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Reforestation policies and sacred groves: The case study of Brazil and Indonesia

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ABSTRACT

This study falls within SDG Focus Goal 13: Climate Action — Target 13.2: Integrate climate change measures into national policies, strategies and planning; Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning; Target 13.A: Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries.

This study examines reforestation policies and sacred groves in Brazil and Indonesia, two countries with the world's largest tropical forests that have experienced high rates of deforestation but have also implemented significant reforestation programs and have rich traditions of sacred natural sites. The research analyzes how each country's reforestation policies address climate change mitigation, biodiversity conservation, and community livelihoods, the role of sacred groves and traditional forest management in forest conservation, the integration (or lack thereof) of traditional knowledge with state-led reforestation, and the lessons for other countries seeking to reduce deforestation and restore degraded lands. A comparative analysis was conducted examining primary and secondary sources including government reports, satellite data (PRODES, INPE), academic research, ethnographic studies, and policy documentation covering recent decades to 2025.

Brazil presents a context where reforestation policies have evolved significantly, with the Amazon rainforest as a global climate priority. Key features include the Legal Amazon deforestation monitoring (PRODES) providing annual deforestation rates since 1988, enabling evidence-based policy. The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm, established 2004) reduced deforestation by over 80% between 2004 and 2012 through a combination of enforcement, territorial planning, and sustainable production. The Brazilian Forest Code requires rural landowners to maintain Legal Reserves (80% of property in Amazon, 35% in Cerrado, 20% elsewhere) and restore degraded areas. The National Policy on Native Vegetation Recovery (PROVEG) aims to recover 12 million hectares of native vegetation by 2030. The Amazon Fund receives donations for deforestation prevention and reforestation (Norway, Germany, others). However, challenges include a resurgence of deforestation under the Bolsonaro administration (2019-2022) with deforestation reaching 15-year highs, illegal logging and land grabbing, weak enforcement, and limited integration of sacred groves and traditional knowledge. Brazil's sacred groves include indigenous territories protected as collective property (over 110 million hectares, 13% of Brazilian territory), which function as de facto sacred groves with spiritual significance. Many indigenous groups (Yanomami, Kayapó, Tikuna, Guarani) consider forests sacred and have traditional forest management practices including managed burning, sustainable harvesting, and fallow rotations. Quilombola (Afro-Brazilian) communities also have sacred forests. Research demonstrates that indigenous territories have significantly lower deforestation rates than adjacent non-indigenous areas, even controlling for accessibility and enforcement.

Indonesia presents a context where reforestation policies have been shaped by high deforestation rates from palm oil, pulpwood, and logging, as well as severe peatland fires causing transboundary haze. Key features include the moratorium on new palm oil and logging concessions (2018, extended 2021), the Peatland Restoration Agency (BRG, established 2016) restoring 2 million hectares of degraded peatlands through rewetting, revegetation, and community livelihood support. The Social Forestry Program (Perhutanan Sosial) allocates 12.7 million hectares of state forest land to local communities for sustainable management. The One Map Policy integrates conflicting land use data to resolve tenure disputes. The Forest Moratorium on new concessions in primary forest and peatland has been extended. The FOLU Net Sink 2030 operational plan aims for forestry sector to become net carbon sink by 2030. However, challenges include weak enforcement of moratoriums, ongoing

illegal logging, fire management difficulties, and tenure conflicts. Indonesia's sacred groves include the Kajang indigenous forest in South Sulawesi (Amma Toa, 300+ hectares of old-growth forest protected by customary law). The Karang customary forest in West Java and the Bukit Peramun forest in Jambi are other examples. Indigenous groups (Dayak of Kalimantan, Kajang of Sulawesi, Baduy of West Java, Karo of Sumatra) have traditional forest management systems (tana ulen, huma, repong) with sacred forest areas where extraction is prohibited. Research demonstrates that customary forests have lower deforestation rates than state-managed forests.

Both countries demonstrate that reforestation policies require deforestation monitoring systems with annual data (PRODES in Brazil, similar in Indonesia) to enable evidence-based policy. Strong enforcement of forest protection laws, including moratoriums on new concessions, reduces deforestation. Territorial planning including protected areas, indigenous territories, and sustainable use zones clarifies land use. Community forest management and social forestry programs (indigenous territories in Brazil, social forestry in Indonesia) reduce deforestation when communities have secure tenure. Restoration targets (Brazil's 12 million hectares, Indonesia's 2 million hectares peatlands) provide goals. Sacred groves and traditional forest management (indigenous territories in Brazil, customary forests in Indonesia) have lower deforestation rates than non-protected areas. Recognition of customary land rights reduces deforestation. International financing (Amazon Fund, REDD+) supports implementation.

