgeog.2025.103509>

¹⁶ Yanu Aryani and others, 'Advancing Indoor Environmental Quality (IEQ) in Indonesian Hospital Wards: An Integrated Importance Performance Analysis (IPA) and Objective Approach', *Energy and Built Environment*, 2025 <https://doi.org/10.1016/j.enbenv.2025.07.004>

¹⁷ Laura Comănescu, Alexandru Nedelea, and Cosmin Păunescu, 'Geolandscapes of the Ciucas Mountains (Eastern Carpathians, Romania) - the Assessment of Geomorphosites and Development of Geotourism', *Geomorphology*, 480 (2025), 109753 <https://doi.org/10.1016/j.geomorph.2025.109753>

¹⁸ Suparak Suriyankietkaew and others, 'Creative Tourism as a Driver for Sustainable Development: A Model for Advancing SDGs through Community-Based Tourism and Environmental Stewardship', *Environmental and Sustainability Indicators*, 27 (2025), 100828 <https://doi.org/10.1016/j.indic.2025.100828>



interconnected with six overarching dimensions: renewable energy potential, sustainable tourism, economic growth, environmental conservation, social justice, and local wisdom. Unless these are addressed holistically, development will perpetuate ecological degradation and social inequality. Integrative governance, therefore, must not only harmonize existing laws but also strengthen accountability and embed ecological justice as a unifying principle.¹⁹

Table 1. Schematic Map Diagram of Natural Resource Utilization in the Ring of Fire Region

Aspect	Renewable Energy	Forest Belt	Plantation	Farming	Fishery	Sustainable Tourism
Key Challenges	Fossil fuel lock-in; limited investment	Deforestation; forest fires	Land conflicts; monoculture	Land conversion; low productivity	Overfishing; aquaculture expansion	Over-tourism; weak planning
Root Causes	Tech gap; fragmented incentives	Weak law enforcement; corruption	Investor-driven, unclear land rights	Subsidy misallocation; climate risk	Weak coastal governance; IUU fishing	Profit-oriented mass tourism
Economic Growth	Green jobs; export (Law 30/2007 Energy, Law 21/2014 Geothermal)	Carbon trade, biodiversity market (Law 41/1999 Forestry)	GDP/export palm, rubber (Law 39/2014 Plantation)	Food security, rural growth (Law 18/2012 Food; Law 41/2009 Farming Land)	Fishery export & aquaculture (Law 31/2004 jo. 45/2009 Fishery)	Foreign exchange, jobs (Law 10/2009 Tourism)
Ecological Prevention	Low-carbon pathway (Law 32/2009 Environment)	Climate resilience, biodiversity	Agroforestry potential vs biodiversity loss	Climate-smart farming	Marine conservation (UU 27/2007 jo. 1/2014 Coastal Areas)	Ecotourism (Perpres 50/2011 Tourism Master Plan)
Critical Review	Energy law not integrated with environment & fiscal	Forestry law sectoral, little integration with energy/tourism	Plantation law pro-investor, weak on equity & sustainability	Farming law productivity-biased	Fishery law weak on fisher rights	Tourism law ignores conservation–equity link
Reform Approaches	Harmonize RE–Env–Fiscal framework	Social forestry; zero deforestation	Integrate agroforestry; agrarian reform	Climate-smart farming & subsidy reform	Blue economy; strengthen small-scale fishers	Carrying capacity zoning; certification
Policy Brief	Just Energy Transition roadmap	Moratorium + social forestry expansion	Inclusive plantation standards (ISPO/RSPO)	Food sovereignty & resilience framework	Blue Economy Roadmap (Perpres 83/2018)	Ecotourism linked to conservation & local wisdom

Source: processed by Author

This figure illustrates the interconnected systems of geothermal energy development, sustainable tourism, forestry, and other resources, highlighting the complex interactions between natural capital, policy interventions, and ecological outcomes.²⁰ The integrated policy framework is urgently needed one that emphasizes value creation, participatory governance, and ecological justice. Strengthening implementation, oversight, and evaluation mechanisms will be

¹⁹ Maider Samper-Mendivil, Maria Elena Aramendia-Muneta, and Rocío Alarcón-López, 'Assessing Sustainability in Rural Tourism: Insights from Accommodation Managers and Residents in Navarre', *Journal of Rural Studies*, 120 (2025), 103866 <https://doi.org/10.1016/j.jrurstud.2025.103866>

²⁰ Khalid Omar Murtaza and others, 'Glacial Geomorphosites in the Greater Himalayan and Pir Panjal Ranges of the Kashmir Valley: Inventory, Classification, and Geotourism Potential', *Geomorphology*, 486 (2025), 109895 <https://doi.org/10.1016/j.geomorph.2025.109895>



essential to ensure that development across the ring of fire is truly inclusive, equitable, and sustainable.²¹

Previous research on sustainable tourism in Indonesia's Ring of Fire has primarily explored the potential of natural and cultural resources as foundational elements for tourism development and their contribution to the socio-economic welfare of local communities. Putri and Nugroho²² analyzed the role of community-based ecotourism in enhancing conservation in volcanic regions such as Mount Rinjani and Mount Bromo and demonstrated that participatory governance strengthens biodiversity protection and sustains local tourism economies. Similarly, Adnyana et al.,²³ examined the socio-economic impacts of geotourism in areas surrounding active volcanoes and emphasized the importance of incorporating disaster-resilient approaches into tourism planning to reduce vulnerability and enhance sustainability. Hidayat and Kusuma,²⁴ investigated the application of geothermal energy for eco-friendly tourism infrastructure in West Nusa Tenggara and showed that adopting clean energy technologies significantly reduces both carbon emissions and operational costs of tourism enterprises. Building on this discourse, Sutopo et al.,²⁵ assessed policy and regulatory gaps in promoting solar and wind energy in remote volcanic destinations and argued that fragmented regulations impede the large-scale integration of renewable energy into tourism sectors in the Ring of Fire region. These studies underscore the urgent need for a comprehensive governance framework that integrates sustainable tourism, renewable energy, and ecological justice to address socio-ecological challenges in Indonesia's Ring of Fire. Nevertheless, existing scholarship remains sectoral and fragmented, tending to focus on either tourism development or energy transition in isolation, without embedding ecological justice into a unified legal and policy framework. This persistent gap highlights the necessity for further research that bridges these dimensions to inform integrated, sustainable, and resilient governance in the ring of fire region.

