Forest Restoration Planning and Practice in the Asia-Pacific Region

Asia-Pacific Forestry Planning Network

亚太地区森林恢复规划与实践报告

新 华 出 版 社

图书在版编目(CIP)数据

亚太地区森林恢复规划与实践报告 : 英文 / 亚太森林恢复与可持续管理组织编.
-- 北京 : 新华出版社,2021.6
ISBN 978-7-5166-5911-3
Ⅰ. ①亚… Ⅱ. ①亚… Ⅲ. ①森林植被—恢复—研究
报告—亚太地区—英文 Ⅳ. ①S718.54
中国版本图书馆CIP数据核字(2021)第111887号

亚太地区森林恢复规划与实践报告
Forest restoration planning and practice in the Asia-Pacific region（英文版）

作者：亚太森林恢复与可持续管理组织
Asia-Pacific Network for Sustainable Forest Management and Rehabilitation

责任编辑：徐文贤
封面设计：李良

出版发行：新华出版社
地址 ：北京石景山区京原路8号
邮编：100040
网址：http://www.xinhuanet.com
经销：新华书店、新华出版社天猫旗舰店、京东旗舰店及各大网店

照排：自在本如
印刷：廊坊市博林印务有限公司

成品尺寸：170mm×240mm
印张：5　　**字数：**12400字
版次：2021年7月第一版　　**印次 ：**2021年7月第一次印刷

书号：ISBN 978-7-5166-5911-3
定价：45.00元

Acknowledgements

This report was prepared by Chen Yijue and Kong Zhe (Program Coordinator and Manager of the Communication and Outreach Division of APFNet's Secretariat, respectively).

The document has benefited immensely from economy reports prepared by seven APFNet members who participated in this activity under the APFNet Forestry Planning Network (FPN). We are very grateful for the wealth of information on forest restoration planning and the valuable lessons learned provided by the authors.

Contributions came from:

1. **Bangladesh:** Mohammad Zahirul Haque and Oli Ul Haque, Forest Department
2. **Cambodia:** Say Sinly and Tev Tep Kosal, Forestry Administration
3. **China:** Xie Hesheng, National Forestry and Grassland Administration
4. **Fiji:** Olivia Vakaloma and Osea Ratuyawa, Ministry of Forestry
5. **Indonesia:** Ubaidillah Syohih, Ministry of Environment and Forestry
6. **Nepal:** Deepa Oli and Ambika Khatri, Ministry of Forests and Environment
7. **Sri Lanka:** Dulip Somirathna and Hewayalage Upali Dias, Forest Department and Ministry of Mahaweli Development and Environment

Preface

The Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) is dedicated to advancing sustainable forest management and forest rehabilitation in the Asia-Pacific region. With 31 members, numbering 26 economies and five international organizations, APFNet strives to advance its mandate through policy dialogues, demonstration projects, information and knowledge sharing as well as capacity development programs.

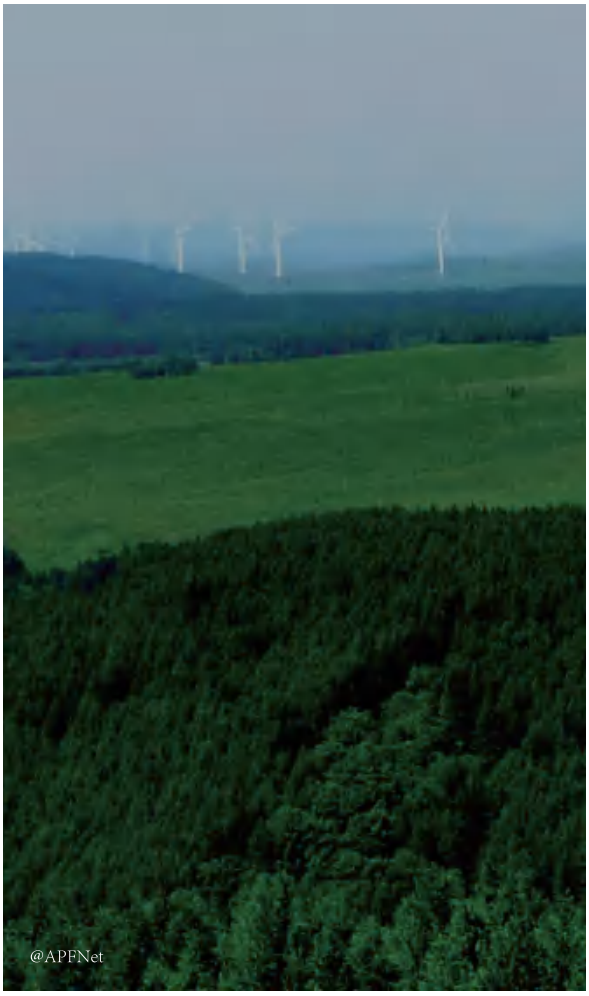
The Asia-Pacific Forestry Planning Network (FPN), initiated by APFNet in 2013, is an informal knowledge network that aims to strengthen economy-level forestry planning processes in the Asia-Pacific region through experience exchange, capacity development and the provision of technical support. Through various activities and workshops under the FPN platform, forestry planners and officials responsible for forestry strategy development have identified several challenges facing forestry planning, particularly economy-level restoration planning. They have proposed a number of activities to enhance

opportunities for the exchange of experiences and best practices, combined with cooperation on forestry planning, among member economies.

The 2019 Forestry Planning Network Workshop was held from 24 to 25 July 2019 in the People's Republic of China. During the workshop, participants exchanged experiences and perspectives on success stories in forest restoration planning and lessons learned in their respective economies. The workshop also collected economy reports on forest restoration practices from forestry planners to disseminate experiences on how restoration planning at the economy level is translated into reality. In this context, APFNet summarized and edited these reports for the publication of this document.

I am extremely grateful to everybody involved in the compilation of this report. I hope it will serve to inform the international community's desire to further understand forest restoration planning in the Asia-Pacific region.

Lu De
Executive Director
APFNet Secretariat


@APFNet

CONTENTS

Tables Figures Boxes

Tables

Figures

Boxes

Acronyms and abbreviations

ANR	Assisted Natural Regeneration
APEC	Asia-Pacific Economic Cooperation
APFNet	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
APL	Areal Penggunaan Lain (Other Use Areas)
BFD	Bangladesh Forest Department
BPDASHL	Balai Pengelolaan Daerah Aliran Sungan dan Hutan Lindung (Watershed and Protection Forest Areas Management Offices)
DJBPDASPS	Direktorat Jenderal Bina Pengelolaan Daerah Aliran Sungai dan Perhutanan Sosial(Directorate General of Watershed Management and Social Forestry)
CBFM	Community-based Forest Management
CDM	Clean Development Mechanism
CF	Community Forests
CFMC	Collaborative Forest Management Committee
CNY	Chinese yuan
DBH-DR	Dana Bagi Hasil Dana Reboisasi (Revenue Sharing from the Reforestation Fund)
DJPDASHL	Direktorat Jenderal Pengelolaan Daerah Aliran Sungai dan Hutan Lindung (Directorate General of Watershed and Protection Forest Management)
DPP	Department of Forest Plantations and Private Forest Development
ELC	Economic Land Concession
ERPA	Emissions Reduction Payment Agreement
ERPD	Emissions Reduction Program Document
ESIA	Economic and Social Impact Assessment

FA	Forestry Administration of Cambodia
FAO	Food and Agriculture Organization of the United Nations
FFHCOP	Fiji Forest Harvesting Code of Practice 2013
FPN	Forestry Planning Network
GESI	Gender Equality and Social Inclusion
IPPKH	Izin Pinjam Pakai Kawasan Hutan (Borrow and Use Permits)
KPHP	Kesatuan Pengelolaan Hutan Produksi (Production Forest Management Units)
KSA	Kawasan Suaka Alam (Sanctuary Reserve Area)
KPA	Nature Conservation Area
MAFF	Ministry of Agriculture, Forestry, and Fisherie
MPFS	Master Plan for the Forestry Sectors
NDP	National Development Plan
PES	Payments for Ecosystem Services
RDF	Reforestation of Degraded Forests
REDD+	Reducing Emissions from Deforestation and forest Degradation Plus
RHL	Rehabilitasi Hutan Dan Lahan (Forest and Land Rehabilitation)
SDG	Sustainable Development Goal
TNSP	Three-north Shelterbelt Program
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States dollar

Introduction

Context

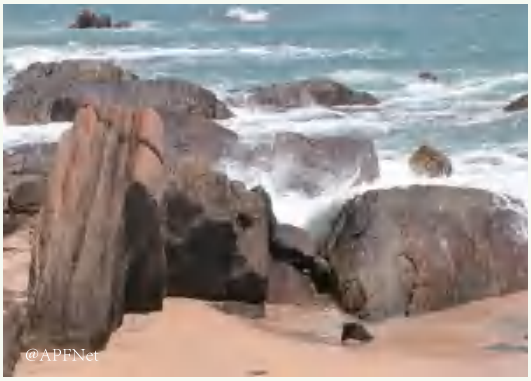
In recent decades, forest area expansion in the Asia-Pacific region has made remarkable progress in reversing the downward trend of global forest coverage. However, the overall increase in forest cover is largely driven by large-scale reforestation efforts in a few economies[1]. Economies in the region are still facing challenges such as deforestation and forest degradation, overexploitation of forest resources and poverty in forest-dependent communities, among other issues. According to estimates, over 500 million hectares (ha) of deforested and heavily degraded land in Asia and Oceania are in urgent need of recovery (FAO and APFNet, 2018).

Therefore, promoting forest restoration is still one of the top priorities in the region's forestry sector. Many Asia-Pacific economies have actively participated in various international and regional forest restoration-related processes, for instance the Sustainable Development Goals, Bonn Challenge, Asia-Pacific Economic Cooperation (APEC) 2020 Forest Cover Goal and so forth. Many economies in the region have also adopted forest restoration targets in their forestry master plans to support the efforts in meeting these commitments.

In this context, the APFNet Forestry Planning Network (FPN) searched for best practices on forest restoration planning in the Asia-Pacific region to reveal how forest restoration plans at the economy level are developed and implemented successfully. This report describes best practices on forest restoration planning from seven regional economies, sharing success stories and lessons learned. It endeavors to serve as a reference tool for future forest restoration efforts both

[1] Consistent with APEC terminology, government members of APFNet are referred to either as an 'economy' or 'economies'.

practices on forest restoration planning in the Asia-Pacific region to reveal how forest restoration plans at the economy level are developed and implemented successfully. This report describes best practices on forest restoration planning from seven regional economies, sharing success stories and lessons learned. It endeavors to serve as a reference tool for future forest restoration efforts both within and outside the region.