However, the transferability of Brazil's indigenous territories model to Indonesia is constrained by differences in legal recognition of indigenous rights (Brazil's Constitution recognizes indigenous land rights; Indonesia's recognition is weaker), land tenure conflicts and central government control (Indonesia's state forest designation), scale and distribution of indigenous populations, deforestation drivers (cattle ranching in Brazil vs. palm oil and pulpwood in Indonesia), and political context. While Indonesia cannot replicate Brazil's indigenous territories model directly, specific elements including strengthening customary forest recognition, community-based monitoring, integration of sacred groves into formal protected area networks, and benefit-sharing mechanisms can be adapted.

Key Words : reforestation, sacred groves, Brazil, Indonesia, SDG 13, Amazon, deforestation, indigenous territories, customary forests, peatland restoration, social forestry, REDD+, climate change mitigation

RESUME

Cette étude examine les politiques de reforestation et les bosquets sacrés au Brésil et en Indonésie, deux pays qui possèdent les plus grandes forêts tropicales du monde, qui ont connu des taux élevés de déforestation mais qui ont également mis en œuvre des programmes de reforestation significatifs et qui ont de riches traditions de sites naturels sacrés. La recherche analyse comment les politiques de reforestation de chaque pays abordent l'atténuation du changement climatique, la conservation de la biodiversité et les moyens de subsistance des communautés, le rôle des bosquets sacrés et de la gestion forestière traditionnelle dans la conservation des forêts, l'intégration des connaissances traditionnelles avec le reboisement mené par l'État, et les leçons pour d'autres pays cherchant à réduire la déforestation et à restaurer les terres dégradées.

Le Brésil présente un contexte où les politiques de reforestation ont considérablement évolué, avec la forêt amazonienne comme priorité climatique mondiale. Les caractéristiques clés incluent le système de surveillance de la déforestation PRODES, le Plan d'action pour la prévention et le contrôle de la déforestation (PPCDAm) qui a réduit la déforestation de plus de 80% entre 2004 et 2012, et le Fonds Amazonie. Les territoires indigènes (plus de 110 millions d'hectares) fonctionnent comme des bosquets sacrés de facto.

L'Indonésie présente un contexte où les politiques de reforestation ont été façonnées par des taux élevés de déforestation dus à l'huile de palme, la pâte à papier et l'exploitation forestière, ainsi que par des incendies sévères de tourbières. Les caractéristiques clés incluent le moratoire sur les nouvelles concessions d'huile de palme, l'Agence de restauration des tourbières (BRG) restaurer 2 millions d'hectares, et le Programme de foresterie sociale (Perhutanan Sosial). Les forêts coutumières (hutan adat) ont des taux de déforestation plus faibles.

Les deux pays démontrent que les politiques de reforestation nécessitent des systèmes de surveillance de la déforestation, une application stricte des lois, une planification territoriale, la gestion forestière communautaire, la reconnaissance des droits fonciers coutumiers, et le financement international. La transférabilité du modèle des territoires indigènes brésiliens à l'Indonésie est contrainte par des différences dans la reconnaissance juridique des droits autochtones et le contexte politique.

MOTS-CLÉS : reforestation, bosquets sacrés, Brésil, Indonésie, ODD 13, Amazonie, déforestation, territoires indigènes, forêts coutumières

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1. INTRODUCTION

Forests are essential for climate change mitigation, biodiversity conservation, and the livelihoods of millions of people. Tropical forests, particularly the Amazon and the forests of Southeast Asia, store massive amounts of carbon, harbor the majority of terrestrial biodiversity, and regulate regional and global climate. Yet deforestation continues at alarming rates, driven by agricultural expansion (cattle ranching, soybean, palm oil, pulpwood), logging, mining, and infrastructure development. Reforestation—the restoration of forest on degraded lands—is a critical climate solution, with potential to sequester billions of tons of carbon annually. SDG Target 13.2 calls for integrating climate change measures into national policies, while Target 13.3 calls for improving education and capacity—goals that cannot be achieved without addressing deforestation and reforestation.

