



Forest policy diagnostics for Indonesia

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The present report builds on the analytical framework introduced in the deforestation archetypes paper (de Sy et al. 2026). It applies this framework to examine national deforestation policies in Indonesia in relation to identified archetypes. In parallel, similar analyses have been conducted for Brazil, the Democratic Republic of the Congo (DRC), and Peru. Together, these country studies and the archetypes paper form the foundation of the deforestation diagnostic framework.

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The assessments and views expressed in this report are those of the authors alone.

Summary

This report applies a deforestation diagnostics approach to identify which forest policies are most likely to work, where, and why. The diagnostics framework links policy effectiveness to forest context and behavioural mechanisms, recognizing that policies achieve results by acting on behavioural responses—such as sensitivity to incentives, enforcement credibility, and motivational drivers—which ultimately determine land-use decisions. Developed under CIFOR’s Global Comparative Study on REDD+, the approach combines three complementary components. First, it develops a spatial ‘deforestation archetype’ analysis that classifies Indonesia’s forest landscapes according to forest cover, degradation, deforestation severity, and hotspot dynamics. Second, it constructs a typology of forest policies based on a behavioural theory of change, which categorizes policies according to the actors they target, the mechanisms they activate (material incentives, compliance and enforcement, social belongingness, or competence/self-efficacy), and the forest threats they address. Third, it links archetypes and policy types to assess the effectiveness of these policies in each circumstance. It integrates these three levels of analysis to provide a contextualized alternative to one-size-fits-all solutions to forest policy design while also avoiding a purely case-by-case analysis, thereby improving policy design supposed to target the right levers, enhance comparability, and achieve strategic learning within and across countries.

Indonesia’s forest landscape is highly heterogeneous, with intact forest areas concentrated in eastern islands and provinces and chronic deforestation areas in Sumatra and Kalimantan. Between 2001 and 2024, Indonesia lost roughly one-third of its tree cover present in 2000. Annual deforestation rates averaged close to 1.0% during the 2001–2015 period, but declined to below 0.5% per year after 2015/16. Oil palm and pulpwood plantations are dominant post-deforestation land uses in high-deforestation archetypes, while peatland drainage and fires amplify degradation risks.

Indonesia’s policy mix includes moratoria on primary forest and peatland permits, an oil palm licensing moratorium, peatland restoration under the 3R strategy, strengthened enforcement (including anti-corruption approaches), ecological fiscal transfers, village funds and social forestry programmes. Commodity certification schemes (SVLK, ISPO, RSPO) and international results-based payment agreements complement domestic measures. Evidence suggests that declining deforestation after 2015 is linked to a combination of enforcement improvements, moratoria, peatland governance reforms and corporate commitments, although commodity price dynamics also played a role.

Command-and-control instruments have been particularly relevant in chronic and accelerating deforestation archetypes, especially where land status falls within the forest estate. However, land classification ambiguities and decentralization reforms complicate enforcement. Fiscal transfers and social forestry schemes are more aligned with intact forest and mosaic archetypes, where strengthening local competence and incentives can sustain conservation. Peatland restoration is critical in degraded and fire-prone landscapes.

The diagnosis underscores the importance of aligning the instruments with Indonesia’s complex land tenure and governance architecture. Policy effectiveness depends not only on instrument design but also on subnational coordination, monitoring transparency and sustained political commitment. Indonesia’s experience points to persistent structural challenges but also indicates how integrated policy packages combining enforcement, fiscal incentives and restoration measures can generate measurable reductions in deforestation.

1 Introduction

From 2001 to 2024, Indonesia lost 32 Mha (20%) of its tree cover, resulting in 23 Gt of CO₂e emissions. Approximately half of Indonesia's annual GHG emissions were generated from deforestation and forest degradation. Since 2015/2016, however, deforestation rates have dropped significantly; the annual rate in 2021 was 0.5%, the lowest recorded since 2004.¹

Several policies and broader trends are behind this recent decline in deforestation, which we discuss in this report. To further improve the effectiveness of current and future initiatives to reduce deforestation, practitioners and policymakers can benefit from prior knowledge around the impacts of policies implemented in similar contexts in other tropical countries. CIFOR's Global Comparative Study on REDD+ is developing and operationalizing a deforestation diagnostics approach which addresses the key question: which policies and measures are likely to work where and why? For policymakers and practitioners, this diagnostics approach can provide a tool to help identify the most feasible policy interventions, based on policy experiences in comparable contexts. The approach offers a middle ground between a 'one size fits all' solution to deforestation and case by case interventions.

The deforestation diagnostics approach consists of three primary stages (Angelsen 2022; Chervier et al. 2022). Firstly, a set of specific forest contexts – otherwise known as archetypes – is identified for the country, based on diagnostic variables. These variables describe aspects of the deforestation context that will most probably affect policy outcomes and their impacts. Second, policies and measures that support countries to address deforestation (or forest management and land cover change more generally) are identified. Finally, the question of 'what is likely to work where?' can be addressed by examining available evidence around context-dependent policy impact.

This deforestation diagnostic approach is both a decision-making and research tool. For decision makers, the approach can identify the contexts in which different conservation measures are being implemented, as well as the most appropriate measures and public policies for each context. For researchers, the approach can help identify factors critical to understanding individual cases and place them within broader tropical forest contexts. For civil society, the archetypes can increase information and transparency about the different processes and dynamics of deforestation at the national level, including deforestation risks.

This report presents progress on the deforestation diagnostic approach as applied to Indonesia. The structure of the report is as follows. Section 2 presents archetype analysis around forest policies. This section elaborates a framework for archetype analysis, which comprises of discussion around landscape characteristics, deforestation drivers and risks, as well as key actors and governance. Section 3 discusses the typology of relevant forest policies and measures based on the archetype approach. This section focuses on actors being targeted by the forest policies, the behavioural mechanisms being targeted by the policies, and the forest threat being targeted. Section 4 gathers evidence on how the archetype approach works in Indonesia, highlighting policies that contribute to the reduction of deforestation. Section 5 offers concluding comments.

2 Archetypes: Defining the deforestation context

2.1 Overview of the archetype approach

To understand the contexts in which deforestation is occurring, we use archetype analysis. Archetype analysis is a methodological approach that identifies repeated, generalizable patterns of a specific phenomenon (Eisenack et al. 2021; Oberlack et al. 2019); this approach has recently been applied to studying deforestation patterns (Baumann et al. 2022; Buchadas et al. 2022). Archetype analysis classifies regions and landscapes into different categories (i.e., archetypes) according to a set of attributes which we call ‘diagnostic variables’. Each ‘case’ (i.e., geographical area) is assigned an archetype, which represents that particular type of landscape. An archetype is therefore a group of geographical areas which share a set of key attributes, or diagnostics variables.

We built the archetypes using a nested approach (Figure 1). A nested approach allows us to introduce regional complexity step-by-step: a first set of variables (i.e., building blocks) defines a small number of broad categories, the next set of variables further splits these into subcategories, and another set of variables gives a third and more detailed set of archetypes. Based on literature reviews and experimenting with several global, spatial datasets, we propose a two-level nested approach (Figure 1). The first level identifies archetypes based on three ‘typologies’ that are built using data on deforestation trends, forest cover and forest degradation. This is explained in Section 2.2. The second level defines ‘nested archetypes’ by incorporating metrics that describe drivers of deforestation as well as deforestation risks; this is explained in Section 2.3.

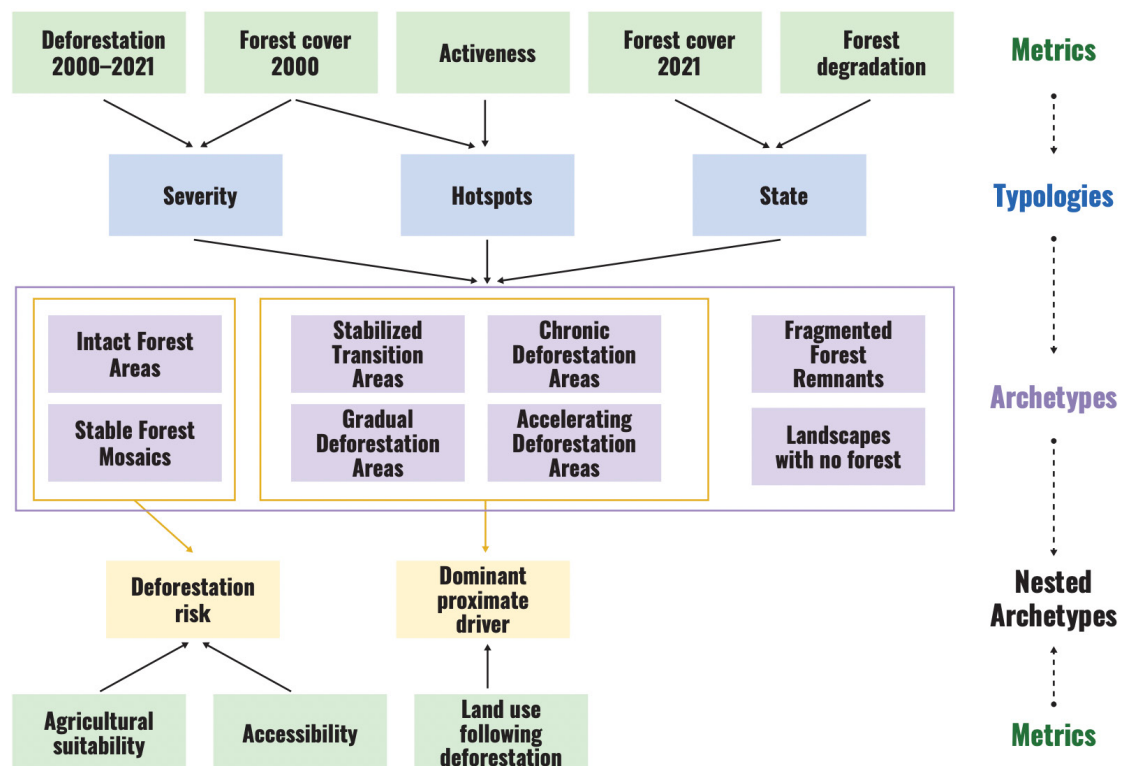


Figure 1. Conceptual framework used to build the archetypes and the nested archetypes

Future work may add a third level of archetype analysis, which will focus on specifying the quality of governance and actors present in the deforestation areas. This work will identify land users who are engaging in deforestation or forest extraction activities, tenure security and governance quality. For the Level 3 analysis of the archetypes, there are at least two key challenges. First, how to define and measure the institutional and governance quality in a way that is comparable across regions and countries. Second, how to relate identified deforestation and forest degradation actors to specific geographical locations. At this stage, we tentatively discuss Level 3 factors in Section 4.

2.2 Archetypes of deforestation

For this analysis, we use the Tropical Most Forest (TMF) dataset (Vancutsem et al. 2021), in which the unit of analysis is the landscape, defined as a 5x5 km pixel. We selected the TMF dataset because it provides detailed information on forest degradation and post-deforestation recovery. This dataset characterises forest state from 2000 to the end of 2021. We describe the landscape according to three main characteristics or ‘typologies’: (i) current forest state; (ii) severity of deforestation; and (iii) whether the landscape is a deforestation hotspot.

‘Current forest state’ (Figure 2) describes the state of the forest in the 5x5km landscape and is built using two metrics: forest cover in 2021 (as a percentage of land) and forest degradation in 2021 (as a percentage of forest cover). From this we see that 41.4% of Indonesia has landscapes with high forest cover and low levels of degradation, while approximately 18% is low forest cover with high forest degradation; this is primarily seen in the southern part of the country, mostly on the island of Java.

‘Severity of deforestation’ (Figure 3) describes the landscapes according to the extent of total forest cover lost since 2000. This is established using two metrics: forest cover in 2000 (as a percentage of land) and gross forest cover lost from 2000 to 2021 (as a percentage of land). The map shows that most of the areas that had high forest cover in 2000 have had low deforestation rates in the last two decades (46.5% of the national territory).

‘Deforestation hotspots’ (Figure 4) highlights which landscapes have average annual deforestation rates above 1%, and which are below that threshold. We also describe these hotspots considering changes over time, depending on whether the high deforestation rate (above 1%) is before 2015, after 2015, or high throughout the analysis period. Analysis shows that the areas with the highest forest cover loss between 2000 and 2021 are Sumatra and Kalimantan. There are few areas that are accelerating deforestation areas (1.8%); that is, areas that have seen higher deforestation rates after 2015 compared to before.

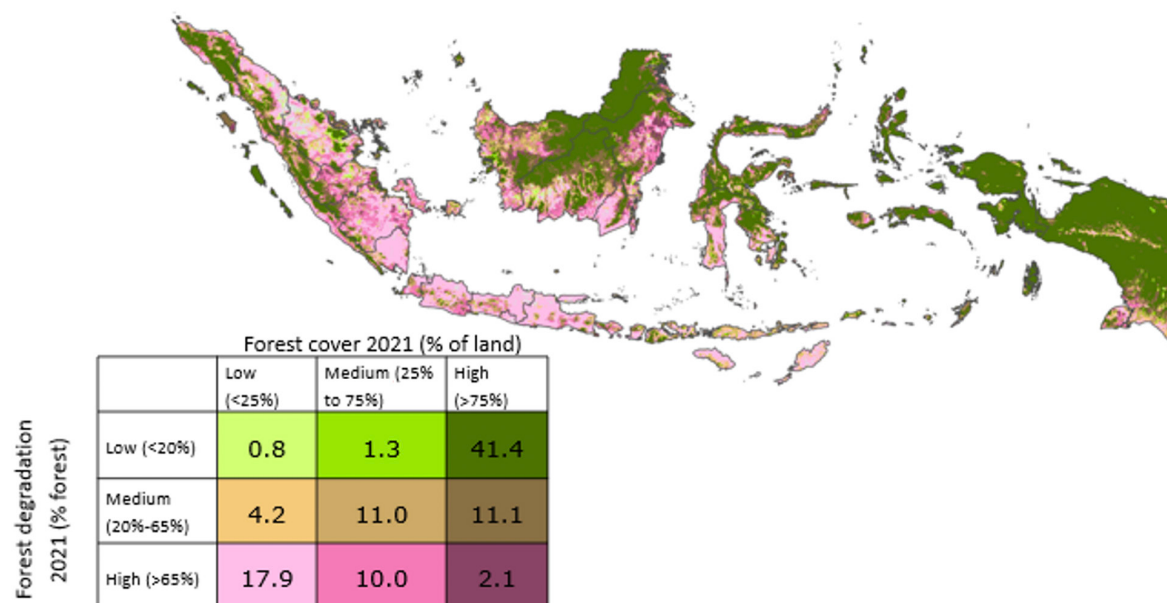


Figure 2. The current state of Indonesia's landscapes considering forest cover and forest degradation in 2021

