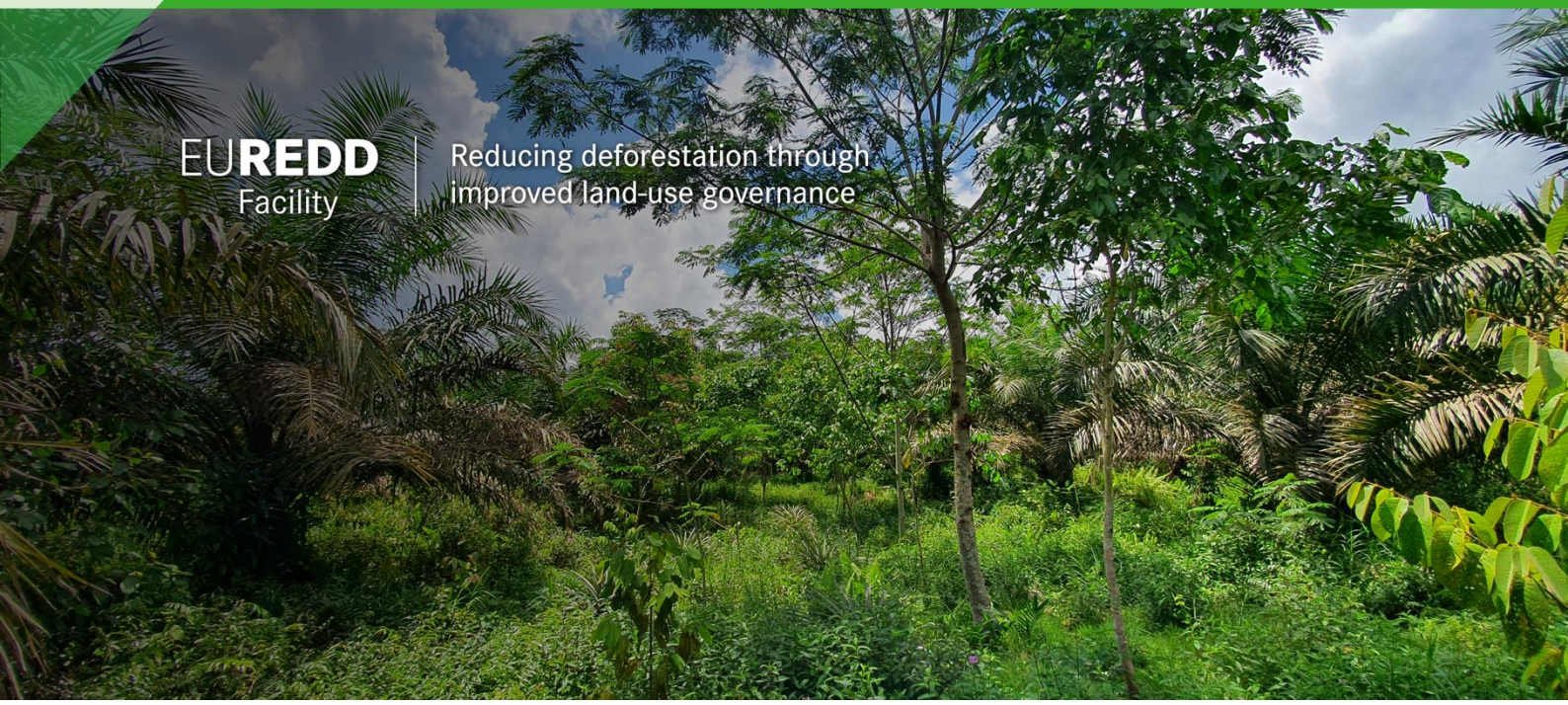


# Forest Restoration and Rehabilitation in Indonesia: A Policy and Legal Review

## Report

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Micah R. Fisher, Sebijak Institute

Muhammad Haidar Daulay, Sebijak Institute

Satrio Adi Wicaksono, European Forest Institute

Alice Bisiaux, European Forest Institute

Erliza Cikal Arthalina, Sebijak Institute

# Table of contents

# List of abbreviations

| | |
|---|---|
| APROBI | Association of Indonesian Biofuel Producers |
| ASEAN | Association of Southeast Asian Nations |
| BAU | Business as usual |
| Bappenas | Ministry of National Development Planning |
| BKSDA | Balai Konservasi Sumber Daya Alam (the Technical Implementation Unit under DG KSDAE, MoEF) |
| BPDLH | Badan Pengelola Dana Lingkungan Hidup (Environmental Fund Management Agency, organisational unit under MoF) |
| BPK | Badan Pengawas Keuangan (Financial Audit Agency) |
| BPSPL | Balai Pengelolaan Sumberdaya Pesisir dan Laut (Center for Coastal and Marine Resources Management, Technical Implementation Unit under MoMAF) |
| BRGM | Badan Restorasi Gambut dan Mangrove (Peat and Mangrove Restoration Agency) |
| BUMN | Badan Usaha Milik Negara (State-Owned Enterprises) |
| BUMS | Badan Usaha Milik Swasta (Private-Owned Enterprises) |
| CM | Coordinating Ministry |
| COP | Conference of the Parties |
| D-BUPH | Directorate of Forest Utilisation Business Control, MoEF |
| D-KTA | Direktorat Konservasi Tanah dan Air (Directorate of Soil and Water Conservation, directorate under PDAS-RH, MoEF) |
| DG | Directorate General |
| DG-PDAS-RH | Direktorat Jenderal Pengendalian Daerah Aliran Sungai dan Rehabilitasi Hutan (Directorate General of Watershed Management and Forest Rehabilitation, MoEF) |
| DG-PPKL | Direktorat Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan (Directorate General of Pollution and Environmental Damage Control, MoEF) |
| DG-PPI | Direktorat Jenderal Pengendalian Perubahan Iklim (Directorate General of Climate Change, MoEF) |

| | |
|---|---|
| DG-PSKL | Direktorat Jenderal Perhutanan Sosial dan Kemitraan Lingkungan (Directorate General of Social Forestry and Environmental Partnership, MoEF) |
| DAK | Dana Alokasi Khusus (Special Allocation Funds) |
| DJR | Dana Jaminan Reboisasi (Reboisasi Guarantee Fund) |
| EFI | European Forest Institute |
| FAO | Food and Agriculture Organization of the United Nations |
| FOLU | Forest and Other Land Uses |
| Forest Estate | Lands designated as forests under the jurisdiction of the Ministry of Environment and Forestry |
| FMU | Forest Management Unit |
| FRR | Forest Rehabilitation and Restoration |
| G20 | Group of Twenty (strategic multilateral platform that connects countries with the world's major economies) |
| GAPKI | Gabungan Pengusaha Kelapa Sawit Indonesia (Indonesian Palm Oil Association) |
| Gerhan | National movement for forest and land rehabilitation |
| GHG | Greenhouse Gas |
| IPCC | Intergovernmental Panel on Climate Change |
| IPPKH | Izin Pinjam Pakai Kawasan Hutan (Borrow-to-Use Forest Zones Permit) |
| IUPHHK | Izin Usaha Pengelolaan Hasil Hutan Kayu (Timber Forest Product Utilisation Business Permit) |
| JCL | Undang-Undang Cipta Kerja (Workforce Development Act, also known as the Omnibus Law or Job Creation Law) |
| JDIH | National Legal Documentation and Information Network |
| JICA | Japan International Cooperation Agency |
| KMP | Katingan Mentaya Project (a Project under PT RMU) |
| LCDI | Low Carbon Development Indonesia |

| | |
|---|---|
| LULUCF | Land-use, Land-use Change, and Forestry |
| MoA | Ministry of Agriculture |
| MoASP | Ministry of Agrarian Affairs and Spatial Planning |
| MoEF | Ministry of Environment and Forestry |
| MoF | Ministry of Finance |
| MoHA | Ministry of Home Affairs |
| MoMAF | Ministry of Marine Affairs and Fisheries |
| MoPWH | Ministry of Public Works and Housing |
| MoV | Ministry of Villages, Development of Disadvantaged Regions and Transmigration |
| MRV | Monitoring, Reporting and Verification |
| NDC | Nationally Determined Contribution |
| NDVI | Normalised Difference Vegetation Index |
| NGO | Non-Governmental Organisation |
| PEN | Programme Pemulihan Ekonomi Nasional (National Economic Recovery State Budget) |
| Penghijauan | Reforestation on land outside the forest estate |
| REDD+ | Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries |
| RE | Restorasi Ekosistem (Ecosystem Restoration) |
| Reboisasi | Reforestation within Forest Zones |
| Repelita | Rencana Pembangunan Lima Tahun (Five-Year Development Plan from the New Order Period) |
| RHL | Rehabilitasi hutan dan lahan (Forest and land rehabilitation) |
| RPEEG | Rencana Perlindungan Ekosistem Gambut (National Peat Ecosystem Protection and Management Plan) |
| RPJMN | Rencana Pembangunan Jangka Menengah Nasional (Medium-Term Development Plan) |

| | |
|---|---|
| SDGs | Sustainable Development Goals |
| THPB | Clear Cutting Artificial Regeneration |
| TJSL | Tanggung Jawab Sosial dan Lingkungan (Social and Environmental Responsibility, company's commitment to sustainable development, especially BUMN) |
| TPTI | Selective Harvest and Planting Industry |
| UPT | Unit Pelaksana Teknis (Technical Implementation Unit) |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNFCCC | United Nations Framework Convention on Climate Change |
| Verra | Verified Carbon Standard |
| WMC | World Mangrove Center |
| WWF | World Wide Fund for Nature |

# Executive summary

In recent years, forest rehabilitation and restoration (FRR) has drawn a lot of attention for its potential in mitigating greenhouse gas (GHG) emissions and enhancing carbon sinks, while protecting the environment and supporting development outcomes. Indonesia is the third-largest tropical forest country in the world and has undergone immense deforestation over distinct phases in the past 70 years. Nevertheless, it has recently adopted climate mitigation commitments and programming that are among the most ambitious in the world.

This report takes stock of the evolution of formal FRR initiatives in Indonesia, evaluates current progress and legal frameworks, and provides strategic policy recommendations. The analysis is rooted in broader forest and land-use governance dynamics and aims to support stakeholders in implementing Indonesia's Nationally Determined Contribution (NDC) on climate change. The framework for the study draws from emerging international approaches around Forest and Landscape Restoration, distinguishing between best practices and the existing enabling environment. The methodology used included tracking historical policy changes, analysing recent regulatory developments around the Job Creation Law, and conducting 14 semi-structured interviews with key policy and implementing agencies and civil society organisations.

### Three broad categories of Forest Rehabilitation and Restoration

With more than 16 million ha of "degraded" lands, Indonesian FRR targets can be divided into three broad categories. The first is the classic dryland approach, which accounts for most of Indonesia's historical FRR efforts and continues to form the backbone of implementation practices. The passing of the Basic Forestry Law in 1999, however, reshaped long-standing FRR categories and ushered in a new era of FRR in Indonesia. The Law drew on old spatial distinctions of forest rehabilitation, namely reboisasi and penghijauan – the former inside state forest zones and the latter outside – and introduced new approaches emphasising restoration of damaged forests and ecosystems. Despite initial government plans to prioritise restoration on degraded lands, particularly in upper watersheds, the Forestry Ministry's focus on dryland FRR continues to support exotic fast-growing crops in production forests. The legal framework also evolved in line with increased awareness of the need to reduce GHG emissions, reorienting policies from tree-planting to ecosystem restoration. This transition is evident in various forms, including government-supported FRR for climate mitigation, companies pursuing carbon capture and biodiversity conservation concessions, initiatives to deepen community-driven restoration, as well as reclamation of damaged landscapes.

In the mid-2000s, international attention on climate change drew intense focus on Indonesia due to the high levels of emissions from burnt, degraded peatlands. Peatlands thus became a second major FRR category. In 2007, with the United Nations Climate Change Conference (COP 13) hosted in Bali, Indonesia released its first GHG National Action Plan. The high levels of emissions from Indonesian landscapes at that time accounted for over half of the global Land-use, Land-use Change, and Forestry (LULUCF) sector. Drawing significant global interest, restoration priorities in Indonesia coincided with the initial articulation of REDD+, a carbon market scheme envisioned to support ecosystem restoration, among other activities. At the G20 meeting in 2009, then-President Yudhoyono announced the beginning

of Indonesia's ambitious commitment to reduce GHG emissions. Reductions targets are rooted in FRR, especially by pursuing peatland ecosystem restoration.

Assuming the presidency in 2014, Joko Widodo (popularly, Jokowi) enhanced Indonesia's commitments to reduce emissions in the lead-up to COP 21 by 29% unconditionally, or 41% with international cooperation, compared to business-as-usual scenarios by 2030. Widespread fires in 2015, however, burnt almost a million ha of peatlands, undermining climate policy commitments. This prompted President Widodo to scale up regulatory mechanisms aimed at meeting ambitious climate mitigation targets.

Coinciding with the UN Decade for Ecosystem Restoration 2021–2030, global attention on blue carbon also began to spotlight the important role of mangroves as sensitive ecosystems emitting high concentrations of GHG. Jokowi's second term thus established a third major FRR focus on mangroves. At 3.31 million ha, Indonesia accounts for the largest distribution of mangroves in the world. Official data showed that in 2020 over 637,000 ha were degraded. Restoration presents significant potential for mitigating GHG emissions. By 2020, the Indonesian Government declared FRR a national priority, and conferred heightened authority to the nascent Peatland and Mangrove Restoration Agency (BRGM). Currently, FRR forms the backbone of Indonesia's FOLU Net Sink 2030 Operational Plan. Released in February 2022, the Plan outlines targets and scenarios for the land and forest-based sectors to become a net absorber of carbon.

## Contemporary policy developments

FRR terminologies have continued to evolve in the current policy landscape, particularly in the context of Indonesia's 2020 passing of the Job Creation Law. This report simplifies FRR terminology into three overarching approaches, namely rehabilitation, restoration and reclamation. These approaches are accompanied by legal mandates, regulatory tasks and administrative functions, which then link to plans, budgets and implementation. Chapter 3 of this report details these distinctions and processes, mapping out the relational roles of Bappenas, Coordinating Ministries, BRGM, the various directorates general within the Ministry of Environment and Forestry (MoEF) and other key stakeholders. Two fundamental changes in policy directives concern the evolving definition of degraded lands and the categorisation of rotational and non-rotational rehabilitation, which are discussed at length in this report.

During Jokowi's second term, the 2020–2024 Medium-Term Development Plan (RPJMN) extended ambitious FRR targets to focus on 1.5 million ha of peatland restoration and scaling up mangrove restoration targets to 600,000 ha. At the end of Jokowi's first term in 2019, the targeted 5.5 million has of FRR listed in the previous RPJMN had only succeeded in rehabilitating about 1.18 million ha. However, this figure does not include FRR efforts conducted by concessionaires or Forest Management Units (FMUs) in production forests or restoration initiatives within conservation areas, which account for additional FRR achievements of 1.7 million ha. An assessment by the Central Statistics Agency in 2018 identified 14 million ha of highly degraded and degraded lands across all provinces, serving as the baseline for FRR prioritisation in the 2020–2024 RPJMN. The FOLU Net Sink 2030 Operational Plan provides a complementary basis for emissions reductions targets. Chapter

3 details the various policies to achieve peatland restoration targets and the acceleration of FRR in mangrove areas across key government agencies.

While the RPJMN and FOLU Net Sink 2030 Operational Plan guide formal FRR initiatives, partnerships and inter-institutional cooperation also play a key role. The MoEF has traditionally held strategic importance and receives significant budget allocations (USD 558 million in 2021). Approximately 27% of MoEF's total budget allocation goes to the DG responsible for FRR, the Directorate General of Watershed Management and Forest Rehabilitation (PDAS-RH). Albeit signifying a strong national commitment, the nominal value for FRR falls well short of fulfilling national targets calculated on a rupiah per hectare estimate. Supplementary state budgets thus play a strategic role. During the COVID-19 pandemic, an innovative National Economic Recovery Programme (PEN) provided significant financing support in the form of cash transfers for communities to plant mangroves. The Revenue Sharing Reboisasi Fund (DBH-DR) also provides a complementary source of FRR financing from concessionaires, with a fund channelling mechanism that provides 40% of funds to local governments. Foreign aid and development assistance continue to play a key role, but the promise of private sector involvement in REDD+, carbon trading and corporate responsibility programmes have largely fallen short of expectations. The recently established Environmental Fund Management Agency (BPDLH) is anticipated to play a facilitating role in addressing policy inconsistencies and directing funding allocations.

The lack of technical and institutional capacity remains a crucial obstacle to improving FRR. Defining land degradation is a complex science particularly across Indonesia's profoundly diverse ecosystems. It involves high-resolution satellite imagery on the one hand, and challenging coordination mechanisms with varying institutional contexts and diverse communities on the other. Methodologies have undergone significant changes in recent years, particularly on indicators and overlays determining degraded lands and watersheds. These are mapped and determined using land cover, slope, erosion rates, and management conditions, as well as ground truthing features that determine priority locations for FRR implementation. In turn, implementation challenges range from species selection, determination of type of intervention, procurement and oversight. Financing sustained FRR maintenance poses some of the most difficult funding and coordination challenges. Meanwhile, accounting for FRR outcomes also poses an equally complex undertaking. Recently, mangrove classification systems have undergone changes, with renewed mapping efforts expanding priority restoration areas. One major challenge is the widespread conversion of mangroves into fishponds throughout Indonesia's coastal regions, rendering many mangrove ecosystems unidentifiable. Often, the conversion is irreversible.

## Report findings and recommendations

Indonesia has made significant strides in prioritising and scaling up FRR in recent years. This study identified five policy challenges, and provided a set of strategic FRR recommendations for addressing them. The challenges include: i) Ensuring programme quality across large FRR area targets; ii) Regulatory complexity and uncertainty; iii) Siloed processes and coordination barriers; iv) Long-standing dilemmas on unequal access to land and natural resources for local communities; and v) Data management and monitoring systems and applications.

## 1. Towards improving FRR programme quality

Establishing the conditions for successful FRR requires careful consideration of local ecological and social contexts and coordination with various stakeholders, which are undermined by Indonesia's ambitious area targets that lack the necessary implementation measures to sustain them. Historical deforestation challenges and priorities for plantation reinvestment shaped initial forms of FRR. Since the early 2000s, ecosystem restoration priorities largely emerged out of climate policy interests. Peatlands and mangroves have hence gained the most FRR attention. Nevertheless, with rapidly increasing FRR targets, policymakers and implementers face dilemmas in allocating budgets and personnel to achieve sustained high-quality outcomes. FMUs were established to serve as site-level managers to support the continuity of programming and leverage local participation. However, regulatory interpretation relegates FMUs to a facilitation role, hampering their authority to carry out site planning and implementation.

To improve programme quality, there is a need for planning and financing mechanisms that support multi-level governance in support of site-level institutions for longer-term sustainability. Expanding area targets have increased the scope and importance of FRR, and high-level government prioritisation will likely remain high. Building upon and introducing proven planning mechanisms must reinforce accountability. Doing so requires empowering site-level institutional authority that can cultivate local support. FMUs were envisioned as such an institution but their roles have been limited with the passing of the Job Creation Law. Finding a way to refocus their mandates will help leverage financing mechanisms that yield higher restoration success rates.

## 2. Taking on complex regulatory issues

The policy landscape has undergone significant changes in terminology, mandates and tasks, resulting in uncertainty, a lack of trust and inadequate implementing regulations. This is true in three areas. The first is on social and environmental protection. While the Job Creation Law aimed to reduce bureaucratic inertia, civil society organisations have raised concerns over the dilution of regulatory safeguards. This has eroded trust in state institutions. Without the adequate means for consultation and participation, FRR institutions and policy goals will languish. Second, definitional issues have led to the inability to pursue restoration in conservation forests, indicating an overdue regulatory provision, especially in contexts of natural disasters in downstream areas. Third, there are competing regulations across FRR institutions on the way to work with local communities, particularly over cash incentives and continuous maintenance support. Given the rise of social forestry policy in Indonesia, there are strategic ways to strengthen local engagement and empower local institutions to support FRR sustainability. More broadly, disconnects and inconsistencies between policy priority and implementation approaches remain a key barrier.

Improving the regulatory environment directly corresponds to these three challenges, which can be done by establishing more supportive mechanisms, clarifying terminologies and integrating international best practice. This starts with synchronising terminologies and approaches, and aligning programmes with key zoning and land-use considerations. Such definitional issues have been especially complex in mangrove ecosystems. There is an opportunity to extend FRR initiatives into conservation forests like natural parks and nature reserves. There is precedent for doing so, but regulatory mechanisms are yet to be

formalised. Such a policy would improve engagement and continuity in ecosystem restoration approaches. More broadly, while synchronisation is essential, it should not be prescribed in such a way that stifles flexibility of implementation, particularly given the need to consider differentiation across Indonesia's local institutions and ecosystem types.

## 3. Improving coordination across siloed governing structures

FRR involves numerous institutions at different governing scales making coordination a challenge not only within ministries but also across agencies and institutions. Within MoEF, DGs are split between jurisdictional and thematic policy mandates. This fundamental distinction affects plans, budgets and implementation. It also creates clashes across programmatic targets and outputs. One of the clearest missed opportunities for FRR revolves around the continued disconnect with increasing attention to social forestry. As social forestry aims to empower local livelihoods and conservation outcomes, there are natural synergies for FRR policy and practice. Beyond MoEF, FRR takes place with minimal coordination across agencies. This is especially evident in recent mangrove restoration programmes, whereby links between central and local government agencies remain weak, and by extension, opportunities to partner with local communities are underdeveloped.

Addressing coordination challenges is a fundamental prerequisite for FRR best practice and new precedent is needed for establishing better partnerships and accountability. Within MoEF, the convergence between social forestry and FRR represents an immense opportunity to leverage funds in support of local livelihoods and FRR sustainability. However, this will require overcoming deeply rooted differences between jurisdictional agencies pursuing mandates over forest zones versus agencies driven by a thematic mandate (e.g. social forestry). Resolving competing interpretations of mandates will not only address overlaps in funding, it can also help to leverage more supportive approaches to community engagement. Rapidly scaling-up mangrove restoration initiatives through PEN has forced agencies to revisit coordination mechanisms and learn valuable lessons on the importance of partnerships that move beyond the planting phase. A key next step is institutionalising these lessons. There is a clear need for establishing working groups and other mechanisms at different levels to provide adequate space and incentives for local governments and civil society to shape planning and implementation.

## 4. Reforming land governance through local participation and empowerment

FRR implementation fundamentally suffers from the legacy of state and corporate land and natural resource enclosures and development programming established long before Indonesia became an independent state. This legacy continues to underpin land administration conflicts, which are among the most contentious and intractable issues in Indonesia. Conflicts persist in the many overlapping land designations and claims, and dispossession often ensues in attempts at resolution.