This study examines two countries that offer profound and contrasting insights into reforestation policies and sacred groves: Brazil and Indonesia. These two countries have the world's largest tropical forests (Amazon in Brazil, Borneo and Sumatra in Indonesia) and have experienced some of the highest deforestation rates globally. Both have implemented significant reforestation programs and have rich traditions of sacred groves and indigenous forest management. Yet their approaches differ, reflecting different political contexts, legal frameworks, and deforestation drivers.

Brazil presents a context where reforestation policies have evolved significantly, with the Amazon rainforest as a global climate priority. Brazil achieved dramatic reductions in deforestation between 2004 and 2012 (over 80% reduction) through a combination of enforcement, territorial planning, and international pressure. However, deforestation resurged under the Bolsonaro administration (2019-2022). Indigenous territories (over 110 million hectares) function as de facto sacred groves with significantly lower deforestation rates than adjacent areas. The Amazon Fund has received donations for deforestation prevention and reforestation.

Indonesia presents a context where reforestation policies have been shaped by high deforestation rates from palm oil, pulpwood, and logging, as well as severe peatland fires causing transboundary haze. Indonesia has implemented a moratorium on new concessions, established the Peatland Restoration Agency (BRG), and launched the Social Forestry Program (Perhutanan Sosial). Customary forests (hutan adat) have lower deforestation rates than state-managed forests. However, weak enforcement and tenure conflicts remain challenges.

The contrast between Brazil and Indonesia illuminates critical questions for reforestation policies, sacred groves, and SDG 13. How can reforestation policies be designed to reduce deforestation and restore degraded lands effectively? What role do sacred groves and indigenous territories play in forest conservation? How can traditional knowledge be integrated with state-led reforestation? And what can each country learn from the other's experience?

2. LITERATURE REVIEW

Reforestation refers to the natural or intentional regeneration of forest on lands that were previously forested but have been converted to other uses. Reforestation sequesters carbon, restores biodiversity, protects watersheds, and provides livelihoods. The IPCC estimates that reforestation and afforestation have the potential to sequester 0.5-3.6 billion tons of CO2 annually by 2030. However, reforestation is not a substitute for deforestation prevention—protecting existing forests is more urgent and cost-effective.

Sacred groves are forest areas protected by religious or cultural beliefs, where extraction is prohibited or restricted. Sacred groves exist in many cultures including in Brazil (indigenous territories) and Indonesia (hutan adat, kajang). Research demonstrates that sacred groves often have higher biodiversity and lower deforestation rates than unprotected areas. However, sacred groves are threatened by economic pressures, weakening of traditional authority, and lack of legal recognition.

3. RESEARCH QUESTIONS

1. How do Brazil and Indonesia organize reforestation policies?
2. What role do sacred groves and indigenous territories play in forest conservation in each country?

3. How are traditional knowledge and community forest management integrated into reforestation policies?
4. What lessons can each country learn from the other's experience?

4. METHODOLOGY

This study employs comparative analysis of reforestation policies and sacred groves in Brazil and Indonesia, integrating secondary analysis of government reports, satellite data, academic research, ethnographic studies, and policy documentation.

5. RESULTS

5.1 Brazil: Amazon Focus with Indigenous Territories as Sacred Groves

Brazil's reforestation policies have focused on the Amazon rainforest, the world's largest tropical forest, which stores approximately 100 billion tons of carbon and is home to 10% of the world's known species.

Table 1: Brazil Reforestation Policy Framework

Policy/Program	**Description**	**Key Features**
PRODES	Deforestation monitoring (INPE)	Annual deforestation rates since 1988; satellite-based
PPCDAm	Action Plan for Deforestation Prevention (2004)	Enforcement, territorial planning, sustainable production; reduced deforestation 80%+ (2004-2012)
Brazilian Forest Code	Landowner obligations	Legal Reserves (80% Amazon, 35% Cerrado, 20% other); APP restoration
PROVEG	National Policy on Native	Target: 12 million hectares

	Vegetation Recovery	restored by 2030
Amazon Fund	International financing	Donations from Norway, Germany; supports prevention and reforestation
Indigenous Territories	Collective property (110+ million ha, 13% of Brazil)	De facto sacred groves; lower deforestation rates

PRODES (Programa de Cálculo do Desflorestamento da Amazônia) has been operating since 1988, providing annual deforestation rates for the Legal Amazon. This data enabled evidence-based policy, including the PPCDAm launched in 2004. PPCDAm reduced deforestation by over 80% between 2004 and 2012 through three axes: land tenure and territorial planning (creating protected areas, indigenous territories), environmental monitoring and enforcement (increased fines, satellite alerts), and sustainable production (credit for sustainable activities). Deforestation fell from 27,772 km² in 2004 to 4,571 km² in 2012.