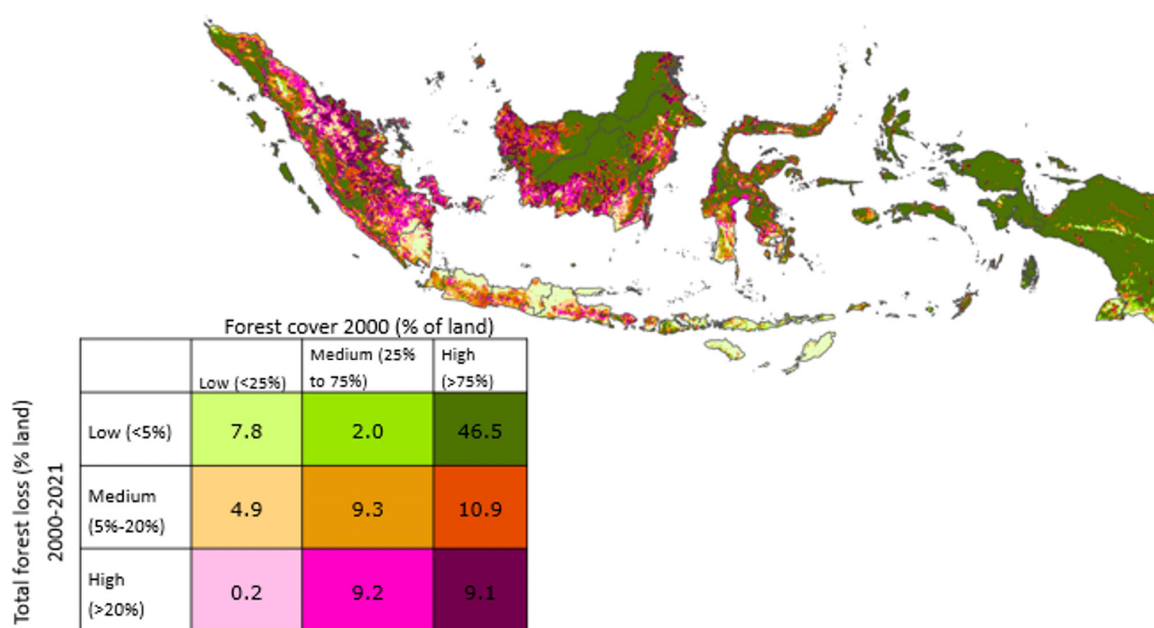


Figure 3. Severity of deforestation in Indonesia, based on forest cover in 2000 and total forest loss between 2000 and 2021

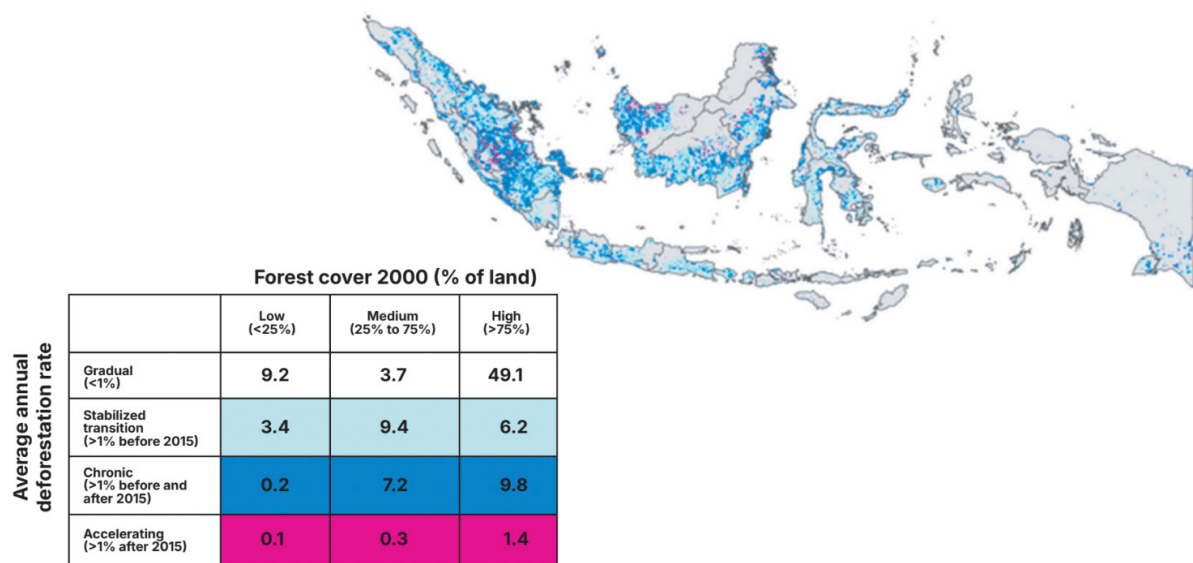


Figure 4. Deforestation areas with higher than 1% average annual deforestation

Qualitative evaluation of the state of Indonesia's landscape, severity and hotspot typologies resulted in seven archetypes (Figure 5), with an eighth category of non-forest land that is no proper forest or deforestation archetype. We first defined two archetypes where deforestation has been historically low: intact forest areas and stable forest mosaics. These two archetypes share low overall deforestation during 2000–2021, with intact forest areas having lower forest degradation. As such, these two archetypes consist of landscapes with relatively undisturbed forests. Together, they cover almost half of Indonesia's territory (48.2% in total). Notably, Indonesia's eastern provinces have the most conserved forest areas; the four provinces with the highest percentage of conserved forest are Papua (81.7%), West Papua (94.4%), North Maluku (78.9%) and Maluku (71%).

We then distinguished four archetypes which we label 'deforestation areas'. These landscapes describe areas where deforestation during 2000–2021 has been high or medium, or where the deforestation rate is higher than 1% – these areas are therefore classified as hotspots. We also describe them considering how they have changed over time – 'stabilized transition areas' (i.e., old deforestation areas) are those with deforestation rates higher than 1% only before 2015, while 'chronic deforestation areas' have deforestation rates higher than 1% both before and after 2015, and 'accelerating deforestation areas' are those with deforestation rates higher than 1% only after 2015. 'Gradual deforestation areas' are those that have at least lost 20% of their forest cover since 2000, but where average annual deforestation rates have not been higher than 1% on average.

Deforestation areas cover 44% of Indonesia's territory and can be considered priority areas for policies aiming to reduce deforestation. Interestingly, most deforestation areas (18.9%) are older, in the sense that they had deforestation rates higher than 1% before 2015 but these rates reduced after 2015. Chronic deforestation areas also form a significant share of the land (17%), while there are fewer accelerating deforestation areas (1.8%). The five provinces with the highest percentage of deforestation areas are Bangka Belitung (90.8%), South Sumatra (78.4%), Bali (75.9%), Riau (73.9%) and Jambi (73.7%). These are the areas where most oil palm-driven deforestation has developed.

The last two archetypes are 'fragmented forest remnants' and 'landscapes with no forest'. Their main characteristic is having less than 25% forest cover in both 2000 and 2021, and therefore, they have seen lower deforestation in the last two decades as well as lower deforestation rates. These areas cover approximately 8% of the country's land and are mostly located in the southern part of the country.

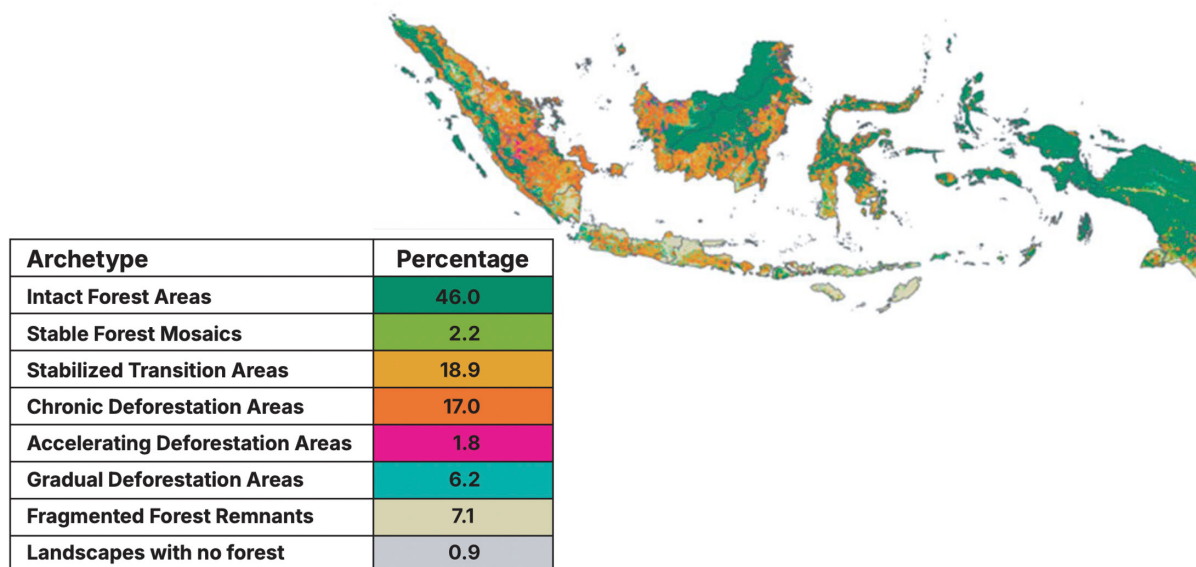


Figure 5. Archetypes of deforestation in Indonesia. See Annex Table 3 for the percentage of archetypes in each province.

2.3 Nested archetypes

The second level of the archetype analysis provides more detail on the deforestation areas, intact forest areas and stable forest mosaics through nested archetypes (see Figure 1). For deforestation areas, we considered the direct drivers of deforestation (Figure 6). We included the following land uses/covers: tree plantations, forest regrowth, water, cropland, grassland, urban and shrubland (see Annex Table 4 for a description of each category). The most significant land use following deforestation is tree plantations, which can be associated to oil palm and timber plantation developments. The second most important driver – and a dominant driver in many provinces in Java and Bali – is urban development. Sulawesi is dominated by cropland and grassland areas rather than tree plantations (Rijal et al. 2019; Supriatna 2020; Supriatna et al. 2020). How land is used following deforestation is therefore highly dependent on the geographical location and island in question.

To further describe intact forest areas and stable forest mosaics, we include information on the area's accessibility to urban areas and agricultural potential to show the risk of agricultural-driven deforestation (Figure 7). We define accessibility based on the time it takes to travel to the nearest urban centre (Weiss et al. 2018), which is defined as an area with 1,500 or more inhabitants per square km, or most of the built-up land cover coinciding with a population centre of at least 50,000 inhabitants.

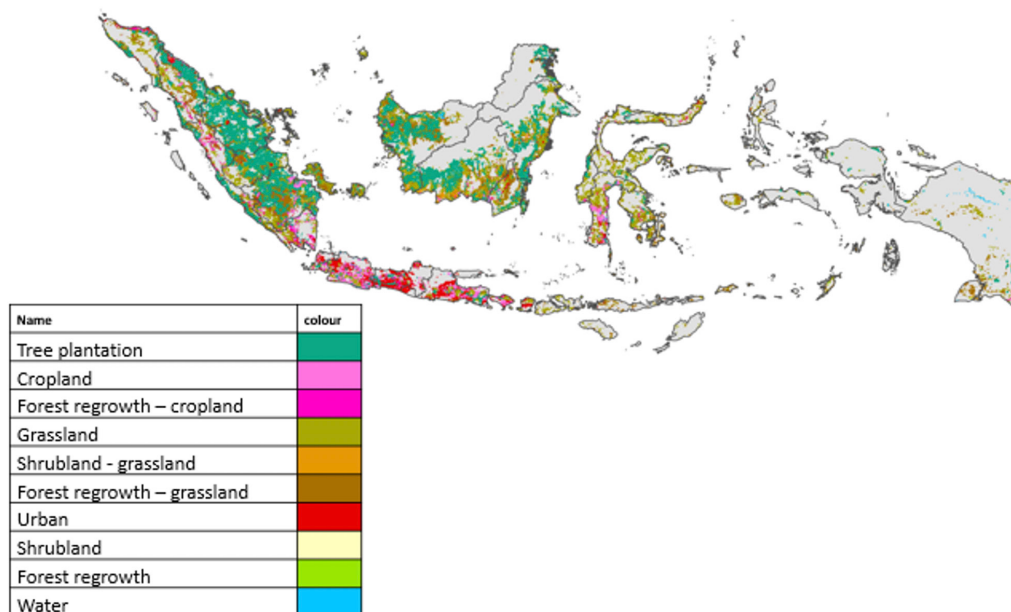


Figure 6. Land use following deforestation, considering only deforestation areas (see Figure 5)

Agricultural potential represents the agroclimatic potential for low input rainfed agriculture of main commodity crops (wheat, soy, maize, rice, cassava, banana, cocoa, coffee, tea, sugarcane and oil palm) with data available in the tropics over the baseline period of 1961–1990. This potential is summed and standardized across crops.

Figure 7 shows that most of the remaining forested areas in Indonesia have low agricultural potential and low accessibility. Areas with high agricultural suitability are in Papua (Gani and Sukarman 2019; Mulyani et al. 2022, 2023) mapping, land resource correlation, and suitability assessment at the 1:50,000 scale was conducted. This study aimed to identify the potential and direction of the land resources through land suitability maps for agriculture, especially food crops on a semi-detail map. The research was conducted through the use of standardized methods developed by the Indonesia Center for Agricultural Land Resources Research and Development (ICALRRD, a province also characterised by low accessibility).

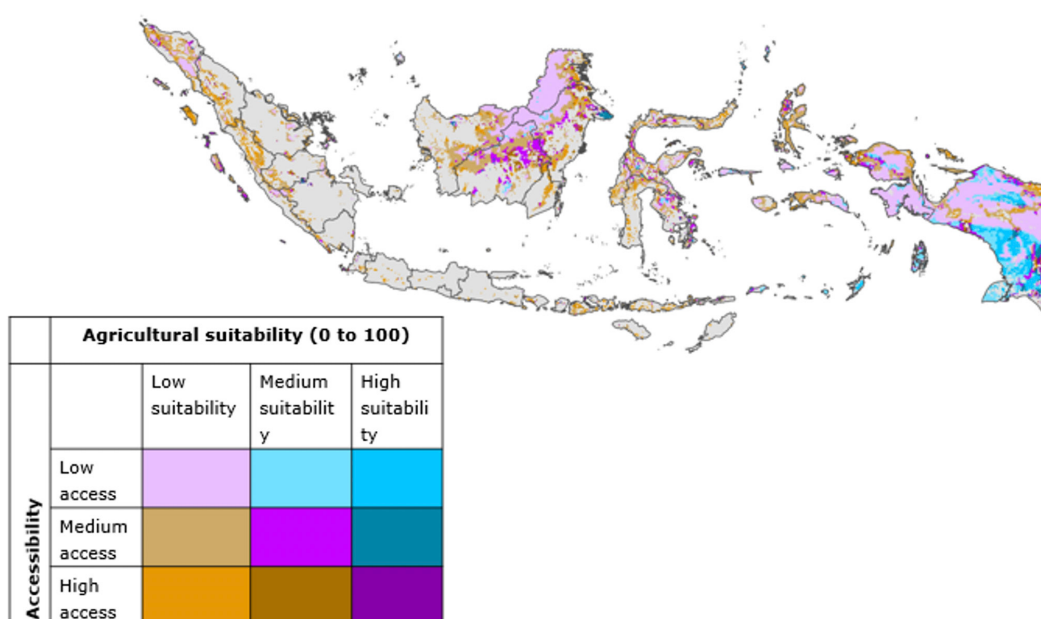


Figure 7. Risk of agricultural expansion, considering accessibility and agricultural suitability

3 Typology for forest policies and measures

3.1 Forest policy theory of change

While the knowledge base on the impact of forest policies and measures is growing, drawing general lessons from case studies often remains challenging, due to the varying local and regional characteristics of each policy context. To be able to make relevant comparisons and draw lessons from different policies, the characteristic traits of each policy must be defined and assessed. The second part of the diagnostics approach is therefore to establish a typology for forest policies. A policy typology is a classification system that groups deforestation policies according to how similar or different they are.