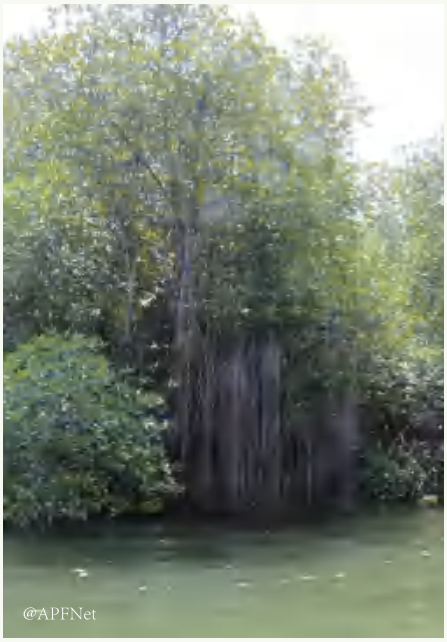
Purpose of the report

This report intends to:

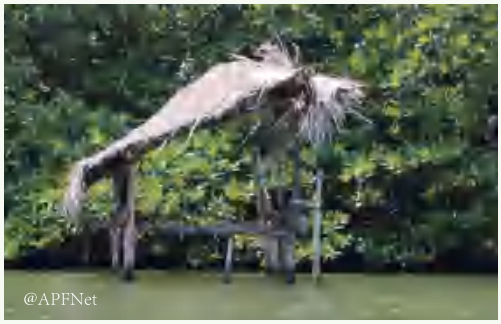
1) Share success stories and lessons learned on forest restoration planning at the economy level by explaining plan contents, implementation approaches and the final outcomes.

2) Provide a better understanding of the supporting environment created for successful forestry planning in different economies in terms of financial backstopping, human resource capacity, technical back-up and so forth.

3) Discuss how economy-level forestry planning can respond to global restoration goals and explore opportunities for future forestry planning in the Asia-Pacific region.



Methodology


@APFNet

The report is primarily based on the economy reports received. The APFNet member economies were invited to provide detailed information on their forest restoration policies and economy-level restoration plans and programs. An outline for their inputs was developed and distributed by the Secretariat on 23 May 2019 with a submission deadline of 20 July 2019. Bangladesh, Cambodia, China, Fiji, Indonesia, Nepal and Sri Lanka provided these reports.

Structure of the study

Section I discusses the important changes faced by the forestry sector in the economies concerned and how forestry strategic plans, especially forest restoration plans, respond to these changes; this provides an overview for understanding the trend in regional forestry planning. Some of the economies elaborate on how economy-level forestry planning responds to international restoration commitments. Section II presents economy cases of forest restoration planning and implementation at the local level.


@APFNet

Section I. Introduction

Important changes faced by the forestry sectorand how forestry strategic planning responds

Both forests and the forestry sector in the Asia-Pacific region are undergoing rapid changes in line with broader societal modifications. These impacts are generated by a wide range of societal drivers of economic, political, technological and environmental dimensions. To better understand the trends and transitions of forestry planning in the region and to evolve methodology for designing economy-level forestry plans, the seven economies in this document were asked:

• *What have been important changes in terms of forestry development priorities and challenges in your economy over the last 30 years?*

• *How have forestry strategic plans, especially forest restoration plans, responded to these changes?*

Bangladesh

The current forest management system in Bangladesh is undergoing continuous evolution to match changing needs and objectives. The traditional forest management system adopted during colonial times had several defects, which led to a bureaucratic- and revenue-oriented forest management structure that undermined local rights and indigenous knowledge. For a long time, local communities were isolated from the forest management system, so it failed to keep pace with increasing population and rising livelihood demands. The consequent exploitation of forest resources thus resulted in forest and forest land degradation as well as productivity decline. Concomitantly, burgeoning development needs led to large-scale infrastructure construction developments, which hindered horizontal forest cover expansion.

Consequently, since 1980, social forestry, which focuses on local people's involvement in forest restoration and management, has received increasing impetus as the most feasible strategy for long-term forest sustainability. In a move towards achieving a more participatory and community-focused forest management approach, a clear and positive trend in reforming the forest policy and institutional framework became noticeable in the early 1990s. The first Forestry Master Plan (1995-2015), which provided the operational basis for the functioning of the forestry sector in Bangladesh, clearly accommodated the concerns of participatory forestry.

In the same vein, the current National Forestry Policy (1994), however, is to some

degree different from the earlier policies. This policy views forestry within a broader framework of sustainable development, integrated rural development and poverty reduction. It seeks the participation of local people and pledges full government support and encouragement for all forms of public and private afforestation programs. Moreover, enactment of the Forest Amendment Act (2000) specifically underscored social forestry as one of the major focuses of the Forest Department in accordance with the National Forest Policy.

Poverty and high population density will have negative impacts on terrestrial and aquatic ecosystems in Bangladesh if no proper ways of cooperation are explored between the government and local communities. In order to ensure optimum land-use practices, preservation and management of natural resources, forest management is now increasingly embracing landscape co-management. In landscape co-management processes, decision-making rights are shared between central and local governments. This decentralizes decision-making and accountability and, ideally, exploits the strengths and mitigates the weaknesses of each level (Singleton, 1998). The government has enacted empowering policies and legislation, formulated and implemented the Protected Area Management Rules (2017) and also established appropriate community institutions for the co-management of forests and wetlands. Co-management practices have been implemented in 22 forest- and wetland-protected areas where local communities can not only access forests for natural resources to sustain livelihoods but also share the responsibilities of conservation to ensure ecosystem sustainability.

In the Seventh Five Year Plan (2016-2020), conservation of forest ecosystem biodiversity and addressing environmental sustainability and implementation of forestry development programs, with emphasis on climate change adaptation and impact mitigation, are important objectives for the forestry sector. To achieve these objectives, the following approaches have been taken:

- A moratorium on tree felling in natural forests has been imposed;
- Existing natural forests, denuded hills and scattered tree areas are divided into 'core zones' and 'buffer zones';
- Assisted Natural Regeneration (ANR) is applied to improve and conserve biodiversity in the core zone;
- Buffer zone productivity is intensified to meet local demand for forest products;
- Scientific management principles are strictly followed to restore productivity of forest lands;
- Enrichment planting and ANR are applied to improve forest quality and increase tree density.

Moreover, the Perspective Plan of Bangladesh (2010-2021) attaches high importance to raising the productive forest cover rate from 13 percent to 15 percent by 2021 and increasing productivity and balancing the ecological and economic functions of forests through further development of social forestry.

Box 1

Coastal afforestation and integrated coastal management

The government has given priority to the sustainable management of forests and tree resources in line with the SDGs. It has set a target of achieving a 16 percent (14 percent in 2015) forest cover rate by 2030. In this context, the government has adopted a number of initiatives including forest expansion along coastal frontiers in newly accreted lands, turning marginal and fallow lands (roadsides, railways and embankments etc.) into strip plantations and restoration of degraded and denuded forest lands through social forestry.

Since 1994, the National Forestry Policy of Bangladesh has acknowledged the need for massive plantation efforts and the maintenance and protection of forests in coastal areas to reduce the impacts of cyclones, tornadoes and tidal surges. It also stipulates that effective measures will be taken for afforestation in newly accreted ***chars**** *in coastal areas. A study recently conducted by the Center for Environmental and Geographic Information System (CEGIS) revealed that currently there are about 67 000 ha of newly accreted land available for plantation. These char lands will be under plantation program management by 2023.*

To achieve ***SDG 15****, targets of the Bonn Challenge and the APEC 2020 Forest Cover Goal, the Bangladeshi forestry sector's strategies and policies under the Seventh Five Year Plan have emphasized that plantation activities in the coastal zone will be intensified to strengthen climate change adaptation and impact mitigation initiatives. Selecting suitable plant species will receive special attention. Coastal afforestation and enrichment plantation will also be continued. Coastal plantations that have matured will be maintained to reinforce the greenbelt.*

** Tracts of land surrounded by the waters of an ocean, sea, lake or stream.*

*** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.*

Cambodia

During implementation of the NFP from 2009 to 2013, planting activities conducted by the FA in collaboration with private investment companies and small-scale household investments resulted in the establishment of 87028 ha of forest. During the same period, community forestry was promoted as well and the number of community forests in Cambodia increased from 402 to 457, encompassing around 400000 ha. Efforts were also initiated in anticipation of marketing carbon credits through an assessment of carbon markets in association with development partners and international organizations, as well as by means of the preliminary establishment of REDD+[2] pilot activities in selected community forests.

[2] REDD+:
Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks.

Notwithstanding these achievements, several remaining challenges must be resolved. One of the principal concerns is the continuing decline of forest area, which has resulted from recent increases in agricultural land use as the population has grown and the agricultural economy has expanded. The collaboration of appropriate authorities in resolving these challenges remains limited, especially with regard to preventing forest clearing and diminishing encroachment on demarcated forest areas.

Since 2014, the government has halted the provision of concession land to companies in order to re-examine the progress of all Economic Land Concessions (ELCs); evergreen forests in ELCs have been strictly protected. Permission has only been granted for degraded deciduous forest land to be cleared for crop cultivation. Withdrawing degraded lands that remain unplanted by ELCs from their domain is a policy that is being prioritized by government authorities at both central and provincial levels. Owing to ELC malfeasance in this context, many hundreds of thousands of hectares have been confiscated from some ELCs. Building partnership with the FA in investing in forest plantations, in the meantime, has been promoted and is prevailing in the private sector.

Cambodia's forest cover has undergone significant changes over recent decades. Between 1965 and 2014, Cambodia lost almost one-third of its forest cover, primarily due to civil war, social dislocations and the diminished role of forests in national development priorities. By 2006, Cambodia's forest cover had been reduced to 59.09 percent, declining further to 57.07 percent in 2010, with the most recent assessment in 2014 indicating that it had decreased to 49.48 percent.

In its ongoing forestry reform process, the Royal Government of Cambodia has strived to strengthen national forestry sector capacities. Practically, this has been addressed through the National Forest Program or NFP (2010-2029) pursued by the Forestry Administration (FA). The NFP emphasizes, in particular, the enhancement of good governance, improving forest and wildlife management as well as conservation practices, improving community forestry development, establishing and expanding plantations and reforestation programs, developing institutional capacities and human resources, and establishing secure sources of financial support.