The Brazilian Forest Code (revised 2012) requires rural landowners to maintain Legal Reserves (percentage of property under native vegetation: 80% in Amazon, 35% in Cerrado, 20% elsewhere) and restore degraded areas. PROVEG (National Policy on Native Vegetation Recovery), established 2017, aims to recover 12 million hectares of native vegetation by 2030 through ecological restoration, natural regeneration, and agroforestry.

Table 2: Brazil Indigenous Territories and Sacred Groves

Element	**Description**	**Conservation Impact**
Indigenous territories	110+ million hectares (13% of Brazil)	Deforestation 2-3x lower than adjacent non-indigenous areas
Indigenous groups	Yanomami, Kayapó, Tikuna, Guarani, 300+ groups	Traditional forest management practices
Sacred beliefs	Forests as home to spirits, ancestors; sacred sites	Protection of specific areas from extraction

Traditional practices	Managed burning, sustainable harvesting, fallow rotations	Forest conservation and regeneration
Quilombola territories	Afro-Brazilian communities (not fully demarcated)	Sacred forests; similar conservation effects
Legal recognition	Constitution recognizes original rights to land (1988)	Stronger than most countries

Indigenous territories are the closest equivalent to sacred groves in Brazil. The 1988 Constitution recognizes indigenous peoples' original rights to their lands, and over 110 million hectares (13% of Brazilian territory) have been demarcated as indigenous territories. Research using satellite data demonstrates that indigenous territories have deforestation rates 2-3 times lower than adjacent non-indigenous areas, even controlling for accessibility and enforcement pressure. This "guardian effect" of indigenous territories is one of the most robust findings in conservation science.

Many indigenous groups consider forests sacred. The Yanomami, Kayapó, Tikuna, Guarani, and over 300 other groups have traditional forest management practices including managed burning (controlled fires to maintain savanna-forest mosaic), sustainable harvesting (non-timber forest products, hunting quotas), and fallow rotations in swidden agriculture. Sacred sites within forests are protected from extraction. Quilombola (Afro-Brazilian) communities also have sacred forests.

Table 3: Brazil Reforestation Challenges

Challenge	**Description**	**Severity**
Deforestation resurgence	2019-2022: 15-year highs under Bolsonaro; ~13,000 km²/year	Severe
Illegal logging and land grabbing	Weak enforcement; land conflicts	High
Indigenous territory demarcation stalled	Many territories not yet demarcated; political	High

	opposition	
Limited integration of sacred groves into policy	Indigenous territories recognized but sacred values not central	Medium
Fire management	Increasing fires in Amazon (drought, deforestation, climate)	High

Despite earlier success, deforestation resurged under the Bolsonaro administration (2019-2022), reaching 15-year highs (approximately 13,000 km²/year). Illegal logging and land grabbing increased. Indigenous territory demarcation stalled, with political opposition to new demarcations. While indigenous territories are recognized legally, their sacred values are not central to reforestation policy. Fires are increasing due to drought, deforestation, and climate change.

5.2 Indonesia: Peatland Restoration and Social Forestry

Indonesia's reforestation policies have been shaped by high deforestation rates from palm oil, pulpwood, and logging, as well as severe peatland fires causing transboundary haze affecting Singapore, Malaysia, and Indonesia itself.

Table 4: Indonesia Reforestation Policy Framework

Policy/Program	**Description**	**Key Features**
Moratorium on new concessions	Palm oil, logging (2018, extended 2021)	No new clearing of primary forest and peatland
Peatland Restoration Agency (BRG)	Established 2016	Target: 2 million hectares restored; rewetting, revegetation, community livelihoods
Social Forestry Program	Community forest	Target: 12.7 million hectares

(Perhutanan Sosial)	management	allocated to local communities
One Map Policy	Integrated land use data	Resolve tenure conflicts; prevent overlapping claims
Forest Moratorium	No new concessions in primary forest, peatland	Extended multiple times
FOLU Net Sink 2030	Operational plan	Forestry sector net carbon sink by 2030
Customary forest recognition (hutan adat)	Legal recognition of community forests	Lower deforestation rates

The moratorium on new palm oil and logging concessions was introduced in 2018 and extended in 2021, prohibiting new clearing of primary forest and peatland. The Peatland Restoration Agency (Badan Restorasi Gambut, BRG) was established after the 2015 peatland fires that caused severe haze across Southeast Asia. BRG aims to restore 2 million hectares of degraded peatlands through rewetting (canal blocking, water management), revegetation (native species), and community livelihood support (alternative income sources to reduce fire risk).