To build this typology, we conducted a literature review and examined policy documents in Brazil, Indonesia, Peru and DRC. We identified a total of 35 policies and measures relevant to reducing deforestation (see Annex Table 5 for the list of policies and their definitions). For the purpose of our analysis, we define a forest policy as “any policy, programme or action aimed at changing or significantly affecting the behaviour of forest-related actors and thereby directly or indirectly contribute [sic] to avoiding deforestation.” (Chervier et al. 2022). With this definition, policies and measures like those on agriculture, infrastructure and rural development are all relevant for this analysis, if their implementation is in forested landscapes and therefore, they impact upon the behaviours of those living there.

Policies can be categorized into public, private/industrial and self-regulatory (i.e., by companies). Public policies are those issued by public authorities, like forest estate delineation and forest product taxation. Private policies are those issued by private sector actors. Private policies can be developed at the industry level – such as the Roundtable of Sustainable Palm Oil (RSPO) for palm oil – and can also be issued by a company or several companies as self-regulatory policies. An example of self-regulatory policy issued by individual companies can be seen with the ‘No Deforestation, No Peat and No Exploitation’ (NDPE) policies issued by various palm oil, pulp and paper companies. Meanwhile, an example of a collective self-regulatory policy is the initiative of several palm oil companies to produce deforestation-free palm oil, through the Indonesian Palm Oil Pledge (IPOP) and Sustainable Palm Oil Manifesto (SPOM).

We built a generic Theory of Change (ToC) to describe the general causal pathway in which the policies generate impact, following the primary steps seen in the literature that evaluates theory (Börner et al. 2020; International Initiative for Impact Evaluation (3ie) and White 2012; Niel et al. 2019; Weiss 1997)2012; Niel et al., 2019; C. H. Weiss, 1997. This theory of change differs from other direct forestry policy and measure ToCs that can be found in the literature, however, in the sense that it puts emphasis on what behavioural motivations are catalysed as a direct consequence of implementing policies and measures (Figure 8).

Based on our ToC, we describe policies according to three traits of forest policies and measures that characterize the three main steps in our generic theory of change: (i) the stakeholders; (ii) the behavioural mechanisms¹ activated by policies; and (iii) the forest threat targeted by the policy. These three attributes are used to build the policy typology.

¹ In previous work, for example by Chervier et al (2022), these are referred to as ‘psychological mechanisms’. Here we have opted to change this term to ‘behavioural mechanisms’, as the focus is on the behavioural change of forest actors.

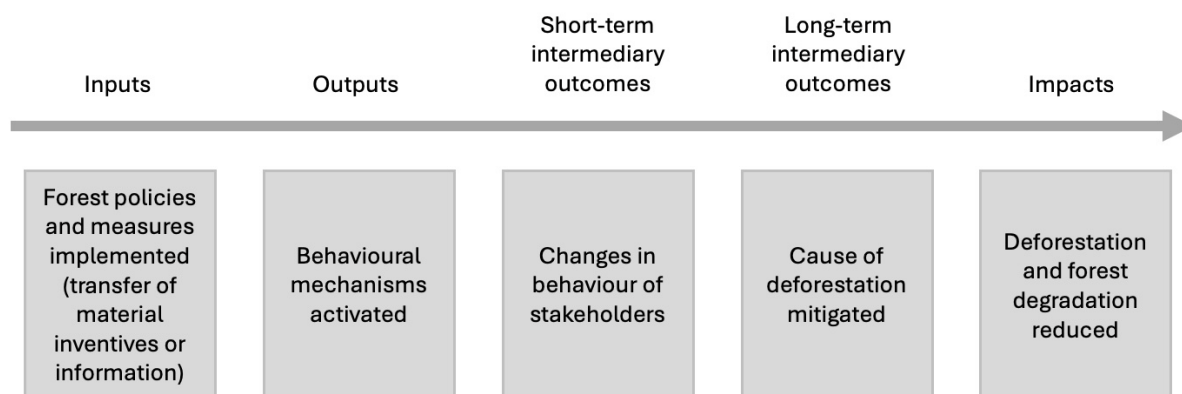


Figure 8. Generic theory of change for forest policies considered in deforestation diagnostics.

Source: Chervier et al. (2022)

3.2 Actors targeted by the forest policies

Five main categories of actors are identified for the forest policy typology. The first is *producers* – these are land/forest owners and users involved in forest-friendly or forest-risk products and commodities. We distinguish between small-scale subsistence-oriented landholders, medium/large scale landholders and companies with concessions. This distinction is necessary because the behavioural and economic responses of these actors are likely to be significantly different (Angelsen 1999; Pfaff et al. 2013).

The second category of actors includes those involved in the value chains of forest-risk or forest-friendly commodities and products, but who are not producers or consumers. These *supply chain actors* are therefore the input suppliers, slaughterhouses, agro-industrial multinational companies and others along the supply chains that play a role in transforming a raw, deforestation-related product into a final consumption product.

The third category of actors is the *consumers* – the end users of deforestation-related products. In this category, we can find private individuals and public entities located in producing and importing countries. For example, the households consuming firewood or charcoal in forest-rich countries are considered consumers.

The fourth category of actors is *governments and public institutions* located in forest-risk tropical countries that have mandates to regulate land use. These actors can have responsibility at the national, regional or local level.

The fifth and final category is the *finance actors and investors*, including donors. These are involved almost exclusively in transferring assets, capital and resources that ultimately impact land-use changes in the tropics. This includes both public and private entities, for example investors, insurance companies, banks, asset managers and pension funds.

3.3 Behavioural mechanisms targeted by the policies

Drawing from both economics and psychological literature, Chervier et al. (2022) identified four main behavioural mechanisms triggered by forest policies. The four mechanisms are: (i) maximization of material payoffs; (ii) compliance and obedience; (iii) social belongingness and satisfaction; and (iv) competence and self-efficacy.

Maximization of material payoffs assumes that individuals make decisions to maximize their own material payoffs – the neoclassical conceptualization of human behaviour (*Homo Economicus*). This mechanism is associated with policies that either increase payoffs from desired behaviour, or decrease payoffs connected to undesired behaviour through transferring material resources that can be conditional or non-conditional, e.g., subsidies or taxes.

Compliance and obedience assumes that individuals respond to fear of punishment when not compliant with restrictions or standards established by norms or laws (Karp and Gaulding 1995). Authority figures, for example state entities, can usually exert power as a means of coercion to induce compliance or obedience. This behavioural mechanism has been associated with command-and-control policies like protected areas. While it can have impacts like maximization of material payoffs, it differs in the sense that incentives are given on a non-voluntary basis and there is coercion.²

Social belongingness satisfaction assumes that humans want to feel a sense of social belonging, in other words, a subjective feeling of inclusion or acceptance into a group of people, and this drives the tendency to conform to behaviours they believe to be approved by peers or wider society (Baumeister and Leary 1995). Pro-social motivations – for example reputation and honour, social approval and image, shame, pride and guilt – are triggered by this behavioural mechanism (Rode et al. 2015). This mechanism is usually related to informational policies like consumer awareness campaigns or disclosure initiatives that aim at revealing inconsistencies between corporate or individual behaviour and broader social values.

Competence/self-efficacy is the fourth behavioural mechanism, and it assumes that people are more likely to choose a given behaviour if they are confident that they are competent enough to successfully implement it. Bandura (1977) labels this as self-efficacy or “people’s beliefs in their capabilities to exercise control over their own functioning and over events that affect their lives”. This mechanism is typically associated with capacity-building, like technology extension services which aim to give beneficiaries a chance to practice the target behaviour and therefore develop mastery through experience (identified in the literature as the most influential source of self-efficacy).

The diversity of our identified behavioural motivations reflects the evolution of paradigms underlying the conservation of natural resources. This evolution has been characterized by a shift from command-and-control mechanisms, through financial incentives (Gómez-Baggethun et al. 2010), towards mechanisms that integrate lessons from psychology literature and social motivations to create behavioural change in forest users (Belinga et al. 2021; Moros et al. 2019).

² There is, however, a fine line between command-and-control mechanisms and taxes, as the (expected) fines in a command-and-control system can be seen as a form of taxation.

3.4 Forest threat targeted by the policies

Any forest policy or measure aims to mitigate at least one cause of deforestation and forest degradation, either directly or indirectly. We identified five forest threats targeted by policies and measures. Following the literature on direct and underlying drivers of deforestation (Geist and Lambin 2002), these can be broadly classified into direct threats and indirect threats.

There are two types of policies that address direct deforestation threats. The first type includes policies that address the low captured value of forests and benefits of forest-friendly activities. These policies and measures aim to increase perceived or captured use and non-use values of standing natural forests (Pascual et al. 2010) social perceptions about economic fairness (or distributive justice of the payments or increase the benefits of forest-friendly activities that contribute to reducing deforestation and forest degradation (e.g., sustainable timber harvesting practices, agroforestry) and/or enhancing the provision of forest ecosystem services.

The second type of policies address the direct threat that stems from the significant benefits gained from forest-degrading activities. Policies and measures addressing this threat aim to reduce the benefits of activities that generate deforestation, forest degradation or loss of forest ecosystem services, including agricultural expansion and unsustainable logging.

We then identified three indirect deforestation threats targeted by policies: weak governance, ineffective human development and insufficient demand for forest-related commodities. Policies and measures that address weak governance tackle the underlying drivers of deforestation and forest degradation correlated with governance failures, for example corruption, weak law enforcement and open access conditions. Policies and measures that address inadequate human development also indirectly reduce deforestation by addressing the underlying drivers of deforestation and forest degradation associated with lack of economic alternatives or demographic pressures. Finally, we see policies and measures that address inadequate demand for forest-related commodities; these seek to reduce demand for forest-risk products and commodities while increasing demand for those that are forest-friendly.

3.5 Application of the policy typology to Indonesia's policies

To apply our forest typology to Indonesia's forest-related policies, we first listed the relevant policies that have been or are currently being implemented in the country. We then classified these policies according to our three forest policy attributes (see Table 1).

We recognize that any given forest-related measure or policy could fall under several classifications and be assigned various attributes. To be able to categorize each policy and measure into a single type, we identified a dominant attribute for each forest policy, for each of the three main steps of the ToC: the primary actor targeted by the policy, the main behavioural mechanism and the deforestation threat.

Table 1. Forest policies in Indonesia, along with the targeted actors, behavioural mechanisms and deforestation threat

Actor targeted	Behavioural mechanism activated	Deforestation threat	Policies and measures	Key policies in Indonesia
Producers	Payoffs	Forest values and benefits	• PES • Community-based eco-tourism • Certification • Conservation easement	• RSPO and ISPO certification³ • SVLK certification • REDD+ projects • Social forestry⁴
Producers	Payoffs	Benefits from other land uses	• Avoid road building	• West Papua conservation province⁵ • Several conservation districts⁶
Producers	Payoffs	Development conditions	• ICDP • Cash transfers	• REDD+ projects • Village fund (<i>Dana Desa</i>)⁷
Producers	Obedience	Benefits from other land-use	• Offsetting schemes • Government moratoria • Monitoring tools	• Moratorium of permits on primary forests and peatlands • Palm oil permit moratorium⁸ License revocation of mining, forestry business licenses, and cultivation rights⁹
Producers	Obedience	Governance	• Protected areas • Land-use zoning	• IUCN protected areas category: Leuser, Sebangau. • Establishment of new national parks, e.g., Mamberamo Foja
Producers	Belongingness	Forest values and benefits	• Environmental education	• Curriculum on environmental education on theme of mangroves¹⁰ • Ministerial regulations on the guidelines on forest, peatland and mangrove valuation¹¹

3 Presidential Regulation 44/2020

4 <https://gokups.hutsos.kehutan.go.id/>

5 <https://www.tempo.co/arsip/papua-barat-deklarasikan-diri-sebagai-provinsi-konservasi-1412727>

6 Cf. <https://peraturan.bpk.go.id/Details/45885/perda-kab-kapuas-hulu-no-20-tahun-2015>

7 <https://sid.kemendesa.go.id/village-fund>

8 Presidential Instruction 10/2011, 5/2019

9 <https://setkab.go.id/en/govt-revokes-thousands-of-mining-forestry-business-licenses-cultivation-rights/>

10 <http://p3esuma.menlhk.go.id/versi3/index.php/news/87-berita/1026-raih-rekor-muri-kurikulum-mangrove-klhk-dijadikan-instrumen-cinta-lingkungan-sejak-dini>

11 E.g., MoEF Regulation 14 and 15 of 2012

Table 1. Continued

Actor targeted	Behavioural mechanism activated	Deforestation threat	Policies and measures	Key policies in Indonesia
Producers	Competence	Forest values and benefits	- Conservation concessions - Tenure formalization - Community Forest schemes - Logging concessions	- Restoration ecosystem licenses - Social forestry licenses - Customary community (Adat) forest - Agrarian Reform Object (TORA) licenses¹²
Producers	Competence	Development conditions	Family planning	Family planning programme¹³
Multiple	Belongingness	Governance	- Bilateral agreements - Multistakeholder forum	- Indonesia's RBP agreement with Norway FoLU Net Sink 2030¹⁴ - Green Climate Fund¹⁵ - World Bank FCPF-CF East Kalimantan and BioCF-ISFL Jambi¹⁶ - Ford Foundation - GEF - UNDP - World Bank Pooling Fund Bencana (Disaster Risk Financing and Insurance)¹⁷
Government	Payoffs	Governance	- Ecological Fiscal Transfers - Debt relief - Conditional loan	- TAPE (<i>Transfer Anggaran Provinsi Berbasis Ekologi</i>) and TAKE (<i>Transfer Anggaran Kabupaten Berbasis Ekologi</i>)¹⁸ - Green bond and Sukuk initiative¹⁹ - Green Waqf Framework²⁰ - DAU (<i>Dana Alokasi Umum</i>)²¹

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12 Presidential Regulation 86/2018

13 <https://kompaspedia.kompas.id/baca/paparan-topik/sejarah-dan-kebijakan-keluarga-berencana>

14 <https://www.nicfi.no/2022/10/19/contribution-agreement-concluded-norway-delivers-us-56-million-in-results-based-support-for-indonesias-folu-net-sink-2030-climate-goals/> \l “:~:text=The%20Contribution%20Agreement%2C%20following%20the,degradation%20through%20results%2Dbased%20contributions.

