

MYANMAR

COUNTRY ENVIRONMENTAL ANALYSIS

A Road towards Sustainability, Peace, and Prosperity

EXECUTIVE SUMMARY



Public Disclosure Authorized
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Report No: AUS0000757

Myanmar
Country Environmental Analysis

May 2019

Environment and Natural Resources Global Practice



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Support by



FOREWORD

The Union Minister Ministry of Natural Resources and Environmental Conservation



Myanmar has been blessed with rich natural resources, stretching from the mountains to the plains and to the coast. This vast natural wealth has been pivotal to growing the economy and in providing livelihoods and ecosystem services, especially for people living in rural areas.

Myanmar's forestry sector has been central to the country's economy and society, particularly over the last century. Myanmar's forests contain some of the most valued timber species in the world such as teak, rosewoods, and ironwood. They are home to rich biodiversity and a number of endemic and globally threatened species. However, these forests are currently under significant threat due to deforestation and degradation.

Concerns are also arising due to the impacts on the environment from rapid development in the industrial, mining, and energy sectors, as well as from climate change. Both air pollution and solid waste management are becoming burning issues, especially in the cities of Yangon and Mandalay. This underlines the importance of establishing a transparent and robust Environmental Impact Assessment (EIA) system, improving solid waste management and pollution control, and enhancing environmental monitoring and enforcement.

The Government has been advancing the development of a legal framework in the environment and natural resources management area, to ensure that economic growth is balanced with sustainable development, as expressed in the Myanmar Sustainable Development Plan. The adoption of the National Environmental Policy (2019) and Myanmar Climate Change Policy, Strategy and Master Plan (2019) is a remarkable achievement which sets out strategic guidance for mainstreaming environmental protection and climate change into planning and decision-making at all levels of government and across all sectors.

In 2016, in response to the challenges in the forestry sector, the Government also launched the Myanmar Reforestation and Rehabilitation Program (MRRP). This sets out our goals and actions to prevent deforestation and degradation of Myanmar's forests while enhancing our efforts for forest restoration and for enabling more employment and economic opportunities for local communities through the establishment of plantations and community forestry initiatives. In addition, revisions to the legal framework, including the new Forest Law (2018) and the Conservation of Biodiversity and Protected Areas Law (2018), reflect the changing country context and acknowledge the customary natural resource uses and management by local communities.

We would like to thank the partnership of the World Bank in undertaking this Country Environmental Analysis that further advances our understanding of Myanmar's environmental and natural resource trends. This report provides a comprehensive overview of the status of the forestry sector. It also outlines the importance of strengthening EIA systems (including monitoring and compliance) and managing and monitoring solid waste and air pollution.

This Country Environmental Analysis Report sets out a road map with specific recommendations and actions to improve our management of forests and environment. We look forward to taking up these recommendations with support of World Bank and other development partners to achieve sustainable development, for the benefit of all people in Myanmar.

A handwritten signature in black ink, appearing to read 'U Ohn Winn', with a horizontal line underneath.

H.E. U Ohn Winn
The Union Minister
Ministry of Natural Resources and Environmental Conservation
The Republic of the Union of Myanmar

FOREWORD

The Union Minister Ministry of Agriculture, Livestock and Irrigation



Myanmar's rivers and coastline areas provide home for an abundance of natural freshwater and marine fish stocks and for aquaculture resources. Fisheries has long been an important economic sector that contributes significantly to employment, livelihoods, and food security. The sector employs over three million people and fish accounts for nearly half of the animal-source foods consumed in Myanmar.

However, overfishing has contributed to a severe decline in Myanmar's marine fisheries and in high value freshwater fish species in the Ayeyarwady River Basin. Enhanced focus on monitoring, control, and surveillance, including the use of innovative technology like Vessel Monitoring Systems (VMS), is urgently needed to ensure that the fisheries sector is sustainable and performs well both commercially and as a source of livelihoods for small-scale fishing communities.

The potential economic opportunities from improving fisheries management and aquaculture production are well known. Acknowledging this, the Ministry of Agriculture, Livestock and Irrigation has established targets and objectives to improve fisheries and aquaculture in the Agriculture Development Strategy. Further, the Draft National Aquaculture Development Plan will set objectives and targets for the sustainable development of the sector.

The Country Environmental Analysis (CEA) undertaken in collaboration between the World Bank and the Department of Fisheries consolidates our understanding of the trends in marine and freshwater fisheries and aquaculture and provides a clear set of recommendations to achieve sustainable development in the sector.

Importantly, the CEA highlights the potential of community-based fisheries management and the recent success of devolving responsibilities to States and Regions for managing our inland and inshore fisheries. The analysis of aquaculture in Thailand, Vietnam, and Bangladesh also delivers unique insights of how we can further enhance aquaculture production in Myanmar.

We are committed to implementing recommendations made in this joint report for sustainable development of Myanmar's fisheries and coastal resources.

A handwritten signature in blue ink, consisting of stylized cursive letters and a long horizontal stroke extending to the right.

H.E. Dr Aung Thu
The Union Minister
Ministry of Agriculture, Livestock and Irrigation
The Republic of the Union of Myanmar



ACKNOWLEDGEMENTS

This Country Environmental Analysis was prepared by a team led by Martin Fodor and Stephen Ling. The core team was composed of Aye Marlar Win, Katelijn van den Berg, Khine Thwe Wynn, Lesya Verheijen, Nina Doetinchem, Miguel Angel Jorge, Rory Hunter, Thiri Aung, and Werner Kornexl. The extended team included Aung Kyaw Thein, Aung Aung Naing, Benjamin Belton, Lucy Emerton, Michael di Alessi, Mizushi Satoh, Ngwe Moe, Oliver Springate, Rick Gregory, Klaus Sattler, Sanne Tikjoeb, Tun Tun Thein, and U Win Latt.