The current NFP aims to promote the conservation, sustainable management and use of forest resources, and provides strategic orientation for the forestry sector in harmony with other sectors in Cambodia for the period 2010-2029, aligned with the government's strategic socio-economic development plans. Promoting plantation development is one of the key elements of the NFP. In this regard, the FA's efforts focus on promoting the concept of multipurpose planting, which has the potential to meet domestic timber needs, increase incomes of local communities and concurrently improve the environment through watershed protection and erosion control. It is important that such plantations are developed in line with market needs or possible future demands and consider various species for multipurpose planting in both long- and short-term rotations. It is also important to consider species that are indigenous and already utilized by local communities. Familiarity with a topic will lessen the possible adverse attitude that local villagers may have towards the NFP and encourage them to participate on a larger scale. This may

even promote private initiatives, where communities plant trees on their own or open land. The NFP, however, must include extensive training and awareness-raising activities for local communities, which may include technical knowledge on planting procedures, nursery maintenance and the sustainable management of plantations.

Box 2

Cambodia's efforts to increase forest cover in line with international obligations

Forest restoration projects and tree-planting activities in Cambodia play a vital role in maintaining and recovering forest land. They contribute to the target of rehabilitating 50000 ha of degraded forests each year as stipulated in the NFP and complying with SDG 15.

By 2030, Cambodia aims to reach a forest cover rate of 60 percent (UNFCCC, 2015). This will ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands. To accomplish such an ambitious target, as well as to respond to regional and global forest restoration goals, the area of reforestation in degraded forest and deforestation areas will encompass approximately 400000 to 500000 ha every year. The Forestry Administration of Cambodia has demarcated at least 53 restoration sites with more than 430000 ha of degraded forest land to be restored before 2030. However, unless it is firm in this commitment and financial contributions and continuous support are received from regional and global forest restoration projects, these goals may not be easily reached due to limited funding sources, technical assistance and supporting coordination mechanisms at policy levels.

China

In recent years, priority in China's forestry planning has shifted from timber production to strengthening ecological functions, mainly focusing on ecosystem services, biodiversity protection, ecological restoration of key areas, ecology protection, sustainable forest management, a national park-based nature reserve system and green industry and poverty reduction. The following actions have been taken to accommodate these changes.

The objectives of China's forestry development thrust have changed from solely focusing on expanding forest area to both quantity and quality enhancement for ensuring ecological security. Forest cover rate and forest stock volume are both included in the national five-year plan as binding indicators.

The development direction has shifted from timber production to ecological protection and restoration. Protection and restoration efforts have adopted a landscape approach which conserves and manages mountains, rivers, forests, farmland, lakes and grassland holistically.

When composing forestry strategic plans, China focuses on multidisciplinary integration in both the preparation and implementation processes. Another focus is combining 'top-down' and 'bottom-up' approaches, emphasizing the coordination

and participation of different stakeholders. A mid-term and terminal monitoring and evaluation mechanism is being established to monitor and assess the implementation and outcomes of the plans in the long term.

In terms of the implementation of forestry strategic plans, this has shifted from mainly relying on state resources and inputs to a concerted effort with government and social participation.

Box 3

China's responses to international commitments

Making an overview of regional and global forest restoration goals and incorporating key objectives and indicators into national forestry plans;

Determining the indicator value of China's forest restoration thrust based on the regional and global forest restoration index, combined with the status quo of China's forestry development, future development potential and social development needs;

In the process of formulating and implementing national forestry strategic plans, strengthening regional and global cooperation through the drives "introduce the ideas into China" and "share the experiences with the world"; these drives infer introducing advanced concepts and methods to promote sustainable forest management and forest restoration in China while also sharing China's successful technologies and models with other economies in terms of forest inventory preparation, planning and design of restoration programmes, shelterbelt construction, desertification control and so forth;

Promoting exchanges and mutual understanding in the fields of, inter alia, forestry development concepts, laws and regulations, policies, standards and technologies to jointly improve the capacity of forestry planning and contribute to achieving regional and global forest restoration goals.

Fiji


@APFNet

In the past, Fiji' s forestry priorities targeted harvesting due to the large stocks of mature forests available and developments in other sectors. The plantation areas in Fiji increased from 1990 to 2005 owing to expansion of mahogany and pine planting for timber export.

Being aware of the need to increase forest cover to, inter alia, mitigate climate change impacts, address food security and improve water quality, the focus of forestry development began a shift towards forest restoration for long-term conservation purposes. Fiji developed its Forest Policy in 2007 to drive forestry sector development and strike a balance between harvesting and conservation. Concomitantly, a draft legislation has been developed to supersede the 1992 Forest Act and also ensure full implementation of the 2007 Forest Policy on the ground. The Fiji Forest Harvesting Code of Practice 2013 (FFHCOP) also ensures that sustainable logging is carried out. Components of environmental impact assessments are also embedded in the FFHCOP to ensure that the natural status of forests remains relatively pristine. REDD+ was introduced into Fiji in 2009 to prepare the country for developing a carbon trading strategy. The Emissions Reduction Program Document (ERPD) was presented to the World Bank Fund Management Trust in July 2019 and was accepted. Fiji will start negotiating the Emissions Reduction Payment Agreement (ERPA) with the World Bank in September 2019.

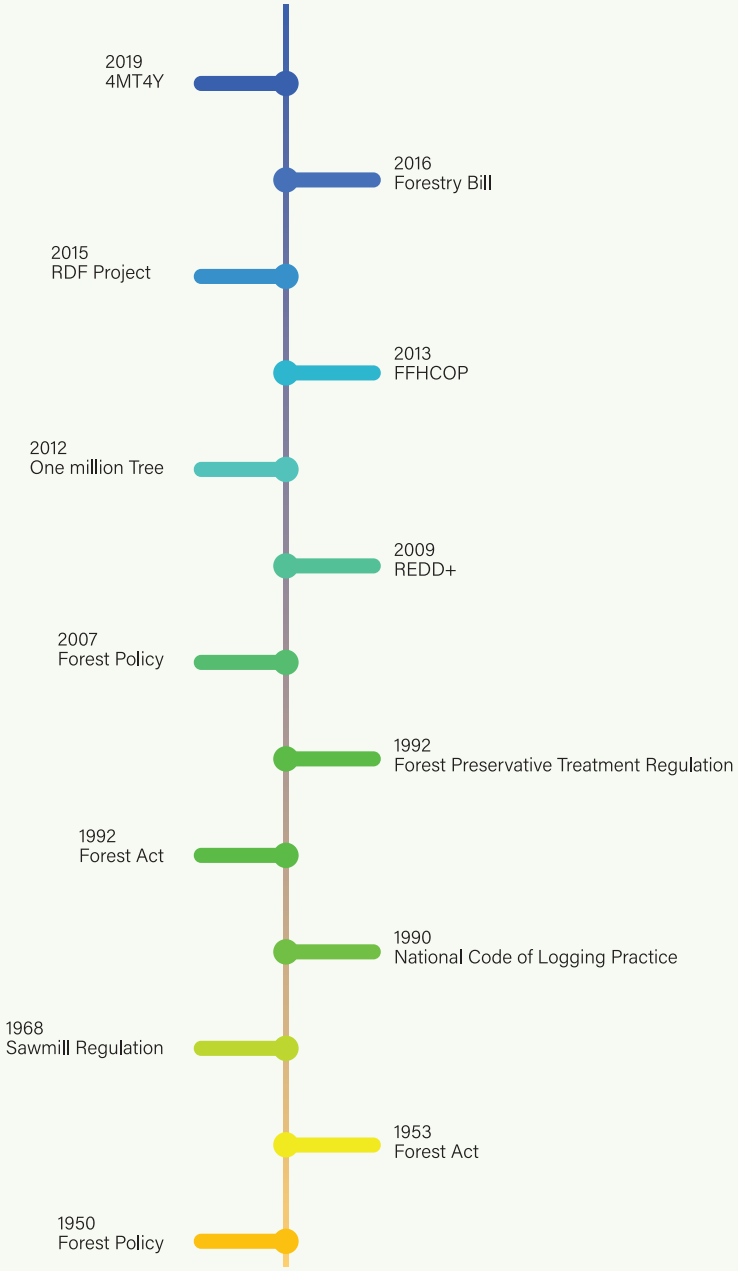


Figure 1. Timeline showing the development of Fiji's forest policies and legislation

Forest restoration remains the main focus of the forestry sector at the economy level while it continues to monitor sustainable logging practices. In 2012, the Ministry of Forestry successfully implemented its 'Million Tree Planting' initiative which entailed planting 1 million trees within a year. In 2015, the Reforestation of Degraded Forests (RDF) project was introduced by the government and managed by the Ministry of Forestry (MoF). This project's main objective was to carry out restoration work in both degraded inland and coastal areas. Because of the initial success of the project, the government continued to fund it subsequently and annual reforestation targets have been included in the National Development Plan (NDP) as shown in Figure 2.

Figure 2. RDF planting targets

Fiji has also embarked on its '4 Million Trees in 4 Years' initiative (4MT4Y) which was launched in January 2019 by the President of the Republic of Fiji, who planted the first tree within the presidential compound in Suva. Since then, the MoF has aspired to promote the program nationwide in rural areas and coastal zones.

The 4MT4Y program builds on the 2012 'Million Tree Planting' achievements, which primarily focused on addressing depleted forest cover, rehabilitating important landscapes, mitigating the loss of biodiversity, soils and nutrients, and ameliorating

the siltation of major water systems. The 4MT4Y program will address these similar issues through a wider landscape approach with emphasis on protecting the main watercourses and maintaining the purity of water that enters reservoirs. The program is basically a revival of the MoF's reforestation program, which was a key mechanism from the late 1960s to the late 1990s that began the onset of rapid economic growth. The program is also Fiji's contribution to SDG 13 on Climate Action and encourages inclusivity through public-private partnership arrangements and multisectoral and integrated approaches to combating climate change issues that confront Fiji.

Indonesia

For more than five decades, forest resources have played a significant role in facilitating Indonesia's economic development. However, the performance of forest management in Indonesia has declined and the economic contribution of forests has declined drastically, particularly since the advent of the reform era, with the associated implementation of regional autonomy policies. The government has now begun to introduce new measures to increase the sustainability of forests, including systems for the certification of forests and chains of custody to ensure the legality of timber that is sourced.