15 https://fiskal.kemenkeu.go.id/nda_gcf/en/tentang-nda/

16 <https://www.forestcarbonpartnership.org/country/indonesia>

17 <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/316601611543685552/indonesia-disaster-risk-finance-and-insurance-project>

18 <https://fiskal.kemenkeu.go.id/publikasi/siaran-pers-detil/66>

19 <https://fiskal.kemenkeu.go.id/publikasi/siaran-pers-detil/66>

20 bwi.go.id/wp-content/uploads/2022/09/INS-20SEP-GREEN-WAQF-FRAMEWORK.pdf

21 jdih.kemenkeu.go.id/api/download/ec5ff661-d428-4fc2-94f7-e6b4e390920d/2024pmkeuangan102.pdf

Table 1. Continued

Actor targeted	Behavioural mechanism activated	Deforestation threat	Policies and measures	Key policies in Indonesia
Government	Competence	Governance	Decentralization Anti-corruption policies	UU No 23/2014 on local administration UU No 1/2022 on fiscal relations between the central government and regions UU No 30/2002 on Corruption eradication Corruption eradication strategy ²²
Supply chain	Payoffs	Demand	Procurement policies	Public procurement policy considers timber legality ²³
Supply chain	Obedience	Demand	Due diligence policies	SVLK as a compatible mechanism with the FLEGT license ²⁴ Due diligence on financing forestry-related investments ²⁵
Supply chain	Belongingness	Demand	Public disclosure initiatives	Traceability initiatives or supply chain reporting by major palm oil companies ²⁶
Consumers	Belongingness	Demand	Consumer campaigns	WWF's campaign of buying good palm oil (' <i>Beli yang baik</i> ') ²⁷
Consumers	Competence	Demand	Technology extension to curb demand (e.g., improved cookstove)	Conversion of kerosene to LPG policy ²⁸

continue to next page

22 Presidential Regulation 54/2018

23 Head of LKPP Decision 157/2024

24 https://www.eeas.europa.eu/node/14827_en

25 <https://www.cifor-icraf.org/knowledge/publication/5655/>

26 For example <https://www.palmoiltransparency.org/>

27 <https://www.wwf.id/id/act/kampanye/beli-yang-baik>

28 <https://www.esdm.go.id/id/media-center/arsip-berita/pemerintah-rencanakan-konversi-minyak-tanah-ke-lpg-3-kg-di-lima-provinsi> - :~:text=Program Konversi Minyak Tanah ke LPG dilakukan dalam rangka diversifikasi,penghematan mencapai 45,3 triliun.&text=Bagikan Ini! The project was eventually halted.

Table 1. Continued

Actor targeted	Behavioural mechanism activated	Deforestation threat	Policies and measures	Key policies in Indonesia
Finance	Payoffs	Demand	Blended finance	SDG Indonesia One ²⁹ Tri Hita Karana Roadmap Blended Finance ³⁰ The Sustainability Project Bond of the Tropical Landscape Finance Facility (TLFF) ³¹ OJK's Sustainable Financing taxonomy ³²
Multiple	Payoffs	Forest values and benefits	Subsidies Improve credit access	Fertilizer subsidies MSME credits like KUR (<i>Kredit Usaha Rakyat</i>)
Multiple	Payoffs	Benefits from other land-use	Taxes Conditional credit	Currently no examples
Multiple	Obedience	Benefits from other land-use	Supply-chain moratoria	Moratorium on crude palm oil export and crude nickel export

²⁹ <https://www.ptsmi.co.id/sdg-indonesia-one>

³⁰ <https://www.thkforum.org/>

³¹ <https://www.blendedfinance.earth/blended-finance-funds/2020/11/16/tropical-landscape-finance-facility>

³² [https://ojk.go.id/id/Publikasi/Roadmap-dan-Pedoman/Sektor-Jasa-Kuangan/Keuangan-Berkelanjutan/Pages/Buku-Taksonomi-untuk-Kuangan-Berkelanjutan-Indonesia-\(TKBI\)-Versi-2.aspx](https://ojk.go.id/id/Publikasi/Roadmap-dan-Pedoman/Sektor-Jasa-Kuangan/Keuangan-Berkelanjutan/Pages/Buku-Taksonomi-untuk-Kuangan-Berkelanjutan-Indonesia-(TKBI)-Versi-2.aspx)

4 Policies implemented³³

It is important to provide regulatory context for Indonesia. This section starts with a description of forest land status classification in the country. This is followed by a description of examples of public, private and self-regulatory frameworks in the forest and land-use sectors in Indonesia.

4.1 Preamble

Indonesia adopts a centralized public policy framework in its forestry sector, where decision making over the forestry sector is largely made at a central government level. The central government delegates some forestry-related matters to the provincial government. However, public policies of other sectors that affect forests may be decentralized. For example, permits for oil palm plantations can be issued by the district government, if the plantation is located within a district. One reason for such difference lies in the dichotomy of land status between forest area and areas for other uses.

4.1.1 Land status classification

In general, Indonesia classifies two land statuses: forest areas (*Kawasan Hutan*) and areas for other uses (*Area Penggunaan Lain*, APL). The Ministry of (Environment and) Forestry determines through decrees what forest areas are. Forest area is classified into three main categories: production forest, protection forest and conservation forest. Production forest consists of permanent production forests, restricted production forests and convertible production forests. Meanwhile, the management of APL is conducted by the National Land Agency in coordination with relevant sectoral agencies.

It is important to note the difference between forest area status and forest cover. Forest or tree cover exists in both forest areas and APL. At the same time, forest areas may not have forest cover. This situation creates both opportunities and challenges for efforts to eliminate deforestation, as the institutional arrangement between forest area and APL is different in terms of government agencies that manage the lands, the use of the lands and the actors involved.

4.1.2 Different regulatory frameworks in Indonesia's land-use sector

We distinguish the policies based on the actors who issue them. Public regulations/policies refer to regulations or policies issued by public authorities. This includes national-level regulations, such as laws, government regulations, regulations of sectoral ministries and subnational-level regulations. Some examples include the Forestry Law and the Presidential instruction on the moratorium of permits on primary forests and peatlands. Private regulations refer to industry-wide standards that mainly indicate if a certain production process has conformed to the standards set by the industry. An example is the Forest Stewardship Council (FSC) or Roundtable on Sustainable Palm Oil (RSPO) standard for sustainable timber and palm oil production. Finally, self-regulation refers to a commitment made by a company or a group of companies, but it does not necessarily reflect the standard set by the industry. It is important to note that making a clear distinction between the scope of public, private and self-regulation policies is not easy and straightforward, as one regulatory framework may be established or improved to catch up with the others.

33 This section is, in part, based on the policy review done by two of the authors (AA and AD) in relation to a study on why deforestation has dropped in Indonesia lately (Angelsen et al. 2025).

4.2 Major public policies

This section presents several key policies in Indonesia that are selected from Table 1. The policies are perceived to have contributed to the reduction of deforestation in Indonesia since 2015/16, a claim supported by several research publications.

4.2.1 Moratorium on licenses for primary forests and peatlands

On 23 May 2011, President Susilo Bambang Yudhoyono signed Presidential Instruction 10 of 2011. This instructed ministries, agencies and subnational governments to take the necessary steps to postpone the issuance of new permits for primary natural forests and peatland in Indonesia's forest areas and areas for other uses (*Area Penggunaan Lain*, APL).

To this end, the government of Indonesia created the indicative moratorium map (*Peta Indikatif Penundaan Pemberian Ijin Baru*, PIPPIB), which is now revised every six months to reconcile data from different ministries and agencies. After more than eight years, the moratorium was made permanent by the issuance of Presidential Instruction 5 of 2019 on 7 August 2019. This instruction aims to protect 66.2 million ha of primary forests and peatlands (MoEF 2022), which is lower than the initial PIPPIB figure of 69.1 million.

The moratorium is seen as providing some clarity on the location and size of primary forests and peatlands in Indonesia. It is also a policy that has gained attention over the last decade, as private sector and civil society organizations watch closely how the PIPPIB developed over time and whether there are violations in the permit granting process. Critics of moratorium lie in the idea that most of the areas under moratorium are areas that should be protected in the first place, i.e., conservation and protection forests. The moratorium has also driven more deforestation into adjacent areas, which may still have reasonably good forest cover (Leijten et al. 2021).

The moratorium focuses on primary forests and peatlands. Since most of the primary forests are in protection and conservation forests, this is relevant for the archetypes of intact forest areas and stable forest mosaics. Considering peatlands, Indonesia has 24.7 million ha classified as Peatland Hydrological Units (*Kesatuan Hidrologis Gambut*, KHG),³⁴ of which 4.0 million ha are in good condition and 1.3 million ha are severely damaged. The moratorium is also therefore relevant to various deforestation area archetypes.

4.2.2 Moratorium on oil palm permits

On 19 September 2018, President Joko Widodo signed Presidential Instruction 8 of 2018 on the moratorium and evaluation of oil palm licensing. The main objectives of this instruction are to improve the governance of palm oil production and to resolve oil palm encroachment into state forests and associated conflicts. One major issue in improving governance was determining that the Directorate General of Estate Crops of the Ministry of Agriculture is designated as the manager of Indonesian oil palm production data. The moratorium requires greater coordination across agencies and between national and subnational levels, since land allocation, land-use permits and plantation business permits are managed by different agencies. The Ministry of Environment and Forestry maintains the data on forest release (i.e., the release of convertible production forests to APL). District governments issue permits for oil palm plantations. The National Land Agency maintains data on the business-use rights of land (*Hak Guna Usaha*, HGU).

Like the moratorium on permits for primary forests and peatlands, the oil palm moratorium aimed to clarify the extent of Indonesia's oil palm area. Due to different agencies publishing different

34 <http://pkgppkl.menlhk.go.id/v0/kesatuan-hidrologis-gambut-nasional-skala-1250-000/>

figures on the oil palm area, the moratorium aimed to establish an official figure for the size of Indonesia's oil palm area. The result came in 2019, when the Ministry of Agriculture issued Decision Letter 833/KPTS/SR.020/M/12/2019 on determining oil palm land cover. The letter stated that oil palm area was 16.4 million hectares in 2019.

The palm oil moratorium was part of broader efforts to address the encroachment of oil palm plantations into state forest areas. It is reported that over 1,000 plantation companies are located inside state forest areas (CNN Indonesia 2023). The Job Creation Law 6 of 2023 (previously listed as Law 11 of 2020) contains Article 110, which provided a legal basis to resolve the problem of palm oil within state forests (Muttaqien 2023; Nababan 2023). This Article states that any individual or entity engaged in business activities in a forest area, which were established and permitted prior to the enactment of the Job Creation Law, must fulfil requirements within three years from the date the law came into effect.

Following issuance of the Job Creation Law in 2020, the moratorium was lifted in 2021 and was not extended. Several NGOs expressed concerns about the decision not to extend the moratorium. They noted some early positive outcomes from the moratorium, but acknowledged that several areas, particularly law enforcement, still required improvement (Madani Berkelanjutan 2021). Despite NGO concerns about it ending, it was argued that the moratorium's conclusion was due to integrating the oil palm permit issue into the Job Creation Law 6 of 2023. One year after the moratorium was lifted, the government revoked thousands of mining and forestry business licenses, along with cultivation rights, to enhance natural resource governance.³⁵

When considering the moratorium of oil palm permits, there are potential differences in forest land status and forest cover. In terms of forest land status, areas impacted by the oil palm permit moratorium are likely to have been converted and released from the state forest area. Some of these may have experienced deforestation or degradation, which means they are likely to be stabilized transition areas or chronic deforestation areas. This is different from the moratorium of permits in primary forests and peatlands, where most of these are areas under some form of protection.

4.2.3 Law enforcement

Since the Forest Law Enforcement and Governance (FLEG) meeting in 2001,³⁶ the Ministry of (Environment) and Forestry has been listing law enforcement as a key priority area in the Ministry's medium-term plans. One programme was to develop a better timber legality verification system (see Section 4.2.13 on commodity certification). Another was to conduct law enforcement measures, such as capturing illegal logging and illegal timber trade actors. There has been critique, however, that such efforts were targeting the small actors and leaving the larger players out.

In the late 2000s, attention shifted from following illegal timber to following the money associated with it. The government of Indonesia introduced the term 'multidoor approach' to forest crime.³⁷ In this sense, law enforcement officers work together with financial sector regulators, such as the Corruption Eradication Commission (*Komisi Pemberantasan Korupsi*, KPK) and Financial Transaction Reporting and Analysis Center (*Pusat Pelaporan dan Analisis Transaksi Keuangan*, PPATK). This has resulted in the prosecution of high-ranking government officials and business sector actors in corruption cases related to the issuance of permits.

In the early 2010s, there was increasing effort to bring private sector actors allegedly involved in using fires to clear land (see 4.2.4) into the civil court system. Under this court, the government of Indonesia

35 <https://s-cms.setkab.go.id/en/govt-revokes-thousands-of-mining-forestry-business-licenses-cultivation-rights/>

36 <https://enb.iisd.org/events/forest-law-enforcement-and-governance-fleg-east-asia-ministerial-conference/summary-report>

37 <https://www.hukumonline.com/berita/a/kasus-lingkungan-ditangani-secara-multi-door-lt519aeb0291d25/?page=all>

prosecutes companies for their use of fire for land clearing, and demands fines or compensation for the damages. These developments have shown Indonesia's serious efforts to bring forestry-related crimes and offenses into court.

These examples suggest policymakers and law enforcement agencies use various instruments to deal with a relatively similar issue. Different law enforcement measures target different actors. Law enforcement on illegal logging focuses on loggers and those who transport the timber. Meanwhile, anti-corruption and other 'multidoor approach' instruments target bigger actors, such as government and business sector officials. These measures may operate in all archetypes, from intact forest areas and stable forest mosaics, to deforestation areas, fragmented forest remnants and landscapes with no forests. However, since most of the cases are likely to happen on forest frontiers and areas under concessions, the most relevant archetypes are deforestation areas.

4.2.4 Bringing forest valuation in the court cases

An important change in the last decade has been the strengthening of enforcement. Law enforcement officers successfully tackle illegal timber and wildlife trade, including timber originating from forest-rich regions such as Papua.