Any FRR initiative operates within existing and complex land tenure arrangements and institutions. But fortunately, there is an unprecedented number of regulatory mechanisms for recognising and empowering Indigenous and local communities and institutions. FRR interventions will likely falter unless efforts are made to support local livelihoods and incentivise continued FRR maintenance. Although this report has not introduced detailed local case studies, national-level proponents are forthright about the lack of community

involvement in FRR implementation. This was especially true in the PEN mangrove cash-incentive replanting initiatives. Going forward, key policy proponents seem open to pursuing more sustainable outcomes by establishing better relations and local support mechanisms through social forestry policy, customary forests and land-rights recognition initiatives, village development planning and agrarian reform efforts. Depending on the local context, close coordination will be needed with local village and forest management institutions, farmer groups, and customary communities.

## 5. Improving data management approaches and systems

Finally, data management and monitoring play a crucial role in identifying degraded lands, selecting FRR sites and monitoring the extent of achievement indicators. There have been various breakthroughs in recent years on the delineation and classification of degraded lands and watersheds across different ecosystem types. Efforts to consolidate maps and improve transparency and accessibility of data through the One Map Policy have evolved into encouraging developments for FRR implementation, evident from the applications of One Map Mangrove. When applied as a monitoring tool, however, data management systems are often relegated to simplified indicators around achieving canopy cover and hectarage targets.

Much remains to be done to develop databases and technological data monitoring applications. Indeed, a system that consolidates all FRR initiatives should be established and serve as the locus of monitoring and evaluation policy and practice. In addition, while biophysical indicators have become increasingly sophisticated through the usage and applications of satellite imagery, more attention needs to be paid to the development of indicators around community benefits.

# 1. Introduction

## 1.1 Conceptualising Forest Rehabilitation and Restoration

### 1.1.1 Growing interest in a global solution

With the increasing urgency of the climate crisis, all solutions to reduce greenhouse gas emissions are becoming increasingly fundamental. One of the cornerstones of climate mitigation solutions is to protect forests and curb land-use change. Forest loss and deterioration of carbon-rich ecosystems are responsible for significant global greenhouse gas emissions. Land Use, Land-use Change and Forestry (LULUCF) accounts for nearly 5% of global emissions worldwide (WRI CAIT, 2017). The implications of deforestation go beyond emissions. Biodiversity loss is taking place at unprecedented rates, with numerous species at risk of extinction in the near term. Dramatic ecosystem changes are also linked to water pollution and scarcity, with direct implications for food security. Meanwhile, forest rehabilitation[1] and restoration[2] (FRR) suggest a multiple-win solution with the potential for enhancing carbon storage and sinks, protecting biodiversity, and meeting development objectives (Lewis et al. 2019;Veldman et al. 2019).

There is significant global support for tree planting as a strategic climate mitigation solution. In 2021 alone, billions of trees were planted around the world, as governments, NGOs, private companies, and other interest groups engaged in tree planting as a way to mitigate climate emissions, support livelihoods and restore the environment (Einhorn 2022). Nevertheless, poor FRR implementation has also led to unintended consequences.

> *"The IPCC suggests that boosting the total area of the world's forests, woodlands, and woody savannahs could store around one quarter of the atmospheric carbon necessary to limit global warming to 1.5°C above pre-industrial levels. In the near term, this means adding up to 24 million ha (Mha) of forest yearly from now until 2030."* - Lewis et al. (2019: 25–26).

### 1.1.2 FRR Dilemmas

The critiques and dilemmas faced by FRR can be summarised along the four main issues below:

1. **Trees for monoculture and plantation profit, with perverse incentives:** Lewis et al. (2019) show that although there is a sharp increase in actors interested in reforestation, close to half of these initiatives are slated for commercial monoculture plantation development, raising questions about intent and longer-term sustainability. Ambitious targets to plant trees are also vulnerable to co-optation and corruption due to the large

[1] Rehabilitation refers to efforts to restore, maintain, and improve the functions of forests and lands to increase their productivity and role in maintaining life support systems.
[2] Restoration refers to efforts that support biotic elements (flora and fauna) and abiotic elements (soil, climate, topography)

funds associated with them, which also tend to focus on planting over maintenance (Duguma et al. 2020).

2. **Good trees in one place are not necessarily good elsewhere:** In its native Australia, Eucalyptus supports habitats and surrounding ecological functions. This is not necessarily the case when transplanted elsewhere. As the tree has become one of the most popular species of fast-growing timber and pulp production around the world, research shows it can become a problematic invasive resulting in negative ecological impacts and is also prone to fire. Ecosystem protection and natural regrowth are shown to be much more efficient at storing carbon over tree planting campaigns (Fleischman et al. 2020). Indeed, in some instances, tree planting campaigns can lead to atmospheric warming, decreased water availability, and in grasslands and savannah, can have destructive impacts on biodiversity.
3. **FRR as grounds for dispossession and exclusion:** FRR initiatives can make local communities more vulnerable and lead to loss of livelihoods, especially for those that do not have strong tenure rights to land. Initiatives can also undermine local rights and disrupt long-standing Indigenous and other forms of local stewardship. Afforestation initiatives have been shown to dispossess pastoralists (Ramprasad and Joglekar 2020), while other green initiatives can result in land grabbing processes (Fairhead, Leach, and Scoones 2012).
4. **Trade-offs with emissions in other sectors:** One area of research has also examined the benefits of tree planting relative to investments in other sectors. When evaluated against the potential emissions reductions from switching to other building materials, such as the use of cement at scale, there could be other more efficient ways to reduce LULUCF emissions other than pursuing tree planting campaigns (Appanah et al. 2016).

### 1.1.3. Forms and frameworks of FRR

Over time various approaches to FRR initiatives have developed. Usually the process begins by identifying “degraded” lands. Identifying degraded lands is an increasingly sophisticated process involving highly specialised remote sensing technologies. Nevertheless, “ground truthing,” through localised expertise remains a key feature of degraded land classification. Ground truths are especially important for contextualising FRR within local ecological systems and functions. This identification process is a fundamental prerequisite for project siting and benchmarking.

FRR implementation can be classified under four categories (Appanah et al. 2016). First is *natural regeneration*, which can be done through soil seed banks, seedlings, stumps and roots, and seed dispersed from outside. A second approach is *plantations* in its various forms, including monoculture and multi-species management systems. A third is through *agroforestry*, such as home gardens and farm forests. A fourth is through *ecological restoration* efforts, which involves supporting functions of degraded ecosystems.

Research has attempted to develop guiding principles on what works in FRR initiatives. Broadly, the most successful initiatives are rooted in target indicators of biodiversity, landscapes, and livelihoods (Di Sacco et al. 2021). Best practice guiding principles begin with a primary focus on protecting existing forests, establishing multi-stakeholder arrangements that prioritise local and indigenous knowledge, improving biodiversity indicators, and targeted site- and species-selection mechanisms, all with adequate capacity

development. Successful projects tend to build in processes that adapt and learn, and eventually provide pathways for cost recovery. One key paradigm shift required of conventional FRR is the need to move away from simplistic tree planting solutions in favour of addressing a complex climate problem. This requires a focus on incentivising and supporting existing local and Indigenous systems to protect natural resources as a climate solution (Fleischman et al. 2020).

The more dynamic FRR frameworks that support natural ecosystems as climate solutions have emerged out of a growing awareness and attention to integrated landscape governance, particularly those that prioritise the importance of community participation. Increasing attention of landscape governance to multistakeholder engagement will be more successful than top down approaches that undermine local institutions (Colfer and Pfund 2011). Nevertheless, most FRR in the Asia-Pacific are project-driven initiatives for fast-growing plantations of exotic timber species even though FAO's assessment shows that successes "are overwhelmingly with the countries which have provided the appropriate policies for people's participation" (Appanah et al. 2016).

### 1.1.4. Situating global FRR initiatives

In 2000, the Worldwide Fund for Nature (WWF) and the World Conservation Union (IUCN) began to promote a more deliberate landscape approach to restoration entitled Forest Landscape Restoration to address social and ecological concerns. This was also a move to situate landscape approaches within international agreements, including the Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change (UNFCCC), and others, which led to the Global Partnership on Forest and Landscape Restoration (GPFLR). GPFLR also helped catalyse the Bonn Challenge, an initiative aimed at restoring 150 million ha of deforested and degraded land, which has since been updated in the New York Declaration on Forests and bolstered by the UN Decade on Ecosystem Restoration. FAO also initiated a 'Forest and Landscape Restoration Mechanism' in 2014 to support national efforts (Appanah et al. 2016). Article 6 of the Paris Agreement also explicitly cites the important role of FRR.

**Table 1.1. Estimates of Degraded Land Area in Selected Southeast Asian Countries as Potential Sites for FRR**

| Country | Degraded Land (000 ha) | Percent Land Area (%) | Area for FRR (000 ha) |
|---|---|---|---|
| Cambodia | 2,600 | 15 | No report |
| Indonesia | 14,000 | 30 | 47,000 |
| Lao PDR | 8,700 | 36 | 8,700 |
| Malaysia | 1,200 | 4 | No report |
| Philippines | 9,300 | 31 | 5,500 |

| Country | Degraded Land (000 ha) | Percent Land Area (%) | Area for FRR (000 ha) |
|---|---|---|---|
| Thailand | 2,300 | 4 | 2,306 |
| Viet Nam | 9,700 | 30 | 5,000 |

Source: Lamb (2011), Glimour et.al. (2000)

REDD+ has also played an important part in guiding FRR initiatives. The private sector is eager to establish and innovate various restoration initiatives. In Indonesia most REDD+ focuses on peatlands, but in 2020 the importance of mangroves as effective carbon sinks have also stimulated interest. Given the emerging policy focus on rehabilitating degraded mangroves, developing plans to do so will feature prominently in this report.

## 1.2. FRR in the Indonesian Context

Indonesia is the third-largest tropical forest country in the world after Brazil and Congo. With various unique forest types, its ecosystems range from lowland Dipterocarp forests in Sumatra and Kalimantan, lowland non-Dipterocarp forests in Papua, savannahs in Nusa Tenggara (FWI, 2001), the fourth largest tropical peatlands ecosystems, and the largest remaining mangrove areas in state forest zones in the world (Donato et al., 2011; Alongi, 2015). All these forest ecosystems, especially peatlands and mangroves, serve as important carbon sinks. Their conversion and loss would result in significant greenhouse gas emissions. Therefore, climate change mitigation in Indonesia is pursued through FRR in three broad categories: drylands, peatlands, and mangroves.

### 1.2.1. Indonesian deforestation

Indonesia's forests have undergone immense change in the past 70 years. In 1950 dense forests covered 162 million ha, or 84% of its total land area (FWI, 2001). Deforestation and land degradation in Indonesia have since been caused by various factors. Between 1950 and 1975, the expansion of agricultural areas and plantations initiated a transformation of Java's forests (Nawir & Rumboko, 2007). Subsequently, Law No. 5 of 1967, which regulates the granting of Forest Concession Rights outside Java (Suhardi et al., 2007) increased logging activity and resulted in profound deforestation from the 1970s–1990s (Tacconi et al., 2019). This period accounted for the loss of 64 million ha in just 20 years (Simon, 2004). In 1970, FAO estimated that the rate of deforestation in Indonesia reached 300,000 ha/year, which then increased threefold in the 1980–1986 period to 900,000 ha/year, resulting from government-driven plantation expansion initiatives and labour relocation through transmigration programmes (Boenjamin, 1991).

By the late 1990s, political turmoil and the reconstitution of Indonesia's political system under the framework of regional autonomy led to significant forest losses and land-use change. Decentralisation and democratic reforms initiated further exploitation of Indonesia's forests due to a run on resources unchecked by a lack of legal frameworks and enforcement mechanisms (Ribot and Larson 2013; Barr et al. 2006). Land conversion and extractive practices were pronounced during political elections tied to patronage systems (Burgess et al. 2012). In the period 2001–2016, the encroachment of state forest zones for the

development of oil palm plantations was the largest contributor to deforestation (Austin et al., 2019). Oil palm plantations have caused a loss of 2.8 million ha of forest cover and contributed 23% to national deforestation (Austin et al., 2019), especially in peatland ecosystems. Oil palm plantations on peatlands increased from 700,000 ha in 2000 to 2 million ha in 2014 (Uda et al., 2017)

In parallel, large-scale aquaculture development – initially influenced by high prices during the Asian Financial crisis – began to expand significantly, transforming mangrove coastlines into fishponds (Ilman et al., 2016). The scale of this expansion is significant, as Indonesia in 2018 became the second-largest aquaculture producer in the world. Through the development of both large-scale government-sponsored ponds and smallholder initiatives, mangrove forests declined across Indonesia (Mursyid et al., 2021), leading to a concerted national effort for protection, restoration, and rehabilitation.

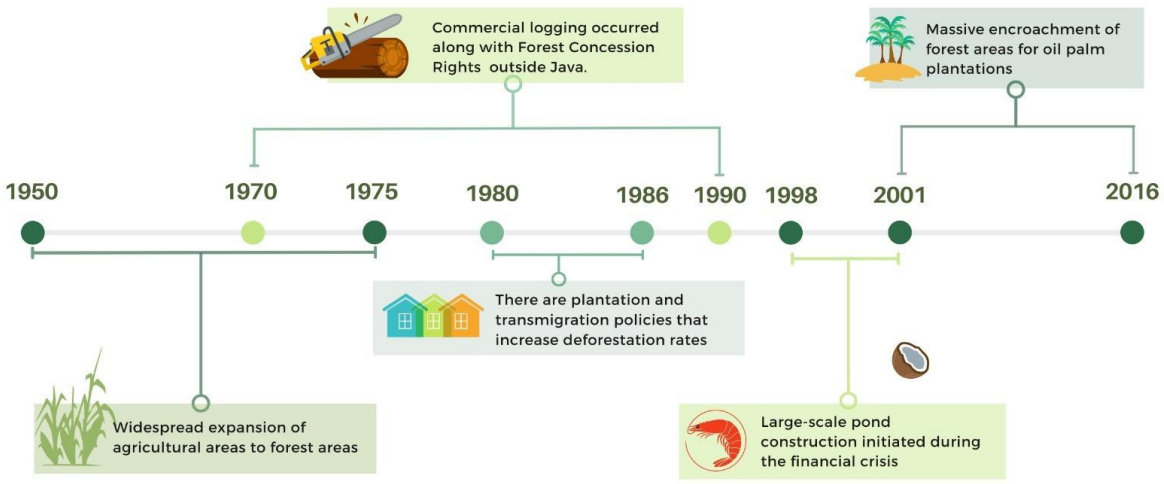


**Figure 1.1. Periodisation of the causes of deforestation and land degradation in Indonesia**

Nawir and contributors in Appanah et al. (2016) sum up the underlying causes and agents of deforestation as a combination of market and policy failures, and broader political economy dynamics. First, *market failures*, particularly the undervaluation of natural resources such as timber, and periods of abundant supply, created conditions of deforestation. Meanwhile *policy failures* related to: i) logging concessions and incentives, ii) misguided rehabilitation initiatives for concessionaires resulting in abandoned lands, iii) quick-fire tug of war on decentralisation, transmigration, and other supporting regulations led to widespread encroachment. Market and policy conditions provide contextual factors shaping deforestation and reforestation dynamics. Underlying these dynamics are the livelihoods and rural development contexts driven by the need for, and access to, land and natural resources.

Although Indonesia was responsible for the fastest rates of deforestation in the world by 2013 (Hansen et al. 2013), in 2019, pre-pandemic reports began to document declining rates compared to previous periods (Wijaya, Samadhi, and Juliane 2019). Differential impacts during the pandemic due to palm oil prices, mobility restrictions, and El Niño Southern Oscillation climatological variability patterns combine to result in further declines of deforestation (Jong, 2021).

### 1.2.2. Contextualising Indonesian FRR

As detailed further in subsequent chapters, FRR can take place in both state forest zones and non-forest zones. Given the legacy of land administration and the mandate of forestry institutions, much of FRR unsurprisingly takes place within the state forest zones. Indonesia's state forests cover an administrative area of 126 million forests. FRR targets most forest types, which will be discussed in detail in chapter 4 (see **figure 3.3** for geographic and area designations). Broadly speaking, although targeted at short term replanting initiatives, the Indonesian Government has implemented a large FRR programme. Between 1990 and 2013, about 6.2 million ha of degraded land were replanted at 270,000 ha per year (Nawir and Rumboko, 2007). Ambitious plans in 2002 aimed to scale up by targeting 11.6 million ha of degraded lands for rehabilitation (Kehutanan, 2011). Nevertheless, only 20% of rehabilitation efforts succeed, mostly due to poor maintenance (Boer, 2016). Indonesian FRR continues to grow in prominence for its role in potential climate mitigation, highlighting the importance of both policy and implementation approaches.

**Table 1.2. Extent of land cover types in Forest Zones and Non-Forest Zones in Indonesia (2019)**

| Land cover | State Forest Zones (in Millions of ha) | | | | | | | Non-Forest Zones | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| | Permanent Forest | | | | | HPK | Total | | | |
| | HK | HL | HPT | HP | Total | | | | | |
| **A. Forested** | 17.4 | 24 | 21.4 | 17.8 | 80.6 | 6.3 | 86.9 | 7.2 | 94.1 | 50.1 |
| Primary forest | 12.5 | 15.9 | 9.8 | 4.7 | 42.7 | 2.5 | 45.3 | 1.5 | 46.8 | 24.9 |
| Secondary forest | 4.8 | 7.8 | 11.3 | 9.7 | 33.6 | 3.7 | 37.3 | 4.9 | 42.2 | 22.5 |
| Plantation forest | 0.1 | 0.3 | 0.4 | 3.5 | 4.3 | 0.0c | 4.3 | 0.8 | 5.1 | 2.7 |
| **B. Non-forested** | **4.5** | 5.6 | 5.4 | 11.4 | 26.8 | 6.5 | 33.4 | 60.3 | 93.6 | 49.9 |
| Total Terrestrial Area | 21.9d | 29.6 | 26.8 | 29.2 | 107.4 | 12.8 | 120.3 | 67.5 | 187.8 | 100 |
| **% Forested Area** | 79.6 | 81 | 80 | 61 | 75 | 49.1 | 72.2 | 10.7 | 50.1 | |

Source: MoEF, 2020

HK: Conservation Forest
HL: Protection Forest

HPT: Limited Production Forest
HP: Production Forest
HPK: Convertible Production Forest

> *"Ambitious and Very Ambitious scenarios of reforestation activities in Indonesia can significantly contribute to its Nationally Determined Contribution in 2030 from forestry by reducing Indonesia BAU emissions by up to 17% to 35%."* – Basuki et al. 2022

## 1.3. Objective

The main objective of this report is to provide context over the complexity of FRR in Indonesia. We focus on historical and contemporary policy developments, institutional and legal frameworks, key definitions and approaches, and align our findings with international landscape restoration principles and best practices. The aim is to gauge the effectiveness of FRR in Indonesia and support Indonesian stakeholders to understand FRR in the context of broader forestry and land-use governance in Indonesia. The outcomes support the European Forest Institute (EFI) and the EU REDD Facility objectives in supporting Indonesia to meet its Nationally Determined Contribution (NDC) targets.

## 1.4. Methodology

This study applies a broad qualitative approach. Primary sources include interviews with key national level policy actors, select engagement with subnational agencies for case study materials, and involvement of other key actors, such as donors, NGOs, international and Indonesian academic institutions, and the private sector. Semi-structured interviews took place from February-March 2022. No formal questionnaires were used. Instead, questions were tailored to the main tasks and functions of each agency/institution. The list of key informants is presented in **Annex 1**. In addition, primary data collection involved attendance, facilitation, and convening from webinars related to FRR policies and institutions, which provided direct opportunities for data collection and observations.

Data collection relied mainly on primary sources obtained from policies, reports, strategy, and other documents, complemented by a far-reaching secondary data collection through literature reviews related to FRR policies, institutions, and case studies. For the primary documents, a targeted content analysis approach was applied involving two key steps. First, we selected the most relevant and up-to-date policy documents including the national constitution, laws, government regulations, presidential regulations, presidential decrees, ministerial regulations, ministerial decrees, memoranda of understanding, and other policy documents related to FRR. Second, we analysed documents by screening all statements relevant to our research that described clear formal duties and responsibilities. These legal documents were taken from the official government website (JDIH MoEF) or other trusted sites (e.g. *Hukum Online*). Lack of national data in official documents were further complemented by scientific literature and reports from credible institutions. The list of regulations analysed is presented in **Annex 2**.

# 2. Origins of forest restoration and rehabilitation in Indonesia

This report largely focuses on formal government agency initiatives, although we recognise the centrality of long-standing multi-generational stewardship of natural resources as a fundamental element of successful reforestation. As such, we do not engage on the rich literature on community-based natural resource management in Indonesia. In addition, we also begin our analysis with Indonesia's independence, although we recognise the foundational role and political economic legacy of colonial institutions.

## 2.1. The Old Order (1945–1966)

Upon Indonesian independence, the state began forest rehabilitation initiatives in 1955 (Nawir et al., 2007), and is one of the earliest pioneers of forest rehabilitation in the world (Oosten et al., 2014). The term forest rehabilitation first emerged in public at the Indonesian Forestry Congress I, which was held on 21–28 January 1956. At this Congress, the terms *reboisasi* and *penghijauan* were introduced and articulated in Indonesian parlance. *Reboisasi* was used at that time to refer to reforestation activities carried out in formerly forested areas (inside state forest zones), while *penghijauan* referred to afforestation activities on land not previously forested (outside state forest zone). During the Old Order, there was no national regulation or integrated programme on forest and land rehabilitation. A handful of projects involving international donor assistance helped to restore damaged watersheds and piloted restoration policy options (Oosten et al., 2014). In parallel, the Indonesian government began its earliest attempts at community forestry initiatives as a reforestation strategy, especially in Java (Suprapto, 2011). The development of community forests was prioritised on degraded and abandoned lands, with the main objective of increasing productivity and planting timber for community development (Suprapto, 2011).

## 2.2. New Order reforestation (1966–1998)

### 2.2.1. Reforestation in the Five-Year Development Plan (*Repelita*): Initiating *reboisasi* and *penghijauan* programmes

The New Order era in the forestry sector was marked by a significant shift in policy and practice through the promulgation of the Basic Forestry Law No. 5/1967. In this Law, forest rehabilitation was not explicitly regulated at the outset. However, forest and land rehabilitation and reforestation (*reboisasi* and *penghijauan*) entered the development planning agenda through the influential Five-Year Development Plan (*Repelita*). Reforestation initiatives were mainly sited in response to degraded lands in strategic watersheds connected to other development priorities.

In *Repelita* I (1968–1973), the achievements of reforestation programming reached 142,290 ha for *reboisasi* and 455,395 ha for *penghijauan*. *Reboisasi* and *penghijauan* increasingly gained government attention in Repelita II (1974–1979) with the issuance of Presidential Instruction (Inpres) No. 8/1976 concerning the *Penghijauan* and *Reboisasi* Assistance

Programme. The issuance of this Presidential Instruction was driven by the increasing incidence of degraded land in Indonesia, which reached 10.7 million ha in 1975 (Syam, 2003). This programme aimed to assist local governments to restore damaged forests and degraded land to become more productive again.