Despite the decline in rates of deforestation and forest degradation, the extent of damage to watersheds in Indonesia is still very high, requiring intensive forest and land rehabilitation (Rehabilitasi Hutan Dan Lahan, RHL) measures. Based on data from the Directorate General of Watershed Management and Social Forestry (Direktorat Jenderal

Bina Pengelolaan Daerah Aliran Sungai dan Perhutanan Sosial, BPDASPS) in 2013, the total extent of critical land in Indonesia stood at 24.3 million ha. This included 15.5 million ha in the Forest Area and 8.7 million ha of public land outside the Forest Area. Although this was a decline of around 3.3 million ha from the figure recorded in 2011, when the extent of critical land[3] stood at 27.3 million ha, rehabilitation activities nevertheless must be intensified, given the large expanse of critical land that remains.

From 2015 to 2019, the government set a target of reducing the extent of critical land by 5.5 million ha. This spreads across 34 provinces, which are managed through 34 Watershed and Protection Forest Areas Management Offices (Balai Pengelolaan Daerah Aliran Sungan dan Hutan Lindung, BPDASHL). However, critical lands are not always located in watershed or protection forest areas. They are also located in production forest areas, which are under the management of timber concessions or Production Forest Management Units (Kesatuan Pengelolaan Hutan Produksi, KPHP), or under lease for non-forestry purposes, such as mining, through Borrow and Use Permits (Izin Pinjam Pakai Kawasan Hutan, IPPKH). Critical lands are also found in conservation forest areas which are managed by Sanctuary Reserve Area (Kawasan Suaka Alam, KSA)/Nature Conservation Area (Nature Conservation Area, KPA) offices, or in areas where Social Forestry schemes are implemented. In non-forest areas (Other Use Areas/Areal Penggunaan Lain, APL), critical lands can be found ubiquitously and the managers of such areas can be a local community, a local government, a non-forestry company and so forth. Forest rehabilitation or restoration both within and outside the Forest Area is best implemented by the managers of these zones, and embedded into their duties as zone managers, and not necessarily monitored by or reported to the BPDASHL in all cases.

[3] There is no nationally approved definition of 'degraded land' and corresponding nomenclature in Indonesian law or policy. However, degraded land in Indonesia can be defined as 'critical land' based on the standard described in the Regulation of Dirjen 4/V-SET/2013 concerning Technical Guidance of Conducting Spatial Data of Critical Land by The Ministry of Forestry (The Ministry of Environment and Forestry since 2014).

The government target for rehabilitating the whole 5.5 million ha in critical land has been set at 1.25 million ha/year from 2015 to 2018 and 500 000 ha for 2019. The total budget allocated for rehabilitating 5.5 million ha of critical land is IDR 39 trillion or US$ 2.9 billion for five years. However, this is insufficient and will only pay for the rehabilitation of about 200 000 ha per year by the Directorate General of Watershed and Protection Forest Management (Direktorat Jenderal Pengelolaan Daerah Aliran Sungai dan Hutan Lindung, DJPDASHL) in the Ministry of Environment and Forestry. This leaves no obvious way forward for the rehabilitation of the more than 1 million ha of remaining critical land to be financed out-of-pocket by concessionaires, Borrow and Use Permit holders, KPHP, KSA/KPA, social forestry licence holders, local governments and land managers throughout Indonesia.

Since 2017, based on the Ministry of Finance Regulation, Revenue Sharing from the Reforestation Fund (Dana Bagi Hasil Dana Reboisasi, DBH-DR) has been distributed to provincial and district governments and can be used not only for reforestation and land rehabilitation, but also to support climate change mitigation and adaptation programs, social forestry schemes, and forest and wildfire prevention and control. A wider range of activities that can be implemented using DBH-DR for 2018 is also listed in the Act on the National Budget of 2018. These include forest protection and security, forest and land rehabilitation, prevention and control of forest and wildfires, delineation of forest area boundaries, seed development, research and development, education and training, empowerment of communities in forest rehabilitation, facilitation, supervision, monitoring and control, management of Grand Forest Parks, tree planting in critical watershed areas, bamboo planting on riverbanks, and construction of soil and water conservation facilities.

Nepal

Over 30 years in Nepal, Community-based Forest Management (CBFM) and the landscape-level conservation approach have proven to be successful strategies for forest restoration. Forest area now accounts for 44.74 percent[4] of Nepal's total land area, up from 39.6 percent in 1998. The rate of deforestation and forest degradation has declined in recent years and the overall status of forests is improving. The mean annual rate of forest and shrubland loss was 0.47 percent from 1978 to 1994 and 0.53 percent from 1990 to 2000. However, this negative trend has been reversed more recently. From 2000 to 2010, there was an annual increase in forest and shrubland cover at about 0.8 percent per year. This was largely due to the development and promotion of CBFM and reducing forest fragmentation by applying the landscape-level conservation approach. Forestry planning systems played a major role in this context.

In Nepal's federal planning system, the National Planning Commission (NPC), a specialized government advisory body, is in charge of formulating development policies and periodic plans as well as sectoral policies for the whole economy. Under the guidance of the NPC, various ministries prepare regular plans and programs in their respective fields.

Following this planning process, the Master Plan for the Forestry Sector (MPFS) 1988-2011 was formulated as the major forest policy framework for conservation and management of Nepal's forests. It had six primary programs and six supportive programs each with a specific aim. The primary program, focusing on community

[4] These data were provided by the Ministry of Forests and Environment based on Nepalese domestic standards and definition of forest.

forestry, was deemed the greatest success. It contributed to halting forest loss and degradation, especially in the middle hills. The program on conservation of ecosystems and genetic resources has made significant achievements, contributing to the conservation of ecosystems and biodiversity. These two programs are considered as milestones in participatory forest restoration and sustainable management in Nepal.

In 2015, Nepal underwent major political reform. The Constitution of the Federal Democratic Republic of Nepal came into effect, structuring the country into three levels: the federal/central level, state/provincial level (seven states) and local level (761 municipalities). As such, responsibility for the forestry sector is now divided between the federal level and the state-local level: the federal government is responsible for policy-making and regulatory management, while the states and municipalities are directly responsible for practical forest management.

Section II.
Case studies

Primarily influenced by the trends described in the previous section, forestry planning in many Asia-Pacific economies has been experiencing a shift from focusing on timber production to adopting a broader perspective that goes beyond the stand level. Forest restoration is a primary component of forestry strategic plans in various Asia-Pacific economies, giving full attention to both restoring forest ecological functions and enhancing the economic contributions that forests provide.

There is no one-size-fits-all approach to restoring forests and each context requires a tailored solution. This section presents six cases of forest restoration planning and practices in six different economies; the cases are grouped into two categories based on their scopes:

1) Design and implementation of forest restoration planning at the economy level (Cambodia and Nepal).

2) Application of national forest restoration planning at the local level (Bangladesh, China, Fiji and Sri Lanka).

To better illustrate planning and practices, information was collected from each economy that answered the following questions:

- What are the major activities in the forest restoration plan?
- How does your economy implement the plan?
- What are the outcomes and how effective is the plan?
- Are there any lessons that can be learned from this practice?

Design and implementation of forest restoration planning at the economy level

Case 1.

Tree planting and development plansfor reforestation in Cambodia

Forest restoration planning and implementation began in 1985. In order to reverse the consistent trend of forest degradation and deforestation, the FA has been promoting reforestation and tree planting for decades by establishing multipurpose tree plantations, where appropriate, in partnership with local communities, international organizations, non-government organizations (NGOs) and other interested stakeholders. To achieve this goal, various actions have been taken to support on-the-ground activities, which include:

Continuing to improve the enabling environment and national policies for multipurpose plantation development through ongoing reforms to demarcate forest boundaries and secure local people's rights to plant, harvest and market forest products and services;

01

Identifying suitable tree species and tending principles for multipurpose tree plantations;

02

Developing modern scientific nurseries to ensure a stable supply of locally suitable quality seedlings for multipurpose tree plantation activities;

03

Identifying multipurpose tree plantation sites
that can be supported by national management plans;
integrating and supporting multipurpose tree plantations
within decentralized forest management plans as well as field demonstrations
of multipurpose tree plantation sites
established in cantonments and local communities;

04

Developing extension services and conducting awareness campaigns
to support local plantation activities in relation to legal and technical issues;

05

Developing cooperation on plantation establishment among communities,
the private sector and the FA, through the development of 'model agreements' on management and benefit-sharing. This modality is justified in the subdecreeon 'Granting user rights to cultivate tree plantations within state forest lands' ;

06

Experimenting with agroforestry for crop diversification and increased output;

07

Establishing 50 000 ha of forest plantations annually in order to increase forest resources.

08

The implementation of forest restoration has been conducted in line with technical guidelines; each restoration project level has to comply with existing legislations and policies on applying development projects at different levels. In the context of technical guidance for the FA, tree planting and/or forest restoration projects are strongly recommended to focus on:

In addition, tree-planting methods for forest rehabilitation differ depending on the level of degradation. To conduct restoration projects, the development of medium-to-large-scale private forest plantations, in particular, has to follow six steps for the identification of priority areas for tree planting: 1) preliminary identification of potential tree-planting areas; 2) assessment of land tenure/resource access security; 3) preliminary assessment of site conditions (prefeasibility study); 4) categorization of areas for tree planting; 5) detailed assessment (feasibility study); and 6) funding and implementation. When implementing such projects, a number of technical aspects are advocated with regard to species selection, seed procurement, nursery operation, plantation operation, tending the plantation and seed requirement calculation.

Other than technical guidance, the management system is also a vital factor that affects forest restoration interventions. Different management systems for different types of projects are summarized in Table 1.