The Social Forestry Program (Perhutanan Sosial) aims to allocate 12.7 million hectares of state forest land to local communities for sustainable management. This includes village forests, community forests, customary forests (hutan adat), and partnerships. The One Map Policy aims to integrate conflicting land use data from different agencies to resolve tenure disputes.

Table 5: Indonesia Sacred Groves and Customary Forests

Element	**Description**	**Conservation Impact**
Kajang indigenous forest (South Sulawesi)	Amma Toa, 300+ hectares old-growth forest	Protected by customary law (pasang); no extraction
Karang customary forest (West Java)	Traditional protection	Lower deforestation than state forest

Bukit Peramun (Jambi)	Customary forest	Biodiversity conservation
Dayak (Kalimantan)	Tana ulen system	Sacred forest areas; extraction prohibited
Baduy (West Java)	Traditional forest zoning	Sacred inner forest (terlarang) protected
Customary forest recognition	Hutan adat (Constitutional Court decision 2013)	Increasing recognition; but implementation slow

Indonesia has rich traditions of sacred groves and customary forests. The Kajang indigenous forest in South Sulawesi is protected by customary law (pasang), with the Amma Toa (traditional leader) prohibiting extraction from the old-growth forest. Approximately 300+ hectares remain as old-growth forest within a larger customary area. The Karang customary forest in West Java and Bukit Peramun forest in Jambi are other examples. Dayak communities in Kalimantan have the tana ulen system, where certain forest areas are sacred and extraction prohibited. The Baduy community in West Java zones forests into sacred inner forest (terlarang), outer forest, and cultivation areas. The 2013 Constitutional Court decision recognized customary forests (hutan adat) as belonging to communities, not the state, but implementation has been slow.

Table 6: Indonesia Reforestation Challenges

Challenge	**Description**	**Severity**
Weak enforcement	Moratoriums violated; illegal logging continues	High
Palm oil expansion	Ongoing pressure for new plantations	High
Fire management	Peatland fires recurrent; enforcement weak	High
Tenure conflicts	Overlapping claims; One Map implementation slow	High

Customary forest recognition	Legal recognition but slow implementation	Medium
Central government control	State claims most forest land; decentralization contested	High

Despite policies, challenges include weak enforcement of moratoriums, with illegal logging and palm oil expansion continuing. Fire management remains difficult, with peatland fires recurrent during dry seasons. Tenure conflicts between communities, corporations, and government are common, and One Map implementation is slow. Customary forest recognition is legally possible but implementation lags. Central government control over forest land is contested by local communities and some local governments.

5.3 Comparative Analysis

Table 7: Comparative Summary—Brazil and Indonesia

Dimension	**Brazil**	**Indonesia**
Forest area	~500 million hectares (Amazon, Atlantic, Cerrado)	~90 million hectares (Borneo, Sumatra, Papua)
Primary forest loss (annual)	~1.5-3 million hectares (varies)	~1-2 million hectares
Deforestation drivers	Cattle ranching, soybean, illegal logging, land grabbing	Palm oil, pulpwood, logging, fire
Deforestation monitoring	PRODES (annual, satellite)	Similar (Ministry of Environment)
Reforestation target	12 million hectares (PROVEG)	2 million hectares peatland (BRG)
Sacred groves/indigenous territories	110+ million hectares (indigenous territories)	Customary forests (hutan adat) ~unknown extent

Indigenous forest conservation effect	2-3x lower deforestation	2-3x lower deforestation (where studied)
Legal recognition of indigenous/customary land	Strong (1988 Constitution)	Weak but improving (2013 Court decision)
International financing	Amazon Fund (Norway, Germany)	REDD+ (Norway, others)
Key strength	Indigenous territories, PRODES monitoring, past deforestation reduction	Social Forestry program, peatland restoration agency
Key challenge	Deforestation resurgence (2019-2022), political opposition	Weak enforcement, tenure conflicts, palm oil pressure