Environmental Management Law No. 32 of 2009 provides the legal basis for 'Minister of Environment Regulation' No. 7 of 2014 on the valuation and recovery of environmental damages. This regulation establishes reference prices for various environmental goods and services (Soedomo and Risdiyanto 2020).

The regulation considers several elements of environmental damage and provides an associated value for these. First, ecological damage costs, including for: (a) reservoir construction costs; (b) reservoir maintenance costs; (c) water regulation; (d) erosion control; (e) soil formation; (f) nutrient cycles; (g) waste decomposition; (h) biodiversity; (i) genetic resource; (j) carbon release; and (k) carbon reduction. Second, economic damages, including: (a) loss of use time of land; (b) loss of sale value for 11 years; and (c) loss of profit. Third, recovery costs, consisting of: (a) costs of compost purchase; (b) costs of compost transport; and (c) costs of compost dispersal. Fourth, costs of activating ecological functions, including: (a) nutrient recycling; (b) waste decomposition; (c) biodiversity; (d) genetic resources; (e) carbon release; and (f) carbon reduction.

When the government of Indonesia brings companies allegedly clearing land using fires into the civil court, it uses this law to estimate the level of penalties to be paid by companies found to be guilty of environmental destruction through forest and land fires. Examples include the penalty of IDR 114.3 billion (USD 10 million) payable by PT Kalista Alam, which was decided through a court verdict. By November 2023, the government of Indonesia had won a lawsuit with 14 companies, giving total fines of IDR 5.6 trillion (*Ditjen Gakkum KLHK* 2023)³⁸. Between 2013 and 2022, the Supreme Court had issued verdicts on 291 cases related to land fires.³⁹

Civil court cases that adopt forest valuation are largely used for cases related to forest and land fires, which are an inexpensive way of clearing the land. The civil court is mainly a dispute settlement mechanism between the government and companies. Disputes therefore concern areas that are already under concession, which in our archetype categorization are largely deforestation areas.

38 KLHK Siap Eksekusi 14 Perusahaan Penyebab Karhutla Senilai Rp 5,6 Triliun

39 <https://putusan3.mahkamahagung.go.id/search.html?q=%22kebakaran%20lahan%22&tp=0&cat=20b9031c89f699d59202fe933a3a58af>

4.2.5 Peatland protection and management

Indonesia has over 24 million hectares of peatlands, which are well-recognized as a major carbon pool. Following devastating fires in 2015, the Government of Indonesia implemented a significant policy aimed at protecting and restoring the country's peatlands. This agenda included establishing an organization dedicated to peatland restoration, creating a regulatory framework for peatland protection, and engaging in both national and international collaborations focused on peatland restoration efforts (Nugroho et al. 2023).

The government of Indonesia established the Peatland Restoration Agency (*Badan Restorasi Gambut*, BRG) in 2016. In 2021, the agency's mandate was expanded to include mangrove restoration, leading to a name change to the Peatland and Mangrove Restoration Agency (*Badan Restorasi Gambut dan Mangrove*, BRGM). The government of Indonesia also issued Government Regulation No. 57 of 2016, on the protection and management of peatland ecosystems. Within this framework, the government utilizes the concept of peatland hydrological units (*Kesatuan Hidrologis Gambut*, KHG) to categorize peatland management areas for both cultivation and protection purposes.

The government has established 865 KHGs covering an area of 24.6 million hectares. The BRGM focuses its activities on priority provinces, which include 522 KHGs covering 12.9 million hectares (Badan Restorasi Gambut dan Mangrove 2023). Additionally, the MoEF has strengthened its peatland-related units by developing information systems, including one that monitors fires, known as Sipongi, and another that tracks the water table in peatland areas, referred to as Simatag.

The Indonesian government adopts a 3R approach to peatland restoration: rewetting, revegetation and revitalization. Rewetting involves restoring the moisture levels of peatlands that have been drained, primarily by constructing canal blocks. Revegetation focuses on increasing the vegetation cover in peatland areas. Revitalization aims to strengthen the capacity of communities and grassroots institutions, particularly at the village level (Badan Restorasi Gambut dan Mangrove 2023). Some critics, however, have stressed that the 3R approach needs to be complemented by Reduction of fire (hence 4R) (Harrison et al. 2020) climate and socio-economic benefits from the local to the global scale. However, these ecosystems and their associated benefits are threatened by anthropogenic activities, including agricultural conversion, timber harvesting, peatland drainage and associated fire. Here, we identify key challenges, and provide potential solutions and future directions to meet forest and peatland conservation and restoration goals in Indonesia, with a particular focus on Kalimantan. Through a round-table, dual-language workshop discussion and literature evaluation, we recognized 59 political, economic, legal, social, logistical and research challenges, for which five key underlying factors were identified. These challenges relate to the 3Rs adopted by the Indonesian Peatland Restoration Agency (Rewetting, Revegetation and Revitalization, and Reporting and monitoring (hence 5R)) (Terzano et al. 2022).

BRGM has collaborated with various stakeholders to implement its peatland restoration programmes. This has resulted in the construction of 7,697 canal blocks across 746 villages in seven priority provinces. These programmes have developed 2,147 hectares of revegetation plots, and established 1,246 activity packages to revitalize livelihoods, focusing on land-based, water-based and ecosystem services. In total, BRGM is tasked with restoring 1.2 million hectares of degraded peatlands. By 2023, BRGM reported that it has restored nearly 830,000 hectares through rewetting and revegetation efforts (Badan Restorasi Gambut dan Mangrove 2024). Complementing the agency's efforts, the national government took corrective action in 2020 by implementing the long-term National Peat Ecosystem Protection and Management Plan (RPPEG) for 2020–2049. This plan mandates the minister, governors, and regents/mayors to develop and establish Peat Ecosystem Protection and Management Plans in accordance with their respective authorities.⁴⁰

40 <https://pkgppkl.menlhk.go.id/v0/en/perencanaan-pengendalian-kerusakan-gambut/>

Peatland restoration can be seen as a complementary policy to the moratorium of permits on peatlands. The focus is to restore degraded peatlands. This policy is relevant to the archetype of fragmented forest remnants and landscapes with no forests.

4.2.6 General allocation fund

A significant recent reform in domestic resource mobilization in Indonesia has occurred in the context of intergovernmental fiscal transfers (IFTs). One particularly notable development is the changes in the general allocation fund (*Dana Alokasi Umum*, DAU) through the newly enacted law on intergovernmental fiscal relations (UU HKPD No. 1/2022). The fiscal need formula considers a mix of factors, such as basic services (education, health, public works and public services), public servant salaries, and the so-called adjustment factor. This latter now includes forest cover indicators. The final DAU transfer calculation is capped differently for provinces, for local districts and municipalities, and for four regions (including Sumatra and Papua). In fiscal year 2023, approximately IDR 17 trillion (or USD 1 billion) of DAU transfers from the central government to subnational governments could be attributed to the extent of forest cover.⁴¹

This development is important for two reasons. First, a forested country like Indonesia is mobilizing its domestic resources for outcomes strongly related to REDD+. This can be complimentary to the standard international REDD+ and ODA funding, which tends to be confined in terms of its amount, predictability, and long-term and sustained certainty for budget planning purposes. Second, historically, the IFT in Indonesia has not incentivized conservation efforts (Lewis 2023; Nurfatriani et al. 2015). For example, existing revenue-sharing funds (*Dana Bagi Hasil*, DBH) are structured in a way that encourages resource extraction – the more natural resources extracted from a region, the larger the revenue share that region receives.

4.2.7 Village fund

The Village Fund was established in 2015 under the legal framework of Law 6 of 2014. The fund is transferred from the central government to village administrations to finance village and community development to improve communities' wellbeing. The emphasis is on poverty reduction and livelihood improvements based on priorities set out by village government and community representatives in their village development plan.

The annual allocation of village funds is regulated by the Ministry of Finance, while priority areas for use of the village fund are regulated by the Ministry of Villages. The amount of money that each village receives depends on a base allocation (which depends on the size of village population), affirmative allocations (which depends on the number of underdeveloped villages and amount of the population living in poverty), and performance-based allocations (which depends on criteria such as programme outputs and financial management). In the 2024 fiscal year, the size of individual village funds varied between IDR 500 million and over IDR 2.4 billion⁴².

The village fund has been used mainly to develop villages, for example to build or improve basic infrastructure (Watts et al. 2019), while forest conservation outcomes might not be the main objective. Positive forest outcomes may still be generated, for example, if funds create opportunities that shift livelihood activities away from forests. Village spatial planning is also key in ensuring that conservation considerations are integrated in the Village Development Plan, and that development planning is aligned with spatial planning.

41 This information is based on the speech of the Vice Chair of the Finance Commission of Indonesia's National Parliament (Komisi XI DPR RI), Mr. Fathan Subchi, at the Indonesia Pavilion in 2023 COP28 in Dubai, which again is based on the estimate supplied by the Center for Climate and Sustainable Finance at the University of Indonesia.

42 <https://sid.kemendesa.go.id/village-fund>

4.2.8 Ecological fiscal transfer

Ecological fiscal transfer is another instrument introduced by Government Regulation 46 of 2017. Ecological fiscal transfer (EFT) is a modification of intergovernmental fiscal transfers, arranging transfers across different levels of government based on regulated ecological principles and priorities. Under this Regulation, higher levels of government carry out transfer of funds to lower levels. The national government carries out national ecological fiscal transfers (*Transfer Anggaran Nasional Berbasis Ekologi*, TANE), the provinces carry out EFTs called *Transfer Anggaran Provinsi Berbasis Ekologi* (TAPE), while districts carry out EFTs called *Transfer Anggaran Kabupaten Berbasis Ekologi* (TAKE). The new Law on Intergovernmental Fiscal Transfers (UU HKPD 1 of 2022) has introduced an adjustment factor in the calculation of fiscal need for subnational jurisdictions, so that any fiscal gap is covered by the transfer. In the Ministry of Finance regulation, indicators for this adjustment factor include forest cover.

This ecological fiscal transfer mechanism provides an incentive for subnational governments to maintain ecological services within their regions. The main ecological service under consideration relates to forest condition, such as forest cover. The ecological fiscal transfer also provides an opportunity for subnational governments to contribute to the national carbon emission targets stipulated in the country's Nationally Determined Contribution (NDC). In terms of archetypes, the EFT is mainly relevant to intact forest areas and stable forest mosaics.

4.2.9 Payment for ecosystem services

While some forms of payment for ecosystem services (PES) have been taking place since the early 2000s in Indonesia, more explicit regulations on PES were issued later. Law 32 of 2009 on environmental protection and management provides stipulations on payment for environmental services. An implementing regulation of this law is Government Regulation 46 of 2017 on instruments for environmental services. Article 48 of this regulation stipulates the scope of PES, which entails policy implementation, as well as facilitation of institutional development and conflict resolution (Art 48[1]). Policy implementation entails identifying environmental services, calculating the value of environmental services, verifying and validating environmental service providers and users, providing an information system for implementation and monitoring, and capacity development (Art. 48[2]).

The types of environmental services in question depend on spatial scale. Carbon sequestration and biodiversity services are more prominent at the global scale, while water management and watershed protection are more relevant at local level. Another environmental service, landscape beauty, is a service relevant for both global and national transactions (Leimona et al. 2019, 2020).

4.2.10 Essential ecosystem areas

In 2011, the Indonesian government issued Regulation 28 of 2011, which introduced the term 'essential ecosystem areas' (*Kawasan Ekosistem Esensial*, KEE). KEE are defined as areas outside nature reserves, natural conservation areas and hunting parks that are ecologically important for biological diversity. The idea behind identifying KEE is to recognize the presence of areas with high biodiversity beyond official conservation areas that are within state forests, which covered about 27.3 million hectares in 2016 (Forest Watch Indonesia 2019). In 2010, the Ministry of Environment and Forestry estimated that a total of 105 million hectares needed to be protected and conserved as essential ecosystem areas (Ditjen KSDAE 2022).

One important feature of KEE is that they are located outside the boundaries of conservation and protection forests that fall within state forest areas. These areas are classified as biological diversity parks, wildlife corridors, high conservation value forests, buffer zones, peatlands and karst.⁴³ As they are

43 https://pdf.usaid.gov/pdf_docs/PA00XH1P.pdf

located outside the boundaries of state forest areas, subnational governments play an important role in managing and protecting these areas.

The Ministry of Environment and Forestry coordinates the inventory of KEE through BKSDA, the Ministry's deconcentrated offices that conduct conservation of natural resources. In 2022, the Ministry identified and verified 8.1 million hectares of KEE across 26 provinces (Ditjen KSDAE 2022).

4.2.11 Integrated fire management

In the last decade, increased attention on eliminating fires started after the 2013 fire events. However, more serious actions took place after a large fire incidence in 2015 contributed significantly to forest loss in Indonesia that year. In 2017, the government of Indonesia formulated a strategy and action plan for preventing forest, plantation and land fires for 2017–2019.⁴⁴

An important aspect of this fire management policy was the emphasis on fire prevention and early suppression as key performance indicators for high-ranking officials at the subnational level. The President threatened to remove provincial heads of military and police from their positions if they failed to prevent and manage fires effectively. Firefighting efforts were coordinated by the fire brigade of the MoEF, known as Manggala Agni.

4.2.12 Result-based payments

One climate mitigation strategy for the Indonesian government is to establish 'multi-bilateralism' in international negotiations (Aurora 2012). A key component of this strategy is results-based payments (RBP) within multilateral frameworks (Dwisatrio 2021). The Letter of Intent between Indonesia and Norway, established in 2010, was the first national-level RBP agreement. In this agreement, Norway committed to providing USD 1 billion to Indonesia in exchange for verifiable reductions in emissions. However, due to dissatisfaction, disputes over various issues and delayed payments, Indonesia decided to terminate the agreement in September 2021 (Jong 2021). In September 2022, Indonesia and Norway reached a new agreement that modified their previous arrangement. Under this new agreement, Norway would pay Indonesia to preserve its forests while also honouring outstanding payments from the earlier agreement (Jong 2022). The first payment of USD 56 million was made in 2022 for emissions reductions achieved during 2016–2017.