@APFNet

Table 1.
Management systems for different types of project

Project type	Major management requirements	Key stakeholders	Monitoring and evaluation
Partnership with the FA	- Need to conduct Economic and Social Impact Assessment (ESIA) - Need to get relevant permission, licenses or business patents - Need to follow relevant laws and regulations	Ministry of Agriculture, Forestry, and Fisheries (MAFF), FA, local authorities and local communities	- Compulsory, contract with the MAFF - Progress reports
Small-scale enterprises	- Need to conduct ESIA - Need to get relevant permission, licenses or business patents - Need to follow relevant laws and regulations	MAFF, FA and local authorities	- Compulsory, contract with the local authorities - Progress reports
Family project	- Register with the local FA - Need to follow relevant laws and regulations	Collaborate with the local FA & authorities	- Not compulsory

Project type	Major management requirements	Key stakeholders	Monitoring and evaluation
Reforestation (FA, central)	- Owned and implemented by the central FA (Department of Forest Plantations)and DPPC Private Forest Development - Need to follow relevant laws and regulations	MAFF, departments of the FA	- Progress reports - M&E commission
Reforestation (FA, local)	- Implemented by the local FA - Need to follow relevant laws and regulations	MAFF, departments of the FA and local authorities	- Progress reports to the DPP - M&E commission
Others (NGOs, military etc.)	- Registration with the local FA - Need to follow relevant laws and regulations	Collaborate with the FA and local authorities	- Depending on scale and agreements

From 1985 to 2014, planting activities conducted by the FA in collaboration with private investment companies, small-scale household investments, NGOs and the military resulted in the establishment of 143 700 ha of forests. These forests were restored through various tree-planting methods, including monoculture plantation, agroforestry plantation, multispecies plantation, ANR, framework species methods, enrichment planting and so forth.

Table 2.
The extent of tree planting from 1985 to 2014

Forest plantation (ha)							Arbor Day (ha)	Total (ha)
FA centre	FA provincial level	Military	Private sector					
			Partnership with the FA	Households	ELCs	NGOs		
15583	3731	2180	2366	6159	111717	309	1656	143701

Data source: Forestry Administration: Forest Statistics (2015).

Box 4

Cambodia's policies and legislation for supporting reforestation plans

The government has been promoting a comprehensive review of amendments to the Forest Law and updating of the NFP since 2002. This is in response to current reform in the context of regionalization to ensure robust development.

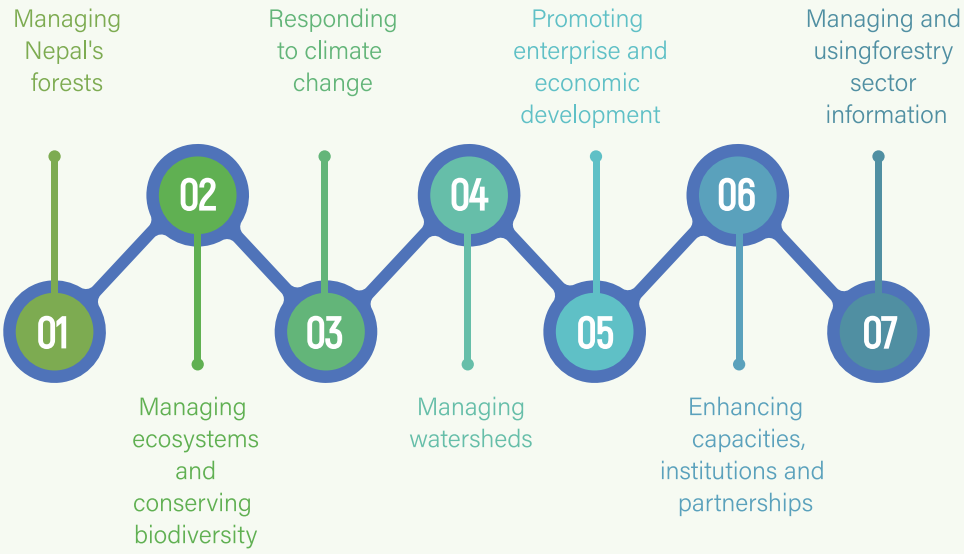
In accordance with the NFP, the government encourages the public and private sectors to take part in forest and landscape restoration activities, particularly with regard to enrichment planting and the re-establishment of natural forests. Plantations established by local communities and the government, which commonly consist of multiple species, are allocated to improve local livelihoods and ensure the provision of natural resources as well as ecosystem goods and services.

The MAFF issued the declaration on 'Procedure for Establishing Private Forest Plantation' on 26 May 2017 to determine the rules and regulations for private forest establishment in order to encourage individuals to plant and maintain tree plantations. The declaration confirms that individuals who have planted trees on state-owned or private land have the right to maintain, develop, use, sell and/or distribute products that are derived from these trees.

Case 2.
Forest Sector Strategy of Nepal (2016-2025) and forest restoration planning

The Master Plan for the Forestry Sector or the MPFS (1989), which guided Nepal's forestry development for almost 23 years, ended in 2011. Recognizing the importance of a forestry policy, the government formulated the Forest Policy in 2015. Nepal has undergone significant political, social and economic changes since the MPFS was formulated in 1988. These changes, accompanied by global shifts, have influenced the way forestry is practiced in Nepal. The Forest Act 1993 and Forest Regulations 1995 enlarged the scope of community forest governance and made forest tenure reforms, while amendments to the National Parks and Wildlife Conservation Act (1973) changed the paradigm of conservation by creating opportunities for local communities to be involved in the management of conservation areas and buffer zones. These two practices have been milestones for Nepal's forest restoration strategy. Thus, continuing the same spirit of conservation together with optimum utilization of forest, the Forest Sector Strategy of Nepal (2016-2025) provides strategic directions and guidance over the next decade.

The ultimate goal of the strategy is to protect and sustainably manage forest and other ecosystems, increase biodiversity, enhance climate change impact resilience, and provide employment and livelihood opportunities for forest-dependent communities through an inclusive, decentralized and competitive approach. To achieve the goal, actions are taken in seven key thematic areas:



To support the implementation of actions under each thematic area, the strategy identified eight strategic pillars, which provide the approaches to translate the strategy into practice. Table 3 details the eight strategic pillars and the main approaches defined under each of them that will be used to implement the actions required in all seven key thematic areas of the strategy.

Table 3.
The eight strategic pillars and the main approaches of the Forest Sector Strategy of Nepal (2016-2025)

No.	Strategic pillar	Implementation approaches
01	Sustainably managed resources and ecosystem services	• Landscape-level approach • Forest land-use planning • Support for Payments for Ecosystem Services (PES) approaches
02	Conducive policy process and operational environment	• Evidence-based policy-making processes • Interlinked and clear policy provision
03	Responsive and transparent organizations and partnerships	• Mechanisms to channel funds, improve transparent delivery, transparency and effectiveness of development organizations and program partnerships • Cross-sectoral working approaches
04	Improved governance and effective services and delivery	• Multistakeholder approach • Bottom-up planning approach • Consistency with the policy legislation process • Clarified roles for state bodies/NGOs/civil society organizations and other stakeholders
05	Security of use rights for community resources	• Capacity development approach at community and group levels • Revision of legislation to ensurecommunity rights
06	Private sector engagement and economic development	• Partnerships for service delivery, investment, commercial/enterprise expertise, commercial leasehold forest etc.
07	Gender Equality and Social Inclusion (GESI) and poverty reduction	• Mainstreaming the GESI strategy across all of the forestry sector • Capacity development • Disaggregated monitoring system
08	Climate change impact mitigation and resilience	• REDD+ • Community-based adaptation approach (national, local and community adaptation plans)

Following the direction of the overarching strategy, interlinked plans at different levels are made to provide concrete guidance to fully implement actions. Each of the plans has a coordination structure that enables cross-sectoral coordination and collaboration and, more importantly, ensure the participation of different stakeholder groups, especially women, low-income households and disadvantaged groups. The development sequence has a bottom-up planning process that begins at the forest user group level, extends to the district level and finishes at the provincial level. To kick-start implementation, annual plans at different levels with immediate actions and budgets are then prepared. Progress over five years of implementation is summarized in Table 4.

Table 4.
Current progress of the Forest Sector Strategy of Nepal (2016-2025)

2015	Target 2025	Actions taken
Community Forests (CF) covered about 29 percent of Nepal's forest area	Community Forests cover 40 percent of Nepal's forest area	**Policy interventions** Development of the Community Forest Guideline **Programs** Development of the Community and Leasehold Forestry Development Program Establishment of the International Community Forestry Research Center Annual award for best CF To date, about 35 percent of the total forest area is under community forestry.
Leasehold forests covered about 0.7 percent of Nepal's forest area	Leasehold forests cover 1.5 percent of Nepal's forest area	**Policy interventions** Recognized by the Forest Act (1993) **Programs** Priority program: National Strategy for Poverty Reduction Community and Leasehold Forest Development Program To date, 7 766 leasehold forests have been established with 75228 households involved.
Private forests covered about 54 900 ha	Private forests cover 200 000 ha	**Policy intervention** Private forest development directives **Programs** Promoting registration of private plantations
Protected Areas (PAs) comprised 23.3 percent of Nepal's land area	Protected Areas are conserved and managed sustainably. The landscape approach is strengthened. Community conserved areas are identified, protected and managed sustainably.	**Policy interventions** National Plans and Wildlife Conservation Act and Regulations Protected Areas (PAs) Specific Management Plan Landscape Declaration with specific strategy **Programs** Regular annual program for PAs Regular research and development programs To date, PAs have increased by 0.9 percent; two wildlife conservation areas are managed as national parks; five official landscapes have been declared and strengthened; a program focusing on corridor connectivity has been initiated.
Tiger, rhino and wild buffalo populations were 198645 and 259 respectively	Tiger, rhino and wild buffalo populations increase to 250700 and 400 respectively	**Policy intervention** Tiger/Rhino Conservation Plan Habitat Management Plan To date, the tiger population has increased to 235.

Box 5

Community forestry impacts on forest conditions in Nepal

Community forestry, initiated by the government in the late 1970s, emerged as a new approach to engage communities in the usage, rehabilitation and management of forests. As of 2015, the community forestry area accounted for 29 percent of Nepal's total forested area.

Community forestry is successful in mitigating resource degradation and helpful in the conservation of biodiversity. Implementation of community forest management has improved forest conditions and biodiversity in the hills of Nepal when compared to former forest degradation. Owing to the increasing expanse of community forestry areas, degraded forests have regenerated, forest conditions have improved and land degradation is diminishing with less soil erosion. Biodiversity is also increasing with more plant species growing in the hills. Various studies have demonstrated a significant improvement in forest conditions under community forestry, evidencing that it is an effective model for controlling deforestation and forest degradation. The study 'Reductions in deforestation and poverty from decentralized forest management in Nepal' led by the University of Manchester, revealed that community forestry has contributed to a 37 percent relative reduction in deforestation and helped to restore 1.2 million ha of forest land (Paudyal et al., 2017). Apart from ecosystem services, improved forest conditions increase the availability of forest products for local users thereby improving their livelihoods.