Locations targeted by the *Penghijauan* and *Reboisasi* Assistance Programme included Protection Forests (for *reboisasi*) and degraded lands (for *penghijauan*) deemed from a hydrological perspective as endangering watershed sustainability. The determination of nursery area, priority activity locations, and budget allocations were jointly determined by the Ministry of Home Affairs (MoHA), Ministry of Agriculture (MoA)[3], Ministry of Finance (MoF), and Ministry of National Development Planning (Bappenas). This process was very top down with no public participation. The *penghijauan* and *reboisasi* assistance programme used the State Revenue and Expenditure Budget (APBN) for distribution to provincial governments to procure seedlings and implement *reboisasi*, or to the district/municipal governments for *penghijauan*.

Funding for *penghijauan* and *reboisasi* was also provided to local communities directly involved in activities. In 1978–1979, the government targeted the procurement of seeds equivalent to at least 2,500 ha of nurseries, implementation of *penghijauan* of 300,000 ha, and implementation of *reboisasi* of 100,000 ha. The Presidential Instruction helped boost *reboisasi* in Repelita II. The achievements of *reboisasi* and *penghijauan* in Repelita II reached 437,699 ha and 437,194 ha, respectively (Government of Indonesia, 1998). The *reboisasi* and *penghijauan* activities in Repelita II were carried out in 23 provinces, with the largest area implemented in West Java. The reforestation activities involved local stakeholders through community forest initiatives, which also benefited by obtaining clearer land status.

In 1983, President Suharto issued Presidential Instruction (Inpres) No. 9/1983 concerning Assistance for *reboisasi* and *penghijauan*. In contrast to the previous Presidential Instruction, this one provided a mandate to adjust funding allocation systems in line with the needs of the region. In the 1983/1984 budget year, 87 billion rupiah (89.6 million USD)[4] was provided for *reboisasi* and *penghijauan* assistance. As a result, *reboisasi* and *penghijauan* in Repelita III achievements were the largest during the Soeharto presidency, reaching 529,484 ha and 1,568,729 ha, respectively. Details of New Order Era reforestation achievements are presented in **Figure 2.1** One shift that occurred in this period was the introduction and rise of Community Forestry (*Hutan Kemasyarakatan*), a key reforestation strategy in the Suharto era. This development began in Repelita III (1978) and succeeded in establishing 910,000 ha of community forest over the next 20 years, thereafter, paving the way for future social forestry expansion.

[3] At that time, Forestry was still under the purview of MoA
[4] This conversion is based on an exchange rate from 1983, whereby 1 USD = 970 IDR

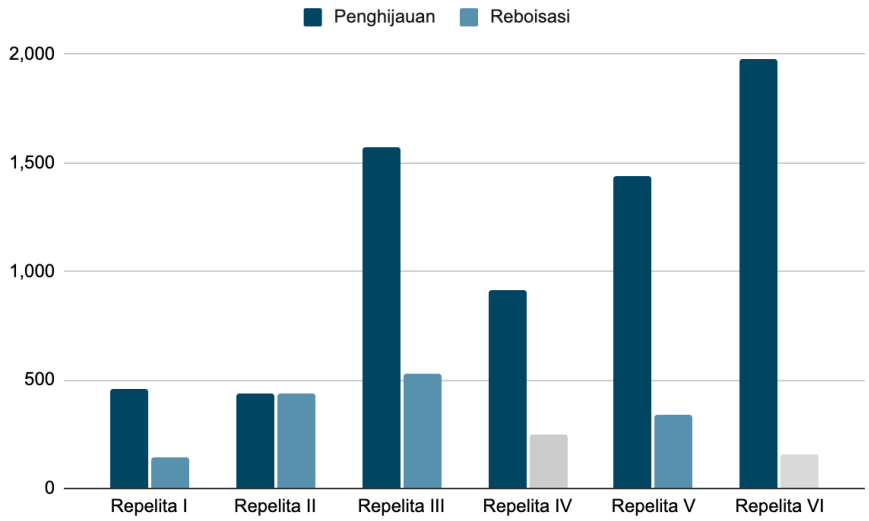


**Figure 2.1. Total area reforestation (*Reboisasi* and *Penghijauan*) during the New Order**

### 2.2.2. Reboisasi funds

President Soeharto issued Presidential Decree No. 35/1980 to provide a Reboisasi Guarantee Fund (DJR) to the *reboisasi* and *penghijauan* programmes. This policy aimed to address widespread deforestation driven by excessive logging (Tacconi et al., 2019) by Forest Concession Rights (HPH) holders outside Java between the 1970s and 1990s (Suhardi et al., 2007). For every cubic metre of wood produced, HPH holders were required to pay the fund. The fund would reimburse the HPH holder if field inspections revealed confirmation of reforestation within logged-over HPH concession sites. However, the fees were used to fund *reboisasi* implementation if the terms of the DJR were not met. Because natural resources were more profitable, most HPHs only paid the fund during the nine-year implementation period, neglecting implementation on their concessions. The high amount of funds gathered by the government demonstrates this. Concessions brought in a total of 614 billion rupiah (333 million USD) for the DJR Fund. Meanwhile, *reboisasi* funds only amounted to 54 billion rupiah (29 million USD).

The funds were returned to HPH who implemented *Reboisasi.* Part of the funds were used to finance the development of industrial forest plantations. In 1989, the Fund was revoked and replaced with a *Reboisasi* Fund regulated through Presidential Decree No. 31/1989. This Fund was collected from parties who directly utilised timber forest products such as Forest Concession Rights holders, Forest Harvest Rights holders (*hak pemungutan hasil hutan*), and Timber Utilisation Permits holders (*izin pemanfaatan kayu*). The key difference with the new Fund is that it became non-refundable. This Fund aimed to finance *reboisasi* activities outside of forest concessions, with aims to develop industrial forest plantations and rehabilitate strategic areas determined by the Ministry of Forestry. Fund collection did not negate the obligation of Forest Concession Rights holders to maintain and regenerate forests. Rather, the Fund aimed to support industrial forest plantation productivity, which became the main strategy for rehabilitation of non-productive forest zones.

In Government Regulation No. 7/1990 on Concession Rights for Industrial Plantation Forests, Forest Plantation Rights could only be granted to permanent non-productive forest zones[5], but in practice Forest Plantation Rights were often found on productive forest lands due to the rapidly growing demand for forest products (FWI, 2001). This occurred due to the increasing government priority for plantation development. Plantation forests were considered an indispensable supplier of wood, provided raw materials for pulp, paper, and fibre, as well as other forest products fundamental to Indonesia's foreign exchange (Wardojo, 2021). Nevertheless, the characteristics of plantation and natural forests are very different and served as the origins of an ongoing debate about plantation development policies in Indonesian state forests. Many continue to point to plantation development as the cause of deforestation, but there is a coalition that advocates for plantation development as a strategy for avoided deforestation in previously cleared areas (Gaveau et al., 2016).

President Megawati's presidency would later restructure the *reboisasi* funding scheme through Government Regulation No. 35/2002, shifting authority to the Ministry of Finance (MoF). The basis for determining *Reboisasi* Funds did not only evaluate cubic metres of felled trees but required attention to the silvicultural system of the holder of the Timber Forest Product Utilisation Business Permit (IUPHHK). In the Selective Harvest and Planting Industry (TPTI) silvicultural system, *Reboisasi* Funds were applied to annual cutting blocks with a minimum diameter of 40 cm for wetland production forest, a minimum diameter of 50 cm for production forest, and a minimum diameter of 60 cm for limited production forest. While in the silvicultural system of Clear Cutting Artificial Regeneration (THPB), payments were imposed on trees with a diameter of 10 cm and above. The *Reboisasi* Fund deposit would then be divided by 40% for producing regions (districts/municipalities) and 60% for the central government. The province coordinated proposals for forest and land rehabilitation activities annually from each district/city for access to the *Reboisasi* Fund. Meanwhile, *Reboisasi* funds that go to the central government were allocated to finance the rehabilitation of forests and land outside areas where *Reboisasi* funds were collected. This regulation was later repealed in 2021 and replaced by Government Regulation No. 23/2021, a derivative of the Job Creation Law, which will be discussed in section 3.5.3.

## 2.3. Reforestation in the *Reformasi* era (1998–2014)

### 2.3.1. Forest rehabilitation and "reclamation" in the new Basic Forestry Law

The *reformasi* era significantly reformulated the forestry sector chiefly guided by the issuance of the Basic Forestry Law No. 41/1999, replacing Law No. 5/1967. For the first time, the new Basic Forestry Law explicitly included language to regulate forest rehabilitation and reclamation. Rehabilitation and reclamation have the same goal, namely ecosystem restoration. The new approach aimed to restore, maintain, and improve forest and land functions so that their carrying capacity, productivity, and role in supporting life support systems.

[5] Non-productive forests at that time were characterised by land classification indicators based on vegetation dominated by shrubs, 'vacant' land, and mixed gardens

Initiatives previously described as *Reboisasi* and *Penghijauan* were thereafter placed under the broader category of forest and land rehabilitation (*Rehabilitasi Hutan dan Lahan*/RHL). Like before, *reboisasi* activities continued to apply in state forest zones, while *penghijauan* activities referred to areas outside state forest zones. FRR prioritised degraded land, especially in upstream parts of the watershed especially for flood and drought prevention. Such rehabilitation initiatives were not limited to drylands, but also included mangrove ecosystems. In addition to rehabilitation, the new Basic Forestry Law also regulated reclamation as an effort to repair or restore damaged vegetation according to their land-use designations. Reclamation targeted damaged forest zones marked by changes in surface and land cover (for more details see chapter 3.2).

### 2.3.2. The birth of ecosystem restoration in Production Forests

In 2002 under President Megawati, the Forestry Ministry introduced a new course for Indonesia's forestry development for the next two decades under the theme: "Conservation-Restoration-Rehabilitation of Indonesian Forests." Rehabilitation and restoration occupied centre stage of programming given the extent and severity of damaged forests at that time. In 2001, nearly 24 million ha of forests were recorded as heavily damaged, especially in production forest zones (Wardojo, 2021). The development of industrial forest plantations became the main strategy for rehabilitation. However, this strategy was considered to pay less attention to forest biodiversity while prioritising fast-growing species compared to native/indigenous species.

> *"Rehabilitation does not pay attention to native/indigenous species, and has encouraged the introduction of invasive species. Unsurprisingly, the priority has always been fast-growing species. Restoration efforts must distinguish between overall rehabilitation needs and those that need to be rehabilitated with fast-growing species."* – Secretary General of the Ministry of Forestry 2001–2005.

The concept of ecosystem restoration aimed to pay more attention to forest biodiversity and local ecology. However, the term "ecosystem restoration" was not stated in the Basic Forestry Law, so there was no clear legal umbrella for implementation at that time. The Ministry of Forestry requested special consideration of this issue to the Supreme Court for the issuance of a regulation on ecosystem restoration. Considered aligned with the philosophy of the Basic Forestry Law, the Supreme Court gave the green light to issue a Ministerial Regulation on ecosystem restoration, with the condition that the terminology "forest restoration" appear in a higher order regulation (Government Regulation) within a maximum of five years after ratifying the Ministerial Regulation. The term ecosystem restoration was then officially adopted by the Government of Indonesia in 2004.[6]

[6] MoEF Regulation No. 159/2004 (amended by Minister of Forestry Regulation No. 61/2008) concerning Ecosystem Restoration in Production Forests and appeared in Government Regulation No. 6/2007 j.o. Government Regulation No. 3/2008. According to this regulation, ecosystem restoration can apply in production forests in productive, less productive, or unproductive conditions.

At the outset, ecosystem restoration focused on Kalimantan and Sumatra because of the severity of damage in production forests. PT Restorasi Ekosistem Indonesia (PT REKI) applied for and received the first concession in Indonesia to hold a Timber Forest Product Utilisation Business Permit for Ecosystem Restoration (IUPHHK-RE) which was ratified through the Decree of the MoEF No. 293/2007 covering an area of 98,555 ha, located across the provinces of South Sumatra and Jambi (Hutan Harapan, 2021).

**PT REKI ecosystem restoration**

*"As a concessionaire, PT REKI's ecosystem restoration operations are determined by the extent of forest damage/degradation. Areas that are heavily degraded apply a restoration approach by replanting damaged areas. This approach is much costlier, however, and has a lower success rate (20%) than natural succession. Therefore, in heavily degraded areas with residual stands of high economic value, only protection measures are taken. Meanwhile, in areas with moderate damage (for example, with shrubs and sparse woody plants with low economic value), the recovery effort applies species enrichment interventions. However, if there are species of high economic value in the area, then there is no need for enrichment, protection would be sufficient. Similarly, in areas with a low level of damage (e.g. no decrease in land cover and experiencing positive growth indicators), protection is sufficient. In general, PT REKI's recovery efforts focus on ecosystem protection and species enrichment to reduce degradation"* – Director of PT REKI

The National Movement for Forest and Land Rehabilitation Programme (known as the *Gerhan* Programme) began in 2003 with targets of planting 3 million ha within 5 years. This programme emerged out of advocacy from international NGOs including as WWF, AOI, and FORINA to address the extent of degraded lands in Indonesia (Rabiali et al., 2018). In 2000, degraded land was estimated at 23.2 million ha (Riyanto & Paimin, 2011) and Gerhan was envisioned as a catalyst to involve communities in forest rehabilitation. This programme involved multiple sectors spanning MoEF, MoA, Ministry of Social Welfare, and Ministry of Education (Suhardi et al., 2007). Gerhan initially received subsidies from the government, but the programme waned due to the absence of a clear approach (types, nurseries), premature planning, unmeasured targets, unprepared human resources, limited availability of seeds, ineffective institutions, and unclear monitoring mechanisms.

### 2.3.4. Restoration in Conservation Forests

Initially, the restoration concept only applied to production forests and not to conservation forests. This is because the restoration of ecosystems in conservation areas presumed natural mechanisms. However, increasing indicators of ecosystem damage identified in Conservation areas due to invasive species, raised the importance of restoration

interventions. Restoration in Conservation Forests were first regulated in 2011[7] and served as one strategy for restoring ecosystems. The birth of the restoration concept in Conservation Forests was intimately linked to a project by the Ministry of Forestry in partnership with the Japan International Cooperation Agency (JICA) that aimed to increase stakeholder capacity in restoring damaged ecosystems in Conservation areas (JICA, 2012). This project created a technical guideline for restoration in conservation areas and continues to be used today as a reference (Setio & Desriwan, 2020).

> Restoration in conservation forests can be carried out in the Rehabilitation Zone and Special Zones in National Parks, Nature Reserves, Wildlife Sanctuaries, Large Forest Parks, and Nature Tourism Parks. Furthermore, a survey will be conducted on the distance of the nursery to the prospective restoration site, topography, soil layer, vegetation on the forest floor, dry season period, social conflict and local wisdom to determine priority locations for restoration activities.

### 2.3.5. The emergence of carbon and climate mitigation in the SBY Era

During President SBY's leadership (2004–2014), climate change and forests received renewed global concern. In this period, numerous international events discussed not only the role forests play in mitigating greenhouse gas emissions, but focused on the significant emissions and sequestration potential inherent in Indonesia's peatlands. The government published the National Action Plan for Greenhouse Gases as a reference for formulating policies related to climate change in the forestry, agriculture, and energy sectors (Indrarto et al., 2013). This policy was released ahead of the 2007 UNFCCC COP 13 hosted by the Indonesian government on the island of Bali. COP 13 in Bali was especially poignant as one of the first concrete articulations of the Reducing Emissions from Deforestation and Forest Degradation (REDD) scheme. The National Development Plan also began to document and set targets in governing Indonesia's Response to Climate Change (Bappenas, 2014). In 2009, Bappenas developed a Climate Change Sectoral Roadmap to be integrated into the Medium-Term Development Plan (RPJMN) 2010–2014 and issued guidance to subnational governments (Bappenas, 2014).

At the 2009 G20 meeting, Indonesia declared for the first time its commitment to reducing GHG emissions by 26% in 2020 and 41% by 2020. Of the 26% target, the forestry sector was given the largest responsibility for meeting emissions reductions (14%), while the rest (12%) would come from other sectors. Rehabilitation and restoration were considered to be the cheapest and easiest approach to reduce emissions, especially through interests in developing REDD+ projects. Indonesia's Second National Communication to the UNFCCC stated that increasing carbon stocks from the forestry sector can be achieved in two ways: forest and land rehabilitation through reboisasi and penghijauan, and restoration of production forests through enrichment (Ministry of Environment, 2010).

[7] Government Regulation No. 28/2011 concerning the Management of Nature Reserves and Nature Conservation Areas

# 3. Current FRR legal and institutional frameworks

## 3.1. FRR in the Jokowi era

Since the beginning of Joko Widodo's (popularly, Jokowi) election as president, global concern on the climate crisis increased around the 2015 UNFCCC COP 21 in Paris. The resultant Paris Agreement required all UNFCCC member countries to set emission reduction targets, which Indonesia domestically ratified in 2016[8]. In the first period, Indonesia set Nationally Determined Contribution (NDC) targets of 29% through its own efforts, and 41% with international cooperation. The forestry sector remained the backbone of achieving these goals, translating to 59.6% of the NDC under the unconditional target, and 60.5% under the conditional target.

Climate change mitigation initiatives initially focused on peatlands because of the high carbon stocks located there, as well as the destructive fire and haze events associated with those landscapes. Indonesia has the largest tropical peat ecosystems in the world, covering almost ten percent of Indonesia's land area (Uda et al., 2020). Peatlands have been drained, burnt, and converted to other uses, especially for oil palm plantations, agricultural land, and settlements (Gunarso et al., 2013; Miettinen et al., 2016). The government's attention to the restoration of peat ecosystems began in earnest in 2014[9]. Peat utilisation permit holders are required to restore peat ecosystems in damaged areas, one of which is through restoration initiatives.

The approach to peatland restoration aims to improve the overall hydrological condition, structure, and function of a peat ecosystem. However, the immediate aftermath of the Government Regulation prompted criticism as widespread forest and wildland fires burnt 2.6 million ha in 2015, of which 37% occurred on peatlands (BRG, 2019). The World Bank attributed state losses on account of the fires at 221 trillion rupiah (World Bank, 2016). Jokowi responded by revising Government Regulation No. 71/2014 by adopting Government Regulation No. 57/2016 and establishing the Peat Restoration Agency (BRG)[10] through Presidential Regulation No. 1/2016. Though linked with MoEF in terms of budgeting, the initial BRG was established as a new independent agency. At its founding, the Head and some of the Deputies came from civil society backgrounds. Initially, BRG's work emphasised issued penalties over violations in the form of administrative sanctions or freezing of environmental permits. It also updated the forest moratorium, postponing the issuance of any new permits on peatlands. Meanwhile, BRG establishment directed emergency and immediate action for seven priority provinces, namely Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan, and Papua. Over time, BRG's main task involved coordinating and facilitating peat restoration in these provinces. Meanwhile, the

[8] Through the issuance of Law No. 16/2016
[9] Government Regulation No. 71/2014 concerning the Protection and Management of Peat Ecosystems
[10] Replaced subsequently as the Peat and Mangrove Restoration Agency (Badan Restorasi Gambut dan Mangrove/BRGM)

Directorate of Peat Damage Control[11] at MoEF holds the authority for determining policy directives, compiling norms, standards, and procedures for the recovery of peat ecosystems.

The status of forest rehabilitation and restoration was hence scaled up to a National Priority[12], with a macro indicator of reducing greenhouse gas emissions. In addition to peatland ecosystems, scope was expanded to include mangrove ecosystems. However, mangrove ecosystems had not yet gained national prominence during the drafting of the 2020–2024 National Development Plan (which was compiled in 2019) due to the lack of mangrove data at that time.

In 2020, degraded mangrove ecosystems became a global area of concern for rehabilitation through discussions about blue carbon. The United Nations General Assembly set a mangrove restoration target of two billion ha worldwide through a commitment known as the UN Decade for Ecosystem Restoration 2021–2030. Therefore, efforts to improve mangrove ecosystems have risen in prominence in many countries, especially Indonesia. With the largest mangrove ecosystem areas in the world, Indonesia sees immense opportunity in contributing to global commitments in climate change mitigation (Mursyid et al., 2021). However, based on One Map Mangrove Indonesia 2013–2019, there were 637,624 ha of degraded mangroves from a total 3.31 million ha of estimated total mangrove area in Indonesia. These degraded mangroves were then used as a target for rehabilitation until 2024.

> *"MoEF has data on degraded mangroves in the 2013–2019 One Map Mangrove, amounting to approximately 637,000 ha. To obtain that data, MoEF must consult with experts, reviewed satellite images, conducted ground checks, etc. But in reality, monitoring and evaluation shows a much more complicated situation. For example, in our visit to Bangka Belitung, of a total 1,000 ha of degraded land, verification became very challenging as the degraded land was transformed into a fishpond."* – Interview with Deputy for Coordination of Environmental and Forestry Management, CM of Maritime Affairs and Investment.

Programmes target approximately 600,000 ha of mangrove areas for rehabilitation, which Jokowi commonly refers to in various international forums on the environment and climate change, including the 2021 COP 26 in Glasgow. The government has since added the mandate for mangrove rehabilitation into BRG stipulated through Presidential Regulation No. 120/2020. The newly named BRGM targets mangrove rehabilitation of 600,000 ha by 2024 in nine priority provinces: North Sumatra, Riau, Riau Islands, Bangka Belitung, West Kalimantan, East Kalimantan, North Kalimantan, Papua, and West Papua. BRGM is committed to involving local people in the implementation, because a key part of mangrove rehabilitation is revitalisation of local people's livelihoods. Mangrove rehabilitation also took centre stage at the G20 Summit hosted in Indonesia in November 2022, whereby the

[11] Under the Directorate General (DG) of Pollution and Environmental Damage Control
[12] 2020–2024 National Development Plan

Indonesian government featured mangrove rehabilitation as a climate mitigation showcase for G20 member leadership.

> *"In every major international forum on climate and the environment, the President always mentions Indonesia's plans for rehabilitating 600,000 ha by 2024. This is a very difficult task because it first requires mapping the mangrove areas that can be rehabilitated. There are issues around high costs of mangrove rehabilitation, clarity of land status, and emerging conflicts with local community-operated ponds and businesses"* – Deputy Environmental and Forestry Management Coordination of Maritime Affairs and Investment

Attention to mangrove ecosystems is also reflected in the formation of a coordinating team for wetland management involving multiple ministries, including the Ministry of National Development Planning (Bappenas), Ministry of Environment and Forestry (MoEF), Ministry of Marine Affairs and Fisheries (MoMAF), Ministry of Agrarian Affairs and Spatial Planning (MoASP), and Ministry of Villages (MoV). This wetland management coordination team was ratified through Decree of Bappenas No. 89/2020. This team was formed to support an integrated mangrove ecosystem database and design a mangrove management roadmap, which includes a mangrove rehabilitation plan. The government also involved the private sector through corporate responsibility programmes specific to mangrove rehabilitation (CM of Maritime Affairs and Investment, 2021).

FRR forms the backbone of Indonesia's FOLU Net Sink 2030 Operational Plan. Released in February 2022 the plan outlines targets and scenarios for land and forest-based sectors to absorb more carbon than they release. The Operational Plan also articulates how forest and land rehabilitation are divided into two schemes, namely rotational rehabilitation and non-rotational rehabilitation. RPJMN Non-rotational rehabilitation activities are guided by protection and rehabilitation directives, which take place in former Forest Concession Rights or Forest Plantations Rights areas, conservation areas, social forestry areas, and key restoration watersheds.