In 2020, the Green Climate Fund (GCF) approved a project valued at USD 103.8 million based on emissions reductions achieved from 2014 to 2016. The funds were disbursed in 2021, with the United Nations Development Programme (UNDP) acting as the accredited entity. This funding is intended to support activities that implement the country's national REDD+ action strategy (STRANAS); "this includes working with key agencies at the national, provincial, and local levels to strengthen the development, coordination, and implementation of Indonesia's overall REDD+ architecture, as well as providing support to decentralized sustainable forest governance. This includes establishing forest management units and expanding implementation of the country's social forestry programme..."⁴⁵

4.2.13 Commodity certification

Indonesia has developed two main mandatory verification or certification mechanisms for timber and palm oil. Timber is regulated by the Timber Legality and Sustainability Verification (*Sistem Verifikasi Legalitas Kayu*, SVLK). For timber concessions, SVLK is supposed to be a stepping stone to achieve Sustainable Production Forest Management (*Pengelolaan Hutan Lestari Produksi*, PHPL) certification (Kosar et al. 2019). SVLK is compatible with the EU Forest Law Enforcement Governance and Trade

44 <https://ppidklhk.com/berita/grand-design-pencegahan-kebakaran-hutan-kebun-dan-lahan-2017-2019>

45 <https://www.greenclimate.fund/project/fp130>

(FLEGT) and became the first scheme in the world that can issue FLEGT licenses in 2016. According to the Ministry of Environment and Forestry's Information System on Legality and Sustainability (known as SILK), in April 2024, there were 3,983 SVLK-certified management units⁴⁶.

Palm oil is the second commodity for which Indonesia has its own public certification system. Called Indonesian Sustainable Palm Oil (ISPO), this mandatory sustainability certification for palm oil was the first of its kind. ISPO was created in 2011 and has been revised several times since to improve the system. ISPO has also been legally strengthened by a Ministry of Agriculture Regulation to a Presidential Regulation 44 of 2020. By 2023, about 4.2 million ha were ISPO-certified, of which 3.9 million ha were large-scale plantations. By 2024, 707 companies (about 31% of the total number of companies) and 79 smallholders had received ISPO certificates (Antara 2024). These figures translate to approximately 25% of total oil palm area. However, 79 certified smallholders are minuscule among the literally millions of small palm oil producers in existence in Indonesia.

4.2.14 Forest management units

Although the concept of forest management units, (*Kesatuan Pengelolaan Hutan*, KPHs) existed before 2000, this became a key programme after the issuance of Government Regulation 6 of 2007. KPH is one of the government initiatives that receives significant funding from donors, for example the German government (Scholte 2019) and in fact around 30 percent of the national territory has been cleared of trees over the last 65 years (50 percent remains forested). KPH was considered a necessary condition for attaining sustainable forest management under Indonesian forestry legislation (Sahide et al. 2016) and a response to address deforestation and forest degradation (Ramadhan et al. 2023). Because of its ability to link local realities with national and international actors, KPH has the potential to be a significant intermediary in achieving REDD+ targets (Bae et al. 2014; Kim et al. 2016).

KPHs have shown some signs of potential success. For example, well-established KPHs in Sulawesi exhibited less deforestation during 2015–2016 and less forest fires (Chervier et al. 2025). However, it still takes time for KPHs to provide desired forest conservation outcomes, even with their potential and strong donor support, and they face a few challenges in doing so. First, KPHs still lack the funding and personnel necessary to carry out their operations, especially to protect the extent of forests within their jurisdiction (Bae et al. 2014; Kim et al. 2016; Scholte 2019). Second, the 2023 Job Creation Law has effectively denied KPH's decision-making authority (Nugroho et al. 2023; Ramadhan et al. 2023). One consequence is that KPHs rely more on collaborating with other government organizations, like the Watershed Management Agency (*Balai Pengelolaan Daerah Aliran Sungai*, or BPDAS), and other organizations that have programmes and activities aligned with KPH plans. Third, KPHs frequently need to devote time and money to managing and resolving conflicts and land tenure issues (Budiningsih et al. 2022; Ichsan et al. 2021). Since KPHs can be found on all types of forest areas, they fall within all archetypes.

4.2.15 Social forestry

Social forestry has been studied and discussed since before 2000s, but it gained more attention during President Joko Widodo's administration (2014–2024). The ministry issued a regulation that defined different schemes of social forestry; that is, Indigenous or customary forest (*hutan adat*), community forestry (*hutan kemasyarakatan*), smallholder timber plantation (*hutan tanaman rakyat*), village forest (*hutan desa*) and forestry and environmental partnership (*kemitraan lingkungan*). The government set out a target to allocate 12.7 million ha (about 10%) of state forests for social forestry. By 2022, the MoEF had issued or established 5.3 million ha of social forestry agreements (Kementerian Lingkungan Hidup dan Kehutanan 2023). In terms of archetype, one can argue that social forestry areas are generally those that have exhibited some deforestation (i.e., deforestation areas and fragmented forest remnants).

46 <https://silk.phl.kehutanan.go.id/>

Village forests in Sumatra and Kalimantan have slowed deforestation, although long-term performance will likely depend on the type of forest where village forests reduce deforestation in areas allocated for watershed protection and limited timber extraction (Meijaard 2017; Santika et al. 2017). Interestingly, analysis of three social forestry schemes covering 2.4 million ha – village forests, community forestry and community timber plantations – found that schemes that aim at conservation tend to increase forest loss, while those aimed at production tend to reduce deforestation, although reductions came after higher forest loss (Kraus et al. 2021).

Civil society organization support also affects the performance of social forestry. There are cases in which forest cover has increased after a social forestry scheme has been in place, mainly through natural succession. One argument is that social forestry increases a sense of ownership and responsibility among communities. They conduct patrols and adopt agroforestry systems in cultivation areas (Sastra 2024). However, flawed land administration processes, conflicting interests among local actors and lack of institutional engagement beyond permitting processes have been hindering this programme (Fisher et al. 2018). Social forestry permits also exist on small patches of forest, which could lead to forest fragmentation (Gunawan et al. 2022). Therefore, the deforestation reduction impacts of social forestry initiatives remain to be seen.

4.3 Selected subnational government policies

Apart from the national-level policies discussed above, several provinces have worked or are working to formulate and implement green growth strategies or low carbon development strategies. These initiatives are largely developed under a multistakeholder process, where subnational governments coordinate interaction among public agencies, private sector actors and civil society organizations.

4.3.1 Result-based payments in East Kalimantan's jurisdictional REDD+ programme

East Kalimantan is a province where the size of forest area is more than twice of that of areas for other uses (*Area Penggunaan Lain*, APL). Forest area accounts for 8.4 million hectares, while APL accounts for 4.3 hectares (Satu Data).⁴⁷ Of the 8.4 million hectares of forest area, 6 million hectares are permanent and restricted production forests.

East Kalimantan has experienced significant forest loss over the last decade, driven mainly by oil palm and pulpwood plantation expansion, agricultural encroachment, fires, mining and aquaculture (World Bank 2020). In the last few years, there has been an increase in forest loss for pulpwood.⁴⁸

Over the same period, East Kalimantan has been working to develop institutional foundations for green growth and low carbon development. The province formulated a low carbon growth strategy in collaboration with the National Council on Climate Change (*Dewan Nasional Perubahan Iklim*, DNPI). This strategic document promoted the initiation of a programme called 'Kaltim Green' between 2010–2013, known for its main programme 'One man five trees'. The province also conducted a moratorium of permits in 2014 as an additional measure to the nationwide moratorium on primary forest and peatlands that took off in 2011.

The result-based payment arrangement for East Kalimantan is an agreement between the Government of Indonesia and the World Bank's Forest Carbon Partnership Facility (FCPF). The preparation phase was coordinated by a concerted effort between the Research and Development Center for the

47 <https://data.kaltimprov.go.id/dataset/data-luas-lahan-hutan-provinsi-kaltim-tahun-2016-2020/resource/c40a4541-48fd-4d7d-baf7-ba8846c22379>

48 <https://nusantara-atlas.org/2023-deforestation-by-the-wood-pulp-industry-in-indonesia-surges-hits-record-highs-in-kalimantan/>

Socioeconomic and Climate Change Policies (*Pusat Penelitian dan Pengembangan Sosial Ekonomi Kebijakan Perubahan Iklim*, P3SEKPI) of the Ministry of Environment and Forestry and the Regional Council on Climate Change (*Dewan Daerah Perubahan Iklim*, DDPI), in coordination with other government agencies at national and subnational levels and other stakeholders in East Kalimantan.

The agreement started in November 2020 and is expected to be completed by December 2025. The total value of the arrangement is USD 110 million. The baseline for the calculation of emission reduction uses the reference level of 2007–2016 average emissions in the province. In 2023, the country received a first payment of USD 20.9 million, to be disbursed to beneficiaries of the programme (Forest Carbon Partnership Facility 2022).

4.3.2 Low carbon development in Papua and West Papua

Papua has been one Indonesian province to put forest protection into its development planning. In 2009, the province published a report called *A Global Solution* (Suebu 2009), which highlighted various oil palm expansion plans in the province threatening forest protection, and the required financial support associated with addressing this.

The trigger for developing low carbon development policy on Papua Island was the Manokwari Declaration. This declaration was signed by the Papua and West Papua governors on 10 October 2018 and launched during the International Conference on Biodiversity, Ecotourism and Creative Economy (ICBE). It endorsed the shared vision of Tanah Papua, coined ‘Land of Peace, Sustainability, and Dignity’. It consists of 14 points that require the commitment of government and development partners to support and strengthen the people of Tanah Papua, including a commitment to conserve 70% of the jurisdictions as forest and to recognize the Indigenous rights of Papuan people. This declaration was preceded by a ‘conservation district’ declaration made by West Papua’s Tamberau District in 2011 (Fatem et al. 2018).

4.4 Selected private sector policies

4.4.1 Timber and palm oil certification

For palm oil and lumber, private regulation – industry-wide standards started by the industry – has existed since the early 2000s. Demand for and production of certified palm oil has been steadily rising (RSPO 2023). The use of certified wood, obtained for example from FSC and PEFC programmes, is also growing.

By limiting development in wooded areas and expanding the regions under certified agriculture, certification may help minimize deforestation. In Indonesia, RSPO-certified oil palm acreage increased from 1.5 million hectares in 2015 to 2.4 million hectares in 2022. At the same time, there were 3.2 million ha (FSC) and 4.8 million ha (PEFC) of certified forest area. As of 2018, RSPO certification has adopted a policy of zero deforestation.

Research on the benefits of RSPO certification suggests that it may have helped to reduce deforestation. Certification reduced annual deforestation from a counterfactual of 9.8% to 6.6% (Carlson et al. 2018). RSPO-certified businesses also handle fires more skilfully when the probability of a fire is low, but this is not always the case when it is high (Cattau et al. 2016). Certification dramatically decreased deforestation, but not fire or peatland clearing (Carlson et al. 2018).

Except for pulp and paper, Indonesia’s timber sector is in decline, which constitutes a difficult reality for FSC certification in the country. Several issues, such as low productivity, outdated equipment and falling global timber prices have caused this decline (Purnomo et al. 2016; Wibowo et al. 2023). Since 2001

there has also been a restriction on the export of logs, which has decreased illegal logging and driven down the price of Indonesian logs relative to the world market⁴⁹. The logging industry is not viable because the price of domestic logs does not mirror the cost of production. Overall, the conservation of forests has probably benefited from this evolution.

4.4.2 ‘No Deforestation, No Peat and No Exploitation’ (NDPE) policies

The last ten years have seen an increase in corporate self-regulation, as seen by palm oil producers and their zero deforestation pledge (Dermawan 2022). As well as industry-wide sustainability certifications such as RSPO or ISCC (International Standard for Carbon Certification), palm oil, pulp and paper manufacturers are making additional commitments not to use peatlands, abuse local communities or deforest while making palm oil and timber products through ‘No Deforestation, No Peat and No Exploitation’ (NDPE) policies. Early indications point to the possibility that corporate NDPE strategies may have the desired effect of lowering deforestation (AidEnvironment 2021; Heilmayr and Benedict 2022).

Despite these advancements, there are two significant concerns. First, firms can violate their zero-deforestation promises and sustainability credentials. According to several reports, corporations that have pledged not to deforest can be certified despite having violated their pledges (TheTreeMap 2023). Among the challenges is making sure that indirect suppliers – that is, suppliers of businesses that supply businesses with NDPE policies – are compliant (Dermawan et al. 2022). Papua has seen a recent rise in deforestation, while Sumatra and Kalimantan experienced a decline in deforestation linked to industrial oil palm (Jong 2024; TheTreeMap 2023).

4.5 Explaining the recent decline in deforestation⁵⁰

Since 2015–2016, Indonesia has seen a significant decrease in deforestation – a 50% decrease across the country. This decline varies by province and island; a significant decrease was seen in both Kalimantan and Sumatra, while Riau, South Sumatra and Central Kalimantan saw the most absolute reduction, followed by West and East Kalimantan.

Oil palm is the most significant commodity among the direct drivers of deforestation. According to Mapbiomas Indonesia (MBI) data, oil palm accounted for 46% of deforestation during 2018–2022, compared to 55% for 2010–2017. Particularly in Kalimantan, pulp is becoming a more significant contributor to deforestation. The pulp industry was responsible for about one-third of natural forest loss in the three highest deforestation provinces in 2022. Similarly, coal and nickel-related deforestation is also increasing. Compared to 0.9% during 2010–2017, MBI data indicates that its proportion of national deforestation was 5.4% during 2021–2022. Mining is a key deforestation driver in Sulawesi, where it was responsible for 30% of deforestation in 2021–2022 (Angelsen et al. 2025).

Five hypotheses are put forward to explain the decline: civil society pressure, commodities prices, private (business) policies, public policies and forest scarcity (in some provinces).

One of the main causes of this decline has been new public (government) policies. While several new policies have been implemented, we emphasize three key public policies. The first is the moratorium of new permits from primary forests and peatlands. Although it took some time to come into effect, the 2011 moratorium on new permits for primary forests and peatlands did have an impact by prohibiting the issuance of new licenses. Interviews undertaken for preparation of a report (Angelsen et al. 2025) emphasized that the delay was largely due to improved sectoral collaboration regarding the

49 <https://ekonomi.bisnis.com/read/20250916/257/1911575/pakar-ungkap-tantangan-sektor-kehutanan-telah-masuk-sunset-industry> \l “goog_rewarded

50 This section is based on Angelsen et al. (2025).

moratorium. Second, the 2015 forest fires prompted a second set of regulations on fire management and the protection of peatlands. Interviewees emphasize that this was a crucial policy change because it made subnational government officials more accountable for fire management. Third, although the first payment was not made until 2022, results-based payments (RBP) were a key component of both the new Memorandum of Understanding and the 2011 Letter of Intent between Indonesia and Norway. In 2020, the Green Climate Fund approved an RBP-based project worth over USD 100 million. With assistance from donors, RBP has also been implemented at the subnational level, beginning in East Kalimantan and Jambi. Though they are probably too location-specific and arrived too late to have significantly impacted the noted drop in national deforestation statistics since 2016, certain reports show encouraging effects.

With a growing percentage of oil palm plantations obtaining certification, private regulations like certification and corporate pledges are also showing encouraging results. However, the forest encroachment factor – the percentage of new land being converted from forest – has not decreased as much as anticipated, and there have been reports of breaches. Mining and pulp production certification is also falling behind.