Application of national forest restoration planning at the local level

Case 3.

Site-specific collaborative forest management planning in Bangladesh

The Bangladesh Forest Department (BFD) recently adopted a site-specific collaborative forest management planning approach to restore degraded forest lands across the hills, coastal and salt forest ecosystems of the economy. The scope of this planning approach targets 'forest beats' (around 1 000 ha each) – the smallest forest administrative unit in Bangladesh – and will be aggregated into ecosystem restoration planning of approximately 80 000 ha by 2023.

Bangladesh, an overpopulated economy with high demand for economic growth, is experiencing heavy pressure in terms of natural resource exploitation, particularly of forests. Over the last few decades, climate change-induced natural disasters and human-induced pressures, e.g. deforestation for settlement and agricultural practices, have jeopardized ecosystems. In line with the new National Forestry Policy (2017, yet to be approved) and SDG 2030 commitments, the BFD initiated long-term and

comprehensive forest restoration planning for subsequent implementation with financial support from the government and international development partners.

In the very local (forest beat) context, the plan addresses ecosystem restoration and community well-being enhancement. It has been assisted by review of existing land cover (based on SPOT Image[5] classification), regeneration surveys, index mapping (of all previous plantation types and areas) and profiling of community dependency patterns with livelihood development opportunities. Via discussions at the village level, village Collaborative Forest Management Committees (CFMCs), BFD on-the-ground personnel and other stakeholders determined required interventions for various sites within their forest beats. Prioritizing and scheduling of activities, including silvicultural operations and income-generation activities, have been documented, mapped and endorsed for implementation. Notably, the plan is publicly available through Open Data Kit[6], an android-based geospatial technology.

The entire plan provides a biophysical and socio-economic baseline for forestry and community activities. Monitoring is part of the schedule as well as the completion of self-assessment scorecards for grassroots institutions (e.g. CFMCs). The approach is very comprehensive with multiple dimensions which require at least ten-year investments in forests and people, despite very limited and dwindling resources. Although the government is strongly committed to expanding forest cover, local-level political commitments and support from, inter alia, agriculture, livestock and fisheries agencies as well as the private sector is crucial for effective implementation of this restoration initiative.

Although this is a recent initiative and yet to complete an implementation cycle, an example of how the planning approach is being carried out in Kalirchara forest beat, located in Meherghona forest range of Cox's Bazar (northern forest division) is provided below.

---

[5] Spot Image is a public limited company created in 1982 by the French Space Agency. The company is the commercial operator for the SPOT
Earth observation satellites.
[6] https://opendatakit.org/

Example of site-specific restoration planning

Step 1

Reconnaissance visits and consultations with BFD personnel as well as discussions with communities regarding forest history, existing conditions, current pressures and concerns (natural and human-induced), community livelihood patterns and recommendations for potential interventions to restore forests. The BFD and community members conducted a transect walk through the villages and forests.

Step 2

Index mapping – the development of an index map showing the forest beat boundary, previous plantations, road and drainage patterns, location of settlements and so forth. This step took a little longer because the index map was based on Department of Land Record & Survey sheet maps (Reconnaissance/Revision Survey) and the adding of existing plantations, landmarks and other map features. Discussions continued during this mapping exercise, particularly on the expansion of settlements and degradation patterns over the last three decades as well as the conditions of existing plantations. This laid the foundation for the restoration approach, which in general entailed multidimensional and simultaneous interventions.

Step 3

Zonation – using a fully featured index map, several discussions took place (with BFD personnel, via five village meetings and a final combined larger meeting) to achieve consensus on broad-based ecological zonation of the forests, i.e. for settlements, social forestry, indigenous species plantations and a conservation zone. It was evident that each of these broad-based zones was heterogeneous and required longer-term interventions for restoration and to maintain uniqueness.

Step 4

Defining interventions – community-BFD joint discussions generated recommendations for the restoration of each zone, for instance:

- Settlements can become more consolidated rather than sporadic over a broad landscape. Villages can be tailored to growing medicinal herbal species, with each settlement providing a few seed trees. Intensive and climate-smart agrofisheries projects can enhance community welfare and so forth.
- Social forestry in the forest beat can be carried out in two ways: 1) merge exotic fast-growing plantation areas with about one-third of the existing social forestry area; 2) enrich degraded social forestry areas with indigenous timber and fruit species. In some cases, use medicinal herbs for understorey planting.
- Plantation of indigenous species: In existing plantations, once abundant natural regeneration is manifested, the ANR approach is recommended with 500 seedlings/ha of enrichment planting; to rehabilitate degraded plots, enrichment planting is recommended with up to 1 500 seedlings/ha.
- Protection areas are also identified for larger portions of forests, where abundant natural regeneration is threatened by fuelwood collection and illegal timber harvesting. These zones can also be migration corridors for Asian elephants. The discussion agreed to handle this area differently by not practicing any forestry interventions and identifying employment opportunities or alternative livelihoods for about 150 households in four villages located around the area.

Step 5

Scheduling interventions – for immediate action, the following year and longer-term activities were identified, starting from nursery raising of indigenous species for plantations, formation of CFMCs in villages, value chain and market assessment for enterprise development, networking with local NGOs and government service providers for livelihood support and so forth.

The final picture of the forest beat, after the restoration planning process, is shown in Figure 3.

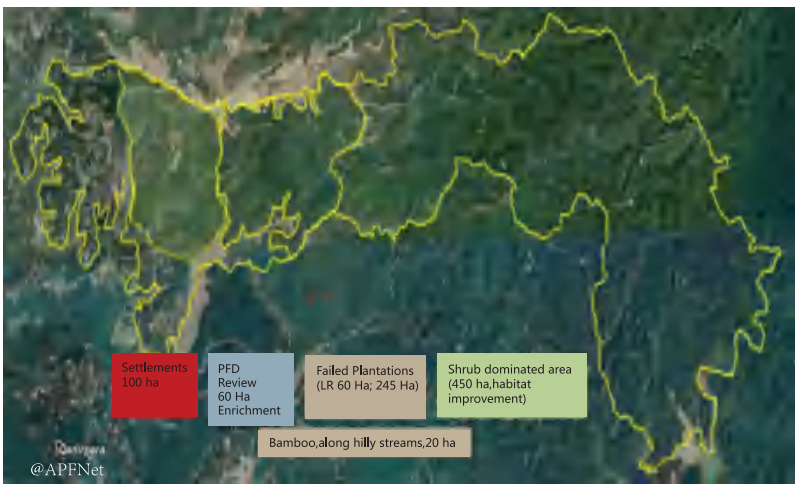


Figure 3. Landscape zonations of the Kalirchara forest beat after the restoration planning process

Case 4. China's Three-north Shelterbelt Program(Tnsp)

The Three-north Region (northwest, north and northeast China) is the frontier of China' s northern border. In this huge area of around 4 million square kilometres (km2), there are eight deserts, four sand belts and the vast Gobi expanse. They are highly vulnerable ecologically and key zones for ecological management. Before the launching of the TNSP, desertification of this land was expanding rapidly and sandstorms occurred frequently. Ecological hazards caused by sandstorm damage, soil erosion and drought not only severely restricted economic and social development of the region but challenged development of China in its entirety. After liberalization in China, during November 1978, the government made a major strategic decision to initiate the TNSP, starting a new era for China to explore and promote harmonious development in the interests of balancing economic growth and ecological protection. It was and remains a landmark program for ecological protection in China, being the largest

thrust in scale, the longest in duration and implemented with the most complex ecological management methodology in Chinese history.

The entire program spans 73 years (1978 to 2050) and is divided into three stages and eight phases. The fifth phase is currently being implemented (2011-2020). The scope includes 14 provinces (autonomous regions and municipalities directly under the central government) in the northwest, north and northeast of China. The total program area is 4.069 million km^2, accounting for 42.4 percent of China' s total land coverage; it encompasses 83.7 percent of China' s desertified land, 67 percent of land affected by soil erosion and 33.3 percent of all poverty-stricken counties.

Workshop on Best Practices on Forest Restoration Planning in the Asia-Pacific Region
The Three-north Shelterbelt Program (TNSP) Plan of China

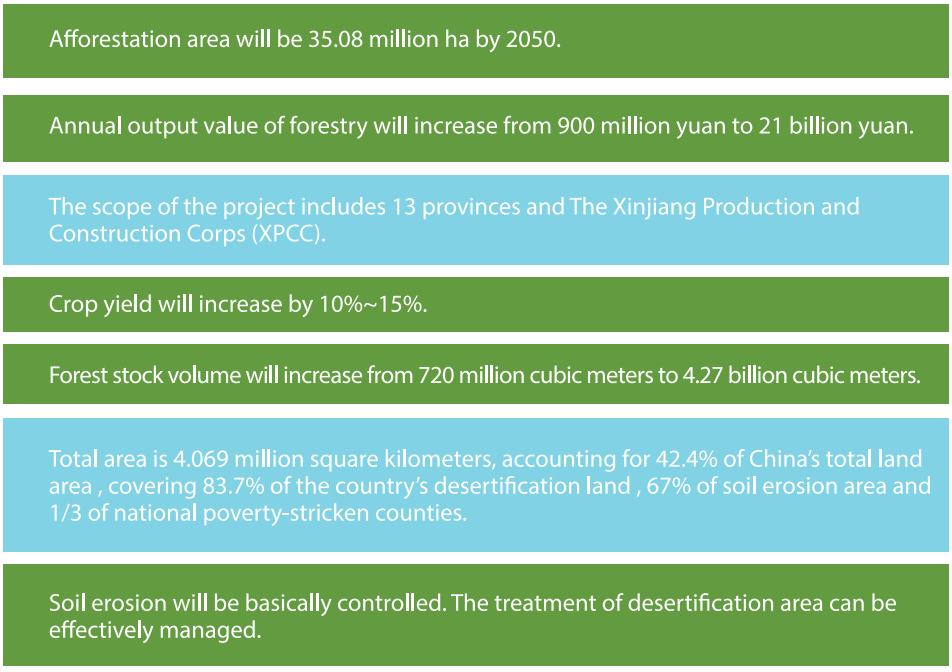


Figure 4. Aspects of the Three-north Shelterbelt Program

Afforestation and the restoration of degraded forest stands are the main components of the program. By 2050, it is expected to have achieved:

01

A total afforestation area of 35.08 million ha; an increase in regional forest cover rate from 5.05% to 14.95%

02

Increase in total forest stock volume from 720 million cubic metres (m^3) to 4.27 billion m^3.