> *"The FOLU net sink is an attempt to make carbon sequestration values greater than emissions. Successful FRR is the backbone for realising this. FRR provides the largest contribution to the NDC. But doing this requires a lengthy process, so we must start now. The results will only become apparent in 2030, and even then, we won't necessarily see the results as pristine primary forests. If it succeeds in re-establishing or improving forest ecosystems, it has the potential to be calculated in reducing emissions"* – Directorate of Climate Change Mitigation, Director General of Climate Change, MoEF

### 3.1.1. FRR targets and achievements in Jokowi's first term (2014–2019)

In 2013, Indonesia classified 24.3 million ha of degraded land (divided into "degraded" and "highly degraded" categories). During Jokowi's first term, MoEF set an FRR target of 5.5 million ha, including 1.25 million ha to be completed between 2015 and 2018, and 500,000

ha in 2019. With minimal funding (only able to finance rehabilitation of 200,000 ha per year), the target of 5.5 million ha was far from being achieved. In 2019, the Government of Indonesia was only able to rehabilitate 1.18 million ha, as detailed in **Table 3.1**.

### Table 3.1. FRR planting areas in 34 watersheds in 2015–2019

| Land Area Type | Planting area (in Ha) | | | | |
|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 |
| Protection forest/conservation forest/protected area (*drylands*) | 10,508 | 7,067 | 19,482 | 25,170 | 206,000 |
| Mangrove forest/swamp/peat | 481 | 497 | 1,175 | 960 | 1,000 |
| Urban forestry development | 240 | 215 | 452 | - | - |
| Agroforestry | 7,624 | 13,416 | 15,875 | - | - |
| Land rehabilitation through community nurseries | 181,594 | 177,151 | 164,006 | 162,500 | 188,168 |
| Total | 200,447 | 198,346 | 200,990 | 188,630 | 395,168 |

Source: SOIFO, 2020

The above rehabilitation achievements have not included the regular planting by concessions or FMUs in production forests. At that time, this activity was not commonly called rehabilitation but only called planting because it was an obligation that had to be fulfilled after logging. However, in the FOLU Net Sink document released in 2022, this activity has since been included in the category of rotational rehabilitation. The area planted in production forest zones from 2015 to 2019 is presented in **Table 3.2**.

### Table 3.2. Area planted in production forest zones

| Year | Administrative category | | |
|---|---|---|---|
| | IUPHHK-HA | IUPHHK-HT | KPHP |
| 2015 | 181,052 | 333,298 | 940 |
| 2016 | 21,339 | 300,075 | 2,344 |

| Year | Administrative category | | |
|---|---|---|---|
| | IUPHHK-HA | IUPHHK-HT | KPHP |
| 2017 | 15,942 | 206,757 | 233 |
| 2018 | 20,865 | 240,743 | 2,424 |
| 2019 | 20,594 | 330,073 | 5,138 |
| Total | 259,792 | 1,410,946 | 11,079 |

Source: SOIFO, 2020

Definition:

- IUPHHK-HA: *Izin Usaha Pemanfaatan Hasil Hutan Kayu - Hutan Alam* (post-Job Creation Law called Forest Utilisation Business Permit - Natural Forest/PBPH-HA)
- IUPHHHK-HT: *Izin Usaha Pemanfaatan Hasil Hutan Kayu - Hutan Tanaman* (post-Job Creation Law called Forest Utilisation Business Permit - Plantation Forest/PBPH-HT)
- KPHP: *Kesatuan Pengelolaan Hutan Produksi* (Production Forest Management Unit)

Differing slightly from approaches in production forests or protection forests, conservation forests tend to use the concept of restoration. Restoration in conservation forests is often hindered by a lack of funding. The budget of DG KSDAE (with the jurisdictional mandate over conservation areas) is mostly allocated for conservation activities, not planting. Therefore, restoration in conservation areas is carried out in partnership with various stakeholders (see **Table 3.3**).

### Table 3.3. Partnerships in ecosystem restoration in conservation areas

| No. | Conservation area | Habitat type | Partner | Area of restored ecosystems |
|---|---|---|---|---|
| 1. | TN Gunung Leuser | Tropical rainforest | UNESCO, OIC | 870 |
| 2. | TN Bukit Barisan Selatan | Tropical rainforest | UNILA-PILI-OWT | 200 |
| 3. | TN Way Kambas | Tropical rainforest | Tropis Alert | 1,715 |
| 4. | CA Pulau Dua (Serang) | Mangrove | Wetlands International | 715 |

| No. | Conservation area | Habitat type | Partner | Area of restored ecosystems |
|---|---|---|---|---|
| 5. | TN Gunung Gede Pangrango | Tropical rainforest | Mitsubishi Corporation,<br>OISCA Sukabumi TC | 18 |
| 6. | TN Gunung Ciremai | Tropical rainforest | JICA-JICS | 7,728 |
| 7. | SM Paliyan | Karst | Mitsui Sumitomo<br>Insurance Ltd | 350 |
| 8. | Tahura Ngurah Rai | Mangrove | JICA | 250 |
| 9. | TN Gunung Palung | Tropical rainforest | Yayasan Asri | 37 |
| 10. | TN Sebangau | Peat | WWF | 688 |
| 11. | TN Manupeu Tanadaru Laiwangi<br>Wanggameti (TN Matalawa) | Tropical rainforest | JICA-JICS | 4,868 |

Source: SOIFO, 2020

### 3.1.2. FRR targets and achievements in President Jokowi's second term (2020-present)

A review of the degraded lands map is carried out every five years. After first being conducted in 2013, degraded land mapping was again undertaken in 2018. This second iteration determined that Indonesia has 14 million ha of "highly degraded" and "degraded" land. Highly degraded lands amount to an area of 4.55 million ha, while degraded lands cover an area of 9.45 million ha. The total area of degraded land is much reduced compared to 2013, which was evaluated at 24.3 million ha. Table 3.4 shows the overall distribution of degraded lands across all Indonesian land categories.

**Table 3.4. Distribution of degraded land in Indonesia in 2018**

| No. | Province | Land area | | |
|---|---|---|---|---|
| | | Highly Degraded | Degraded | Total |
| 1 | Aceh | 190,399 | 126,238 | 316,637 |
| 2 | Sumatera Utara | 502,280 | 836,530 | 1,338,810 |

| No. | Province | Land area | | |
|---|---|---|---|---|
| | | Highly Degraded | Degraded | Total |
| 3 | Sumatera Barat | 477,221 | 174,748 | 651,970 |
| 4 | Riau | 275,164 | 435,709 | 710,873 |
| 5 | Jambi | 102,130 | 111,855 | 213,985 |
| 6 | Sumatera Selatan | 130,818 | 602,938 | 733,756 |
| 7 | Bengkulu | 28,289 | 120,598 | 148,887 |
| 8 | Lampung | 21,977 | 381,933 | 403,910 |
| 9 | Kep. Bangka Belitung | 261 | 20,426 | 20,687 |
| 10 | Kep. Riau | 3,961 | 4,269 | 8,230 |
| 11 | DKI Jakarta | - | - | - |
| 12 | Jawa Barat | 679,748 | 231,445 | 911,192 |
| 13 | Jawa Tengah | 217,359 | 158,374 | 375,733 |
| 14 | Di Yogyakarta | 790 | 78,333 | 79,123 |
| 15 | Jawa Timur | 345,289 | 86,937 | 432,225 |
| 16 | Banten | 94,083 | 23,6325 | 330,407 |
| 17 | Bali | 2,284 | 44,611 | 46,895 |
| 18 | Nusa Tenggara Barat | 10,641 | 55,158 | 65,799 |
| 19 | Nusa Tenggara Timur | 9,585 | 83,1330 | 840,914 |
| 20 | Kalimantan Barat | 19,090 | 99,6541 | 1,015,631 |
| 21 | Kalimantan Tengah | 92,484 | 76,8756 | 861,240 |
| 22 | Kalimantan Selatan | 225,135 | 28,6459 | 511,594 |
| 23 | Kalimantan Timur | 118,433 | 15,6839 | 275,272 |
| 24 | Kalimantan Utara | 36,214 | 16,3520 | 199,734 |
| 25 | Sulawesi Utara | 92,034 | 19,7748 | 289,782 |
| 26 | Sulawesi Tengah | 100,569 | 16,4305 | 264,874 |

| No. | Province | Land area | | |
|---|---|---|---|---|
| | | Highly Degraded | Degraded | Total |
| 27 | Sulawesi Selatan | 294,019 | 15,5587 | 449,606 |
| 28 | Sulawesi Tenggara | 15,031 | 40,9624 | 424,655 |
| 29 | Gorontalo | 258,855 | 73,443 | 332,298 |
| 30 | Sulawesi Barat | 14,336 | 74,085 | 88,421 |
| 31 | Maluku | 30 | 29,9577 | 299,607 |
| 32 | Maluku Utara | 14,949 | 37,2940 | 387,889 |
| 33 | Papua Barat | 9,784 | 42,7504 | 437,288 |
| 34 | Papua | 16,9481 | 36,9042 | 538,523 |
| 35 | Indonesia | 4,552,721 | 9,453,729 | 14,006,450 |

Source: Central Agency on Statistics, 2019

FRR is designated a priority in the 2020–2024 Medium-Term Development Plan (RPJMN). Priority projects are divided into three themes, namely i) vegetation forest and land rehabilitation, ii) civil-technical forest and land rehabilitation, and iii) planting/enrichment of production forests. FRR is also planned for the new construction of Indonesia's Capital in East Kalimantan, with targets of 1,500 ha by 2024. For mangrove rehabilitation in particular, MoEF and MoMAF target rehabilitation of 50,000 ha by 2024. For peat restoration, MoEF targets 1.5 million ha in seven provinces prone to forest fires.

### Table 3.5. FRR targets in the 2020–2024 RPJMN

| Project | Indicator | Target Indicator (In Ha) | | | | | Location | Implementing Agency |
|---|---|---|---|---|---|---|---|---|
| | | 2020 | 2021 | 2022 | 2023 | 2024 | | |
| Vegetation forest and land rehabilitation | Area of forest and rehabilitated land (ha) | 56,000 | 40,000 | 30,000 | 25,000 | 20,000 | 33 provinces | MoEF |
| Technical civil engineering forest and land Rehabilitatio | No. of technical civil rehabilitation structures built (units) | 3,000 | 5,000 | 5,000 | 5,000 | 5,000 | 33 provinces | MoEF |

| Project | Indicator | Target Indicator (In Ha) | | | | | Location | Implementing Agency |
|---|---|---|---|---|---|---|---|---|
| | | 2020 | 2021 | 2022 | 2023 | 2024 | | |
| n | | | | | | | | |
| Planting/enrichment in production forest | Planted area in production forest (ha) | 310,000 | 378,000 | 403,000 | 428,000 | 453,000 | 33 provinces | MoEF |
| Mangrove Rehabilitation | | 5,000 | 1,250 | 1,250 | 1,250 | 1,250 | Dispersed | 7,500 Ha by MoEF; 42,500 ha by MoMAF, local Gov, community, private sector |
| Peat Restoration | Area of peat ecosystem coordinated and facilitated by peat restoration in 7 provinces prone to forest fires (ha) | 300,000 | 300,000 | 300,000 | 300,000 | 300,000 | 7 provinces | MoEF |
| Forest rehabilitation in the IKN area | Area of Ecosystem Recovery in the Bukit Soeharto Tahura Conservation Area (which is the location of IKN) (ha) | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | East Kalimantan | MoEF |

Source: RPJMN 2020–2024

The FOLU Net Sink document was designed to achieve Indonesia's emissions reduction target by 2030. Priority locations for the implementation of non-rotational rehabilitation are based on degraded land and priority watersheds of 688,000 ha (see **Table 3.6**).

## Table 3.6. Priority non-rotational rehabilitation on degraded lands and watershed restoration initiatives

| Province | Production FMU | | | | | Non-social forestry permit in protected FMU | Social forestry permit in protected FMU | Conservation | Non-Forest Zones | | Total (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Non-Concession | Business permit for plantation forest utilisation | Business permit for natural forest utilisation | Business permit for natural ecosystem restoration | Social forestry | | | | Non-cultivation rights | Culti-vation rights | |
| Bengkulu | | | | | | 2,850 | 14,665 | | 450 | | 17,965 |
| Jambi | 473 | 20,429 | | 8,767 | 4,750 | | | 1,449 | 66 | | 35,934 |
| West Kalimantan | 15,097 | 6,489 | | | 2,502 | | | 1,589 | 726 | 882 | 27,285 |
| South Kalimantan | 5,275 | 1,097 | | | 97 | 189 | | | 1 | | 6,658 |
| Central Kalimantan | 21,007 | 2,325 | | 110 | 22,663 | 98 | | 27,827 | 2,140 | 722 | 76,891 |
| East Kalimantan | 5,870 | 19,209 | 49 | | 8 | 4,402 | 1,057 | 54,967 | 6,599 | 1,033 | 93,193 |
| Lampung | 5,091 | | | | | 46 | | 3,418 | | | 8,555 |
| Riau | 42,701 | 30,040 | | | 36,652 | | 3,044 | 72,561 | 657 | 144 | 185,799 |
| West Sumatra | 2,016 | | | | 211 | | 3 | | | | 2,230 |
| South Sumatra | 1,316 | 99,726 | | 73 | 7,627 | 22,203 | 66 | 71,358 | 3,018 | | 205,387 |
| North Sumatra | | 8,573 | | | | 19,434 | 5 | | 5 | | 28,017 |
| **Total (ha)** | **98,847** | **187,887** | **49** | **8,949** | **74,510** | **49,223** | **18,839** | **233,170** | **13,659** | **2,781** | **687,914** |

Source: Indonesia FOLU Net Sink Document

Note: The target locations for non-rotational rehabilitation are those which according to the Environmental Services Index (ESI) are included in rehabilitation and protection on both mineral soils and peat.

Rotational rehabilitation on degraded lands and priority watersheds amount to a total of 830,000 ha (see **Table 3.7)**. The main target of rotational rehabilitation activities includes areas that ESI classifies for production on mineral soils. Peatlands are designated for restoration.

**Table 3.7. FRR rotational rehabilitation priority areas on degraded lands and restoration watershed areas through 2030**

| Province | Production FMU | | | | | Local Government | | Total (ha) |
|---|---|---|---|---|---|---|---|---|
| | Non-Concession | Business permit for plantation forest utilisation | Business permit for natural forest utilisation | Business permit for natural ecosystem restoration | Social forestry | Non-cultivation rights | Culti-vation rights | |
| Bengkulu | | | | | | 10,801 | | 10,801 |
| Jambi | 71 | 1,033 | | 13,814 | 1,547 | 1,288 | 197 | 17,950 |
| West Kalimantan | 8,167 | 86,452 | | | 12,940 | 9,130 | 6,169 | 122,858 |
| South Kalimantan | 627 | 833 | | | 12 | 3,250 | | 4,721 |
| Central Kalimantan | 19,855 | 12,780 | | 705 | 506 | 15,963 | 1,974 | 51,783 |
| East Kalimantan | 37,670 | 11,584 | 30,495 | | | 203,043 | 55,133 | 337,924 |
| Lampung | | | | | | 5 | | 5 |
| Riau | 972 | 54,215 | | | 255 | 1,222 | 178 | 56,843 |
| West Sumatra | 602 | | | | | | | 602 |
| South Sumatra | 723 | 162,066 | | 1 | | 52,020 | | 214.81 |
| North Sumatra | 2,434 | 7,368 | | | | 1,497 | | 11,299 |
| **Total (ha)** | **71,122** | **336,33** | **30,495** | **14,52** | **15,259** | **298,22** | **63,652** | **829,596** |

Source: Indonesia FOLU Net Sink Document

Mangrove ecosystems have not yet (at the time of writing) been taken into account in Indonesia's NDC, although there is broad recognition of its potential in supporting emissions reductions. The calculation of mangrove carbon sequestration valuations will be elaborated in the FOLU Net Sink Operational Plan 2030. Based on the 2021 National Mangrove Map, total existing mangrove areas amount to 3.3 million ha, while areas considered with the potential for mangrove habitat is estimated at 756,000 ha (**Table 3.8)**.

### Table 3.8. Existing mangrove area and potential mangrove habitat

| No. | Area Function | Mangrove Existing (Ha) | Potential Mangrove Habitat (Ha) | Total (Ha) |
|---|---|---|---|---|
| 1. | Protected Forest | 911,397 | 83,737 | 995,134 |
| 2. | Conservation Forest | 748,271 | 48,837 | 797,108 |
| 3. | Production Forest | 1,001,614 | 142,961 | 1,144,575 |
| 4. | Non-Forest Zone | 702,798 | 480,648 | 1,183,446 |
| **Total** | | 3,364,080 | 756,183 | 4,120,263 |

Source: National Mangrove Map, 2021

Beginning in 2021, President Jokowi announced in several international forums commitments to rehabilitating 600,000 ha of mangroves by 2024. However, the formal commitments for mangrove rehabilitation in the 2020–2024 RPJMN only amount to 50,000 ha. These account for degraded mangrove areas based on One Map Mangrove 2013–2019. Based on this map, the classification of degraded mangroves (sparse and very sparse mangrove cover) is based on a canopy density of less than 50%. Viewed from this perspective, degraded land areas amount to 637,000 ha. However, in the 2021 National Mangrove Map, a change in classification of degraded mangroves took place. A mangrove ecosystem classified as a degraded mangrove (sparse mangrove) was revised to canopy density less than 30%. With this crucial definition change, degraded mangrove areas declined to only 54,474 ha (2% of Indonesia's total mangrove area). Thus, the 600,000 ha target was no longer relevant in targeting sparse mangrove areas. For the 2021 National Mangrove Map, revisions included target areas of not only sparse mangroves, but also potential areas of mangrove habitats, such as fishponds, raised lands, and abraded areas (the definition of each explained in section 3.4.2). However, efforts to rehabilitate such areas are often complex, due to existing livelihood activities by local communities.

### Table 3.9. Condition of Indonesian Mangroves

| Category | Area (ha) | Percentage |
|---|---:|---:|
| Sparse Mangroves | 54,474 | 2% |
| Medium Mangroves | 188,363 | 5% |
| Dense Mangroves | 3,121,239 | 93% |

Source: National Mangrove Map, 2021

Finding degraded mangrove areas for rehabilitation is a challenge for the responsible technical institutions, such as MoEF, BRGM, and MoMAF. For example, in 2021, BRGM had difficulty finding locations for mangrove rehabilitation of 83,000 ha in 9 provinces identified as BRGM's working areas. The difficulty in finding a working area is caused by problems with land status and the continued use of mangrove forest zones by communities, particularly due to the expansive growth of aquaculture initiatives since the 1990s. To meet this target, BRGM was directed by Commission IV of the House of Representatives (the commission in charge of forestry affairs) to expand its working area to 23 other provinces (specifically in 2021 for mangrove rehabilitation with PEN funds).

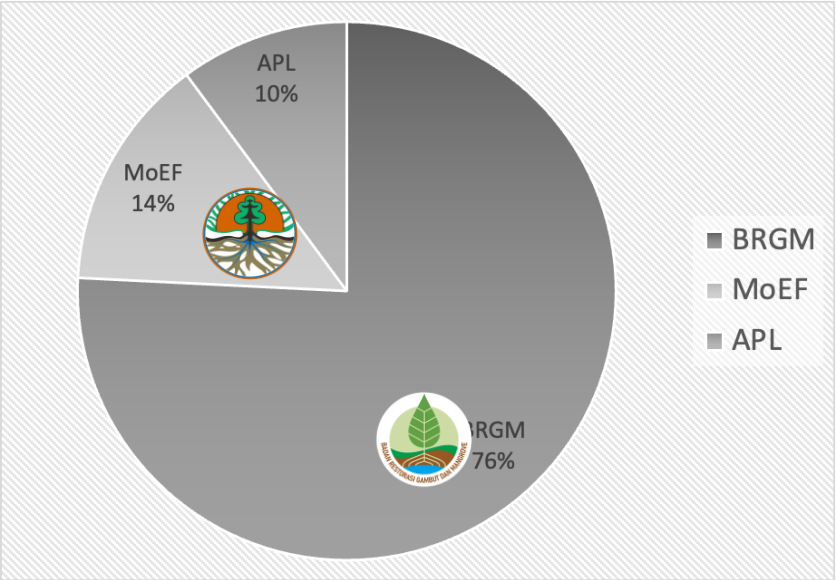


**Figure 3.1. Distribution of targets for mangrove rehabilitation between agencies**

## 3.2. FRR Enabling Conditions

### 3.2.1. Current laws and regulations, emerging terminologies, and applications

The concept of forest ecosystem restoration and the use of various terms (rehabilitation, restoration, reclamation, *reboisasi*, *penghijauan*, and revegetation) have continued to evolve. These terms are often loosely tied to a broader idea – a global regime, emergent policy, or discourse. They also link directly to a legal mandate, regulatory task, or administrative function. During the Jokowi administration, the Job Creation Law (Law No. 11/2020) established various new policy references on forest ecosystem restoration. This section will explain how the different concepts that shape the law are interpreted based on the latest regulations (post-Job Creation Law). We try to simplify the terms of FRR into three main terms: rehabilitation, restoration and reclamation (see **Figure 3.2**)


**Figure 3.2. Concept map for rehabilitation, reclamation, and restoration**

Legend:

- BRGM: *Badan Restorasi Gambut dan Mangrove* (Peat and Mangrove Restoration Agency)
- IPPKH: *Izin Pinjam Pakai Kawasan Hutan* (Borrow-to-Use Forest Zones Permit)
- MoEF: Ministry of Environment and Forestry
- RE: *Restorasi Ekosistem* (Ecosystem Restoration)

### 3.2.1.1 Forest and land rehabilitation

The term “forest and land rehabilitation [*Rehabilitasi Hutan dan Lahan*]” first emerged in the Basic Forestry Law No. 41/1999. The definition of this terminology has not changed with the Job Creation Law and its implementing instruments.[13] It states that “rehabilitation is intended to restore, maintain, and improve the functions of forests and land so that their overall carrying capacity, productivity, and role in supporting life support systems are maintained.” Rehabilitation can be carried out in production forest, protected forests, designated areas in conservation forests, and in non-forest zones.

[13] Government Regulation No. 23/2021

Rehabilitation activities are not allowed in the nature reserves and national park core zones to maintain the authenticity and uniqueness of flora, fauna, and ecosystems. Nonetheless, in practice, in urgent conditions, such as a natural disaster, rehabilitation can be carried out in these areas through a revision of the ecosystem recovery plan. This happened in the Cycloop Nature Reserve in Papua. However, to date there is no national regulation on rehabilitation in nature reserves and core zones of national parks. In addition to rehabilitation in degraded conservation areas, non-rotational rehabilitation efforts in conservation areas can be carried out on open lands that have been utilised by the community through a forestry partnership scheme.