Although it is difficult to pinpoint their precise role and contribution, civil society pressure has impacted two areas in particular. First, CSOs actively participate in the policy arena and have the ability to impact private sector policies and actions. Second, CSOs play a crucial role as watchdogs for the execution of private and governmental pledges and rules. As one respondent noted, this has aided in “bringing the forests to the court”.

Since key commodity prices were comparatively steady between 2016 and 2020, it is not possible for these to account for a large portion of the decline. However, no significant rise in the prices of commodities that pose a danger of deforestation has reduced the cost of implementing public and private policies (for producers and politicians alike), and has also decreased the profit margin for breaking laws and regulations, thereby improving the efficacy of policies.

Nonetheless, there has been a consistent rise in the cost of coal and minerals like nickel and gold during this time. The price of nickel increased fourfold from 2016 and 2022. The high and rising profitability of mining accounts for a substantial portion of its growing role in deforestation, and the global energy transition is expected to drive steady demand growth in years to come.

According to statistical (regression) analysis, forest scarcity (also known as forest transition) may account for as much as one-third of the decrease in deforestation over the period. Deforestation tends to decrease when a province reaches about 40% forest cover.

Although all five sets of factors have contributed to the recent decrease in deforestation, we conjecture that the most significant elements have been governmental policies combined with the forest transition (scarcity) effect. Results from private policy are less clear. Through its watchdog role, civil society has been instrumental in supporting more effective implementation of governmental and private policy changes. The cost of implementing forest conservation strategies has decreased due to non-increasing prices for key agricultural commodities.

Land users and (sub)national governments continue to profit from deforestation, and policies to conserve forests need to be constantly evolving to adapt to changing market, economic, political and environmental conditions. Future risks include the potential for current policies to lose their effectiveness over time, shifting political priorities, rising prices for commodities (and minerals in particular) that pose a risk of deforestation, and changes in the makeup of direct drivers, all of which call for a continuous evolution of the policy focus.

On the other hand, one significant policy change in Indonesia can increase the risks of future deforestation: the Job Creation Law (also known as the Omnibus Law) of 2020. Following the Constitutional Court's decision to declare the Law unconstitutional, the Government reissued it in 2023. Some significant features of this law include that it amended 78 laws, covering areas such as forestry, agriculture and energy; relaxed environmental and land-use restrictions; amended the Forestry Law to allow corporate use of protection forests (which was previously restricted); and gave a three-year window to legalize plantations illegally operating in forest estates.

5 Summary and concluding remarks

5.1 Archetype-based policies in Indonesia

Section 4 elaborates on national and subnational public and private policies applied in Indonesia across different archetypes. Table 2 summarizes these policies. These policies are not exhaustive. Many other policies may contribute to the reduction of deforestation in Indonesia. The policies mentioned in Table 2 are selected as they are perceived as key contributors to the reduction of deforestation in Indonesia over the past decade.

Policies that address the archetypes of intact forest areas and stable forest mosaics mainly emphasize forest conservation or protection. At the national level, the primary forest, peatland and oil palm permit moratoria aim to protect remaining primary forest and peatlands from clearing by restricting the issuance of licenses. Ecological fiscal transfers (EFTs) aim to provide financial incentives for subnational governments to maintain remaining forest cover. This policy is similar to payments for ecosystem services (PES), where the aim is to maintain the environmental service through some conditional payments. Essential ecosystem areas (KEE) is probably a not-so-popular but important policy. KEE emphasizes the importance of protecting high conservation value areas that are located outside the state forest. This policy is important because it changes the perception that areas outside state forests can be cleared, and provides a legal foundation for subnational governments to protect such areas. Safeguarding high conservation areas outside state forest is one of the activities under the results-based payment scheme in East Kalimantan. Similarly, low-carbon development planning in Papua also aims to protect the province's remaining forest.

Next, policies that address the archetypes of fragmented forest remnants or landscapes with no forests include peatland protection and management and integrated fire management. Peatland protection and management policy was more seriously considered after the 2015 forest fires in Indonesia. This policy is integrated with the creation of an agency that is tasked to restore peatlands – the Peatland Restoration Agency (now Peatland and Mangrove Restoration Agency or *Badan Restorasi Gambut dan Mangrove*, BRGM). Peatland fires contributed significantly to forest loss in 2015 (Angelsen et al. 2025; Kementerian Lingkungan Hidup dan Kehutanan 2023). Integrated fire management policy is strongly related to peatland protection. The 3R (rewetting, revegetation and rehabilitation) approach of peatland restoration relies on fire prevention as an important element of integrated fire management policy (Harrison et al. 2020) climate and socio-economic benefits from the local to the global scale. However, these ecosystems and their associated benefits are threatened by anthropogenic activities, including agricultural conversion, timber harvesting, peatland drainage and associated fire. Here, we identify key challenges, and provide potential solutions and future directions to meet forest and peatland conservation and restoration goals in Indonesia, with a particular focus on Kalimantan. Through a round-table, dual-language workshop discussion and literature evaluation, we recognized 59 political, economic, legal, social, logistical and research challenges, for which five key underlying factors were identified. These challenges relate to the 3Rs adopted by the Indonesian Peatland Restoration Agency (Rewetting, Revegetation and Revitalization).

Table 2. Key policies for different archetypes

	Policies	Main mechanism	Location	Relevant forest archetype	Behavioural mechanism activated	Actors	Deforestation threat
I	Public policies – national						
1.1	Moratorium of permits on primary forests and peatlands	Land-use restriction	State forest Areas for other uses (APL)	Intact forest areas, stable forest mosaics	Compliance and obedience	Government, producers	Large benefit from forest-degrading activities Weak governance
1.2	Moratorium of oil palm permits	Land-use restriction	State forest APL	Stabilized transition areas, chronic deforestation areas	Compliance and obedience	Government, producers	Large benefit from forest-degrading activities Weak governance
1.3	Law enforcement	Enforcement/coercion	Largely APL	Deforestation areas	Compliance and obedience	Producers	Large benefit from forest-degrading activities Weak governance
1.4	Bringing forest valuation into court	Enforcement	Largely APL	Deforestation areas	Compliance and obedience	Producers	Large benefit from forest-degrading activities
1.5	Peatland protection and management	Competence		Fragmented forest remnants, landscapes with no forest	Compliance and obedience	Government, producers	Small captured value of forests and benefits of forest-friendly activities
1.6	Village fund	Fiscal	Largely APL	Deforestation areas*	Payoff	Producers	Small captured value of forests and benefits of forest-friendly activities
1.7	Ecological fiscal transfer	Fiscal	State forest APL	Intact forest areas, stable forest mosaics	Payoff	Government	Small captured value of forests and benefits of forest-friendly activities
1.8	Payment for ecosystem services	Conditional payment	State forest APL	Intact forest areas, stable forest mosaics*	Payoff	Producers	Small captured value of forests and benefits of forest-friendly activities
1.9	Essential ecosystem areas	Land-use restriction	APL	Intact forest areas, stable forest mosaics	Payoff	Producers	Large benefit from forest-degrading activities
1.10	Integrated fire management	Enforcement	Largely APL	Deforestation areas, fragmented forest remnants	Compliance and obedience	Producers	Large benefit from forest-degrading activities

continue to next page

Table 2. Continued

Policies	Main mechanism	Location	Relevant forest archetype	Behavioural mechanism activated	Actors	Deforestation threat
1.11 Result-based payment	Conditional payment	State forest APL	Intact forest area, stable forest mosaics, deforestation areas	Maximization of material payoffs	Government	Large benefit from forest-degrading activities
1.12 Commodity certification	Certification	State forest APL	Stable forest mosaics, deforestation areas	Maximization of material payoffs	Producers	Large benefit from forest-degrading activities
1.13 Forest management unit	Competence	State forest	All	Compliance and obedience	Government	Large benefit from forest-degrading activities
1.14 Social forestry	Competence	State forest, APL	Deforestation areas, fragmented forest remnants	Maximization of material payoffs	Producers	Small captured value of forests and benefits of forest-friendly activities
II Public policy – subnational						
2.1 Result-based payment in East Kalimantan	Conditional payment	State forest APL	Deforestation areas, stable forest mosaics	Maximization of material payoffs	Government	Large benefit from forest-degrading activities
2.2 Papua and West Papua low carbon development	Land-use planning	State forest APL	Intact forest areas, stable forest mosaics, deforestation areas	Competence/self-efficacy	Government	Large benefit from forest-degrading activities
III Private policies						
3.1 Timber and palm oil certification	Certification	State forest APL	Deforestation areas	Maximization of material payoff	Producers	Large benefit from forest-degrading activities
3.2 'No deforestation, no peatland and no exploitation' policy	Conditional market access	Largely APL	Stable forest mosaics, deforestation areas	Competence/self-efficacy	Producers	Large benefit from forest-degrading activities

Finally, policies that address deforestation area archetypes include the moratorium on palm oil permits, law enforcement, bringing forest valuation into court, village funds, integrated fire management, results-based payment and commodity certification. The palm oil moratorium differs from the primary forest and peatland permit moratorium. The palm oil moratorium consists of two parts: (i) moratorium on conversion from state forest to APL; and (ii) review of the existing permit pipeline. Intact forest areas or stable forest mosaics archetypes are probably more relevant to the first part, to avoid forest loss due to conversion. The second part may cover areas that have gone into different stages of deforestation. Policies on law enforcement and forest valuation are more appropriate for deforestation area archetypes, however, since these policies often involve bringing companies into court for illegal activities, mostly using fires for land clearing. Village funds are allocated to villages, with most of them located near forest frontiers where deforestation has occurred. The aim is to create alternative income sources for households and thus reduce pressure on forest land and forest resources.

5.2 Usefulness of the approach

The case of Indonesia shows that most policies attempt to address deforestation risks within stable forest mosaics, i.e., areas with substantial forest cover. This is understandable given that the mandate of Ministry of Environment and Forestry (MoEF) is the state forest areas. Much of the deforestation occurring in deforestation areas is the result of concessions granted, public programmes (historically, the transmigration programme is the most notable) or other state-sponsored initiatives as a part of the national economic development strategy. There are relatively fewer conservation policies for deforestation areas, with a probable explanation being that deforestation is planned and thus not considered a problem to be addressed.

In terms of the approach's usefulness in distinguishing between forest and non-forest areas and coordinating with government agencies, there are three key policy issues. The first relates to authorities over spatial management. While the MoEF's geographical mandate is state forest areas, other policies can overrule forest policies for other interests. For example, the moratorium on permits in primary forests and peatlands has an exception – areas classified as national strategic projects, for example food estates and mining. Various agencies outside MoEF also make decisions on forest cover in non-forest areas, requiring a high level of coordination among government agencies.

The second issue relates to the temporal analysis needed to better understand land-use transitions. If an area falls under a particular archetype (except for intact forest areas), it is helpful to understand what land uses drive any changes. As such, archetype analysis and deforestation diagnostics should be complemented by analysis of the underlying forest transition process.

Third, policies are not the only factor explaining the reduction of deforestation in Indonesia, as discussed in Section 4.5. Increasing demand for commodities drives demand for additional land, which puts pressure on forests. Conversely, these factors may also reduce deforestation. Looking across a longer period, the declining profitability of timber – due to low global market prices and an export ban on raw logs – has probably contributed to forest conservation.

The archetype analysis and diagnostics approach is highly relevant for identifying future risks. In general, intact forest areas are protected by either poor agricultural productivity, poor access or a combination of the two. Humans can change access through the building of roads and other infrastructure. The two largest remaining intact forest areas are the interior of Kalimantan and Papua (Figure 5). There is a difference between the two, as illustrated in Figure 7. Papua has poorer access but also areas of high agricultural suitability. Current development plans for Papua provinces, therefore, have the potential to make this a hotspot of future deforestation, possibly reversing the trends of declining deforestation seen over the past decade. To this end, policymakers can consider various archetypes in evaluating existing policies and formulating future policies.

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Annexes

Table A1. Percentage of each archetype seen in each province

Province	No forest left (%)	Stabilized transition areas	Chronic deforestation areas	Accelerating deforestation areas	Gradual deforestation areas	Fragmented forest remnants	Stable forest mosaics	Intact forest areas
Aceh	0.0	17.3	18.0	1.3	8.2	1.6	2.3	51.4
Jawa Tengah	4.6	33.0	11.5	0.4	14.3	34.6	0.4	1.2
Jawa Timur	3.6	36.8	7.8	0.4	9.2	38.6	1.1	2.6
Kalimantan Barat	0.2	22.6	23.8	4.4	7.8	0.3	0.2	40.8
Kalimantan Selatan	1.6	33.3	20.7	1.4	11.8	11.0	0.9	19.2
Kalimantan Tengah	0.8	22.9	18.9	1.8	3.1	0.6	0.3	51.6
Kepulauan Riau		20.4	37.7	4.3	12.7	0.3	0.9	23.8
Lampung	1.4	32.7	10.6	0.3	13.0	33.0	1.4	7.6
Maluku Utara		9.5	6.5	0.5	4.5	0.1	1.1	77.8
Maluku	0.2	14.1	5.4	0.4	5.4	3.6	6.1	64.8
Bali		58.8	17.1		3.9	5.7	1.8	12.7
Nusa Tenggara Barat	1.3	20.0	7.1	2.0	6.6	37.7	9.0	16.3
Nusa Tenggara Timur	3.9	6.3	0.4	0.6	6.5	71.2	10.3	0.8
Papua Barat		1.9	1.5	0.5	0.9	0.2	0.8	94.4
Papua	0.0	3.7	2.8	0.8	2.2	3.4	5.4	81.7
Riau	5.6	36.4	34.3	3.2	3.5	3.2	0.6	13.2
Sulawesi Barat		16.6	27.6	1.2	7.9		1.8	44.9
Sulawesi Selatan	0.3	32.6	17.3	0.2	11.3	11.1	3.8	23.4
Sulawesi Tengah		18.0	20.2	1.0	7.4	0.2	1.0	52.3
Sulawesi Tenggara		32.3	14.5	0.7	7.0	5.7	2.4	37.4

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Table A1. Continued

Province	No forest left (%)	Stabilized transition areas	Chronic deforestation areas	Accelerating deforestation areas	Gradual deforestation areas	Fragmented forest remnants	Stable forest mosaics	Intact forest areas
Sulawesi Utara		19.6	24.0	0.9	5.8		1.2	48.5
Bangka Belitung		22.4	67.7	0.7	3.7	1.5	0.7	3.3
Sumatera Barat	0.1	13.0	19.4	3.4	15.3	0.8	1.1	47.1
Sumatera Selatan	0.7	33.9	42.7	1.8	6.4	4.3	0.4	9.8
Sumatera Utara	2.6	30.4	17.4	1.4	14.4	4.7	2.4	26.7
Yogyakarta	11.4	31.1	16.7		6.8	34.1		
Kalimantan Timur	0.3	16.7	20.9	3.0	3.3	0.9	1.4	53.4
Kalimantan Utara		5.9	7.9	1.5	2.0		0.1	82.5
Banten		16.7	5.0	1.0	34.5	26.9	5.5	10.4
Bengkulu		17.3	40.8	1.4	8.8	2.5	0.9	28.4
Gorontalo		28.1	17.0	0.2	3.9	2.9		48.0
Jakarta Raya		16.7			4.2	79.2		
Jambi	0.3	14.8	46.8	12.1	5.1	0.6	0.2	20.2
Jawa Barat	1.3	32.5	22.9	0.5	15.7	23.3	0.6	3.2

Table A2. Follow up land-use categories used to describe deforestation areas

Follow up land use	Description
Tree plantation	Tree plantations, mainly oil palm and rubber
Forest regrowth	Tree cover regrowth (visible for at least 3 years) after a full removal of tree cover that has remained without regrowing trees for at least 2.5 years.
Water	Permanent and seasonal water
Cropland	Land covered with annual cropland that is sowed/planted and harvestable at least once within the 12 months after the sowing/planting date. The annual cropland produces an herbaceous cover and is sometimes combined with some tree or woody vegetation. Note that perennial woody crops will be classified as the appropriate tree cover or shrub land cover type.
Grassland	This class includes any geographic area dominated by natural herbaceous plants (plants without persistent stem or shoots above ground and lacking definite firm structure) such as grasslands, prairies, steppes, savannahs and pastures, with a cover of 10% or more, irrespective of different human and/or animal activities, such as grazing and selective fire management. Woody plants (trees and/or shrubs) can be present assuming their cover is less than 10%. It may also contain uncultivated cropland areas (without harvest/ bare soil period) in the reference year.
Urban / built-up	Land covered by buildings, roads and other man-made structures such as railroads. Buildings include both residential and industrial building. Urban green (parks, sport facilities) is not included in this classification. Waste dump deposits and extraction sites are considered as bare.
Shrubland	This class includes any geographic area dominated by natural shrubs having a cover of 10% or more. Shrubs are defined as woody perennial plants with persistent and woody stems and without any defined main stem being less than 5 m tall. Trees can be present in scattered form if their cover is less than 10%. Herbaceous plants can also be present at any density. Shrub foliage can be either evergreen or deciduous.
Other / no data	Other land uses (e.g., bare, wetlands).