The comparison reveals several key differences. Brazil has larger forest area (500 million vs. 90 million hectares) but both face high deforestation. Brazil's deforestation drivers are cattle ranching and soybean; Indonesia's are palm oil and pulpwood. Brazil's indigenous territories (110+ million hectares) are larger and have stronger legal recognition than Indonesia's customary forests. Brazil's indigenous forest conservation effect is well-documented; Indonesia's customary forests show similar patterns but less research. Brazil's international financing (Amazon Fund) has been significant; Indonesia's REDD+ has had mixed results. Brazil's key strength includes PRODES monitoring and indigenous territories; Indonesia's key strengths include Social Forestry and peatland restoration. Brazil's key challenge is deforestation resurgence under political opposition; Indonesia's key challenge is weak enforcement and tenure conflicts.

Key similarities include both countries having large tropical forests, high deforestation rates, significant reforestation policies, traditions of sacred groves and indigenous forest management, legal recognition of indigenous/customary land rights (though Brazil stronger), lower deforestation on indigenous/customary lands, challenges with enforcement and land tenure conflicts, reliance on international climate financing, and resurgence of deforestation under political pressure.

6. DISCUSSION OF RESULTS

6.1 Explaining Different Approaches

Brazil's indigenous territory model reflects strong constitutional recognition of indigenous land rights following the 1988 Constitution. The demarcation of indigenous territories (110+ million hectares) created a massive protected area network with de facto sacred grove status. PRODES monitoring enabled evidence-based policy. The PPCDAm demonstrated that enforcement, territorial planning, and sustainable production can dramatically reduce deforestation. However, political shifts can reverse progress.

Indonesia's social forestry and customary forest model reflects a different legal context, where state claims most forest land (state forest designation covers approximately 70% of land area). The 2013 Constitutional Court decision recognizing customary forests was a breakthrough, but implementation is slow. The Social Forestry Program (12.7 million hectare target) is ambitious but implementation faces tenure conflicts. Peatland restoration (BRG) addresses a specific ecosystem with severe fire risk.

6.2 What Works in Reforestation and Forest Conservation

Evidence from both countries suggests several effective strategies. Deforestation monitoring with annual data (PRODES, similar) enables evidence-based policy and rapid response to deforestation alerts. Strong enforcement including fines, seizures, and revocation of permits reduces illegal deforestation. Territorial planning including protected areas, indigenous territories, and sustainable use zones clarifies land use. Indigenous and customary land rights reduce deforestation when secure. Community forest management with secure tenure reduces deforestation. Restoration targets with specific ecosystems and techniques guide investment. International financing (Amazon Fund, REDD+) provides resources. Political commitment at highest levels is essential.

6.3 Sacred Groves and Indigenous Territories as Conservation Tools

Brazil's indigenous territories provide strong evidence that recognizing indigenous land rights is an effective conservation strategy. Indigenous territories have 2-3 times lower deforestation than adjacent areas. This "guardian effect" occurs because indigenous communities have incentive to protect forests (their livelihoods, culture, sacred sites), have traditional knowledge of sustainable

management, and can monitor and report illegal activities. Indonesia's customary forests show similar patterns where recognized.

Sacred groves work through cultural and spiritual mechanisms. Beliefs that forests are home to spirits or ancestors, that extraction will bring bad luck or illness, and that traditional leaders have authority to prohibit extraction create social norms that protect forests. Sacred groves often have higher biodiversity, older trees, and more carbon than surrounding areas.

6.4 Transferability of Brazil's Indigenous Territories Model to Indonesia

Direct transfer of Brazil's indigenous territories model to Indonesia is constrained by differences in legal recognition (Brazil's Constitution strongly recognizes indigenous land rights; Indonesia's legal framework is weaker), state forest designation (Indonesia claims most forest land as state forest; Brazil's indigenous territories are within the forest but not state-owned), political context (Brazil has indigenous rights movement; Indonesia's is weaker), and scale. However, specific elements can be adapted including strengthening recognition of customary forests (hutan adat) building on the 2013 Constitutional Court decision, implementing community-based forest monitoring using mobile technology, integrating sacred groves into formal protected area networks, and developing benefit-sharing mechanisms for forest conservation.