Rehabilitation can be implemented in various ways. Initially, the terminologies *reboisasi* and *penghijauan* referred to rehabilitation activities based on the location of the activities (i.e. state forest zones, outside of nature reserves and national park, or non-forest zones). In the latest regulation[1], *reboisasi* is defined as efforts to plant tree species in state forest zones to restore forest functions[14]. *Reboisasi* is further delineated between intensive *reboisasi* and agroforestry. Intensive *reboisasi* is carried out on degraded land with little land cover or mixed groves and shrubs, specifically in areas without local agricultural activities. Agroforestry is carried out on degraded land with the same land cover conditions, but refers to areas where agriculture activities are already present. Agroforestry is suitable for implementation in social forestry areas where there are already agricultural activities present. Meanwhile, *penghijauan* is defined as an activity to restore lands in non-forest zones. *Penghijauan* can be implemented through community forestry initiatives, urban forestry programmes, and targeted environmental reforestation (e.g. tree planting on roadsides).

Rehabilitation is not only conducted through planting, but also through civil-technical efforts for soil conservation. The application of soil conservation techniques focuses more on biophysical treatment of the soil to slow down runoff and erosion rates. The application of this soil conservation approach can be pursued through construction techniques in the form of control dams, retention ponds, terracing, drainage channels, infiltration wells, other small dams, dead-end ditches (*rorak*), or protective buildings for river/reservoir/lake cliffs.

#### 3.2.1.2. Forest and land reclamation

Differing slightly from the concept of rehabilitation and restoration, forest reclamation does not only focus on planting, but also involves improving soil structure. Forest reclamation is carried out in damaged forest zones that have undergone land cover and land surface changes. However, the basic law of forestry does not explain the threshold of “damaged” forests. The absence of a single definition of degraded/damaged land creates confusion over its area, location, and legal status (Gingold et. al., 2012).

Furthermore, reclamation is often associated with activities in the mining sector because it is the final stage of mining activities after the exploration and exploitation stages (Jung et al., 2021). However, the Basic Forestry Law No. 5/1967 and the Basic Mining Law No. 11/1976, did not mention the “reclamation” terminology. This term only emerged in the Basic Forestry

[14] Based on Law No. 41/1999, forest have 3 categories based on their function: protection forest, conservation forest, and production forest

Law No. 41/1999 stating that reclamation activities are not only required for the holder of a *Izin Pinjam-Pakai* for mining, but also other permits that result in significant changes to surface cover and the subsurface.

Even in Government Regulation No. 26/2020 concerning FRR, damaged forests refer to changes in land cover due to natural disasters. In general, the stages of forest reclamation include two main activities, land management and revegetation. Revegetation is defined as an effort to repair and restore damaged vegetation through planting and maintenance activities in areas that have been used as state forest zones. Revegetation is the main indicator for assessing the success of forest reclamation by the MoEF, covering aspects of planting area, percentage of plant growth, and plant composition (Pratiwi et al., 2021).

#### 3.2.1.3 Forest and ecosystem restoration

Restoration, though similar to rehabilitation, includes various prerequisites that must be met, most importantly that planting must use native species (no exotic species). The location of ecosystem restoration is prioritised for production forests that are no longer productive. Restoration only allows for non-timber forest products or for environmental services initiatives. As a term, restoration first appeared in 2004[15] referring to ecosystem restoration in production forests aiming to restore biotic elements (flora and fauna) and abiotic elements (soil, climate, and topography) towards achieving “biological balance.”

In MoEF Regulation No. 61/2008[16], ecosystem restoration implementation prioritises efforts on production forests that are no longer productive, for example, degraded ex-Forest Concession Rights lands. During the ecosystem restoration permit period, a permit holder is not allowed to log. However, this terminology no longer appears in the Job Creation Law and its implementing regulations. Ecosystem restoration is implicitly included in multi-business forestry and several forestry business activities, including area utilisation, NTFP utilisation, and environmental service utilisation.

The restoration terminology is also adopted in conservation areas. The concept is motivated by conservation area degradation, mainly due to the emergence of invasive exotic plants in several national parks (JICA, 2012). Ecosystem restoration in conservation areas began in 2011[17] but technical guidelines were only released three years later[18]. The use of restoration in national forestry policies also applies to peat ecosystem types. Peat ecosystem restoration began in earnest in 2014[19]. At that time, restoration aims to improve hydrological

[15] MoEF Regulation No. 159/2004
[16] About Provisions and Procedures for Granting Business Permits for the Utilisation of Ecosystem Restoration Timber Forest Products in Natural Production Forests
[17] Government Regulation No. 28/2011 about Management of Nature Reserves and Nature Conservation Areas
[18] MoEF Regulation No. 48/2014 about Procedures for Implementing Ecosystem Recovery in Nature Reserves and Nature Conservation Areas
[19] Government Regulation No. 71/2014 (later revised with Government Regulation No. 57/2016) about Protection and Management of Peat Ecosystems

conditions, structure, and function back to its original condition. With the expanded BRGM mandate, this also applies for mangroves.[20]

### 3.2.2 Institutional authority: Mandates and responsibilities (planning, implementation, and M/E)

While FRR regulations and terminologies provide a framework for implementation, policy must translate through action among key institutions. FRR in Indonesia is unsurprisingly complex, involving many institutions guided by various ministries, special agencies under direct supervision and mandates by the president, and crucially, the varying roles of local governments.

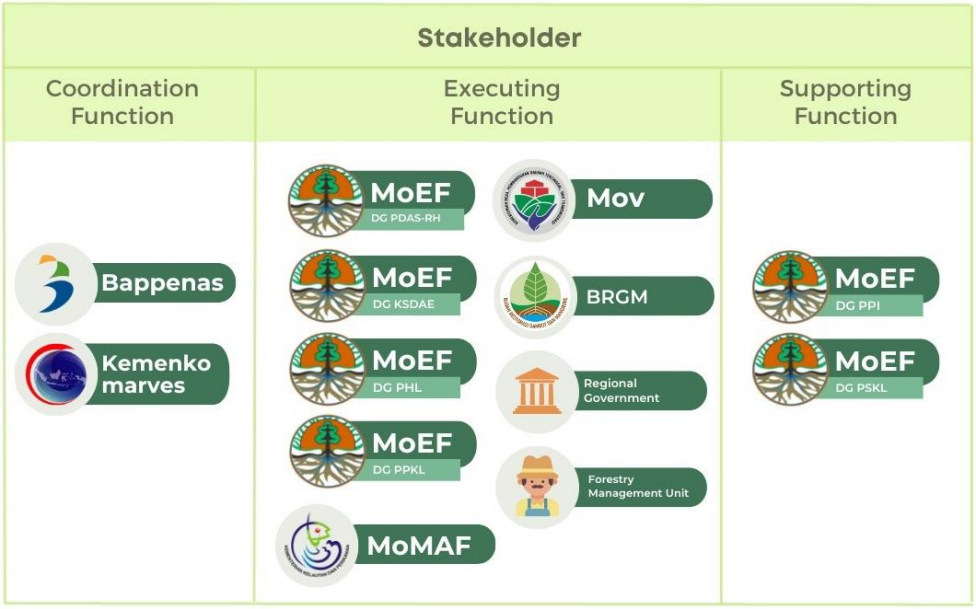


**Figure 3.3. Key FRR stakeholders in government**

Here we provide a brief discussion on each of the main institutions involved with FRR in Indonesia. We classify these institutions into three groups based on their main functions, namely institutions with coordinating functions, implementing functions, and supporting functions. For MoEF, we extended our stakeholder analysis to the DG level, considering their outsized task in FRR.

#### 3.2.2.1. Ministry of National Development Planning (Bappenas)

As the institution that designs the National Development Framework, Bappenas plays a key role in coordinating FRR. This is made explicit through the RPJMN 2020–2024, the Indonesia's Low Carbon Development Plan (LCDI), as well as the Sustainable Development

[20] Presidential Regulation No. 1/2016 (later changed its name to the Peat and Mangrove Restoration Agency/BRGM in 2020

Goals (SDGs). In preparing this plan, Bappenas coordinates with MoEF, MoMAF, as well as other implementing ministries/agencies that have FRR mandates.

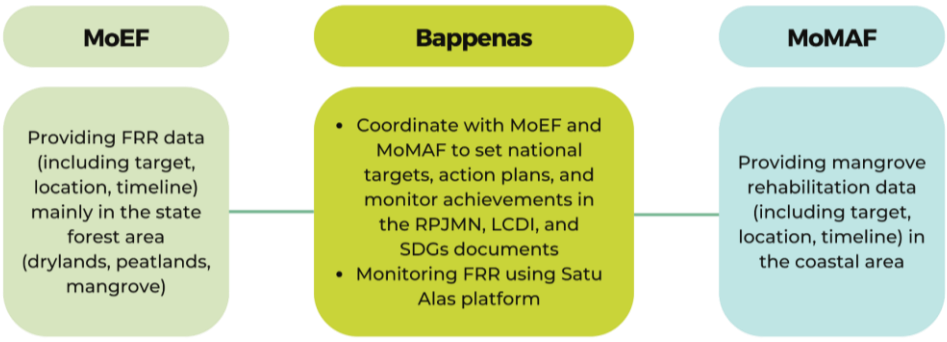


**Figure 3.4. Coordination of Bappenas, KLHK, and MoMAF in the preparation of development planning documents (FRR context)**

Bappenas and the implementing agency coordinate to set targets, action plans, and monitor achievements. In monitoring FRR achievements, Bappenas has input, output, and outcome indicators. Input indicators are evaluated by the number of seeds successfully planted, while outputs are identified by the percentage of growth in a period of 1–2 years, and finally, outcomes are explained through changes in forest cover and extent of carbon sequestration. This differs from MoEF monitoring systems, which applies more rigid indicators based on technical planting elements such as stake height, planting hole size, and other technical silvicultural elements. These technical indicators are scrutinised by the Financial Audit Agency to prevent corruption. Even slight changes in tree diameter, for example, can have huge implications on costs.

> *"Why is Bappenas looking at land cover outcomes? Because tree cover change is clearly visible and can also be seen from imagery. We built the Satu Alas platform. We take imagery from Planet.com which puts out free satellite images every month. We then monitor forest cover monthly as long as we know where the area we want to plant is located. While MoEF only issues annual coverage indicators, Bappenas cannot do that, especially since the Government Work Plan (RKP) cycle is very fast. Therefore we take advantage of the Satu Alas platform for our monitoring purposes"* – Director of Maritime Affairs and Natural Resources, Bappenas.

Bappenas is only focused on higher-level indicators. For monitoring purposes they use the Satu Alas online spatial platform to present data on plans and evaluations at the site level. This platform helps to monitor increases in forest cover in rehabilitated areas (down to the village level) provided data is available for planting areas. Bappenas utilises monthly satellite imagery of forest cover from planet.com, while satellite imagery from the MoEF must wait one year. Satu Alas has only been tested recently in West Nusa Tenggara Province, but the pilot initiative anticipates applications elsewhere in the future.

Rehabilitation and restoration efforts in wetlands have gained special attention from Bappenas by forming a Wetland Management Team across various ministries and agencies. The Wetland Management Team has the task of aligning policies, improving basic data collection, and carrying out monitoring related to the protection and management of wetlands (especially peat and mangroves). This Team is compiling a roadmap for wetland management until 2045 with various scenario models that take into account population, land requirements, and other aspects.

### 3.2.2.2. Coordinating Ministry of Maritime Affairs and Investment

The Coordinating Ministry (CM) of Maritime Affairs and Investments[21] coordinates ministries and technical institutions that have tasks, functions, and work programmes related to mangrove rehabilitation, namely MoEF, MoMAF, MoV, and BRGM. CM of Maritime Affairs and Investments coordinates to ensure no overlapping work programmes between these institutions. Overlaps still occur, however, because of poor data collection, management, and sharing. Therefore, this CM is preparing a roadmap for the National Action Plan for Mangrove Rehabilitation, so that an integrated and non-overlapping mapping of rehabilitation locations can be obtained between MoEF, MoMAF, and BRGM for 2022–2024. MoV is no longer included in the 2022–2024 mangrove rehabilitation plan because they no longer received PEN[22] allocations after 2021 for mangrove rehabilitation. In addition to coordinating mangrove rehabilitation activities, MoMAF also has a mandate to seek funding and investment assistance from various sources. Funding considerations are discussed in detail in section 3.6.

Target for roadmap completion aimed for 12 months after the passing of MoNDAP's Ministerial Regulation[23] released on 30 October 2020. However, this map will only be released in October 2022. The team consists of working groups involving various ministries and government agencies. These working groups include Planning and Budgeting; Policy Synchronisation; and, Monitoring, Evaluation and Reporting.

[21] This mandate has been given to the CM of Maritime and Investment Affairs since 2019. Previously, from 2014 to 2019, the relevant institutions were under the coordination of the CM for Economic Affairs.

[22] PEN (National Economic Recovery Program) is one of a series of activities to reduce the impact of COVID-19. One of the initiatives carried out includes mangrove rehabilitation that involves a labour funding allocation mechanism for planting mangroves

[23] Decree of the Minister of National Development Planning/Bappenas Number 89/2020 regarding the Coordinating Team for Wetland Management Strategy for the Achievement of Sustainable Development Goals and Low Carbon Development

## Table 3.10. Stakeholder Analysis of MOEF

| No | Directorate General | Areal | | | Direct Function | | | Indirect Function |
|---|---|---|---|---|---|---|---|---|
| | | HL | HP | HK | Planning | Implementation | Monitoring | |
| **1.** | DG of Watershed Management and Forest Rehabilitation | X | X | | ● Setting up degraded land criteria; identifying degraded land (*The Directorate of Watershed Management Planning and Supervision*)<br>● Formulating general plan for forest and land rehabilitation | ● Providing seeds in the national scale, setting up certified seeds criteria and seed procurement schemes (*The Directorate of Forest Plant Seeds*)<br>● Conducting *reboisasi* and *penghijauan* (*The Directorate of Forest Rehabilitation*)<br>● Conducting inland waters (such as lakes) and mangrove rehabilitation (*Directorate of Inland Water and Mangrove Rehabilitation*)<br>● Conducting soil conservation techniques and rehabilitation in *pinjam-pakai* forest zones permits (*Directorate of Soil Conservation*) | Measuring the success rate of planting and plant enrichment (*The Directorate of Watershed Management Planning and Supervision*) | |
| **2.** | DG of Natural Resources and Ecosystem Conservation | | | X | Setting up the ecosystem restoration procedure and criteria in conservation areas | Implementing restoration ecosystems in conservation area | Monitoring and evaluation of ecosystem restoration in conservation areas | |
| **3.** | DG of Sustainable Forest Management | | X | | | | Monitoring and evaluating the forest rehabilitation and restoration activities in former Forest Concession Rights and Forest Plantation Rights areas | |
| **4.** | DG Pollution and Environmental Damage Control | X | X | | Preparing technical guidelines for peatland restoration | Coordinating with BRGM in the implementation stage | Monitoring and evaluation peatland restoration activities | |
| **5.** | DG of Social Forestry and Environmental Partnership | X | X | | | | | Integrating forest rehabilitation activities in |

| No | Directorate General | Areal | | | Direct Function | | | Indirect Function |
|---|---|---|---|---|---|---|---|---|
| | | HL | HP | HK | Planning | Implementation | Monitoring | |
| | | | | | | | | social forestry areas permits |
| **6.** | DG of Climate Change | X | X | X | | | | Coordinating with DG Forest Planning in identifying rehabilitation locations that have a high biogeographic and carbon sequestration index |

### 3.2.2.3 Ministry of Environment and Forestry

**Directorate General of Watershed Management and Forest Rehabilitation**

FRR programmes are the main responsibility of the **Directorate General of Watershed Management and Forest Rehabilitation (DG PDAS-RH)**. This DG underwent a nomenclature change in 2021[24] because rehabilitation previously suggested limited focus on protected forests and excluded other forest types and non-forest zones. The name-change intended to broaden public understanding of rehabilitation mandates as reaching beyond protected areas.

DG PDAS-RH oversees 5 directorates (*underlined*). The *Directorate of Watershed Management Planning and Supervision,* which has the main mandate in overall planning and oversight of forest and land rehabilitation (both in terrestrial and coastal regions). The *Directorate of Forest Rehabilitation* is responsible for executing the plans through *reboisasi* and *penghijauan* initiatives. Specific to rehabilitation, utilisation aspects vests authority in the *Directorate of Soil Conservation*. The holder of *Izin Pinjam-Pakai* state forest zones will report planting locations to this directorate. If the holder of *Izin Pinjam-Pakai* does not yet have a target location for planting, the directorate will help locate a planting site.

The Centre for Watershed Management and Forest Rehabilitation (BPDAS-RH) serves as the Technical Implementing Unit of DG PDAS-RH, and is responsible for monitoring and assessing the success of a permit holders' rehabilitation initiative. This overlaps with authority of the Directorate of Forest Rehabilitation, which is also responsible for overseeing permit-holder rehabilitation for the use of state forest zones. The distinguishing factor is that rehabilitation funding by the permit holder to use a state forest zones comes from the permit holder itself. Meanwhile, the *Directorate of Forest Plant Seeds* supports by providing seeds, which can either involve a third party or through construction of permanent community/village nurseries. For seed procurement schemes, the Directorate of Forest Plant Seeds only submits certified species as reference among third parties. These seed types are certified as quality control to guarantee the success of the rehabilitation initiative. Modern and permanent nurseries, besides producing ready-to-plant seedlings, also produce seedlings (saplings) to be distributed to rehabilitation locations, village nurseries, and community nurseries which are then maintained until they are ready for planting. Finally, the *Directorate of Inland Water and Mangrove Rehabilitation* is a newly established directorate tasked with rehabilitating inland waters (such as lakes) and rehabilitating mangroves.

For monitoring purposes, DG PDAS-RH adheres to the principle of Monitoring, Reporting, and Verification (MRV). DG PDAS-RH will assess planting success by measuring the area, number, and type of the plants, as well as calculating the percentage of healthy plant growth. The latest regulation[25] states that the success rate of plant enrichment in state forest zones is at least 70% of the total planting holes. Macro-scale monitoring of forest and land rehabilitation will be measured as a function of added vegetation cover. By utilising available

[24] Previously this DG was Director General of Watershed Management - Protected Forests
[25] MoEF Regulation No. 70/2008 concerning Technical Guidelines for Forest and Land Rehabilitation

technology, there are 2 monitoring schemes for forest and land rehabilitation: (i) using high-resolution satellite imagery if intensive rehabilitation activities are carried out in one compact or scattered area and using digital analysis of Normalised Difference Vegetation Index or Fire Burn Index if rehabilitation is enriched. This monitoring will be carried out by the Directorate of Inventory and Monitoring of Forest Resources (Directorate under the umbrella of the DG of Forestry Planning and Environmental Management). This Directorate already has a spatially based digital platform for national forest monitoring, including for FRR, called SIMONTANA.

**Directorate General of Natural Resources and Ecosystem Conservation**

With conservation area authority, the DG of Natural Resources and Ecosystem Conservation (DG KSDAE)[26] at MoEF is tasked with restoring ecosystems in Conservation area. This DG has its own norms, standards, procedures, and criteria in carrying out rehabilitation or restoration in conservation forests[27]. In carrying out ecosystem restoration in conservation forests, the Technical Implementation Unit (UPT)[28] identifies degraded areas that are included in the rehabilitation zone. To determine priority locations, the technical unit first conducts a socio-economic survey of surrounding communities and ensures security from conflict. Thereafter, a vegetation survey provides information on the types of species to be planted in the targeted restoration area, as well as surveys on the presence of fauna and water availability. The results of these surveys then provide a reference for preparing an ecosystem restoration plan. Rehabilitation and restoration in a conservation area still involve DG PDAS-RH or its UPT. For example, the rehabilitation of the Cikepuh Wildlife Reserve involved the Centre for Watershed Management and Forest Rehabilitation (BPDAS-RH) Ciliwung-Citarum and the West Java BKSDA[29]. Cikepuh Wildlife Reserve determines priority areas for rehabilitation that are free from conflict and do not interfere with wildlife. In addition, Cikepuh Wildlife Reserve will also provide recommendations on what types of plants are suitable for planting. Meanwhile the Centre for Watershed Management and Forest Rehabilitation Ciliwung-Citarum then assist in providing the required seeds.

**Directorate General of Sustainable Forest Management**

Rehabilitation and restoration in production forests are under the authority of the Directorate General of Sustainable Forest Management, specifically the Directorate of Forest Utilisation Business Control[30]. This Directorate monitors and evaluates the extent of FRR activities in former Forest Concession Rights and Forest Plantation Rights areas. However, the Director General of PHL also continues to coordinate with the DG PDAS-RH in monitoring and evaluation. In addition to Forest Concession Rights and Forest Plantation Rights rehabilitation, DG PHL also previously had the authority to monitor and evaluate ecosystem restoration business permits. However, since the issuance of the Job Creation Law and its

[26] The Directorate which specifically handles rehabilitation and restoration affairs is the Directorate of Development for Ecosystem Management and Recovery
[27] MoEF Regulation No. 48/014
[28] Part of the part of the Directorate General of Conservation of Natural Resources MoEF
[29] The technical implementing unit under DG KSDAE which carries out conservation, protection and utilisation of areas including plant and animal species as well as safeguarding areas and types of living natural resources outside the stated forest zones
[30] Directorate General of Sustainable Forest Management

implementing Government Regulations, the term ecosystem restoration business permit[31] is no longer mentioned. However, it is reportedly included in the issuance of business permits for the forests designated for environmental services. Guidelines for environmental services with ecosystem restoration schemes are still under development as of the end of 2020.

**Directorate General of Social Forestry and Environmental Partnership**

Based on organisational structure and task, DG of Social Forestry and Environmental Partnership does not have a direct mandate to carry out FRR activities. However, this is anticipated to change in the future. Rehabilitation initiatives are being integrated into social forestry programming because there are a growing number of local institutions responsible for land management at the site level. This includes village forest management institutions, forest farmers' groups, cooperatives, and others. Indonesia's FOLU Net Sink 2030 Operational Plan document also makes clear connections to the role of social forestry. The potential area for non-rotational rehabilitation initiatives in the work area of DG of Social Forestry and Environmental Partnership targets 220,000 ha. Of this area, about 81% are in production forest zones, while the remaining 19% are in protection state forest zones.

**Directorate General of Climate Change**

Although the DG of Climate Change does not have direct duties and functions in carrying out FRR activities, they coordinate with DG-PDAS-RH in identifying rehabilitation locations that have a high biogeographic and carbon sequestration index. The results of this identification are then used as a reference in determining priority rehabilitation and restoration locations in the FOLU Net Sink. The addition of land cover from FRR activities are monitored by DG of Forestry Planning and Environmental Management and then provided to DG Climate Change. The Directorate of GHG Inventory and Monitoring and Verification Reporting (under DG Climate Change) then calculates the carbon sequestration from FRR activities every year. The results of this inventory are reported as Indonesia's NDC progress to the UNFCCC.