²¹ Han-Shen Chen, 'Sustainable Tourism and Ecological Challenges in Taiwan's Southwest Coast National Scenic Area: An Ecological Footprint and Carrying Capacity Assessment', *Environmental and Sustainability Indicators*, 27 (2025), 100863 <https://doi.org/10.1016/j.indic.2025.100863>

²² Putri, A., & Nugroho, B. "Community-based ecotourism and biodiversity conservation in Indonesia's volcanic regions" *Asian Journal of Ecotourism Studies*, 5(1), (2019). 33–50. <https://doi.org/10.1234/ajes.v5i1.2345>

²³ Adnyana, I. K., Putu, D. A., & Sudiana, P. "Geotourism development and socio-economic resilience in volcanic disaster-prone areas of Indonesia" *Journal of Sustainable Tourism Planning*, 12(3), (2020). 145–160. <https://doi.org/10.1234/jstp.v12i3.4567>

²⁴ Hidayat, M., & Kusuma, R. "Geothermal energy integration for eco-friendly tourism infrastructure in West Nusa Tenggara", *Energy and Environment Review*, 8(2), (2021). 75–89. <https://doi.org/10.1234/eer.v8i2.7890>

²⁵ Sutopo, H., Yuliana, D., & Prasetyo, T. "Policy gaps in renewable energy adoption for sustainable tourism in volcanic destinations" *Journal of Energy Policy and Tourism Development*, 14(4), (2022). 301–318. <https://doi.org/10.1234/jeptd.v14i4.1123>



This research aims to examine sustainable tourism practices in Indonesia's Ring of Fire by emphasizing the integration of ecological justice and the transition to green energy. It seeks to identify policy frameworks, community-based initiatives, and renewable energy strategies that enhance environmental conservation while supporting local livelihoods. The study also evaluates legal, economic, and institutional challenges to promote a balanced approach to tourism development and climate resilience in the region.

METHOD

This research employs a normative legal research method that integrates both statutory and conceptual approaches, with a specific focus on how justice informs legal analysis.²⁶ The statutory approach is used to examine the relevant national legal instruments governing Indonesia's Ring of Fire region, including Law No. 32 of 2009 on Environmental Protection and Management, Law No. 21 of 2014 on Geothermal Energy, and derivative regulations on renewable energy and sustainable tourism. These laws are analyzed in terms of their coherence, hierarchy, and consistency in promoting sustainability and cross-sectoral governance.²⁷

In parallel, the conceptual approach applies various theories of justice as analytical tools. A distributive justice framework is employed to assess how legal norms allocate benefits and burdens of development among the state, local communities, and ecosystems, highlighting whether development outcomes are fair and equitable. Pancasila Justice provides the moral and philosophical foundation, ensuring that legal analysis is grounded in values of humanity, social justice, and collective welfare.²⁸ Meanwhile, ecological justice is used to extend the scope of legal scrutiny beyond anthropocentric interests, evaluating whether the governance framework recognizes the intrinsic rights of the environment and non-human beings. Additionally, principles of energy law, particularly those related to the clean energy transition, are integrated into the analysis to assess the legality, legitimacy, and sustainability of energy resource utilization in the Ring of Fire region.²⁹ This combination of statutory interpretation and justice-based conceptual analysis enables a comprehensive legal evaluation, moving beyond descriptive assessment toward normative prescriptions for integrated, accountable, and ecologically just governance.³⁰

²⁶ Ahmad Dwi Nuryanto, Reza Octavia Kusumaningtyas, and Bukhadyrov Habibullo, 'The Imperative of Social Justice on the Insolvency and Workers' Wage', *Journal of Sustainable Development and Regulatory Issues (JSDEI)*, 2.3 (2024), 209–32 <https://doi.org/10.53955/jsderi.v2i3.48>

²⁷ Sapriani Sapriani, Reza Octavia Kusumaningtyas, and Khalid Eltayeb Elfaki, 'Strengthening Blue Economy Policy to Achieve Sustainable Fisheries', *Journal of Sustainable Development and Regulatory Issues (JSDEI)*, 2.1 (2024), 1–19 <https://doi.org/10.53955/jsderi.v2i1.23>

²⁸ Arsyad Aldyan and Abhishek Negi, 'The Model of Law Enforcement Based on Pancasila Justice', *Journal of Human Rights, Culture and Legal System*, 2.3 (2022), 178–90 <https://doi.org/10.53955/jhcls.v2i3.51>

²⁹ Gang Zhou and others, 'Enhanced Fire Suppression in Coal Mining Development of Konjac Glucomannan-Based Bio-Gel with Coal Slime', *Journal of Environmental Chemical Engineering*, 12.5 (2024), 114001 <https://doi.org/10.1016/j.jece.2024.114001>

³⁰ Abdul Kadir Jaelani, Reza Octavia Kusumaningtyas, and Asron Orsantinutsakul, 'The Model of Mining Environment Restoration Regulation Based on Sustainable Development Goals', *Legality: Jurnal Ilmiah Hukum*, 30.1 (2022), 131–46 <https://doi.org/10.22219/ljih.v30i1.20764>



RESULT AND DISCUSSION

The Potential of the Ring of Fire: Benefits and Impacts

The Ring of Fire in Indonesia represents a strategic landscape formed by intense volcanic and tectonic activity. Stretching from the western to the eastern archipelago, this region is not only characterized by active volcanoes but also endowed with rich ecological, cultural, and energy resources. It constitutes a unique geological zone where subsurface geological processes converge with surface ecosystems, creating fertile, dynamic, and high-value areas both ecologically and economically. However, this immense potential has not yet been fully integrated into just and sustainable development policies.³¹ One of the primary characteristics of this region is the high fertility of volcanic soils, which makes it ideal for agriculture and plantation sectors. On the slopes of volcanoes in West Sumatra, Central Java, and Flores, communities have cultivated vegetables, coffee, tea, and horticultural crops for generations.³² These agricultural practices are not merely sources of food but are integral to the region's socio-cultural systems, reflecting local adaptation to natural disaster risks and the maintenance of local ecosystems. This agricultural potential can be further developed through agroecological approaches integrated into national food security programs.³³

The region's abundant geothermal energy resources offer significant opportunities for the expansion of renewable energy. Volcanoes such as Mount Salak, Mount Ijen, and Ulumbu harbor geothermal reservoirs that can be transformed into clean electricity sources. This form of energy is clean, reliable, and holds promise as a backbone of Indonesia's transition from fossil fuels to green energy. However, its development must be carefully managed to avoid ecological damage and the displacement of local communities. Through inclusive and eco-centric governance, geothermal energy can become a pillar of ecological justice.³⁴ Forestry also plays a pivotal role in the Ring of Fire region. Montane forests, customary forests, and green belts act as natural buffers against landslides, floods, and erosion, which are common due to high rainfall and seismic activity. Areas such as Mount Leuser, Mount Halimun, and the Papuan highlands serve as habitats for thousands of endemic plant and animal species found only in tropical volcanic ecosystems. Preserving these forests is vital not only for biodiversity conservation but also for supporting tourism, scientific research, and the livelihoods of local communities.³⁵

³¹ Minkun Chen and others, 'Integrating Ecosystem Service Spillovers and Environmental Justice in Ecological Compensation: A Pathway to Effective Ecological Protection in China', *Ecological Indicators*, 174 (2025), 113455 <https://doi.org/10.1016/j.ecolind.2025.113455>