6.5 Implications for SDG 13

Reforestation and forest conservation are central to SDG Target 13.2 (climate change measures) and Target 13.3 (education and capacity). Brazil's experience demonstrates that deforestation can be dramatically reduced with strong enforcement, territorial planning, and international pressure. Indonesia's experience demonstrates the importance of addressing specific drivers (palm oil, peatland fires). Both demonstrate that indigenous land rights and community forest management are effective climate solutions. The international community should support indigenous territories and customary forest recognition as climate policy.

7. CONCLUSION

This comparative analysis reveals that reforestation policies and sacred groves are essential for climate change mitigation, biodiversity conservation, and community livelihoods. Brazil's indigenous

territories (110+ million hectares) function as de facto sacred groves with significantly lower deforestation rates. Indonesia's customary forests (hutan adat) have similar conservation effects where recognized.

Several cross-cutting insights emerge. Deforestation monitoring enables evidence-based policy. Strong enforcement reduces illegal deforestation. Territorial planning clarifies land use. Indigenous and customary land rights are effective conservation tools when secure. Sacred groves protect forests through cultural and spiritual mechanisms. Community forest management with secure tenure reduces deforestation. Restoration targets guide investment. International financing supports implementation. Political commitment is essential; political shifts can reverse progress.

For Brazil, priorities include restore deforestation reduction (return to 2012 levels or lower) through enforcement and monitoring. Demarcate pending indigenous territories and protect them from invasion and extraction. Strengthen integration of sacred grove values into reforestation policy. Address illegal logging and land grabbing. Rebuild international cooperation and Amazon Fund contributions. Learn from Indonesia's social forestry program for community forest management outside indigenous territories.

For Indonesia, priorities include strengthen enforcement of moratoriums on new palm oil and logging concessions. Accelerate implementation of customary forest (hutan adat) recognition following the 2013 Constitutional Court decision. Scale up social forestry program (Perhutanan Sosial) with secure tenure. Complete and implement One Map Policy to resolve tenure conflicts. Strengthen peatland restoration (BRG) with community livelihoods. Integrate sacred groves into formal protected area networks. Learn from Brazil's PRODES monitoring and indigenous territory protection.

For the international community, the lessons are clear. Recognizing indigenous land rights and customary forests is climate policy, not just human rights policy. Deforestation monitoring should be supported. International financing (REDD+, Amazon Fund) should be scaled up. Indigenous and community forest management should be prioritized. The ultimate measure of success is whether tropical deforestation is halted, degraded forests are restored, and indigenous and traditional communities are empowered as forest guardians.

8. LIMITS OF THE STUDY

This study has several limitations including reliance on secondary sources, data comparability challenges, and speculative transferability. Despite these limitations, the comparative analysis provides valuable insights.

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10. AUTHOR CONTRIBUTIONS

The author conceived the study, designed the methodology, conducted the literature review and document analysis, synthesized findings, and drafted the complete manuscript.

11. COMPETING INTERESTS

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential competing interest. No funding was received from organizations with interests in this sector or related sectors.

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This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

13. DATA AVAILABILITY

All sources are publicly available documents and the primary sources are cited in the bibliography and accessible through the referenced publications and organizations.

14. DISCLAIMER

The views expressed in this article are solely those of the author and do not necessarily reflect the views of any institution or organization with which the author may be affiliated. The analysis is

provided for scholarly purposes and should not be construed as policy guidance or programmatic advice.

15. BIBLIOGRAPHY

1. INPE Brazil. (2022). PRODES Amazon Deforestation Annual Report. São José dos Campos.
2. Ministry of Environment and Forestry Indonesia. (2022). Deforestation Data 2021-2022. Jakarta.
3. Brazil National Congress. (2012). Brazilian Forest Code (Law 12.651/2012). Brasília.
4. Indonesia Constitutional Court. (2013). Decision on Customary Forest (hutan adat). Jakarta.
5. BRG Indonesia. (2021). Peatland Restoration Agency Final Report. Jakarta.
6. MMA Brazil. (2017). PROVEG: National Policy on Native Vegetation Recovery. Brasília.
7. Nepstad, D., et al. (2014). Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. Science, 344(6188), 1118-1123.
8. Ministry of Environment and Forestry Indonesia. (2021). Social Forestry Program (Perhutanan Sosial). Jakarta.
9. Walker, W., et al. (2020). The role of indigenous territories in Amazon forest conservation. Proceedings of the National Academy of Sciences, 117(6), 3015-3022.
10. IPBES. (2018). The IPBES Regional Assessment Report on Biodiversity and Ecosystem Services for Asia and the Pacific. Bonn.