**Directorate General of Pollution and Environmental Damage Control**

The Directorate of Peat Ecosystem Damage Control, under the DG of Pollution and Environmental Damage Control, holds the authority to formulate policies and prepare technical guidelines for peat restoration. This Directorate plays an important role in the preparation of the National Peat Ecosystem Protection and Management Plan, which is used to guide peat restoration efforts. For site-level implementation, this DG coordinates closely with BRGM, by supporting community institutions through the Independent Village Care Programme for Peat. DG Pollution and Environmental Damage Control then has the authority to monitor peat restoration carried out by plantation forest concessions. The DG also has a peat restoration monitoring system in place through the 0.4 metre Peatland Water Level Information System (SiMATAG-0.4m) platform. This system was created to monitor peat ecosystem restoration through a database of groundwater level and rainfall data.

[31] Ecosystem restoration business permit or called IUPHHK-RE, is the government's discretion through the MoF Regulation P.159/2004 concerning ecosystem restoration which is not contained in the Forestry Law No. 41/1999

### 3.2.2.4. Ministry of Marine Affairs and Fisheries (MoMAF)

MoMAF, through the DG of Marine Spatial Management, is mandated to carry out rehabilitation outside of forest zones, especially in coastal areas and small islands. Based on the National Mangrove Map released in 2021, MoMAF has the responsibility to rehabilitate damaged mangrove areas (mangroves with <30% cover) outside of state forests zones amounting to a total area of 18,837 ha. This mangrove rehabilitation programme is delineated in a way so as not to overlap with BRGM management areas. To achieve this target, MoMAF works together with local governments, NGOs, and corporate social responsibility initiatives. Mangrove rehabilitation targets are also supported by MoEF. In 2020, MoEF planted mangroves outside of state forest zones amounting to 7,973 ha, amounting to almost half of MoMAF's mangrove rehabilitation targets.

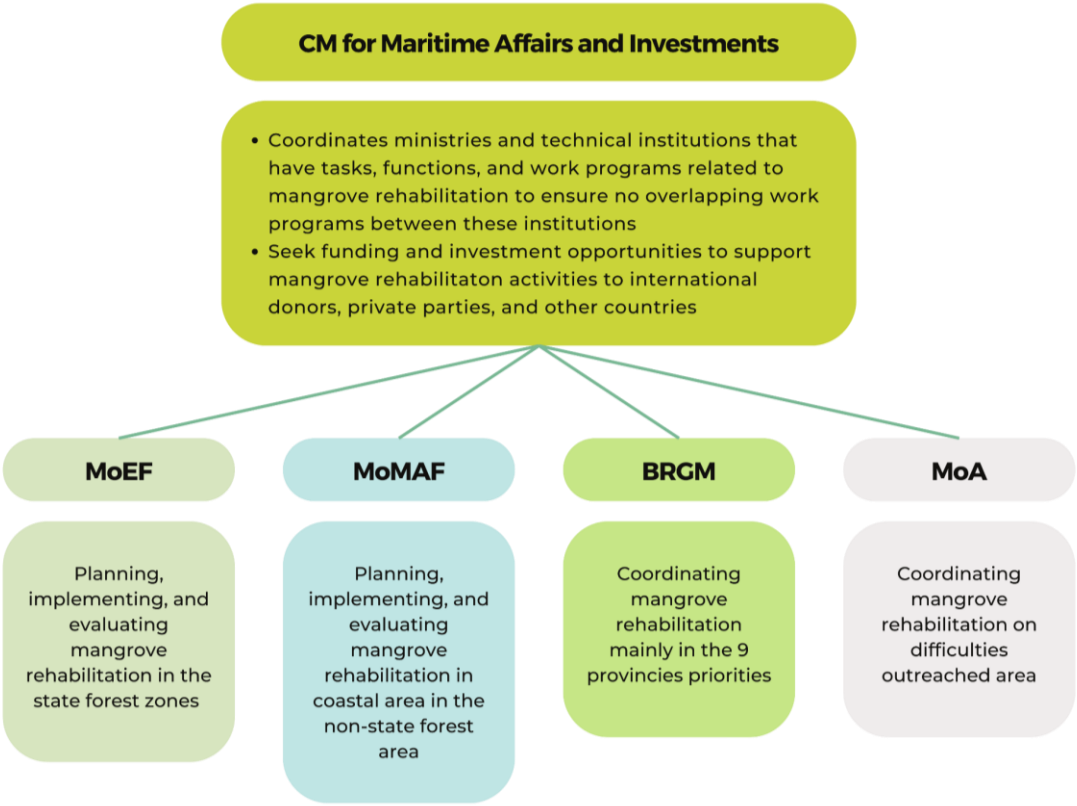


**Figure 3.5. Coordination system in mangrove rehabilitation**

In carrying out mangrove rehabilitation at the site level, MoMAF has a technical unit called the Management of Coastal and Marine Resources. However, this UPT is only operational in certain areas, such as Pontianak, Padang, and Denpasar. Mangrove rehabilitation success indicators are evaluated biophysically based on percentage of growth (at least 70%), and socially through benefits obtained by the community. In addition to planting activities, MoMAF mangrove rehabilitation is also carried out by the Center for Restoration and Development of Coastal Ecosystems (formerly known as the Mangrove Restoration and Learning Center) as a means of education and research, training in mangrove processing for derivative products for coastal communities and developing mangrove nurseries.

#### 3.2.2.5. Ministry of Villages, Development of Disadvantaged Regions, and Transmigration

With a very large mangrove rehabilitation target (600,000 ha within four years), Coordinator Ministry of Maritime Affairs and Investments instructed MoV to help meet the target of mangrove rehabilitation, especially in rural areas that are difficult to reach. MoV was given the task of rehabilitating mangroves in a period of just one year (in 2021) using PEN's funding. This ministry was assigned to rehabilitate 500 ha of mangroves in 70 villages across 3 provinces, namely Maluku, East Nusa Tenggara, and Central Sulawesi.

Ministry of Villages does not, however, have a UPT at the regional level. To achieve mangrove rehabilitation targets in such a short time, they partnered with local government departments in charge of forestry or marine affairs, as well as with NGOs and Forest Management Units (FMU). MoV implemented three main approaches, including outreach, vocational training, and plant breeding. The vocational training programme aimed to provide technical guidance and piloted practices for mangrove nursery development, planting, and maintenance activities. The community was also supported to independently conduct nursery development. The community were given wages based on a predetermined standard for planting costs but did not take into account maintenance costs reducing the potential for sustainability. MoV explicitly acknowledged persistent challenges that if the community does not feel the economic benefits of mangroves, then rehabilitation efforts are unlikely to survive in the long term.

#### 3.2.2.6. The Peat and Mangrove Restoration Agency

BRGM's main mandate is to facilitate the acceleration of peat restoration and mangrove rehabilitation in target provinces. In carrying out its duties, BRGM coordinates with various ministries and institutions. BRGM coordinates with MoEF's DG PPKL on the distribution of peat restoration areas. BRGM's peat restoration work is mostly located outside of state forest zones because peat areas located inside state forest zones have largely been used for plantation forest businesses under the authority of PPKL. BRGM also coordinates with MoEF, MoMAF, the Indonesian Institute of Sciences, and the Geospatial Information Agency in compiling a national mangrove map. This national mangrove map is used as a reference in the distribution of mangrove rehabilitation coordination efforts between BRGM, MoEF, and MoMAF.

BRGM and other ministries in the Wetland Management Team are preparing a Roadmap for Wetland Management. The Wetland Management Team is led by Bappenas with members from various ministries and institutions such as MoEF, MoMAF, BRGM, National Board for Disaster Management, Geospatial Information Agency, Minister for Public Works and Human Settlements and National Institute of Aeronautics and Space. This team was formed to coordinate the management of wetlands (peat, swamps, and mangroves) to achieve Sustainable Development and Low Carbon Development. The Wetland Management Team has the task of aligning policies, improving basic data collection, and carrying out monitoring related to the protection and management of wetlands (especially peat and mangroves). This Team is compiling a roadmap for wetland management through 2045 with various scenario models that take into account population, land requirements, and other aspects.

This Roadmap will be used as a reference for activities of each ministry in wetland management (including peat restoration and mangrove rehabilitation) for the coming years. The results of peat restoration and mangrove rehabilitation will periodically be reported to the lead coordinating agency (CM of Maritime Affairs and Investment) and to MoEF as technical advisor. To assist the implementation of peat restoration and mangrove rehabilitation at the regional level, BRGM collaborates with local governments by forming a Peat Restoration and/or Regional Mangrove Rehabilitation Team. This team serves as an extension of BRGM at the regional level. This team consists of the governor/regional secretary, the provincial office in charge of forestry and environmental affairs, the MoEF's UPT, and NGOs. For implementation at the site level, BRGM has also formed stakeholder groups on peat.

#### 3.2.2.7. Local Governments

Regional Governments have authority to carry out rehabilitation within limited state forest zones, namely Forest Parks (Tahura), as well as on non-state forest zones on land that has not been encumbered with rights. Regional governments carry out FRR through reforestation activities on cleared Tahura lands, through urban forest development programmes, and planting along roadsides. Regional governments have an important role in FRR success especially by incorporating national FRR programmes into their regional spatial plans. However, in some areas, policies serve to undermine FRR. In West Nusa Tenggara province, for example, a government policy provides incentives to villages that produce six tons of corn per ha. With this policy, villages are incentivised to encroach into state forest zones to plant corn and meet quotas, at times clearing trees planted through the FRR programme.

### 3.2.3. FRR Budgeting

#### 3.2.3.1. Allocated State Budgets of Ministries and National Agencies

The National State Budget allocated for ministries and other lead national agencies is based on their work programmes. MoEF, as the main technical implementer, has the largest National State Budget allocation for FRR programmes. In 2021, MoEF received a National State Budget allocation of 7.96 trillion rupiah (USD 558 million). DG PDAS-RH is the main FRR implementer and received the largest budget allocation of 2.18 trillion rupiah (27% of the MoEF's total budget). However, this budget is only deemed sufficient to rehabilitate approximately 200,000 ha. It is estimated that costs needed for dryland forest rehabilitation amount to 14–17 million rupiah/ha, while the cost of mangrove rehabilitation can reach 27 million rupiah/ha. In the DG PDAS-HL[32] strategic plan for 2020–2024, it is stated that an average of 5.1 trillion rupiah/year is required for carrying out FRR activities to meet targets. Meanwhile, rehabilitation/restoration in conservation forests rely more on partnership schemes with the private sector or local communities. Although it has the second-largest National State Budget allocation after the DG of PDAS-RH, the DG KSDAE is mostly allocated for conservation activities, not FRR.

[32] Renamed PDAS-RH (see section 3.3.3.1)

> *"In 2022, BRGM did not obtain National State Budget funding, so inevitably it must acquire an Additional Assistance Budget such as support from the 2022 mangrove PEN. That is still in the initial discussion stage. We cannot say for sure whether PEN 2022 will be available or not"* - Deputy for Coordination of Environmental and Forestry Management, Coordinating Ministry of Maritime Affairs and Investment.

#### 3.2.3.2. Supplementary State Budgets: The National Economic Recovery Programm (PEN)

In addition to regular National State Budget funding, the State Supplementary Budget for PEN (*Additional Assistance Budget*-PEN) provides special funds for mangrove rehabilitation. This fiscal stimulus package was prompted by the COVID-19 pandemic. One aspect included a cash transfer support programme for labour in mangrove planting. The labour-intensive work sought to stimulate local economies while increasing attention to environmental conservation. Community members could receive direct wages reaching up to 120,000 rupiah per day.

This labour-intensive PEN initiative for mangrove planting only involved MoEF and MoMAF in 2020. The total budget amounted to 421.9 billion rupiah (USD 28.3 million), with 406.17 billion rupiah (USD 27.2 million) for MoEF and 15.73 billion rupiah (USD 1.1 million) for MoMAF. PEN mangrove planting in 2020 was considered a successful endeavour in boosting the economy of coastal communities and provided encouraging evidence for achieving 600,000 ha of mangrove rehabilitation. Therefore, the PEN mangrove labour rehabilitation programme resumed in 2021 with a larger budget involving more ministries/agencies. The allocation of labour-intensive PEN funds for mangrove planting in 2021 amounted to 1.58 trillion rupiah (USD 10.6 billion) (a threefold increase from 2020) involving MoEF, MoMAF, BRGM, and Ministry of Village. All BRGM activities related to mangrove planting in 2021 were funded through this channel. MoV also supported mangrove replanting initiatives, assigned to implementation in remote areas.

### Table 3.11. Budget and target for labour-intensive PEN for mangrove planting

| Institution | PEN Amount (rupiah) | | Locus and Target | |
|---|---|---|---|---|
| | 2020 | 2021 | 2020 | 2021 |
| MoEF | 406.17 billion | 1.52 trillion | 15,000 ha in 34 provinces | 34 provinces |
| MoMAF | 15.73 billion | 43.37 billion | 200 ha in 18 districts/cities | 1,373 ha in 11 provinces |
| BRGM | - | (combined with MoEF funding) | - | 83,000 ha in 9 provinces |
| MoV | - | 23.27 billion | - | 500,000 ha in 3 provinces |

Source: Directorate of Finance, Ministry of Finance, 2021

However, additional PEN funding is temporary. Funding ended in 2021 and was discontinued in following years. In addition, PEN funding only covered planting costs and did not allocate any maintenance costs. Various respondents noted the challenges of maintaining planting success without supporting maintenance initiatives. There is a need for a monitoring mechanism from the relevant ministries/agencies to ensure that mangrove planting in areas with PEN funding is successful and sustainable. Overall, the PEN programme carried out by MoV was considered to have yielded positive results. In carrying out mangrove rehabilitation, MoV prioritised vocational activities that provided technical guidance and pilot practice for mangrove nurseries, planting, and maintenance activities. MoV also cooperated with the Village and Community Empowerment Service (*Dinas Pemberdayaan Masyarakat dan Desa*) and the Environment and Forestry Service (*Dinas Lingkungan Hidup dan Kehutanan*)

#### 3.2.3.3. Revenue Sharing - Reboisasi Fund (DBH-DR)

The Revenue Sharing *Reboisasi* Fund (DBH-DR) provides additional APBN financing. This fund is channelled to local governments by allocating a certain percentage for rehabilitation and other forest management activities (see Table 3.12 for a prioritisation list on forest management activities that can be funded from DBH-DR). DBH-DR is provided to local governments at 40% of total revenue, while the remainder goes to the central government. DBH-DR is collected from the permit holder for the use of forest products. Initially, DBH-DR funds were distributed to level II local governments (districts and municipalities). However, after recentralisation of forestry affairs to the province, DBH-DR has since 2017 been channelled to the provincial government.

## Table 3.12. Priority activities that can be funded through DBH-DR

| Priority | Activity |
|---|---|
| 1 | Rehabilitation outside the forest zones according to provincial authority (e.g. community forest development, environmental reforestation, urban forest development, application of soil conservation techniques in mangrove and peat ecosystems) |
| 2 | Forest and land rehabilitation according to provincial authority (example: rehabilitation in Tahura, planting by social forestry permit holders, planting of mangroves outside the forest zones, rehabilitation of watersheds if the local government acts as the holder of a borrow-to-use forest zones permit) |
| 3 | Development and management of Timber, NTFPs, and/or environmental services within the area |
| 4 | Community empowerment and social forestry |
| 5 | Operationalisation of the Forest Management Unit |
| 6 | Forest and land fire control |
| 7 | Forest protection and security |
| 8 | Forest plant seed development |
| 9 | Forestry extension service |
| 10 | Other strategies (example: direct cash assistance to communities living in state forest zones, economic empowerment of forest communities, providing incentives for FRR performance) |

Notes: the maximum allocation of BDH-DR for other strategic activities is 30%

Source: MoF Regulation No. 216/2021

DBH-DR funds can only be used for FRR programmes.[33] With its limited scope of activities, funds have been deposited into the regional treasury (USAID, 2020). However, some regions have had difficulty finding degraded land for rehabilitation. In 2017, the scope of activities funded from the DBH-DR fund expanded to include FRR as a priority. In addition to the ten priority activities above, the provincial government can also allocate a maximum of 10% of the DBH-DR for other supporting activities, such as holding local government coordination meetings or financing supervisory consultancy services. DBH-DR funding is the responsibility of the Governor to be reported every six months to the MoF, MoEF, and MoHA. These ministries monitor and evaluate the use of DBH-DR in accordance with their authority. MoF monitors the implementation and remaining DBH-DR amounts, while MoEF monitors the achievement of outputs for activities, and MoHA plans and budgets further activities using DBH-DR.

[33] Government Regulation No. 35/2002

In the last five years, DBH-DHR fund has had large percentages compared to the suite of revenue sharing funds for natural resources in the forestry sector. Some of the other revenue sharing programmes include the Provision of Forest Resources (PSDH) and the Contribution of Business Permits for Forest Utilisation (IIUPH). The total DBH-DR from 2017 to 2021 reached 3.71 trillion rupiah, with an average DBH-DR of around 740 billion/year (44% of the total revenue sharing funds).

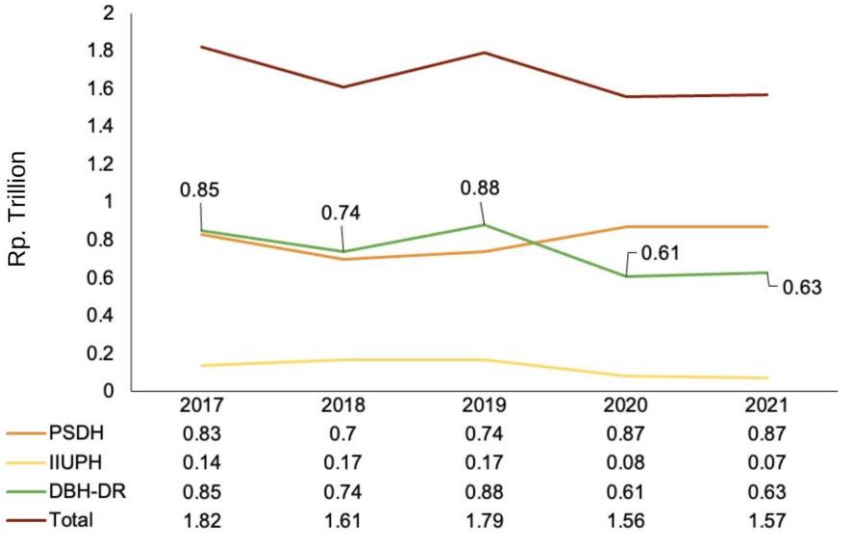


**Figure 3.6. DBH-DR Realisation Graph for 2017–2021**

Source: DJPK MoF, 2022 (11 Feb 2022)

PSDH: Provision of Forest Resources

IIUPH: Contribution of Business Permits for Forest Utilisation

DR: *Reboisasi* Fund

In 2021, DBH-DR disbursed 630 billion rupiah to provincial governments. There is still 4.18 trillion DBH-DR remaining in the provincial treasury (see **Figure 3.7**). Up until 2021, several districts/municipal governments still have DBH-DR that they obtained from before 2017. The remaining DBH-DR in the district/municipal treasury can be used for development activities and management of green open spaces, planting in degraded watersheds, and construction of soil and water conservation structures. The graph in Figure 3.7 shows that the DBH-DR has not been successfully disbursed. At the district/municipal level, DBH-DR has had difficulty disbursing due to the lack of clarity in the Regional Apparatus Organisation (OPD) managing the DBH-DR (Pattiro, 2019). After recentralisation of forestry affairs to the provincial level, there is no longer an OPD mandated for forestry affairs at the district. Therefore, based on instructions from the MoF Regulation No. 230/2017, the regent (*bupati*)/mayor appoints certain OPD to carry out activities from the remaining DBH-DR funds. For example, the *Bupati* of Kubu Raya appointed the Regional Disaster Management Agency (BPBD), the *Bupati* of Ketapang appointed the Department of Housing, Settlements and the Environment, and the *Bupati* of Melawi appointed the Department of Environment

and BPBD (Pattiro, 2019). In the latest regulation (MoF Regulation No. 216/2021), the *bupati*/mayor may establish a secretariat or appoint a coordinator to manage the use of the remaining DBH-DR for synchronisation and coordination of activity implementation.

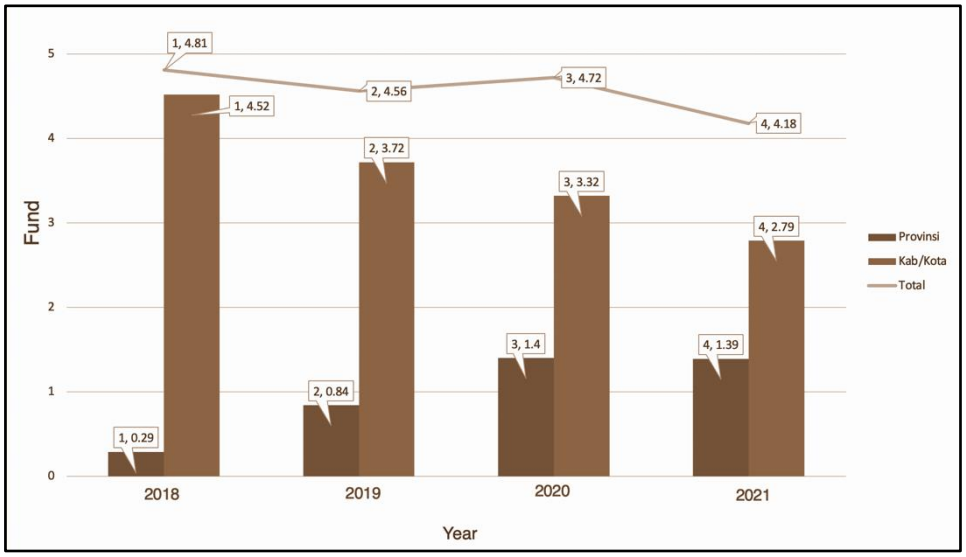


**Figure 3.7. Definitive DBH-DR Remaining Chart for 2018–2021**

In 2022, DBH-DR of 656 billion rupiah will be channelled to the DBH-DR producing provinces. Of all DBH-DR producing provinces, Central Kalimantan Province received the largest allocation of DBH-DR, amounting to 208.6 billion rupiah (or 31.81% of the total DBH-DR in 2022) (see **Figure 3.8**). The size of the DBH-DR allocation for the province of Central Kalimantan is directly linked to large-scale wood production by Forest Concession Rights. Central Kalimantan is the largest timber producing province in Indonesia and in 2017, wood production reached 1.98 million $m^3$ with a production value of more than 3 trillion rupiah (USAID, 2020).