³² Slobodan B. Marković and others, 'An Integrated Glacial Geosite Assessment Framework and Its Application in Montenegro: Inventory, Evaluation, and Prospects for Geotourism', *International Journal of Geoheritage and Parks*, 13.3 (2025), 424–39 <https://doi.org/10.1016/j.ijgeop.2025.02.008>

³³ Zbigniew Jakub Grabowski and others, 'How Deep Does Justice Go? Addressing Ecological, Indigenous, and Infrastructural Justice through Nature-Based Solutions in New York City', *Environmental Science & Policy*, 138 (2022), 171–81 <https://doi.org/10.1016/j.envsci.2022.09.022>

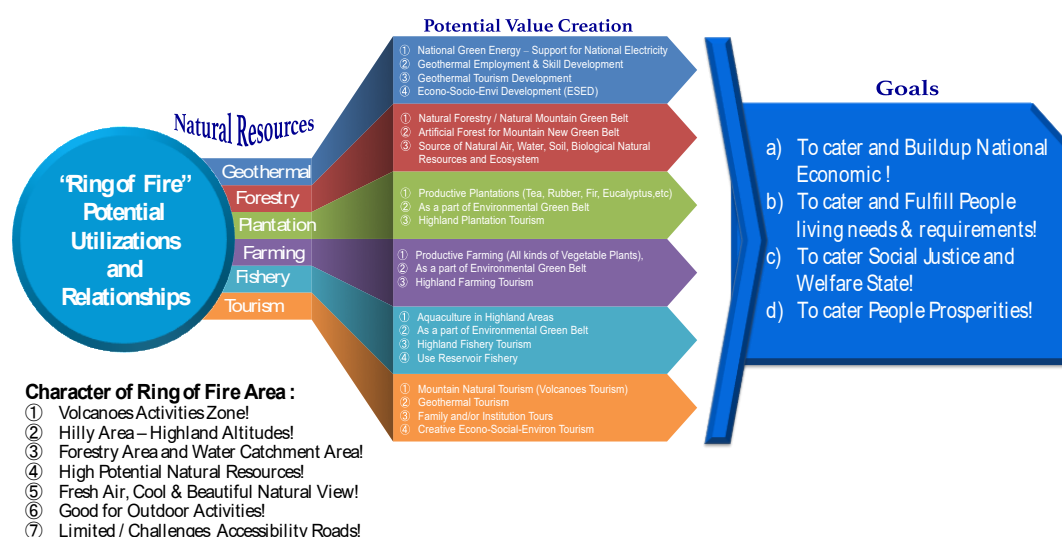
³⁴ Ran Yi, Yanan Chen, and An Chen, 'Integrating Justice into the Assessment of Urban Disaster Resilience Construction Efficiency: Considering the Undesirable Welfare Losses of Vulnerable Groups', *Journal of Environmental Management*, 394 (2025), 127419 <https://doi.org/10.1016/j.jenvman.2025.127419>

³⁵ Kamila Pope, Michelle Bonatti, and Stefan Sieber, 'The What, Who and How of Socio-Ecological Justice: Tailoring a New Justice Model for Earth System Law', *Earth System Governance*, 10 (2021), 100124 <https://doi.org/10.1016/j.esg.2021.100124>

The fisheries sector should not be overlooked. Volcanic lakes such as Lake Toba, Kelimutu, and Poso serve as vital sources of local protein, fishery-based economies, and even spiritual and cultural identity. In coastal areas adjacent to the Ring of Fire, such as East Nusa Tenggara and North Sulawesi, marine cultivation and the blue economy present robust opportunities. These resources must be developed through sustainable approaches that maintain ecological balance and long-term productivity.³⁶ At the peak of this integration is the sector of sustainable tourism. The combination of dramatic geological landscapes, unique local cultures, and rich biodiversity positions the Ring of Fire as a global tourism magnet. Concepts such as geotourism and ecotourism can integrate education, conservation, and local economic empowerment. From Mount Bromo to Kelimutu, and from Lake Toba to Rinjani, these destinations offer immense global appeal that can be leveraged without ecological degradation.³⁷

The integrated potential of the Ring of Fire offers not only economic value, but also ecological, socio-cultural, and spiritual value. If governed through a holistic vision rooted in ecological justice, this region has the capacity to serve as a living laboratory for the future of sustainable development in Indonesia.³⁸

Figure 1. Schematic Diagram of Natural Resource Utilization in the Ring of Fire Region



Source: Processed by Author

This figure illustrates the interconnected systems of geothermal energy development, sustainable tourism, forestry, and others resources, highlighting the

³⁶ Claudia Kemfert and others, 'Locked in a Fossil-Centric System Paradigm: LNG Expansion Impedes Socio-Ecological Transition toward a Just and Renewable Energy Future', *Cell Reports Sustainability*, 2.8 (2025), 100464 <https://doi.org/10.1016/j.crsus.2025.100464>

³⁷ Abdul Kadir Jaelani and others, 'Sustainable Halal Tourism Regulation Based on Local Wisdom in Indonesia and Uzbekistan', *Journal of Human Rights, Culture and Legal System*, 5.1 (2025), 351–77 <https://doi.org/10.53955/jhcls.v5i1.671>

³⁸ Liyang Zhao, Said Khalfa Brika, and Ling Lui, 'Designing Ecological Networks to Foster Regional Economic Sustainability: Source Identification in the Longdong Loess Plateau Using Self-Organizing Map and Complex Network Theory', *Ecological Modelling*, 509 (2025), 111211 <https://doi.org/10.1016/j.ecolmodel.2025.111211>



complex interactions between natural capital, policy interventions, and socio-ecological outcomes.³⁹

The utilization of geothermal energy in the Ring of Fire region is not only a critical solution for accelerating the green energy transition, but also serves as a test of each nation's capacity to implement fair, sustainable, and integrated resource governance. This requires careful alignment with other strategic sectors such as tourism, forestry, and agriculture.⁴⁰ Countries such as Indonesia, Japan, New Zealand, Chile, and the Philippines face diverse challenges and opportunities in managing their geothermal potential. Despite sharing similar geological conditions, each country operates within distinct legal, social, and institutional frameworks, which shape their respective approaches to geothermal development and multi-sectoral integration.⁴¹

Table 2. Comparative Analysis of Integrated Tourism and Geothermal Energy Governance Across Ring of Fire Countries