Table A3. Description of forest policies considered in deforestation diagnostics

Policy name	Description
Payments for ecosystem services (PES)	“Voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services” (Wunder 2015). This includes both user and government-financed PES (Wunder 2015).
Conservation ecotourism	“Ecotourism is a specific kind of tourism, distinguished from nature tourism and outdoor recreation by its conservation and development goals. Tourism, when designed and practiced as ecotourism, can benefit wildlife and biodiversity, create incentives to protect landscapes, and support local communities” (Stronza et al. 2019).
Certification schemes	Programmes that “accredit goods and services that have met defined process standards meant to protect the environment and social welfare in the places of origin” (Lambin et al. 2014). These schemes are typically connected to either a premium price incentive or preferable market access, and encompass private initiatives like the Roundtable for Sustainable Palm Oil (RSPO) sustainable palm oil certification and Forest Stewardship Council (FSC) certified sustainable timber.
Conservation easements	“A negotiated, legally binding agreement between individuals who own property and a second-party organization (e.g., state agency or nongovernmental organization such as a land trust). A conservation easement restricts specific activities on the property in order to meet the owner’s goals and the organization’s conservation objectives” (Farmer et al. 2011).
Avoid infrastructure development	Avoiding the construction of new road infrastructures or favouring the closing of existing roads to avoid deforestation or impact on biodiversity-rich areas (Angelsen 2010) either by neglecting extension, marketing, and infrastructure, generating alternative income opportunities, stimulating intensive agricultural production or by reforming land tenure. The second set aims to increase either extractive or protective forest rent and—more importantly—create institutions (community forest management).
Integrated conservation and development programmes (ICDPs)	“Initiatives that aim to manage and conserve natural resources including biodiversity with socioeconomic development components or goals (Brandon and Wells 1992). Some have understood this as conservation approaches that include the use of socio-economic investment tools to achieve conservation objectives” (Minang and van Noordwijk 2013).
Conditional cash transfers	This involves giving an income source to poor households that is dependent on them undertaking actions typically connected to education and health. “Conditional cash transfers aim to enhance human capital and thereby reduce the intergenerational transfer of poverty” (Ferraro and Simorangkir 2020).
Offsets/cap and trade	“Compensating for losses of biodiversity components at an impact site by generating (or attempting to generate) ecologically equivalent gains, or ‘credits’, elsewhere (i.e., an offset site). Offsets can be achieved in two main ways: (1) via averted loss from ongoing or anticipated impacts (e.g., avoided deforestation or degradation) at a site through the removal of threatening processes and (2) by enhancement of a degraded site through restoration and rehabilitation (‘restoration offsets’)” (Maron et al. 2012). Environmental Reserve Quotas (CAR) was conceived as an offset mechanism in Brazil (Soares-Filho et al. 2016).
Government moratoria	This is a government measure aiming to restrict land-based development activities through the temporary suspension of new land-related rights. One example of this is Indonesia’s moratorium on new timber, oil palm and logging concessions (Busch et al. 2015).

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Table A3. Continued

Policy name	Description
Protected areas	“A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Dudley 2008). “The term embraces a wide range of different management approaches, from highly protected sites where few if any people are allowed to enter, through parks where the emphasis is on conservation but visitors are welcome, to much less restrictive approaches where conservation is integrated into the traditional (and sometimes not so traditional) human lifestyles or even takes place alongside limited sustainable resource extraction. Some protected areas ban activities like food collecting, hunting or extraction of natural resources while for others it is an accepted and even a necessary part of management” (Dudley 2008).
Land-use zoning	“Land use zoning results from a spatial planning process that divides a territory into zones with different rules and regulations for land use, management practices, and land cover change. In and of itself, zoning does not promote sustainability but supports legal land use regulations for different units of a landscape” (Lambin et al. 2014). This encompasses establishing forest estate boundaries (Lambin et al. 2014).
Environmental education	“Encompasses approaches, tools, and programmes that develop and support environmentally related attitudes, values, awareness, knowledge, and skills that prepare people to take informed action on behalf of the environment” (Ardoin et al. 2020). This targets various actors, including the potentially marginalized.
Conservation concessions	“Comprise public land of which the access, management and exclusion rights are granted to non-government actors for conservation purposes, typically for a specific period of time” (Schleicher 2018). Concessions are typically connected with the prospect of direct payments given to keep the forest intact.
Tenure recognition	Policies that promote the recognition of tenure rights. Here recognition implies a legal process to formalize (through either law or de jure process) those rights already being held through informal, customary mechanisms (Fitzpatrick 2005).
Community forest management	Forest management approaches where governance is devolved to local community groups or institutions, to varying degrees (Bowler et al. 2012).
Logging concessions	A scheme through which the state “gives a company the exclusive right to exploit timber resources over a clearly defined boundaries in its private domain for a specified period. In return, concessionaires must meet several requirements in terms of taxation or provision of public goods” (Lescuyer et al. 2012).
Family planning programmes	Interventions that encourage family planning in order to lower fertility rates (Sellers 2017).
Ecological fiscal transfers (EFTs)	A scheme to “transfer public revenue between governments within a country based on ecological indicators. Here, ‘ecological’ refers to ecological public functions of governments, which encompass both nature conservation and abatement of environmental pollution. EFT may transfer revenue ‘vertically’ from higher-level to lower-level governments or ‘horizontally’ between governments at the same level. EFT may be ‘general-purpose’ transfers to subnational government budgets that can be spent on any priority of recipient jurisdictions, whether ecological or non-ecological. Or they may be ‘specific-purpose’ transfers earmarked for a particular ecological use, for example, reforestation or water treatment” (Busch et al. 2021).
Conditional debt relief	“Debt to foreign countries and to international banks may encourage forest loss. Debt-for-nature swaps try to address this by reducing international debt, typically in exchange for establishing a conservation trust fund within the debtor nation” (Pfaff et al. 2013).
Conditional loans or overseas development aid	Conditional loans attach certain reforms – like expanded park areas, improved law enforcement and economic policy changes – to lending from governmental bodies and multilateral financial institutions (Pfaff et al. 2013).

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Table A3. Continued

Policy name	Description
Political decentralization	“Any political act in which a central government formally cedes powers to actors and institutions at lower levels in a political-administrative and territorial hierarchy.” (Ribot et al. 2006) “Political decentralization involves the transfer of power to actors or institutions that are accountable to the population in their jurisdiction.” (Ribot et al. 2006)
Anti-corruption policies	Policies that aim to influence the cost and benefits of corruption related to forest use, for example, reducing opportunities to extract excessive private income through bribes; as well as increasing consequences and/or the probability of being discovered and punished (by increasing accountability and transparency) (Tacconi et al. 2009). Such reforms must frequently exist outside the forest sector so as to regulate how political parties are financed; they regulate lobbying, judicial reform, establishment of anti-corruption commissions and free media (Tacconi et al. 2009).
Procurement policies	These are criteria that governments establish around their purchases of forest-risk products (Brack 2013). One example is the EU Renewable Energy Directive (EU RED), which stipulates that all biofuels used in the EU must observe sustainability criteria (Walker et al. 2013).
Due diligence requirements on industry	“Requirements on industry, requiring companies to put in place procedures to minimize the chance of them handling illegal products, as in the EU Timber Regulation and the Australian Illegal Logging Prohibition Act” (Brack 2013).
Public disclosure initiatives	Initiatives, which involve public and/or private attempts to increase the availability of information on behaviours harmful to the environment (Tietenberg 1998). “Disclosure initiatives have been instituted by civil society, often with the backing of financial institutions (banks, pension funds, asset managers, insurance companies and foundations), to emphasise the importance of full information and disclosure throughout the supply chains” (Walker et al. 2013) and by governments (Cisneros et al. 2015).
Consumer/social media campaigns/ boycotts	Marketing strategies targeting changes in consumer behaviours (i.e., increasing consumption of forest-friendly products and reducing consumption of deforestation-risk products). This is done through increasing consumer awareness around environmental sustainability, as well as informing consumers about the risks and benefits of specific services and products (Dangelico and Vocalelli 2017). This has led to boycotts, where an organization calls upon consumers to avoid purchasing a specific brand/product (Walker et al. 2013).
Extension programmes to curb demand for timber products	These are programmes targeting the adoption of practices and technologies that reduce timber demand, e.g., cookstoves (Chan et al. 2015) or that increase supply of non-forest timber, e.g., agroforestry (Minang et al. 2014).
Blended finance initiatives	A model to strategically direct public finance to mobilize or de-risk private or other sources of finance for sustainable development, concessional finance and green bonds. These initiatives utilize private capital to fund more sustainable agricultural practices (United Nations, Inter-agency Task Force on Financing for Development 2022).
Monitoring tools	These are satellite-based systems to detect deforestation in real time. Free deforestation alerts reduce the cost to policymakers of monitoring forests and by doing so reduce the cost of implementing deforestation policy (Moffette et al. 2021). Monitoring can encourage compliance with laws (Rasmussen and Jepsen 2018) and is a key tool for targeting law enforcement activities in the Brazilian Amazon (Assunção et al. 2017).

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Table A3. Continued

Policy name	Description
Bilateral agreements	“Bilateral agreements between consumer and producer countries to establish licensing systems designed to ensure that only legal products enter trade between the two, and improve forest governance in the producer country, such as the voluntary partnership agreements currently being negotiated and implemented under the EU Forest Law Enforcement, Governance and Trade (FLEGT) initiative” (Brack 2013). Such a programme “is intended to reinforce producer-country government reforms that aim to improve forest governance” (Pfaff et al. 2013).
Multistakeholder forums	“Purposefully organized interactive processes that bring together stakeholders to participate in dialogue, decision-making and/or implementation regarding actions seeking to address a problem they hold in common or to achieve a goal for their common benefit” (Sarmiento Barletti et al. 2020).
Tax relief and environmental subsidies	Environmental subsidies are economic transfer by a legislator that is intended to reduce the costs of activities which contribute to environmental protection or reducing the extraction and use of natural resources (European Union 2015). Tax reliefs are “arrangements and provisions in general tax schemes, with the explicit aim of providing positive financial incentives steering the taxpayers’ behaviour in a more biodiversity-friendly direction” (Ring and Schröter-Schlaack 2011). “Usually applies reduced rates or exemptions conditional on certain ‘biodiversity-friendly’ requirements that the taxpayer should fulfil” (Ring and Schröter-Schlaack 2011).
Environmental tax, user fees and reduced subsidies	Tax levied on an agent causing an environmental externality (environmental damage) as an incentive to avert or mitigate such damage (Hansen and Lund 2018). This also includes tariffs, i.e., a tax to be paid on a particular class of imports or exports. In this category we also include both user fees (economic mechanisms which secure revenues from users of biodiversity and ecosystem services) and the reduction of subsidies (for agriculture in particular).
Conditional access to credit	Policy that makes the concession of rural credit conditional upon proof of compliance with legal requirements that contribute to protecting the environment. A prominent example is Resolution 3545 published by the Brazilian Central Bank in 2008 (Assunção et al. 2020)..
Moratoria/ standards associated with market exclusion	““Moratoria are agreements, brokered by civil society, whereby a significant proportion of an industry agrees to avoid purchasing products arising from a particular area or from deforestation in a specific area” (Walker et al. 2013). “The soy moratorium in Brazil took shape shortly after an NGO report linking illegal deforestation to soy fed to chickens sold in major fast food chains” (Lambin et al. 2014).

CIFOR-ICRAF Working Papers contain preliminary or advanced research results on important tropical forest issues that need to be published in a timely manner to inform and promote discussion. This content has been internally reviewed but has not undergone external peer review.

This report is part of a wider inquiry into the intertwined challenges of climate change, deforestation and policy design, where global environmental goals depend on highly local realities. Forest loss remains a major driver of emissions, but its causes and trajectories vary widely across regions, shaped by governance systems, economic pressures and social dynamics. Moving beyond generic prescriptions, this study adopts a context-sensitive perspective that asks not only what policies exist, but how and where they are likely to be effective. In Indonesia, a vast archipelagic country with highly heterogeneous forest landscapes, deforestation has been both extensive and uneven, concentrated in long-established agricultural frontiers while large tracts of relatively intact forest remain elsewhere. This diversity makes it a critical case for understanding how policies interact with different ecological and institutional contexts. The report applies a diagnostic framework that connects spatial patterns (archetypes) of forest change with the behavioural mechanisms that policies aim to influence, from enforcement and regulatory controls to incentives, social norms and capacity-building. By examining how these instruments align with specific deforestation contexts, it highlights why policy effectiveness depends not only on design but also on where and how interventions are deployed. Indonesia's experience—particularly the marked decline in deforestation since the mid-2010s—offers valuable insights into the potential of coordinated policy mixes, while also revealing the ongoing challenges of governance, land-use pressures and sustaining long-term change.



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