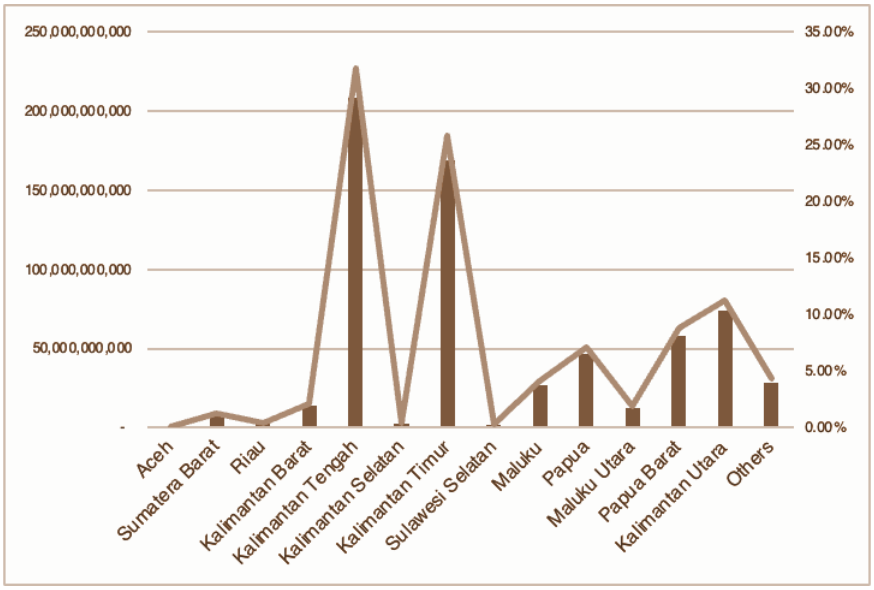


**Figure 3.8. DBH-DR Allocation in 2022**

#### 3.2.3.4. Special Allocation Funds (DAK)

Special Allocation Funds (DAK) are funds sourced from the National State Budget and allocated to certain regions with the aim of helping fund special activities in regional affairs in accordance with national priorities. The use of DAK in the forestry and environmental sectors is regulated through MoEF Minister Decree No. 68/2017. This regulation states that DAK targets in the forestry sector are aimed at reducing degraded land, improving FMU management quality, supporting Tahura, and invigorating urban forests, as well as increasing the productive economy of local communities through forest farmer groups and local businesses. The location of priority areas for DAK recipients are areas that have categories of highly degraded and degraded land, including in high priority watersheds (15 priority watersheds) and watersheds prone to floods, landslides, and droughts. Forest and land rehabilitation is carried out through greening initiatives and civil-technical works in FMU work areas, Tahura, urban forests, and community forests.

#### 3.2.3.5. Foreign aid and development assistance

Foreign loans and grants assist in financing FRR initiatives by supporting state budget limitations in meeting overarching goals. Support is obtained from various sources, both bilateral and multilateral. Most foreign development assistance projects are implemented through MoEF. However, since MoEF is under the CM of Maritime Affairs and Investments, the CM also plays a key role in guiding foreign development assistance funds, especially for mangrove rehabilitation. Currently, the CM is exploring cooperation with the World Bank, South Korea, Germany, and Denmark in mangrove rehabilitation activities. It has signed an implementing agreement with the United Arab Emirates (UAE). The output of UAE assistance is designed to assist in the rehabilitation of 10,000 ha of mangroves. Indonesia and the UAE have agreed to work together in the development of mangrove ecosystems, not only in terms of rehabilitation at the site level but also research and capacity building on blue carbon potential. Indonesia also began cooperation with KfW Germany in the construction of the World Mangrove Center. This Centre will be built in several provinces in Indonesia to serve as an exhibition for visiting countries. In addition, the CM is also exploring cooperation with the World Bank on a fund that would be managed by the Environmental Fund Management Agency (BPDLH).

The Forest Programme III is one of the largest, which is an initiative funded by the German Federal Ministry of Economy and Cooperation Development (BMZ) through their financing body KfW. This grant is valid from 2017 to 2023 with funds amounting to USD 151.8 million to finance forest rehabilitation and conservation of forest resources (Bappenas, 2020). This activity is part of the REDD+ framework in Central Sulawesi (see more on REDD+, below). Specifically for FRR activities, this programme focuses on the Miu, Gumbasa, Wuno, Bambamua and upstream Lariang sub-watersheds which are part of the Lore Lindu landscape (DG KSDAE, 2017). Rehabilitation efforts are carried out through a framework of supporting the development of mixed natural forests. Funding for FRR includes not only implementation activities at the site level, but also institutional strengthening and research strengthening activities, for example research projects funded by Komatsu and others (see **Table 3.13**).

## Table 3.13. Foreign loans and grants for FRR 2014–2024

| Donor | Project Name | Effective Date | Value of grant/loan (Million USD) |
|---|---|---|---|
| KfW | Forest Programme III: Sulawesi Collaborative Integrated Management of the Lore Lindu Landscape | 28 November 2017 - 31 December 2023 | 151.8 |
| ITTO | Accelerating the Restoration of Cibodas Biosphere Reserve Functions through Proper Management of Landscape Involving Local Stakeholders | 9 January 2018 - 31 July 2021 | 0.6 |
| ACIAR | Improving Community Fire Management and Peatland Restoration in Indonesia | November 2017 - December 2021 | 0.5 |
| KfW | Forest Programme I: Forest and Climate Change Programme (Forclime) | 19 October 2011 - 30 December 2020 | 24.7 |
| Komatsu | Follow up Research on Rehabilitation of Degraded Forest and Land | 2015–2018 | 0.13 |
| FAO | Promoting Forest Landscape Restoration in Selected Southeast Asian Countries | September 2016 - October 2017 | 0.1 |
| ITTO | Improving Forest Functions in Bengkulu Province through Community Participation in Rehabilitation Degraded Forest by Using Local Prospective Commodities | June 2015 - June 2018 | 0.3 |

Source: Bappenas

### 3.2.3.6. Funds for Reducing Emissions from Deforestation and Forest Degradation (REDD+)

Apart from foreign development assistance in the form of loans and grants, large potential funding has been envisioned through REDD+. REDD+ funds include a variety of mechanisms, the most prominent of which are rewards obtained by the Government of Indonesia for successful programmatic implementation. FRR is part of the REDD+ framework, managed by BPDLH (see box below). Several parties with stated commitments to channel REDD+ funds are the Green Climate Fund (GCF) (USD 103.78 million), the Government of Norway (USD 56 million), and the Forest Carbon Partnership Facility (FCPF) managed by the World Bank (USD 110 million). However, the Government of Indonesia terminated the REDD+ funding from Norway in 2021, but a new deal to curb deforestation was signed in 2022.[34] Active funding programmes include GCF and FCPF. Indonesia's

[34] See https://www.reuters.com/business/environment/indonesia-norway-plan-launch-new-pact-curb-deforestation-2022-09-12/

REDD+ result-based payments for the 2014–2016 period were approved by the GCF with an emissions reduction volume of around the equivalent of 20.3 million tons of carbon dioxide.

Regulations for REDD+ funding allocation were issued as DG BPDLH No. 07/BPDLH/2020. This regulation states that REDD+ funds can be accessed by beneficiaries (*adat* communities, social forestry community groups, government agencies, regional governments, NGOs, business entities, and/or educational or research institutions) and intermediary institutions. Beneficiaries can be appointed directly by BPDLH if specific programmes have been identified in accordance with BPDLH's disbursement plan. Intermediary institutions perform the allocation if the beneficiary is constrained in their financial management capacity. These intermediary institutions can be local governments, organisations/NGOs, non-bank financial service institutions, cooperatives, universities, and other legal entities.

**BPDLH, in brief**

BPDLH is an organisational unit under MoF with the mandate to collect, manage, and allocate environmental funds. BPDLH was established as an environmental funding agency with representation across various ministries/agencies to address the absence of international standard governance regimes and the absence of a flexible institutional mechanism (Fiscal Policy Agency, 2019). The management of this fund covers the fields of forestry, environmental services, marine and fisheries, energy and mineral resources, and other environmental fields. One of BPDLH's mandates is to collect and distribute REDD+ funding.

### 3.2.3.7. Financing from Carbon Trading

Funding opportunities for forest rehabilitation and restoration from carbon trading has also held great promise in Indonesia. The issuance of Presidential Regulation No. 98/2021 concerning the Economic Value of Carbon and derivative regulation in MoEF Regulation No. 21/2022 opens up opportunities for carbon trading in Indonesia. Carbon trading can be implemented through emission trading systems, crediting mechanism, carbon tax, and results-based payments. The proceeds from this market can be used to fund FRR. The issuance of this Presidential Regulation and MoEF regulation on the value of the carbon economy opens up opportunities for ecosystem restoration business holders to resume their carbon trading businesses, such as the Katingan Mentaya Project (KMP) by Rimba Makmur Utama (RMU).

### 3.2.3.8. Corporate Social-Environmental Responsibility

Funding for forest rehabilitation and restoration can also be obtained through Social and Environmental Responsibility (*Tanggung Jawab Sosial dan Lingkungan*)[35] funds from State-Owned Enterprises (BUMN) and Private-Owned Enterprises (BUMS). MoMAF coordinates

[35] This is Indonesia's version of what are commonly called Corporate Social Responsibility programs elsewhere.

cooperation with BUMN/BUMS on mangrove rehabilitation. In the first quarter of 2021, the CM of Marine Affairs and Investment convened several companies with the potential to support funding for mangrove rehabilitation. From the overall presidential target of rehabilitating 600,000 mangroves through 2024, the CM is requesting support for BUMN and BUMS to rehabilitate 100,000 ha. However, because the cost for mangrove rehabilitation is significantly larger than other forms of rehabilitation (the mutually agreed cost for mangrove rehabilitation is 20 million/ha), only 450 ha of mangrove rehabilitation were committed in 2021 from PT Pelabuhan Indonesia I, PT Pelabuhan Indonesia II, PT Pelabuhan Indonesia III, PT Pelabuhan Indonesia IV, the Association of Indonesian Palm Oil Entrepreneurs (GAPKI), the Association of Indonesian Forest Entrepreneurs (APHI), and the Association of Indonesian Biofuel Producers (APROBI). PT Pelabuhan Indonesia's commitment to mangrove rehabilitation is also in line with their target to transition to green port development through climate mitigation efforts. Apart from formal cooperation coordinated by the MoMAF, there are actually some forest rehabilitation and restoration activities carried out by the private sector that have not been recorded. These activities thus go unmonitored and excluded from documenting successes in the contribution of reducing degraded areas.

> *"The challenge is that of all the corporate responsibility programmes are not reporting their activities to the government because they don't know where to go. For example, like Pertamina: They have a programme to plant 1,000 mangroves and various other related initiatives, but we didn't know about it until recently. As a result, it is not recorded in the government's list of achievements"* - Deputy for Environmental and Forestry Management Coordination, CM of Maritime Affairs and Investment.

### 3.2.4. Technical Capacity

#### 3.2.4.1. Defining degradation and rehabilitation

MoEF Regulation No. 105/2018 j.o. No. 2/2020, sets forth the approach for FRR. Initiatives are carried out on: (i) degraded land based on a national indicative map, (ii) cleared land, namely vacant lands or land with shrub cover, or land with trees of fewer than 200 stems per hectare referring to the land cover map, or (iii) burnt land based on the forest and land fire map. The determination of priority locations is assessed based on two main considerations, namely level of degradation and watershed conditions.

Degraded land is defined as an area that has experienced a decline in its overall functioning, specifically around the production and capacity for regulating water management. Degraded land categories are applied within or outside state forest zones. Degraded land indicators were prepared by DG PDAS-RH and then used as a guide for the Center for Watershed Management and Forest Rehabilitation to conduct mapping of degraded lands. Degraded land indicators consist of land cover, slope, level of erosion, and management aspects (assessed by the presence or absence of area boundaries, existence of forest protection activities, presence or absence of extension services) with different weights applied depending on land status.

### 3.2.4.2. Mapping degraded lands

Degraded land mapping is carried out using satellite imagery in state forest zones (protection forests, production forests, and conservation forests) and non-forest zones, including on dry lands, peat, and mangroves. Specific to peat ecosystems, indicators that determine the level of peat degradation[36] include canopy density, duration of inundation, and peat soil subsidence. Mangrove level of degradation and determination of rehabilitation priority locations uses a very different approach (explained separately, below). The resulting degraded land map is then overlaid with a map of watershed conditions. Determining categories of watershed conditions are broadly divided into two, namely watersheds that need to be restored, and watersheds that need to be maintained. Priorities of forest and land rehabilitation activities are those located in “highly degraded” and “degraded” areas, which overlap with areas deemed as watershed restoration priority areas. In addition to these two considerations, accessibility also determines FRR priority areas, which are determined by DG PDAS-RH and further triangulated through ground checks by the Centre for Watershed Management and Forest Rehabilitation (BPDAS-RH).

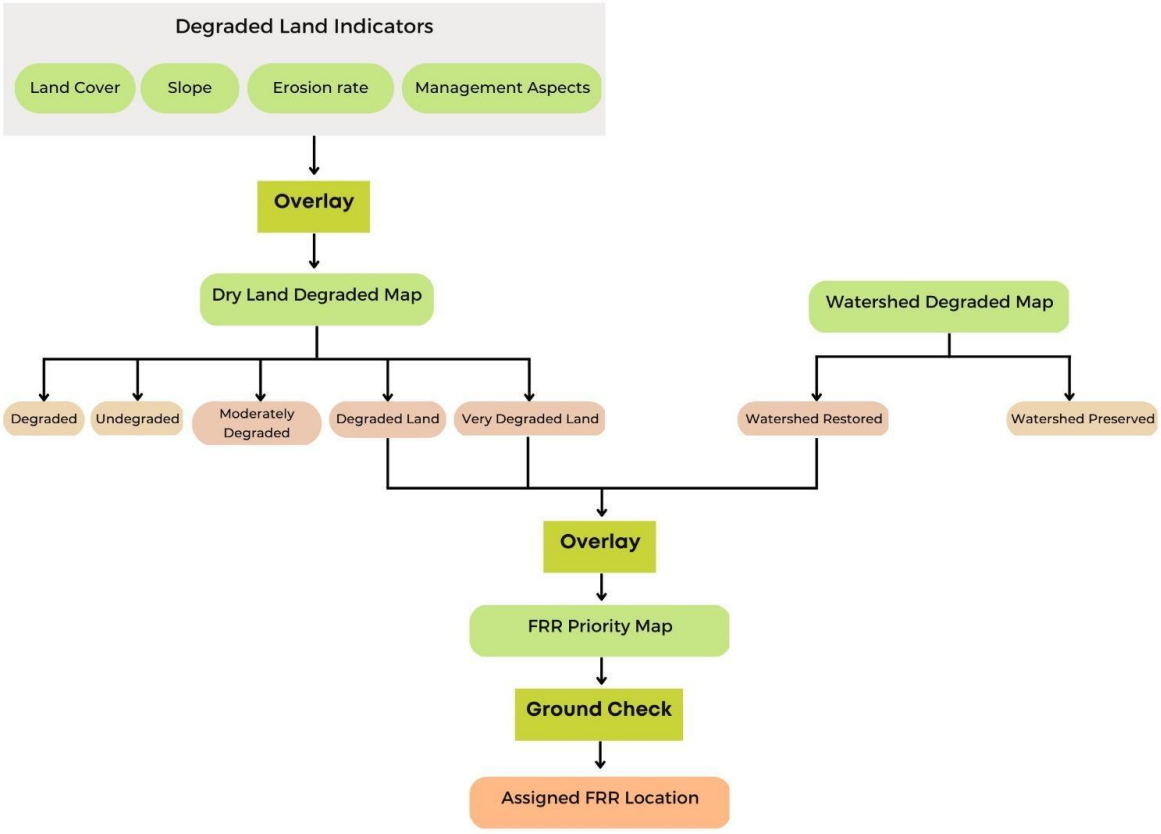


**Figure 3.9. FRR Priority Determination Flowchart**

[36] MoEF Regulation No. 12/2012

Determining degraded land areas has also improved through technological developments. Prior to 1998, there were no standard criteria for degraded land. The first standard criteria[37] led to technical guidelines for spatial data on degraded land in 2013. These criteria continue to be revised to improve the accuracy of spatially based degraded land determination. For example, before 2018, savannah was included in the degraded land category but given ecological considerations have now been excluded.

The use of satellite imagery alone in determining degraded land can be misleading. MoEF also relies on site-based knowledge through the Centre for Watershed Management and Forest Rehabilitation (BPDAS-RH), which serves as site-level managers to verify satellite imagery results. For example, satellite images indicated a location near Lake Toba as dry land agriculture. However, a ground check reclassified the location as a meadow. As a corrective action, DG PDAS-RH sharpened high-resolution images and continues to improve BPDAS-RH ground check guidelines for determining degraded land.

#### 3.2.4.3. Prioritising rehabilitation interventions

The designation of degraded land provides a portrait of a condition, and FRR serves as the policy response to address degradation. Nevertheless, identifying degradation and proposing FRR creates challenges for policy translation. For example, if there are 14 million ha of degraded land, then the assumption is that the same amount of land must be rehabilitated. Furthermore, degraded land designations may be located in areas where rehabilitation is no longer possible (e.g. dense settlement areas). Approaches to mapping degraded land is therefore very important in determining what form of rehabilitation activities can be carried out at a given location. For example, in one Central Java watershed (Kedawung), the mapping of dense forest cover might overlook the high rates of erosion taking place in the understory, indicative of degraded conditions. Therefore, rehabilitation at this site pursued soil conservation techniques rather than reforestation efforts.

#### 3.2.4.4. Emerging focus on mangroves

In 2021, the release of a national mangrove map provided reference for determining priority mangrove rehabilitation sites. This map classified mangroves based on two factors, namely mangrove density and habitat restoration potential. Density considerations classify mangroves into dense, medium, and sparse categories. Meanwhile, habitat restoration potential classifies mangroves into abraded areas, abraded mangroves, open land, ponds, and accretionary land (see **Table 3.14**). In addition to the two categories of density and restoration potential, mangrove rehabilitation locations also take into account non-physical aspects, such as accessibility, tenure conflicts (competing claims over land), national strategic objectives (whether the land is used for other national strategic objectives such as aquaculture development policies), and others.

[37] SK No. 41 of the Directorate of RLL Program Development in 1998 about Technical Guidelines for RTL-RKT

## Table 3.14. Mangrove classification in the national mangrove map and corresponding initiative

| Conditions of land cover in mangrove ecosystems | Definition | Programmatic initiative |
|---|---|---|
| ***Based on cover density*** | | |
| Dense Mangroves | Cover density>70%, | Mangrove ecosystem conservation |
| Medium Mangrove | Cover density 30–70% | Improved community welfare |
| Sparse Mangrove | Cover density <30%. | Rehabilitation (planting with enrichment pattern) |
| ***Potential of mangrove habitat*** | | |
| Open land and accretion | • Open land is land without mangrove cover but associated with mangrove ecosystems (in coastal areas or around river mouths that are affected by tides)<br>• Suspended sedimentation land is land without mangrove cover, in the form of mud deposits that occur naturally due to marine or fluvio-marine processes, and are located in mangrove habitats. | Rehabilitation (pure cropping pattern or spaced clump pattern) |
| Shrimp Ponds | Land developed for the purpose of aquaculture or salt, which is drained/filled with brackish/sea, which was previously identified as a mangrove ecosystem | Rehabilitation with *silvofishery* approaches |
| Abraded Mangrove | Part of the mangrove habitat was previously overgrown with mangroves, which was then lost due to marine processes such as wave power or ocean currents | *Sediment traps* |

Source: National Mangrove Map, 2021

# 4. A discussion on the progress and challenges of FRR

The policy and institutional challenges of FRR in Indonesia are multiple and complex. Like elsewhere around the world, Indonesian FRR programmes are overwhelmingly guided by land area designations and tree planting targets. This runs counter to research on FRR best practices, which call for going beyond hectarage indicators. Best-practice principles for FRR were presented at the outset of this report. FRR would ideally be rooted in sound ecological fundamentals that also fulfil principles of representation and engagement, and be pursued through multistakeholder arrangements, targeted site-selection mechanisms, and adequate capacity development. Successful approaches are ones that continue to learn, evolve and adapt. Fulfilling these principles in FRR initiatives has proved difficult in Indonesia as well as around the world.

Indonesia's ambition to make progress in expanding FRR initiatives is a welcome signal to the potential opportunities for ecological restoration, sustainable development and climate mitigation. At the highest levels of Indonesia's institutions, FRR is given political visibility and policy priority. This has long been on display at the United Nations Climate Conferences and took centre stage at Indonesia's November 2022 hosting of high-level G20 dignitaries. President Widodo continues to push for Indonesia's institutions to be a pioneer in LULUCF carbon mitigation and is a leader in blue carbon initiatives for mangrove restoration.

High-level commitments also translate into institutional programming through formal plans and budget allocations, which coalesce in the FoLU Net Sink Operational Plan. Indonesia has also taken major steps to modernise its mapping technologies, systems and institutions, a prerequisite for successful FRR implementation. There are encouraging steps towards coordination within, between, and beyond ministries. One encouraging sign is the development of a wetland management coordination team, improving the challenge of working across ministries. The Coordinating Ministry of Maritime Affairs and several DGs within MoEF are also working to involve the private sector through their corporate responsibility mandates. Finally, FRR also features prominently, albeit symbolically, in the designs of Indonesia's new capital development (IKN), with plans to build a green city inclusive of modern nurseries in East Kalimantan.

Amidst this growing momentum on FRR, the remaining subsections in this chapter identify a set of policy barriers and institutional challenges that must be overcome to significantly improve the quality and overall progress of FRR in Indonesia. These findings subsequently guide the policy recommendations listed in Chapter 5.

## 4.1. Programme quality challenges across large FRR area targets

### 4.1.1. Planning instruments and longer-term visioning

As the backbone of the FOLU Net Sink 2030 Operational Plan, FRR targets have shifted in scope from dryland initiatives to high-carbon wetland ecosystems. The Indonesian

Government has expanded classical FRR initiatives to focus on mangrove rehabilitation targets totalling 600,000 ha, and peat restoration of 1.5 million ha by 2024. Establishing the social and ecological conditions for successful FRR, however, requires time and careful planning for continued success. Initiatives must link to broader conservation efforts and strategically select degraded landscapes to target for restoration. On the one hand, the more classical dryland restoration initiatives appear to be less of a focus, while on the other hand, the Government's push to pursue ambitious wetland area targets has led to documented challenges in ensuring programme quality from the perspective of forest and landscape restoration (see chapter 3.1).

Increasing hectarage targets do not automatically translate into FRR success. Examples of implementation difficulties in FRR areas are provided throughout this report, and risks to sustainability were widely reported in the 2020–2021 PEN-funded mangrove restoration initiatives. PEN initiatives covered planting costs as a disbursement scheme without considering continued maintenance programming. Successful FRR must be linked to sound site selection, project preparation and implementation teams, and post-planting activities. Programme managers at various levels repeatedly expressed the need for site-level commitments beyond the planting phase. Budgets for longer-term implementation, however, are limited. As a result, commitments appear overly ambitious, jeopardising achievement of future policy targets. With increasing targets, policymakers face difficult choices over site selection, planting, maintenance, and other considerations relative to meeting programmatic goals. A successful long-term vision is one that understands and responds to the complexities of a given place.

### 4.1.2. Financing dilemmas and unmet opportunities

FRR funding is obtained from state budgets, international donors and private companies (see Chapter 3.2.3.). Although seemingly large in comparison to other budget allocations, relative to their mandate, FRR funds fall well short of financing needs, especially in terms of post-planting support. Research confirms the low survivability percentage of tree planting in Indonesia, pointing to the importance for innovation and commitment (Boer, 2016). Policymakers find it much easier to allocate planting budgets, as longer-term support garners less visibility and implies high costs. Post-planting is most effective through community capacity building and support, and supportive monitoring and evaluation mechanisms. Initiatives to unlock international-national-subnational partnerships could help to leverage costs and different governing scales.