Country	Number of Active Volcanoes	Tourism Governance in Volcanic Regions	Ecological Justice Integration	Key Regulations	Nature of Regulation	Cross-sectoral Integration (Energy–Tourism–Forestry)	Integration Level
New Zealand	±58	Geothermal tourism deeply connected with Māori heritage	Central legal principle, based on Treaty of Waitangi	Resource Management Act 1991, Local Government Act	Highly integrated	Strong indigenous rights, cultural sustainability, and green energy integration	Very High
Japan	±111	Strict zoning laws; geothermal and onsen tourism harmonized	Reflected through environmental conservation	Renewable Energy Act, National Parks Act, Tourism Promotion Basic Act	Consistent and integrated	High-level alignment among spa tourism, geothermal, and protected areas	High
Chile	±90	Andes-based ecotourism integrated with geothermal zones	Acknowledged via EIA processes	Geothermal Concessions Law, Environmental Framework Law	Moderate integration	Growing synergy between eco-tourism and green energy, but less attention to equity	Medium
Philippines	±53	Government-led eco-tourism; IP recognition via IPRA	Emerging in policy and law	Indigenous Peoples Rights Act (IPRA), Ecotourism Strategy, Renewable Energy Act	Partially integrated	Community-led initiatives exist but broader policy integration still developing	Moderate
Indonesia	±127	Fragmented, destination-focused; lacks ecoregion-based planning	Weak; not yet a recognized legal principle	Law No. 10/2009 (Tourism), Law No. 21/2014 (Geothermal), Law No. 32/2009 (Environment)	Siloed and overlapping	Limited integration; frequent sectoral conflict (forestry, energy, tourism)	Low

Source: processed by Author

³⁹ Zhou and others.

⁴⁰ Yingji Liu and others, 'The Impact of Environment on Enhancement of Tourism System Resilience in China: The Moderating Role of Digital Technology', *Technological Forecasting and Social Change*, 206 (2024), 123492 <https://doi.org/10.1016/j.techfore.2024.123492>

⁴¹ Sergio Muíño Freire and Begoña Muíño Sar, 'Tourism Intelligence in the Cabo Ortegal UNESCO Global Geopark: Case of San Andrés de Teixido', *International Journal of Geoheritage and Parks*, 13.2 (2025), 290–305 <https://doi.org/10.1016/j.ijgeop.2025.03.002>



This table provides a benchmarking matrix comparing Indonesia, Japan, New Zealand, Chile, and the Philippines, assessing the level of policy integration, legal harmonization, and ecological safeguards in the joint management of tourism and renewable energy sectors. It also includes ranking scores based on the degree of integration, legal clarity, and community participation.⁴² Some examples of geothermal projects that have encountered operational challenges and disrupted the balance of other sectors in their respective regions include:⁴³

Table 3. Activities in the Ring of Fire and Their Impacts on Environment, Ecology, and Social Systems

Location / Project	Activity / Challenge	Main Problems (Law, Env, Eco, Social)	Potential Compensation	Law / Regulation Conflict
Dieng (Central Java)	Expansion & H ₂ S emission issues	Law: weak AMDAL; Env: gas leaks, water; Eco: land instability; Social: farmer protests	Health funds, env rehab, revenue-sharing	Geothermal Law vs Env Law & land rights
Bedugul (Bali)	Planned project near sacred lake	Law: permit disputes; Env/Eco: hydrology risk; Social: cultural & tourism opposition	Cancel/relocate; cultural funds; alt. RE support	Tourism Law & adat vs Geothermal permit
Sarulla (North Sumatra)	Large-scale ops since 2017	Law: land disputes; Env/Eco: habitat loss; Social: livelihood protests	CDAs, royalty share, rehab funds	Concession vs Forestry/land rights
Sorik Marapi (North Sumatra)	Incidents (leaks, fatalities)	Law: safety liability; Env: contamination; Social: health crises, protests	Medical comp, safety audits, suspensions	Geothermal ops vs Env Law & health rules
Ijen (East Java)	New projects, protests (2023–25)	Law: license contested; Env/Eco: fragile caldera; Social: tourism & livelihood threats	FPIC, eco-tourism funds, livelihood programs	Geothermal license vs conservation & tourism
Padarincang (Banten)	Project stalled by community resistance	Law: no FPIC; Env/Eco: watershed risks; Social: entrenched opposition	Community-led RE, moratorium, social funds	W/KP zoning vs local rights & adat

Source: processed by Author

This matrix highlights recent geothermal projects (within the last 5–10 years) that continue to generate legal, environmental, ecological, tourism impacts, and social tensions. It examines the activities and challenges ranging from geothermal exploration and plant expansion to community resistance and licensing disputes, and maps their consequences.⁴⁴ Data analysis has found that the interplay between geothermal development, tourism expansion, and environmental conservation in Indonesia's Ring of Fire reveals a structural conflict that extends beyond technical or ecological limits. It is fundamentally a legal and governance issue. Although Indonesia possesses a comprehensive regulatory framework comprising the Geothermal Law (Law No. 21/2014), the Forestry Law (Law No. 41/1999), and the Environmental Protection and Management Law (Law No. 32/2009) these instruments often operate in silos.⁴⁵

This fragmentation leads to overlapping jurisdictions, inconsistent interpretations, and uncertain enforcement. For example, the classification of “protected forest” under

⁴² Nijman and others.

⁴³ Singh and others.

⁴⁴ Shuyi Wang, Xinyan Zhang, and George Q. Huang, ‘A Game-Theoretic Approach to Green Tourism Development Strategies: Government Interventions and Sustainable Practices across Diverse Markets’, *Tourism Management*, 113 (2026), 105319 <https://doi.org/10.1016/j.tourman.2025.105319>

⁴⁵ Chen.



the Forestry Law often restricts geothermal exploration, while the Geothermal Law allows such activities under certain exceptions, creating tension between conservation mandates and renewable energy expansion.⁴⁶ This should be pursued to achieve integration in legal and policy practices, requiring reform of cross-sectoral governance mechanisms for example, an integrated environmental licensing system, a joint monitoring framework between the Ministry of Energy and Mineral Resources (ESDM), the Ministry of Environment and Forestry (KLHK), and the Ministry of Tourism and Creative Economy (Kemenparekraf), as well as adaptive legal instruments that enable balanced land use.⁴⁷

Distributive Justice in the Governance of the Ring of Fire Region

Indonesia, as an archipelagic nation, lies within one of the most geologically active regions in the world the Ring of Fire. This region, shaped by intense tectonic and volcanic activity, contains exceptional natural resource potential, ranging from geothermal energy and hot springs to unique geotourism landscapes and biodiversity. Although national energy revenues rise, district- and village-level data remain limited.⁴⁸ In geothermal areas such as Dieng and Bedugul, royalty contributions to local budgets account for less than 1% of total project revenue (ESDM, 2022–2023). Nearby villages report minimal infrastructure gains and limited employment, exposing weak benefit-sharing and unclear accountability between government levels.⁴⁹ This makes it crucial to examine issues of distributive justice in the governance of the Ring of Fire, especially when economic development and resource exploitation lead to evident disparities between central and peripheral regions, between investors and indigenous peoples, and between the state and local communities.⁵⁰

In contrast, several international benchmarks demonstrate more balanced governance. For example, New Zealand's Māori Trust geothermal partnerships allocate a fixed revenue share to indigenous landowners, while Iceland's local municipality model ensures reinvestment of geothermal profits into education and welfare. These