03

An increase in the annual output value of forestry from 900 million Chinese yuan (CNY[7]) to CNY 21 billion.

04

Effective restoration of degraded forest stands, adequate control of soil erosion, effective treatment of desertified areas and crop yield increase of 10%-15%.

[7] CNY1.00 = US$0.14269, March 2020.

Preparation and implementation

The TNSP has a three-level planning system that combines economic, provincial and county-level planning; it combines top-down and bottom-up approaches, using the principle of adapting to local conditions. Feedback and summary of experience in TNSP implementation comes from the bottom to the top to ensure the program is carried out in a planned and stepwise manner. After 40 years, the TNSP has established a mature management system to make decisions at the central level, coordinate among provinces and guide implementation in specific cities and counties. The management system is shown in Table 5.

Table 5.
Management system of the TNSP

Task	Level	Responsibility
Form a Project Organization Management System from the central to the local level	National (central planning)	Consists of the **Three North Bureau** under the National Forestry and Grassland Administration, responsible for the planning, supervision and inspection of the TNSP
Establish a **Leading Group** composed of relevant ministries and the leaders of provincial governments	Provincial (coordination)	**Provincial project management agencies** are responsible for the organization, management and review of the project
Strengthen **Whole Process Management** and the **Three-level Inspection System** of implementation	Municipal/county (implementation)	**Local and county forestry authorities** are responsible for the organization, management and self-analysis of local project construction **Town and county forestry work stations** are responsible for organization and implementation of the project

The quality of the project is strictly controlled by a monitoring and evaluation system combining resource monitoring, afforestation management, disaster and emergency management, and effectiveness evaluation. It has three levels of monitoring stations at central, provincial and county levels. The TNSP is evaluated every ten years and the most recent comprehensive evaluation was carried out in 2018 after 40 years of implementation. The evaluation normally lasts for 1.5 years with six operational stages, including preliminary preparation, research and analysis; multiperiod remote sensing interpretation; comprehensive evaluation; report preparation; and consultation. The evaluation mainly focuses on aspects of engineering system construction, the effectiveness of ecological restoration, social and economic benefits as well as enhancement of regional ecological security. The evaluation results will document the experience, identify the problems found and finally propose countermeasures and suggestions for scientific reference and decision-making for future development of the TNSP.

Outcomes and effectiveness

Over the past 40 years, CNY 95.73 billion has been invested in the TNSP. The program has accomplished afforestation over 30.143 million ha. Forest cover rate in the Three-north Region has reached 13.57 percent, forest stock volume has increased 4.96-fold and the forest and grass vegetation coverage rate has increased from 31.70 percent to 42.41 percent. A total of 336 000 km^2 of desertified land has been managed and more than 10 million ha of desertified grassland have been protected and restored. The area of desertified land in the program area has continued to decrease. The annual

average number of sandstorm days has decreased from 6.8 days to 2.4 days and the total restoration extent of waterbodies and soil erosion-prone areas has decreased to 447 000 km^2. An ecological security barrier consisting of trees, shrubs and grass in combinations of strip belts has been built.

Other than ecological benefits, the program also enhances local well-being and economic growth. The total stock volume in the program area has increased to 1.83 billion m^3, the fuelwood forest area comprises 929 000 ha, the economic forest area is 4.06 million ha and the annual output of fresh and dried fruits has increased from less than 2 million tonnes to 48 million tonnes. More than 15 million people can rely on the forestry industry to achieve poverty alleviation goals and forest-related income in some key areas has accounted for more than 50 percent of a household's income. More than 30 million ha of farmland have been effectively sheltered by forests, which account for 44.13 percent of the farmland in the region. At present, the project area has established 8 572 forest parks, 324 wetland parks and 90 desert parks, which have become the main sites for raising public awareness in terms of ecological protection.

Major challenges

After 40 years of large-scale construction, the TNSP has entered a new phase. However, the ecological condition of the Three-north Region is still fragile, and there are still problems and challenges that need to be solved and addressed urgently.

Major challenges

After 40 years of continuous large-scale afforestation in the Three-north Region, at present, land suitable for forest cover constitutes 33.1 million ha. Thirty-six percent of such land is distributed in zones with average annual precipitation of less than 200 millimetres (mm), alpine areas with an elevation of 3 500 metres above sea level, highlands with slopes exceeding 45 degrees and other places not suitable for afforestation activities. According to quality evaluation results, in arid and semi-arid regions of Northwest China, only 11 percent of land in good or relatively good condition is suitable for afforestation. These areas have scarce forest cover and fragile ecosystems. Continuing to promote large-scale afforestation, continuously expanding forest cover and environmental enhancement remain the primary tasks of ecological protection and restoration.

Availability of water resources

Water resources in the Three-north Region are scarce. About 65 percent of the total area (about 2.84 million km^2) has average annual precipitation of less than 350 mm. Rapid increase in the population and farmland area has exacerbated the problem. It is necessary to coordinate regional water use, residential and commercial water use, agricultural water use, and ecological water use to promote rational distribution of water resources and improve water-use efficiency.

Optimizing forest and grass structure

The overall quality of the shelterbelt is not optimal and the risk of degradation is high. Due to restricted growth conditions, trees species are not diverse enough and ecological communities are not balanced. There are too many overmature and mature forests so regeneration is delayed. There is no normal echelon distribution of sapling, middle-aged, near-mature, mature and overmature forests. The distribution of forest and grassland is uneven so arboreal proportions are too high. As shrub species can grow stably in areas with precipitation of less than 200 mm, in later construction phases of the project, the percentage of shrubs should be increased. Tree and shrub populations in each region should be determined by the carrying capacity of water resources, and the structure of forest and grassland should be optimized to form a domain with close-to-nature vegetation cover.

SDGs	TNSP's Achievements in response to the SDGs (by 2018)
	More than 15 million people **alleviate poverty** relying on special forestry industry **Forest-related** income in key areas accounted for more than 50% of farmers' income Net effect of forest brought about an annual increase of more than 10 million tons of grain yield
	**Afforestation area** of 30143000 ha, **forest coverage** increased to 13.57% **Forest stock volume** increased by 4.96 times Increased carbon sequestration
	336000 km^2 of **decertified land was controlled** More than 10000 ha of **decertified grassland were protected and restored** Annual average number of **sand storm days decreased** from 6.8 days to 2.4 days **Controlled area of water and soil erosion** was 447000 km^2

Figure 5. TNSP achievements in response to the SDGs (by 2018)

Case 5. Fiji's Reforestation of Degraded Forests Project

The government made a strategic move in 2015 to contribute to the United Nations Framework Convention on Climate Change's (UNFCCC) Clean Development Mechanism (CDM) by investing in the Reforestation of Degraded Forest Project (RDF), a government-funded mechanism under the Ministry of Forests.

The project involves the planting of trees along grasslands and barren lands to create forest areas as well as replanting of trees on previously harvested forests, degraded areas and coastal areas. Implementation of the RDF project was necessary to restore forests which have been rapidly depleting owing to economic activity in other sectors, particularly agriculture – the biggest driver of deforestation in Fiji. The main objectives of the RDF project are supporting the restoration of degraded forests for their important ecosystem services and sustaining plantation development for future timber needs. The thematic areas that this project needs to address are broad and comprehensive, including carbon stock enhancement, connecting forest corridors, coastal restoration, food security, flood mitigation, catchment restoration, enrichment planting and community woodlots.

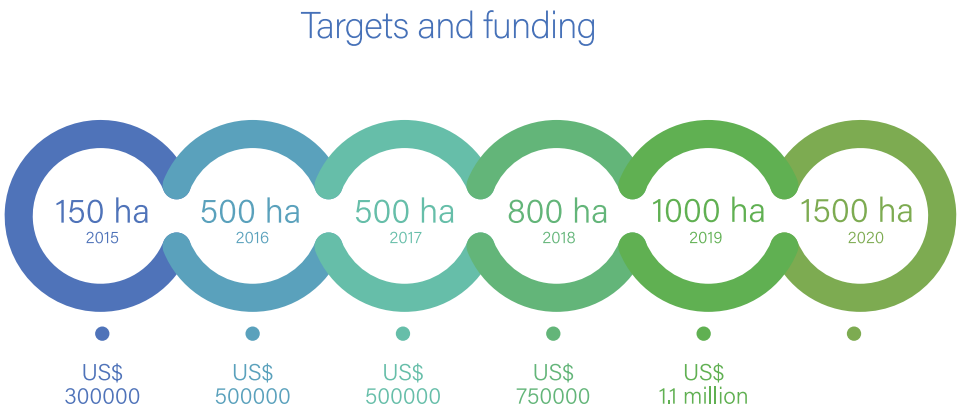


Figure 6. RDF planting and funding targets

In 2015, 2017 and 2018 all targets were achieved. In 2016, the target could not be achieved due to Tropical Cyclone Winston and hence all project funds had to be diverted for rehabilitation purposes.

Implementation and outcomes of the RDF project

At the economy level, this project and its targets are embedded in Fiji's National Development Plans (5 and 20 years). It is also included in the Ministry of Forestry's Strategic Development Plan (2017-2030) and in the ministry's annual operational plan for implementation by officials and key stakeholders. At the provincial level, the national targets are then divided into the three Divisional Forestry Stations located and responsible for the Northern, Western and Central/Eastern divisions. Each division contains various provinces and the divisional teams work in collaboration with key stakeholders to ensure implementation on the ground. Finally, at the local level, the aforesaid targets are then divided into beats (within the jurisdiction of each division) for implementation. When dealing with Native Land, beat officers (foresters and forest guards) work with each community leader, who acts as the local administrator for facilitating government development initiatives, in order to secure land for replanting. Awareness-raising and consultations are carried out with the community members before planting starts. If dealing with freehold and leased land, landowners make written requests for planting to be done on their land and the Forestry officials provide the seedlings and carry out the planting with landowners.

The RDF project has achieved positive outcomes and notable effectiveness. Communities are more educated and more aware of the importance of trees and their benefits; alternative livelihoods have been developed while tree plantation has been carried out for long-term benefits. All community members participate, thus giving them a sense of inclusivity and ownership of the project on their land. Moreover, communities are also incentivized to maintain plantations. They can opt for cash incentives or utilize the fund for direct purchase or construction of small village projects such as building community halls, water tanks, purchasing sporting equipment and so forth.