In addition to state budget allocations, the promise of carbon trading to address financing gaps has not been met. Policies and mechanisms are still being formulated. The lack of traction on clear financing instruments is a lost opportunity and erodes trust in institutions over time. The issuance of a presidential regulation on the economic value of carbon opens up new opportunities for FRR funding in Indonesia. Carbon trading opportunities are presently possible through ecosystem restoration enterprises. However, of the 16 ecosystem restoration enterprises in Indonesia, only three companies are operating under a carbon credit business model. There is awareness of these regulatory barriers, and some progress has been made in the form of a presidential regulation and ministerial regulations.

### 4.1.3. Lack of FMU authority as site-level manager

Site-level managers play a key role in ensuring sustainability. Currently, MoEF tasks the Centre for Watershed Management and Forest Rehabilitation (BPDAS-RH) with FRR technical implementation, but its mandate only includes watersheds. To enhance FRR programme quality, a management unit would need a smaller area to more effectively assist FRR implementation and monitoring. Strengthening the role, authority and capacity of FMUs provides a strategic opportunity for enhancing site-level management, given relative FMU proximity to FRR sites. After the enactment of Law No. 23/2014, FMUs enjoyed a period of increased responsibility in implementing FRR at site level. However, after the issuance of the Job Creation Law and its implementing regulations,[38] FMUs underwent a functional change. The interpretation of Government Regulation No. 23/2021 suggests that FMUs are a structural organisation with a facilitation function, effectively undermining their authority in planning and implementation. Reducing FMUs' role not only jeopardises the opportunity to empower local authority in overseeing FRR, but it also weakens the ability to convene communities and get buy-in among local stakeholders, a key feature of successful long-term FRR.

## 4.2. Regulatory challenges

### 4.2.1. Lack of supportive regulations and uncertainty in the regulatory landscape

The regulatory framework could be enhanced to better ensure social and environmental protection, allow rehabilitation in national parks and reserves when needed, and promote working with communities.

Social and environmental protection: The Job Creation bill was introduced to address the overly complex policy enabling environment and bureaucratic inertia in Indonesia. However, the bill has raised concern among civil society organisations for its potential to undermine social and environmental safeguards. Finding the right balance between policy clarity, bureaucratic efficiency, and social and environmental protection will pave the way to building trust in FRR institutions.

Rehabilitation in national parks and nature reserves: Section 3.2.1 described the regulatory limitation that rehabilitation cannot be carried out in the core zones of national parks and nature reserves.[39] In some cases, however, rehabilitation in these core zones is needed, such as in the aftermath of natural disasters, because of the presence of invasive species or other factors. The natural disaster at Cyclop Nature Reserve presented precedent for pursuing such an intervention, but national regulations have not yet been developed.

Working with communities: In FRR, incentives are provided directly to the community for planting and maintenance activities. However, social forestry prohibits cash incentives. Overcoming these competing mandates would require planting and maintenance activities to be incorporated into technical guidelines to enable target communities to benefit from FRR

[38] Government Regulation No. 23/2021
[39] Government Regulation No. 26/2020 concerning Forest Rehabilitation and Reclamation

incentives, such as planting and maintenance wages. There is growing precedent for such a mechanism.

### 4.2.2. Inconsistent definitions

Competing and overlapping definitions affect jurisdictional issues and mandates. Concepts and definitions are often misconstrued or lack clarity. There are many dimensions to the origins, and continuing developments of this issue is presented in section 3.2.1. One example are the overlapping definitions of forest rehabilitation and reclamation.10 As a result, many directorates in DG PDAS-RH have unsynchronised mandates and work programmes, as is further articulated below. Therefore, improving clarity across concepts issued in various regulations and their subsequent implementation guidelines could help to actively cultivate space for better coordination and supports more responsive support to on-site conditions.

## 4.3. Siloed processes and coordination challenges

### 4.3.1. Unclear, competing, and overlapping roles within MoEF

Overlaps occur within the scope of MoEF DGs and Directorates. The bureaucratic overlaps among DGs originate from the two nomenclature divisions at MoEF. The first is the division of authority based on jurisdiction. Jurisdictional authority is split across three MoEF DGs, DG PHL, DG PDAS-RH, and DG KSDAE (Maryudi et al., 2022). The second is thematic, interpreted from emerging forestry and environmental priorities, which drives the mandates of DG PSKL and DG of Climate Change.

The fundamentally different approaches between jurisdictional and thematic authority create numerous challenges for coordination, which affect plans, budgets, and implementation. DG PDAS-RH maintains the main authority in FRR but due to jurisdictional issues, DG KSDAE and DG PHL also take part in regulating conservation and production forests. FRR guidelines on implementation and assessments in conservation forests are under the authority of DG KSDAE, while monitoring and evaluation in former Forest Concession Rights and Industrial Plantation Forests are regulated by DG PHL. As a result, each DG has different funding allocations based on programmatic outputs and targets, creating fundamental barriers to coordination.

In addition to mandates, each bureaucracy also has different working arrangements and incentives. For example, chapter 3 highlighted the growing interests among stakeholders to integrate FRR programmes into social forestry programmes. This could be strategic due to the growing concerns about longer-term FRR sustainability and the growing awareness about the role communities play in FRR success. However, discrepancies over mechanisms between competing DGs create barriers and missed opportunities to partnering with and empowering local communities. This was discussed in the divergent interpretations of community incentives for rehabilitation in DG PDAS-RH that differ from social forestry at DG PSKL.

### 4.3.2. Disjointed and unsupportive mandates across ministries and subnational entities

Most FRR takes place with minimal interagency coordination (Nawir et al., 2022). This is largely due to competing and overlapping mandates, whereby agencies frame and express objectives in different ways (see chapter 3.2.2). Across agencies, overlapping authority and unclear interpretations and practices among BRGM, MoEF, and MoMAF in mangrove rehabilitation are clear examples of coordination challenges. MoEF and BRGM are mandated to carry out rehabilitation in state forest zones, while MoMAF rehabilitates coastal area non-forest zone mangroves. However, implementation shows activities taking place in overlapping work areas. Even BRGM, which is mandated to focus on nine priority provinces, has expanded its working areas to all provinces in Indonesia in 2021 due to the difficulty of finding degraded mangrove areas for rehabilitation.

Addressing overlapping work locations and programmes is the main reason why the CM of Maritime Affairs and Investment has stepped into the role of coordinating mangrove rehabilitation. Inter-ministerial coordination influences funding allocations and accountability. For example, there is no line item budget allocation for MoEF or BRGM to construct wave breakers but wave breakers help reduce planting failures in areas with high tidal fluctuations. Funding for wave breakers are only accessible in MoPWH budgets. It remains to be seen whether coordination efforts can address these challenges and help to achieve targets.

Local governments have the mandate to conduct FRR in certain areas, and can apply for DAK budgets if their area is classified as degraded or highly degraded land. Local governments can also support the national government by incorporating national FRR programmes into regional spatial plans. However, Chapter 3 noted a certain instance in Nusa Tenggara where local government policies served as a disincentive for pursuing FRR. There are many opportunities to transform disincentives into mechanisms that help reshape national-subnational support streams.

## 4.4. Long-standing land dilemmas and unequal terms with local communities

### 4.4.1. Unclear land status

In most locations, any discussion on FRR must be viewed through the prism of unclear, overlapping and conflicting land status (see chapter 3.2.4). The legacy of land enclosures and development programming since the colonial era often meant that forest management took place through the enclosure of ancestral, inherited, swidden, or community land (Anderson, 1983; Peluso, 1992). Land tenure in Indonesia is arranged by a complex combination of traditional (customary), formal and informal arrangements; and unclear land status or state/corporate enclosures impact local livelihoods and sow conflict (Riggs et al., 2016). In the Jokowi era, there have been attempts to resolve clarity of land status through agrarian reform (*Reforma Agraria; Tanah Objek Reforma Agraria* / TORA), land certificates and social forestry programmes. However, there is growing concern on the extent to which the way land rights recognition serves to empower local livelihoods and support conservation outcomes.

### 4.4.2. Lack of community involvement

Encouraging signs point to FRR beginning to involve local communities more meaningfully through social forestry initiatives. This could be one pathway for resolving the fraught issues of land status and tenure, while also innovating ways to support local livelihoods and forest restoration. Doing so requires community representation in sufficiently robust forms, and more accountability mechanisms through Village Forest Management Institutions, Forest Farmers Groups, or Customary Forest Community Groups.

Examples of FRR community partnerships were implemented in mangrove planting initiatives supported by PEN funds during the COVID-19 pandemic, but these were more part of a cash transfer rather than a committed long-term effort to restore and conserve forests. In addition, such programmes support planting initiatives and do not address the underlying tenure concerns of local communities, nor were there adequate funds to sustain local commitments. Without addressing these concerns, FRR integration into social forestry work plans will continue to face challenges. Bringing together initiatives that support local institutions, innovate and develop capacity, and establish pathways to encourage local communities to participate in mutually beneficial ways serves as a fundamental prerequisite for more sustainable forest and landscape restoration. Doing so must build on the opportunity for communities to be involved beyond just planting, but also in tending and monitoring, as well as innovating ways to directly benefit in the longer term.

## 4.5. Data management and monitoring issues

Data is an intersecting component of FRR that determines the extent to which policy targets are pursued and achieved. Much of data management and monitoring is increasingly dependent on satellite imagery and the different sources and use of such technologies. However, the way data management and monitoring is defined, identified and collected translates into key FRR processes. There is no clear approach to identifying degradation, nor is there a coherent process for determining priority areas for FRR. This impacts the extent to which FRR policy targets are met. These shortcomings are not for a lack of attention to the issue but rather due to the inherent challenges of regulating policy over dynamic landscapes across diverse ecological systems.

These challenges begin with the definitional issues of land classification and land-use change, and extend into the realm of monitoring FRR metrics for increased land cover. Degraded land is defined as an area that has experienced a decline in its overall functioning, specifically on its productivity and capacity relative to water resources. Degraded land indicators were prepared by DG PDAS-RH, consisting of land cover, slope, level of erosion, and aspects related to land management. The degraded land map is then used as a reference in determining which areas need to be restored. Meanwhile, data monitoring determines the success of an FRR initiative, which is measured by various institutions with their own indicators. For example, criteria for success differ between Bappenas and MoEF (in terms of inputs, outputs and outcomes). MoEF determines outcome indicators by measuring the area, number, and type of plants, as well as calculating the percentage of healthy plant growth. Its monitoring system, SIMONTANA, then uses satellite imagery data to assess FRR at a broader scale. Meanwhile Bappenas, uses the Satu Alas satellite imagery interface to focus on higher-level indicators around increase in forest cover. Their

different mandates and competing systems and processes has caused confusion over siting and targets.

Specific to mangrove ecosystems, the government has developed a one map mangrove (satu peta mangrove) that maps degraded mangrove land and develops various approaches to rehabilitation. Monitoring biophysical conditions of mangroves is determined by mangrove density, classified into dispersed mangroves, medium mangroves, and dense mangroves. To date, monitoring the success of rehabilitation (including mangroves) is only measured from a biophysical perspective, with less attention on community benefits. Mapping and prioritisation of degraded land suffers from ever-changing criteria. Criteria for degraded mangrove was revised such that definitional changes meant the extent of degraded mangrove areas declined.

There is yet to be an integrated monitoring and evaluation system to oversee and consolidate all FRR activities. Interviews highlighted the lack of reporting or recording of significant private sector corporate responsibility initiatives. The implications are that it is difficult to develop a picture of overall needs, interventions, and level of success. It also hinders opportunities for learning across different programmatic approaches.

# 5. Conclusion and Policy Recommendations

Forest Restoration and Rehabilitation (FRR) has drawn a lot of attention for its potential to mitigate greenhouse gas emissions and increase carbon sinks, while protecting the environment and supporting development outcomes. Although much scrutinised for its deforestation, Indonesia has become an ambitious pioneer in FRR activities. The preceding chapter highlighted some of the areas of success and potential areas of progress for FRR in the near and long term. The policy recommendations below directly extend from the five identified barriers to future success. These include, improving programme quality, enhancing the regulatory environment, facilitating better coordination mechanisms, addressing persistent land dilemmas, and improving data coordination and management. The table below presents specific steps forward.

## Table 5.1. Policy Recommendations

| Challenges | Recommendation |
|---|---|
| **1. Improve FRR programme quality** | |
| A. Establish planning instruments linked to broader planning and development processes | 1. Ensure restoration remains a priority in the 2024–2028 RPJMN and upcoming RPJP, linking to the FOLU Net Sink Operational Plan<br>2. Examine ways to introduce emerging Forest Landscape Restoration into FRR implementation<br>3. Introduce community socioeconomic analysis in determining FRR location and the potential to establish strong community partnerships. This can also help determine toolkits and approaches for selecting and continuing to improve FRR models (for example: in areas close to ponds, the silvofishery approach can be an alternative)<br>4. Build pathways that can provide direct and long-term benefits to communities from the mangrove rehabilitation program (for example food pathways from non-timber forest products, income pathways from ecotourism, and agroecological pathways from mangrove environmental services to prevent coastal erosion)<br>5. Balance ecological, economic, social, and cultural goals and objectives for sustainable FRR. |
| B. Increase FMUs or other local site planning, implementation, and coordination authority | 1. Empower FMUs to lead bottom-up coordination and execution of FRR at the site level (e.g. provide trainings to communities, compile data, monitor degraded land, lead land suitability analysis, and undertake meaningful steps to restore watersheds)<br>2. Support FMUs with resources, such as through the "*bakti rimbawan" (extension services traineeship)* initiative, which improves capacity to implement FRR<br>3. Assist FMUs in coordinating FRR with NGOs and companies. |
| C. Address barriers to financing and incentivise leveraging mechanisms | 1. Develop a detailed costing and budget plan for each stage of activities, from planting to monitoring, at each location to help |

| Challenges | Recommendation |
|---|---|
| | reassess longer-term outcomes relative to overly ambitious land area targets.<br>2. The most cost-effective and sustainable approach to ensuring lasting FRR success is through community buy-in (Fleischmann et al., 2020). Develop an incentive scheme for FRR through social forestry areas, for example by optimising funding of the Revenue Sharing Fund - Reforestation Fund (DBH-DR).<br>3. Develop schemes and guidelines for accessing funds from the Environmental Fund Management Agency (BPDLH) that can be used to finance FRR.<br>4. Encourage blended financing between public agencies and the private sector.<br>5. Develop mechanisms to better support the ecosystem restoration business model to help restore degraded production forest ecosystems. |
| **2. Improve the regulatory environment** | |
| A. Establish supportive regulations | 1. Review and synchronise regulations related to FRR with the national planning framework (RPJMN, RPJP, Net Sink FOLU).<br>2. Address key zoning and land-use issues. This will be especially helpful in, for example, overcoming sectoral boundaries for management and conservation of mangroves (Harsanto et al., 2021).<br>3. Encourage local governments to develop regulations that support FRR implementation and maintenance.<br>4. Provide incentives to local governments for successful FRR implementation (e.g. through the ecological fiscal transfer initiative). |
| B. Clarify definitions and address inconsistencies, integrating international best practice, transitioning FRR into FLR principles | 1. Clarify concepts issued in various regulations to actively cultivate the space for creativity and innovation based on site conditions.<br>2. Apply the principles of a landscape-based approach in the implementation of FRR to remove definitional boundaries, including: 1) encourage continual learning and adaptive management, 2) |

| Challenges | Recommendation |
|---|---|
| | approach issues based on the entry point of common concern, 3) work at multiple scales, 4) support multifunctionality, 5) actively convene and empower collaborative multi-stakeholder process, 6) support transparent logics of change, 7) clarify rights and responsibilities, 8) support participatory and user-friendly monitoring, 9) cultivate longer term resilience, 10) strengthen stakeholders capacity (Sayer et al., 2013) |
| **3. Increase coordination opportunities** | |
| A. Improve internal ministry processes | 1. Establish a FRR technical team consisting of technical directorates (within MoEF) with detailed duties and functions (led by DG PDAS-RH) |
| B. Enhance inter-ministerial processes and support subnational entities | 1. Establish an FRR working group at the regional level consisting of local governments, NGOs, and academics;<br>2. Improve incentives to involve local governments in FRR and ensure that they are aware of all the potential budgetary allocations that they can get if they support FRR (e.g. DAK, REDD+ funding, etc.);<br>3. Transform disincentives into engaged support mechanisms to help reshape national-subnational relations. |
| **4. Address land dilemmas and empower local communities** | |
| A. Fix persistent issues with land status and support mechanisms to resolve conflict | 1. Implement the *jangka benah sawit* as a rehabilitation strategy in areas where forest zones have been used for oil palm.<br>2. Implement a silvofishery strategy in areas close to community-owned ponds. |
| B. Establish continued incentive streams for communities | 1. Integrate the General Plan for Forest and Land Rehabilitation with the Social Forestry Work Plan, including mapping degraded land in Social Forestry areas. Identify areas across these plans to help formulate incentive mechanisms for community engagement. |

| Challenges | Recommendation |
|---|---|
| | 2. Provide rewards to communities who successfully carry out FRR (an indicator of success can be seen from an increase in forest cover).<br>3. Expand access to benefits for the community from FREE results (access to information, access to technology, access to finance, access to markets). |
| **5. Improve data management and monitoring** | |
| A. Improve overall definitions of degraded land, selection processes of FRR implementation, and monitoring of FRR interventions | 1. Add a spatial-based monitoring feature to the village level in SIMONTANA to monitor the addition of forest cover from FRR. Make it accessible to the community.<br>2. Provide an integrated reporting system to monitor FRR by all parties.<br>3. Provide clear guidelines and reporting mechanisms for companies interested in supporting FRR programmes.<br>4. Agree upon approaches to determining degraded land by combining satellite technology and ground-truthing. |

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# Annex

## Annex 1. List of interviewees

1. Directorate General of Watershed Management and Forest Rehabilitation, Ministry of Environment and Forestry
2. Directorate General of Natural Resources and Ecosystem Conservation (DG-KSDAE), Ministry of Environment and Forestry
3. Directorate General of Sustainable Forest Management, Ministry of Environment and Forestry
4. Directorate General of Social Forestry and Environmental Partnership, Ministry of Environment and Forestry
5. Directorate General of Climate Change, Ministry of Environment and Forestry
6. Directorate of Forestry and Water Resources Conservation, National Development Planning Agency
7. Directorate General of Marine Spatial Management, Ministry of Marine Affairs and Fisheries
8. Directorate of Harmonization of Utilisation of Natural and Environmental Resources, Directorate General of Acceleration of Development of Disadvantaged Regions, Ministry of Villages, Development of Disadvantaged Regions, and Transmigration
9. Deputy for Environmental and Forestry Management Coordination, Coordinating Ministry of Maritime Affairs and Investment
10. Deputy for Education and Socialization, Participation and Partnership, Peat and Mangrove Restoration Agency
11. Ternate Melamo Watershed Management and Forest Rehabilitation Centre
12. Researcher of Centre for International Forestry Research (CIFOR) researcher
13. Senior Advisor to the Minister of Environment and Forestry
14. PT Ecosystem Restoration Indonesia

## Annex 2. List of legal instruments reviewed

| **Regulation** | **About** |
|---|---|
| Law No. 11/2020 | Job Creation Law |
| Government Regulation No. 23/2021 | Forestry Management |
| Government Regulation No. 26/2020 | Forest Rehabilitation and Reclamation |
| Presidential Regulation No. 98/2021 | Implementation of Carbon Economic Value for Achieving NDC Targets and Control of GHG Emissions in National Development |
| Coordinating Minister for Economics | Use, Monitoring, and Evaluation of Revenue Sharing Funds for |

| Regulation | About |
|---|---|
| Affair Regulation No.216/2021 | Natural Resources Forestry Reforestation Fund |
| MoEF Regulation No 23/2021 | Implementation of Forest and Land Rehabilitation |
| MoEF Regulation No. 105/2018 j.o. MoEF Regulation No. 2/2020 | Implementation Procedures, Supporting Activities, Providing Incentives, and Guiding and Controlling Forest and Land Rehabilitation Activities |
| Ministry of Forestry No. 48/2014 | Procedures for the Implementation of Ecosystem Restoration in Nature Reserves and Nature Conservation Areas |
| Ministry of Forestry No.12/2012 | Procedures for Formulating a Technical Plan for the Rehabilitation of Forest and Watershed Lands (RTK RHL-DAS) |
| Ministry of Forestry No. 61/2008 | Provisions and Procedures for Granting Business Permits for Utilisation of Ecosystem Restoration Timber Forest Products in Natural Forests in Production Forests through Applications |
| Ministry of Forestry No.70/2008 | Technical Guidelines for Forest and Land Rehabilitation |
| Ministry of Forestry No. 159/2004 | Ecosystem Restoration in Production Forest Zones |

## Annex 3. Terminology

| Terminology | Description |
|---|---|
| Damaged Forest | Damaged forest zones refers to forest destruction that occurs until the soil structure, while degraded forest has indicators of reduced ecological quality, such as decreased biodiversity. Thus, these two categories of areas have different treatment in RHL. |
| Degraded Land/Forest | According to the official website of the MoA, Indonesia does not yet have a legal definition related to degraded land, nor does the ministerial regulation.<br><br>However, degraded land is often considered to be defined as land that has decreased productivity, either temporarily or permanently. Physically, degraded land looks like empty land overgrown with shrubs. |

| Terminology | Description |
|---|---|
| Production Forests that no longer productive | Lack of productivity criteria is detailed in MoF Regulation No. 18/2004, as follows:<br><br>1) Core trees with a minimum diameter of 20 (twenty cm) are less than 25 (twenty five cm) stems/each hectare<br><br>2) Core trees are less than 10 (ten) stems/per hectare<br><br>3) Lack of natural regeneration, i.e.: a) Seedlings of less than 1,000 (one thousand) stems per hectare, and or b) Trees with a sapling level of less than 240 (two hundred and forty) stems per hectare, and or c) Trees at the pole level (polished) are less than 75 (seventy-five) stems per hectare. These points explain the technical criteria of lack of production forests which are generally in the form of shrubs, fields, reeds, and bare land.<br><br>However, the MoF Regulation No. 18/2004 is revoked by Government Regulation No. 6/2007. In this regulation, lack of productivity refers to bare land, reeds, and/or shrubs, without fields |

## Annex 4. Other Technical Guidelines for FRR

1. ITTO Guidelines for the Restoration, Management and Rehabilitation of Degraded and Secondary Tropical forests
2. Rehabilitation of Degraded and Potentially Deserted Forest Land by AfoCo
3. Guidelines for Forest Landscape Restoration in The Tropics by CIFOR
4. Forest and Landscape Restoration by FAO
5. Village Forest Management Planning Guideline by GIZ

Authors: Micah R. Fisher, Muhammad Haidar Daulay, Satrio Adi Wicaksono, Alice Bisiaux, and Erliza Cikal Arthalina

Cover photo: An oil palm agroforestry site in East Kotawaringin District, Central Kalimantan Province. The switch from oil palm monoculture to agroforestry represents an effort to restore the ecological function of the landscape. Photo credit: Satrio Adi Wicaksono, EFI



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