⁴⁶ Riantini Virtriana and others, 'Predicting Suitable Built-up Areas in Indonesia's New Capital: Integrating Ecosystems, Access, and Socioeconomics', *Sustainable Futures*, 10 (2025), 101342 <https://doi.org/10.1016/j.sft.2025.101342>

⁴⁷ Indah Fajarini Sri Wahyuningrum and others, 'Has Mandatory Reporting Improved Environmental Disclosure Quality in Indonesia?', *World Development Perspectives*, 39 (2025), 100718 <https://doi.org/10.1016/j.wdp.2025.100718>

⁴⁸ Kerrice Bailey, Aman Basu, and Sapna Sharma, 'A Review of Fast Fashion and Environmental Research Gaps in the Top Garment-Producing Countries: A Case Study of China, Bangladesh, Vietnam, India, Turkey, and Indonesia', *Environmental Reviews*, 33 (2025), 1–11 <https://doi.org/10.1139/er-2025-0121>

⁴⁹ Daniela Alba-Patiño and others, 'Environmental Justice Gaps in Human-Wildlife Conflict Research from a Social-Ecological Systems Perspective', *Biological Conservation*, 312 (2025), 111515 <https://doi.org/10.1016/j.biocon.2025.111515>

⁵⁰ Kohei Hibino and others, 'Trade-Offs between Potential Revenue and Environmental Impacts for Refuse-Derived Fuel Production: A Simulation Study Based on the Composition of Fresh and Mining Waste in South Tangerang City, Indonesia', *Energy for Sustainable Development*, 89 (2025), 101835 <https://doi.org/10.1016/j.esd.2025.101835>



frameworks embed distributive justice within contractual and fiscal arrangements, not as normal CSR activities.⁵¹

Distributive justice constitutes a fundamental principle of fairness governing the allocation of resources, benefits, and burdens within a society. In the context of Indonesia's Ring of Fire, this principle critically examines the utilization of available resources, the distribution of profits, and the assignment of ecological, social, and economic risks arising from development activities. It underscores essential normative inquiries concerning the determination of who receives specific benefits, at what stage, through which mechanisms, and on what justifiable grounds.⁵² Policy implementation in several geothermal projects, such as Dieng, Patuha, Gunung Salak, and Sarulla, reveals consistent patterns of inequality the central government collects the bulk of tax revenues and royalties, Local governments often receive minimal revenue shares, while they shoulder significant environmental and social burdens (e.g., damaged infrastructure, sulfur pollution), villages closest to project sites frequently see little to no improvement in real income or public services.⁵³

Importantly, the Ring of Fire is not merely a geographic entity it is a living space for many communities. Numerous indigenous peoples have inhabited these volcanic highlands for centuries, forging spiritual relationships with nature, developing local disaster-mitigation knowledge, and relying on natural resources for their livelihoods. Yet, when state and corporate actors enter to explore and exploit geothermal energy, community participation is often tokenistic, with decisions made in a top-down fashion, lacking fair consultation or benefit-sharing mechanisms.⁵⁴

The injustice becomes stark in cases where large-scale projects such as geothermal power plants or geotourism developments are established on customary lands without fair compensation or profit redistribution.⁵⁵ Notable examples include Bajawa in Flores and Mount Ijen in East Java, where state and investors reap economic gains while local populations are left with environmental degradation (e.g., polluted water, altered soil temperature, reduced access to traditional lands). When local communities attempt to claim their rights, they face legal complexity, lack of legal assistance, and the dominance of a national development discourse that marginalizes grassroots concerns.⁵⁶

⁵¹ Omar Pérez Figueroa and Nicola Ulibarri, 'Navigating Justice: Examining the Intersection of Procedural and Distributive Justice in Environmental Impact Assessment in Puerto Rico', *Environmental Impact Assessment Review*, 109 (2024), 107648 <https://doi.org/10.1016/j.eiar.2024.107648>

⁵² Somaye Imani, Mohammad Hossein Niksokhan, and Reza Safari shali, 'Fair Water Re-Allocation: Lessons Learnt from the Perception of Iranian Policy-Makers about Distributive Justice', *Journal of Hydrology*, 652 (2025), 132675 <https://doi.org/10.1016/j.jhydrol.2025.132675>

⁵³ Mukhtar A. Kassem, Andrea Moscardiello, and Pierre Holmuller, 'Reducing LCOE in Geothermal Energy Production in Switzerland: A Comprehensive Review of Technological, Economic, and Policy Strategies', *Energy Reports*, 13 (2025), 4403–16 <https://doi.org/10.1016/j.egyr.2025.04.024>

⁵⁴ Muhammad Amir Raza and others, 'Power Generation Expansion Planning with High Penetration of Geothermal Energy – Potential, Prospects and Policy', *Environmental and Sustainability Indicators*, 26 (2025), 100614 <https://doi.org/10.1016/j.indic.2025.100614>

⁵⁵ Qiang Dong and others, 'Host Plants with Greater Ecological Resistance and Mutualism of Arbuscular Mycorrhizal Fungi in Degraded Meadows', *Ecological Indicators*, 178 (2025), 114036 <https://doi.org/10.1016/j.ecolind.2025.114036>

⁵⁶ Pérez Figueroa and Ulibarri.



Distributive justice in the governance of the Ring of Fire must ensure that the benefits of resource utilization are proportionally returned to the affected communities. This can be achieved through a range of policy instruments such as; Revenue-sharing mechanisms; Corporate social responsibility (CSR) programs; and also Strengthening of local economic institutions like village-owned enterprises (BUMDes) and community-based tourism cooperatives.⁵⁷ Unfortunately, many CSR initiatives remain ceremonial or physical in nature constructing sports fields or places of worship without addressing structural community needs such as education, health care, or sustainable economic empowerment. To enhance equity, Indonesia's CSR should be regulated through performance-linked obligations for example, mandatory Community Benefit Agreements (CBAs) tied to measurable social and environmental outcomes. The Ministry of Investment and ESDM could integrate CSR deliverables into licensing requirements, ensuring that geothermal companies contribute to long-term local capacity building, ecosystem restoration, and livelihood diversification.⁵⁸

The inequities extend beyond economics into access to information and decision-making power. In many instances, local residents are unaware of planned projects due to poor outreach, lack of materials in local languages, or absence of deliberative spaces. This violates the principle of meaningful participation in distributive justice, where communities should not merely be the object of development, but active subjects with voice and agency in determining their development pathways.⁵⁹ Legally, Indonesia already possesses a normative foundation to enable the implementation of distributive justice. Article 33(3) of the 1945 Constitution explicitly states that "the land, waters, and natural resources therein shall be controlled by the state and utilized to the greatest benefit of the people." The phrase "controlled by the state" should not be interpreted as state ownership in the proprietary sense, but rather as a mandate for the state to act as a trustee, ensuring that natural resources are managed in a way that benefits all Indonesian people especially those residing in marginalized and directly affected regions. Furthermore, Law No. 21 of 2014 on Geothermal Energy provides space for community-based geothermal management, although its implementation continues to face significant field-level challenges.⁶⁰