Expression of Interest (EOI)/Letter of Intent (LOI) from landowners addressed to the Community Forestry Committee (CFC)

Private landowners-write LOI to the CFC. **Community**-collectively writes EOI to the CFC after its village meeting. Letter must be verified and signed by the District Officer. Minutes of the meeting to be attached with the LOI. The committee must nominate 3 member trustees who will sign off on an operation account where funds will be deposited.

Field inspection and consultation with landowners

Sites are inspected and finalized. Species to be planted are determined. Awareness-raising conducted. Contractual agreement is signed.

Planting and maintenance

Landowners are involved in field preparation and planting. Maintenance such as spot weeding will be conducted by communities.

Monitoring

The RDF project team conducts monitoring and survival counts every month after plantation establishment.

Figure 7. Standard operational procedure for the RDF Project

Major challenges

The biggest challenge in Fiji in terms of forest restoration is land tenure, as most land is communally owned. If the community does not want replanting to be conducted on its land, then the ministry has no authority to encroach on such land. Therefore collaboration with other agencies is crucial to promote forestry plans, create awareness and conduct proper consultation with communities as there is always a need to strengthen community decisions and governance to ensure that important forest resources are preserved, protected and restored for the long-term benefit of the community.

Another closely related issue is the need to consult and engage with adjacent land users, especially with regard to the provision of important ecosystem services for public welfare such as water. Reforestation activities on some degraded lands may be surrounded and managed by other land users and it is only appropriate to include them in the discussion so that they are accountable for all their activities and fully support good forest restoration practices instead of creating difficulties.

As securing land for restoration and long-term conservation leases is a lengthy process in Fiji, the ministry has also worked on other alternative livelihood projects for community members such as promoting agroforestry with the Ministry of Agriculture, advocating the planting of short-rotation tree crops such as sandalwood as well as fruit trees for food security, and combating non-communicable diseases. While waiting for sandalwood trees to mature, communities can sell sandalwood seeds and seedlings back to the ministry to support the ministry' s planting and restoration programs.

The ministry cannot carry out forest restoration by itself and therefore needs the support of key government partners, NGOs, industry stakeholders and the general public in order to achieve national restoration targets.

Case 6. Forest Rehabilitation in Ihala Puliyankulam a Degraded Forest of Sri Lanka

In 2014, the Forest Department of Sri Lanka initiated a forest rehabilitation and restoration program to enhance the forest area and to improve the quality of the forests, thereby increasing forest cover by another 60 000 ha. The experiences and lessons learned from this program from 2014 to 2016 in the dry zone of Sri Lanka are exemplified by the case of Ihala Puliyankulama degraded forest, located in the Ipalogama Reserved Forests of Puttalam District.

In Sri Lanka, infrastructure development, settlement and village expansion place a considerable demand on land availability. Degraded forests, in particular, are exploited by the development sector because degraded forests do not comprise large trees or good vegetation. Furthermore, developers do not recognize a regenerating forest but instead see an economic opportunity in the form of apparently unused and unoccupied wasteland. This is a severe threat to forest rehabilitation in Sri Lanka. Ihala Puliyankulama degraded forest is vulnerable in this context and also because of its proximity to Puttalam-Trincomalee highway. Therefore, Ihala Puliyankulama degraded forest is in urgent need of restoration.

The area of the degraded forest at this site is 70 ha and the vegetation is predominantly grass and patches of shrubs, especially Imperata cylindrica, Panicum maximum and Aristidia setaceae. In addition, tree species such as Haldina cordifolia and Manilkara hexandra are scattered sparsely. The grass species are highly combustible so the land is prone to forest fires annually during the dry season. These fires are generated by the negligence of villagers in adjoining villages communities. In addition, hunters set fires in

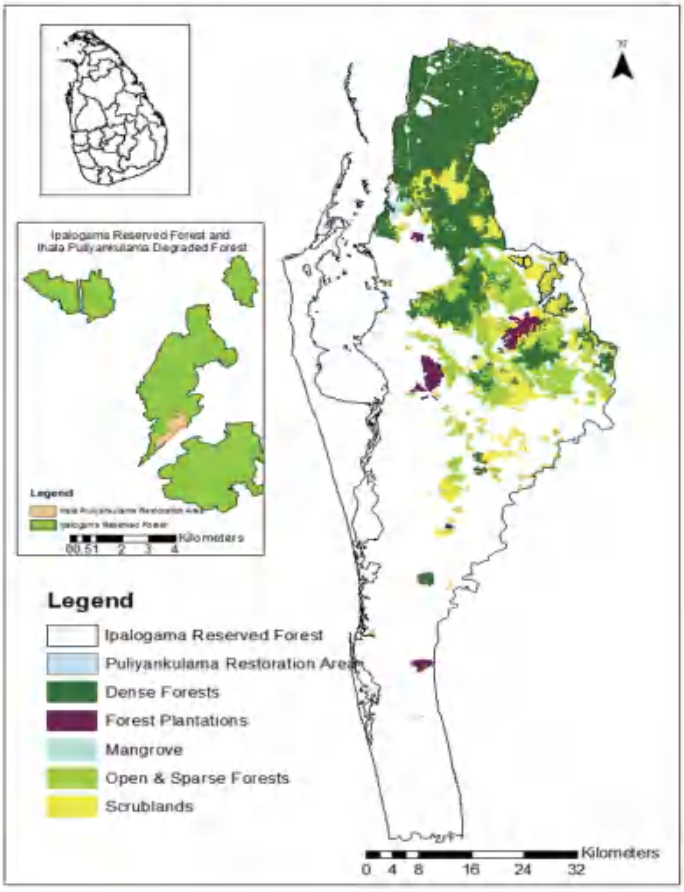


Figure 8. Map of the Ihala Puliyankulama forest area

the forest to trap wild animals. Due to continuous forest fires, natural regeneration has been interrupted so only grass and a few fire-resistant trees species predominate. There are small clumps of large tree species which have the potential to grow to 10 to 15 meters in height, but they remain small due to continuous fire damage. As such, this land was selected for ecological rehabilitation via the forest restoration program in Puttalam District.

Ecological rehabilitation methods

In the absence of human intervention, degraded forest may gradually recover and species richness and biomass will slowly return to their original condition. The rate at which this occurs depends on the speed with which species can colonize the site; however, this might be expedited by human intervention (i.e. restoration). Conversely, recurrent disturbances (i.e. wildfires or grazing) will further degrade the system and more species will be lost. In this case attempts should be made to recover the structure and biomass as well as some of the original species richness. The ecological rehabilitation methods used in Ihala Pulianakulama degraded area are described below:

Fire protection

Fire is the main cause of degradation in this location so intensive fire protection is implemented. Sites where fires start are identified and fire lines, covering the whole area, are established. Fire lines are 10-m wide and 6-km long and all the grass is removed completely. The fire line is cleared once a year during the dry season. The local villages and forest officers are vigilant about fire occurrence.

Promotion of young seedling growth

Young seedlings on the degraded land cannot grow and establish well due to fire damage and dense grass cover that suppresses their growth by limiting their access to light, moisture and nutrients. In order to control the grass, it is uprooted and burned.

Rehabilitation of burned trees

Due to seasonal fires, species which have the potential to grow as large trees only remain as clumps of small bushes. These bushes are managed by removing unnecessary branches, leaving a few stumps.

Scattered tree planting

Small numbers of trees are planted where no seedlings grow. Locally available species are planted. Selection is carried out with consideration of species availability in nearby forest areas via consultation with local people.

Direct seeding
The rate of natural succession is limited by the slow dispersal of seed on the land. Therefore, to accelerate successions, seeds are reintroduced, after removing the grass and loosening the soil, in patches of 1-m diameter.

Raising awareness among local people
In addition to these technical interventions, the Forest Department informs local people about the program through informal meetings and home visits, and solicits their support.

Monitoring
The performance of the program is monitored continuously. Forest officers visit the land at frequent intervals to observe the growth of the seedlings and growth of the grass. In addition, performance is compared to the baseline. Initially, seven samples were taken from Ihala Puliyankulama to establish the baseline; the composition of these samples will be revisited and studied after three years.

The vegetation of the degraded land was studied using a survey of seven sample plots selected randomly at the beginning of the restoration program. The sample plots were circular and 500 m^2 in size. Two years later the same samples were examined again. It was noticed that the number of seedlings and shrubs had increased through the interventions. Only two new species which were not present in 2014 were recorded . Photo monitoring also showed improvement in the vegetative cover. The main reasons for the success of the program are prevention of forest fires, removal of intrusive grass and protection from grazing cattle. During the two-year period only one forest fire occurred and it was controlled immediately before it could spread to a larger area. The fire-damaged area was around 10 ha.

Bibliography

FAO & APFNet. 2018. Regional strategy and action plan for forest and landscape restoration in Asia-Pacific.

Forest Department and Ministry of Mahaweli Development and Environment (Sri Lanka). 2019. Forest rehabilitation: A case study in Ihala Puliyankulam degraded forest in the dry zone of Sri Lanka – Sri Lanka (unpublished).

Forest Department of Bangladesh. 2019. Report on forest restoration planning – Bangladesh (unpublished).

Forestry Administration of Cambodia. 2019. The implementation of forest restoration planning in Cambodia – Cambodia (unpublished)

Ministry of Environment and Forestry (Indonesia). 2019. Best practices on forest restoration in Indonesia (unpublished).

Ministry of Forestry (Fiji). 2019. Best practices on forest restoration in Fiji – Fiji (unpublished).

Ministry of Forests and Environment (Nepal). 2019. Forest restoration planning in Nepal: A review of the Forest Sector Strategy 2016-25 with its implementation status in line with the Forest Restoration Plan – Nepal (unpublished).

National Forestry and Grassland Administration (China). 2019. Best practices of forest restoration planning in China - case study from The Three-north Shelterbelt Project Plan – China (unpublished).

Paudyal, K., Baral, H., Lowell, K. & Keenan, R.J. 2017. Ecosystem services from community-based forestry in Nepal: Realizing local and global benefits. In Land use policy, 63, pp. 342–355. CIFOR.

Singleton, S. 1998. Constructing cooperation: the evolution of institutions of co-management. University of Michigan Press, Ann Arbor.

United Nations Framework Convention on Climate Change (UNFCCC). 2015. Cambodia's intended nationally determined contribution. Government of Cambodia 16p.