The failure to apply distributive justice often stems from the dominance of political-economic logic in natural resource governance. Investment is frequently viewed as the sole vehicle for development, while the rights of local communities are reduced to compensation issues often material and insufficient. Yet, what is at stake in the governance of the Ring of Fire region goes far beyond material gain: it encompasses cultural identity, ecological survival, social relationships, and the rights of future

⁵⁷ Sophie Johanna Lampert, Anne Kathrine Kjær Bruun, and Rajiv Maher, 'Reckoning with Historical Injustices: Relational Values in Ecosystem Services and Environmental Justice in the Mapuche-Forestry Conflict in Chile', *Ecosystem Services*, 75 (2025), 101758 <https://doi.org/10.1016/j.ecoser.2025.101758>

⁵⁸ Suanne Mistel Segovia-Tzompa, Immaculata Casimero, and Marisol García Apagüeño, 'When the Past Meets the Future: Latin American Indigenous Futures, Transitional Justice and Global Energy Governance', *Futures*, 163 (2024), 103438 <https://doi.org/10.1016/j.futures.2024.103438>

⁵⁹ Agus Suprijanto and others, 'Industrial Heat Island and Carbon Emissions: Machine Learning-Based Environmental Impact Assessment in Cilegon, Indonesia', *Environmental Challenges*, 19 (2025), 101141 <https://doi.org/10.1016/j.envc.2025.101141>

⁶⁰ Imani, Niksokhan, and Safari shali.



generations to a livable environment.⁶¹ The strategic and resource-rich Ring of Fire should instead serve as a laboratory for distributive justice. This can be achieved through benefit-sharing schemes, where local communities receive a fair share of economic gains via transparent and measurable mechanisms. Moreover, a robust institutional framework for civil society oversight including media, academics, and NGOs should be developed to prevent elite capture by local power holders or dominant corporations.⁶²

Distributive justice also requires a context-sensitive approach. Each community has unique values, social structures, and worldviews. Therefore, policy design must not be uniform or top-down but must accommodate local practices that have proven effective in balancing exploitation and conservation. In this regard, customary law and indigenous wisdom must be formally recognized as legitimate legal sources not merely administrative add-ons.⁶³ There is no denying that development in the Ring of Fire will continue. However, its trajectory must be corrected and guided by the principles of distributive justice. Every project must begin with participatory social and environmental impact mapping, involving local communities as primary actors. Long-term mechanisms must be established to assess whether the benefits are truly reaching the people not just rhetorical affirmations of inclusivity.⁶⁴

Indonesia has a significant opportunity to make the Ring of Fire a global model of justice-based governance. If successful, it would not only serve national interests but also become an international reference for equitable, sustainable natural resource management that respects the rights of local communities.⁶⁵ However, if it fails, this region could instead become a symbol of new inequality, where resources are exploited for the benefit of a few while destruction and poverty persist for those who live amidst it. Ultimately, distributive justice in the governance of the Ring of Fire is not merely a moral imperative or academic ideal it is a real and urgent necessity for building an Indonesia that is inclusive, resilient, and fair. Without justice in the distribution of benefits and burdens, development will only widen inequality, weaken social cohesion, and deepen ecological degradation.⁶⁶

It is our collective duty to ensure that in every volcanic eruption and every flow of geothermal energy, there is a trace of justice that can be felt by every citizen from

⁶¹ Lisa Lejemtel and others, 'Exploring Environmental Justice and Nexus Approaches in Paris Urban Nature Policies', *Journal of Environmental Management*, 392 (2025), 126547 <https://doi.org/10.1016/j.jenvman.2025.126547>

⁶² Flávio G. Oliveira, Inês Campos, and Filipe Moreira Alves, 'A Quiet Public? Procedural Justice in Portuguese Wind Energy Governance', *Energy Research & Social Science*, 126 (2025), 104147 <https://doi.org/10.1016/j.erss.2025.104147>

⁶³ Laura Mark, Katharina Holec, and Tobias Escher, 'Socio-Spatial Justice through Public Participation? A Mixed-Methods Analysis of Distributive Justice in a Consultative Transport Planning Process in Germany', *Case Studies on Transport Policy*, 20 (2025), 101467 <https://doi.org/10.1016/j.cstp.2025.101467>

⁶⁴ Douglas Paton, 'Living on the Ring of Fire: Perspectives on Managing Natural Hazard Risk in Pacific Rim Countries', *Journal of Pacific Rim Psychology*, 3.1 (2009), 1–3 <https://doi.org/10.1375/prp.3.1.1>

⁶⁵ Indah Fajarini Sri Wahyuningrum and others, 'Foreign Influence on Carbon Disclosure: Evidence from Indonesian Non-Financial Firms', *Journal of Open Innovation: Technology, Market, and Complexity*, 11.3 (2025), 100603 <https://doi.org/10.1016/j.joitmc.2025.100603>

⁶⁶ Xiaoyu Zhan and others, 'Species Diversity and Ecological Strategies Shifted in Degraded Alpine Grasslands: Insights from the Yellow River Source Region', *Agriculture, Ecosystems & Environment*, 394 (2025), 109888 <https://doi.org/10.1016/j.agee.2025.109888>



Sabang to Merauke, from mountain villages to the corridors of policymaking. In practical terms, this means that revenue sharing from geothermal royalties must be designed so that a significant portion directly benefits local communities. Likewise, tourism development must not be exclusive to investors, but must open economic opportunities for rural residents through homestays, local guides, handicrafts, and community enterprises. Decisions regarding tourism zones must consider the potential losses for vulnerable communities, particularly in cases involving the displacement of customary landholders.⁶⁷

Indonesia Regulatory and Ethical Paradigm in the Governance of the Ring of Fire

A regulatory approach to development in Indonesia's Ring of Fire requires a legal and policy paradigm capable of addressing the multidimensional challenges—ecological, social, and economic embedded in the region. In this regard, Pancasila Justice functions not only as a foundational national value but also as a normative analytical tool to assess the alignment of existing legal systems with constitutional ideals and ecological justice.⁶⁸ Pancasila justice embodies an integral conception of justice that unites individual, social, and ecological dimensions without separation. This conception aligns with Notonagoro's (1975) view, which asserts that Pancasila justice is natural and organic, wherein humans, society, the state, and nature form a unified ethical system that cannot be disaggregated. Therefore, any regulation governing natural resource management must be founded upon the core values of balance, harmony, and sustainability to ensure equitable and enduring governance.⁶⁹

At the sectoral level, several relevant laws, such as Law No. 32 of 2009 on Environmental Protection and Management, Law No. 30 of 2007 on Energy, Law No. 10 of 2009 on Tourism, and Law No. 41 of 1999 on Forestry, contain normative mandates to prioritize environmental preservation, equitable distribution of benefits, and public participation. However, in practice, these provisions have not yet been implemented in a holistic and harmonized manner across all sectors. Fragmentation and inconsistency continue to impede efforts to realize integrated governance aligned with the spirit of Pancasila and ecological justice.⁷⁰

The current implementation of regulations remains predominantly sectoral and unsynchronized, demonstrating limited integration in the sustainable management of tourism, environmental conservation within forest areas, plantation zones, and other ecologically sensitive regions. This regulatory fragmentation undermines the development of a coherent and integrative governance framework that is essential for

⁶⁷ Q. Liu, S.L. Zhao, and Y.F. Li, 'The Hidden Costs of Land Use Transformation: Ecological Degradation in Arid and Semi-Arid Areas', *Journal of Arid Environments*, 230 (2025), 105433 <https://doi.org/10.1016/j.jaridenv.2025.105433>

⁶⁸ Jiahao Ma and others, 'Landscape Fragmentation Exacerbates Social-Ecological System Degradation in the Qinling Mountains by Weakening Ecosystem Services', *Ecological Indicators*, 178 (2025), 114130 <https://doi.org/10.1016/j.ecolind.2025.114130>

⁶⁹ Tayierjiang Aishan and others, 'Response of Degraded Populus Euphratica Architectural Variables to Ecological Engineering Project in the Lower Tarim River – A Meta-Analysis', *Ecological Engineering*, 219 (2025), 107723 <https://doi.org/10.1016/j.ecoleng.2025.107723>

⁷⁰ Haoxiang Zhang and others, 'Ecological Network Construction and Land Degradation Risk Identification in the Yellow River Source Area', *IScience*, 28.7 (2025), 112775 <https://doi.org/10.1016/j.isci.2025.112775>



achieving sustainable and resilient management in Indonesia's Ring of Fire.⁷¹ The reorientation of regulatory objectives must prioritize the pursuit of social and ecological justice rather than focusing solely on short-term economic growth.⁷² Achieving this goal requires sectoral and territorial synergy, as Pancasila Justice rejects institutional egoism and calls for central and regional authorities to formulate mutually reinforcing regulations, particularly in managing geothermal energy, forestry, fisheries, and tourism resources.⁷³ Furthermore, strengthening public participation is essential to ensure that local and Indigenous communities in the Ring of Fire region are actively involved in decision-making processes.⁷⁴

In realizing justice for the nation and its people, Pancasila Justice has provided a moral and constitutional compass for regulating geothermal and tourism activities in the Ring of Fire, prioritizing balance, harmony, and sustainability as guiding values. In practice, these principles are often merely rhetoric due to the lack of measurable indicators. Balance can be evaluated through tools such as environmental carrying capacity assessments, equitable benefit-sharing ratios, and inclusive fiscal transfers.⁷⁵ Harmony can be measured using cross-sector policy coherence indices, conflict resolution mechanisms, and participatory governance measures. Meanwhile, sustainability can be monitored through ESG frameworks, biodiversity audits, and community livelihood metrics.⁷⁶

Institutionalizing these indicators in regulations of the Ministry of Energy and Mineral Resources, the Ministry of Environment and Forestry, and the Ministry of Tourism would transform the ethical ideals of Pancasila into operational governance tools, ensuring that energy and tourism policies not only promote growth but also uphold ecological integrity, social justice, and long-term national resilience.⁷⁷ In a regulatory application, a balance must be maintained among economic, ecological, and social interests, in line with the Fifth Principle of Pancasila. Policies must also be flexible to adapt to local dynamics: Strengthening the legal status of customary

⁷¹ Xiaoyu Hou and others, 'Relative Trajectories of Economic and Ecological Activities during Industrialization in the United Kingdom and China Reveal a Sustainable Transition with Frequent Degradations', *Journal of Environmental Management*, 393 (2025), 127059 <https://doi.org/10.1016/j.jenvman.2025.127059>

⁷² Khudzaifah Dimiyati and others, 'Indonesia as a Legal Welfare State: A Prophetic-Transcendental Basis', *Heliyon*, 7.8 (2021), e07865 <https://doi.org/10.1016/j.heliyon.2021.e07865>

⁷³ Abidah B. Setyowati, 'Mitigating Inequality with Emissions? Exploring Energy Justice and Financing Transitions to Low Carbon Energy in Indonesia', *Energy Research & Social Science*, 71 (2021), 101817 <https://doi.org/10.1016/j.erss.2020.101817>

⁷⁴ Ija Suntana and others, 'Ideological Distrust: Re-Understanding the Debate on State Ideology, Normalization of State-Religion Relationship, and Legal System in Indonesia', *Heliyon*, 9.3 (2023), e14676 <https://doi.org/10.1016/j.heliyon.2023.e14676>

⁷⁵ Myrna A. Safitri and Achmad Jaka Santos Adiwijaya, 'Realizing Ecological Justice in Urban Development Laws: Indonesian Experiences and Challenges to Protect Biodiversity in Its New Capital City', *IOP Conference Series: Earth and Environmental Science*, 1447.1 (2025), 012021 <https://doi.org/10.1088/1755-1315/1447/1/012021>

⁷⁶ Bambang Manumayoso, Annissa Dewi Rinenggo Kusumo Utami, and Luiza Gabunia, 'Oil and Gas Fiscal Term Regulations Based on Ecological Justice', *Journal of Sustainable Development and Regulatory Issues (JSDERI)*, 2.3 (2024), 233–63 <https://doi.org/10.53955/jsderi.v2i3.50>

⁷⁷ Hilman S. Fathoni and Abidah B. Setyowati, 'Energy Justice for Whom? Territorial (Re)Production and Everyday State-Making in Electrifying Rural Indonesia', *Geoforum*, 135 (2022), 49–60 <https://doi.org/10.1016/j.geoforum.2022.07.012>



villages (desa adat) as custodians of conservation areas, and also enforcing strong sanctions against licensing violations with mechanisms for swift corrective action.⁷⁸

Ecological Justice in Sustainable Ring of Fire Governance Regulatory Framework

Ecological justice is an evolving concept within legal and environmental thought, emerging in response to the global environmental crisis, which is not solely caused by natural factors but is largely shaped by structural inequalities in social, political, and economic systems.⁷⁹ In the context of Indonesia, this concept is increasingly relevant when discussing governance in the Ring of Fire, a geological zone rich in renewable energy potential but also highly disaster-prone and inhabited by millions of people and other living beings.⁸⁰ The fundamental questions posed by ecological justice concern the extent to which nature receives justice within development frameworks and state governance systems, as well as whether the ecological rights of both human and non-human entities are equally recognized and protected.⁸¹ This calls for a legal and policy paradigm that acknowledges the intrinsic value of ecosystems, integrates justice into environmental planning, and ensures that development does not sacrifice long-term ecological integrity for short-term economic interest.⁸²

Table 4. Comparative Matrix of Legal Theories, Regulatory Instruments, and Foundational Principles

Theori	Focus	Legislation	NKRI Constitution	
			Principles	Approaches
Rawls	Distributive Benefits	UUD 1945 Article 28H, 33; UU 21/2014; UU 10/2009	Social Justice	Justice, Shield, Welfare
Elliot	The Moral Value of Nature	UUD 1945 Article 28H; UU 32/2009; UU 5/1990	Ecological Justice	Shield, Policy, Compliance
Kelsen–Satjipto	Pancasila Justice, Progressive Law	UUD 1945; UU 6/2014; UU 12/2011	The Fifth precept of Pancasila	Justice, Policy, Regulatory, Commitment

Source: processed by Author

This matrix synthesizes key theoretical frameworks distributive justice, ecological justice, and Pancasila justice and correlates them with relevant national laws. In the context of sustainable development based on natural resources and disaster-prone regions such as Indonesia's ring of fire, ecological justice represents both a philosophical and normative approach. It is essential to ensure that the relationship between humans and the environment is not exploitative, but rather mutually supportive within a single, sustainable life system.⁸³ From the perspective of ecological theory, ecological justice encompasses not only the fair distribution of environmental benefits among current human populations (intra-generational justice), but also justice for future generations, as well as justice toward non-human beings and ecosystems.

⁷⁸ Mark, Holec, and Escher.

⁷⁹ Hou and others.

⁸⁰ Anak Agung KT Sudiana, Ni Putu Noni Suharyanti, and Umirov Fitrat Faxriddinovich, 'Assessing the Government's Commitment to Achieving Ecological Justice for Society', *Journal of Human Rights, Culture and Legal System*, 5.1 (2025), 91–123 <https://doi.org/10.53955/jhcls.v5i1.489>

⁸¹ Hari Krishnan Govindarajan and L.S. Ganesh, 'Integrating Energy Governance and Environmental Justice: Role of Renewable Energy', *Renewable Energy Focus*, 43 (2022), 24–36 <https://doi.org/10.1016/j.ref.2022.08.006>

⁸² May Sudhinaraset, Rebecca Woofter, and Priscilla Huang, 'Stratified Reproduction and Threats to Reproductive Justice for Immigrants: Decision-Making for Fertility Using an Ecological Model', *Social Science & Medicine*, 382 (2025), 118334 <https://doi.org/10.1016/j.socscimed.2025.118334>

⁸³ Segovia-Tzompa, Casimero, and Apagüño.



This approach provides a normative legal framework that can serve as an analytical lens to critique the prevailing weaknesses and regulatory fragmentation within Indonesia's current legal system, particularly in the domains of tourism, energy, and environmental management. In practice, many development policies in the Ring of Fire remain focused on short-term economic gains, often ignoring environmental carrying capacity and the long-term sustainability of ecological functions.⁸⁴ Ecological justice theory urges a paradigm shift from man-centered law to eco-centered law, where legal systems recognize not only human interests but also the intrinsic rights of nature and ecosystems. This principle can be integrated into various national legal and policy frameworks. Despite these legal provisions, there is a lack of consistent application of ecological justice principles in technical policies, particularly in the implementation of geotourism development and renewable energy utilization. Conflicts between conservation and resource exploitation persist, as well as regulatory overlaps between central and local governments, due to the absence of an integrated legal framework aligned with ecological justice.⁸⁵

For integrated management of the Ring of Fire region, the following must be applied: Strict zoning (no-go zones) should be established for high-risk areas or those containing rare ecosystems; Ecological audits must be mandated prior to any geothermal exploration activity; and Carrying capacity principles (both environmental capacity and threshold limits) must be incorporated into tourism area management to ensure long-term ecological balance.⁸⁶ In managing Indonesia's Ring of Fire, three justice paradigms converge: Rawlsian distributive justice emphasizes fairness in sharing economic gains and burdens critical when geothermal revenues and royalties are unevenly distributed across central and local authorities; Elliot's ecological justice, which recognizes nature's intrinsic moral value; and Pancasila Justice, which unites both within Indonesia's ethical and constitutional philosophy. Rather than standing apart, Pancasila Justice functions as a synthesis balancing economic equity, environmental protection, and moral responsibility. It transforms imported theories of justice into a culturally grounded framework emphasizing balance, harmony, and sustainability. Through this lens, geothermal and tourism governance should not only pursue efficiency but uphold the coexistence of human welfare and ecological integrity as pillars of national justice.⁸⁷

CONCLUSION

The analysis demonstrates that Indonesia's Ring of Fire holds substantial potential to advance sustainable tourism and renewable energy development; however, this potential remains constrained by fragmented regulations, insufficient institutional coordination, and limited participation of local communities in both policy-making

⁸⁴ Atikah Mardhiya Rohmy, Hartiwiningsih, and I Gusti Ayu Ketut Rachmi Handayani, 'Judicial Mafia and Ecological In-Justice: Obstacles to Policy Enforcement in Indonesian Forest Management and Protection', *Trees, Forests and People*, 17 (2024), 100613 <https://doi.org/10.1016/j.tfp.2024.100613>

⁸⁵ Vojtěch Bosák and others, 'Developing Social-Ecological Justice through a Context-Sensitive Reuse of Urban Vacant Spaces', *Environmental Science & Policy*, 159 (2024), 103802 <https://doi.org/10.1016/j.envsci.2024.103802>

⁸⁶ Haydn Washington and others, 'Ecological and Social Justice Should Proceed Hand-in-Hand in Conservation', *Biological Conservation*, 290 (2024), 110456 <https://doi.org/10.1016/j.biocon.2024.110456>

⁸⁷ Alba-Patiño and others.



and implementation. These structural challenges hinder the realization of a governance system capable of aligning economic development with environmental protection and equitable social outcomes. Integrating ecological justice into the governance framework becomes essential to address these gaps, as it emphasizes the recognition of nature as a legal subject with inherent rights and promotes the fair distribution of benefits and burdens among all stakeholders, particularly local and Indigenous communities whose livelihoods and cultural identities are closely tied to the region's ecological integrity. To achieve these objectives, it is necessary to reform the legal and policy architecture by harmonizing the existing Tourism, Energy, and Environmental Laws, ensuring that they operate cohesively to support sustainable and resilient governance. Strengthening participatory governance is equally critical, as it enables inclusive decision-making processes and empowers local communities and Indigenous peoples to play an active role in shaping development pathways that reflect their socio-ecological priorities. The adoption of appropriate fiscal instruments, including targeted incentives for clean energy utilization and ecological taxes to deter environmentally harmful practices, will further reinforce the alignment between economic activities and environmental sustainability. Moreover, the development and application of measurable ecological justice indicators are vital for monitoring and evaluating the extent to which tourism development contributes to environmental integrity, socio-economic equity, and long-term community well-being. By implementing these integrated strategies, Indonesia can establish a coherent, inclusive, and resilient governance system that balances sustainable tourism development with environmental stewardship and ensures equitable socio-ecological benefits for current and future generations.

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