The team received expert advice from peer reviewers Andrew Mitchell, Berengere Prince, Carter Brandon, Paola Agostini, Randall Brummett, Timothy Brown, Wolfhart Pohl, and Xavier Vincent.

The CEA was produced under the overall guidance of Ellen Goldstein (Country Director, Myanmar), Gevorg Sargsyan (Head of Office, Myanmar), Mark Austin (Program Leader, Sustainable Development), and Christophe Crepin (Practice Manager, Environment and Natural Resources Global Practice).

The team would like to acknowledge the generous support provided for preparation of the report by the Program on Forests (PROFOR); PROBLUE Multi-Donor Trust Fund; the U.K. Department for International Development; and the Australian Department of Foreign Affairs and Trade. Technical inputs were received from the Food and Agriculture Organization of the United Nations, Korea Environmental Technology and Industry Institute, and the Center for Forests and People (RECOFTC).

INTRODUCTION

The Myanmar Country Environmental Analysis (CEA) aims to enhance shared understanding of environment and natural resource (ENR) trends in Myanmar between the Government of Myanmar (GoM), the World Bank, and other stakeholders. It is expected to serve as a basis for dialogue between the GoM and the World Bank on why and how the World Bank's support to the country should promote environmental sustainability and effective management of natural assets and also serve a wider audience interested in these topics.

In consultation with the GoM and other stakeholders, a decision was made to focus this analysis on four priority environmental issues. These are forestry, fisheries, solid waste and air pollution, and the Environmental Impact Assessment (EIA) system diagnostic. It was agreed that changes made in these four sectors are most likely to contribute to reversing the environmental trends Myanmar currently faces.

The CEA is the first major piece of analytical work in the ENR sector since the World Bank's reengagement in Myanmar in 2012. The ENR space is important, complex, and rapidly evolving. This CEA builds on the sector studies and analysis undertaken to date by the government and other development partners and consolidates shared knowledge. It is hoped that the insights the CEA provides will serve to inform further analytical and sector work and guide the investments and policy reforms of the GoM.

The CEA also sets out to inform a number of activities in the World Bank's Myanmar Program.¹ In particular, forest sector studies, undertaken as a part of the CEA, feed into the preparation of proposed forest sector project. There are also community forestry (CF) components planned as a part of the proposed Peaceful and Prosperous Communities Project focused initially in the Kayin, Kayah, and Mon States; mangrove and forest restoration and CF activities planned as a part of the proposed Rakhine Recovery and Development Support Project; subnational Environmental Conservation Department (ECD) capacity-building activities planned as a part of the proposed Enhancement of the State and Regional Government Capacity Project; and the nature-based tourism component of the proposed Myanmar Sustainable Tourism Project.

In addition, the CEA contributes toward the development of the Strategic Country Diagnostic. This diagnostic underpins the upcoming Myanmar Country Partnership Framework, particularly its environmental sustainability pillar—mirroring the pillar of the Myanmar Sustainable Development Program (MSDP) on People and Planet. The CEA is further complemented by other pieces of ongoing analytical work, including the Myanmar Country Forest Note, Myanmar Coastal and Delta Resilience Program, Myanmar Sustainable Solid Waste and Pollution Management Study, Wealth Accounting and the Valuation of Environmental Services Program, and the proposed Blue Economy Study.

The CEA focuses on four areas of particular significance to ENRs from the perspective of poverty reduction, social inclusion and participation, and economic growth. In particular, the CEA focuses on forests and fisheries as two key renewable natural resources which Myanmar has relied upon to provide livelihoods, fuel, and nutrition to a large part of its population, and whose ecosystems provide a variety of additional protective and productive services to multiple parts of the economy. It also reviews the impacts solid waste and air pollution have on the environment, including the issue of plastics, a topic of increasing global interest and awareness. It assesses Myanmar's progress in establishing effective EIA and monitoring systems as the cornerstones of a national environmental management framework. And it does this while acknowledging the growing pressure on these critical natural assets (that many of the threats come from development activities in other sectors) and the exceptional opportunities and challenges presented by Myanmar's transitions to peace, democracy, and economic openness.

¹ The focus of the World Bank Myanmar Program is on promoting social inclusion in conflict-affected areas through analytical work, advisory, and investments in education, health, nutrition, energy, agriculture, rural development, water resource management, macroeconomics, and other sectors.

This CEA Synthesis Report is the main deliverable of the CEA. It is a consolidation of the key findings and recommendations of three separate reports on **Forest Resources, Fisheries,** and an **EIA Systems Diagnostic.** A separate study on **Potential for Scaling Up Community Forestry** was undertaken as well. In addition, the Synthesis Report integrates some initial findings of the ongoing World Bank study on ‘Sustainable Solid Waste and Pollution Management’ to draw attention to this agenda of increasing importance.

The CEA has been carried out by the World Bank in partnership and close collaboration with a number of GoM departments. These include the Forest Department (FD) and ECD under the Ministry of Natural Resources and Environmental Conservation (MONREC) and the Department of Fisheries (DOF) under the Ministry of Agriculture, Livestock, and Irrigation (MOALI). The CEA adopted a highly participatory approach during preparation, involving the GoM development partners, civil society, nongovernmental organizations (NGOs), communities, and the private sector in a series of consultations and technical and validation workshops.

The CEA applied the methods outlined in the World Bank CEA Toolkit. These covered (a) review of environment development priorities, status, and trends by consolidating existing information, data, studies, and reports; (b) assessment of environmental policies and institutions drawing on the experience from the World Bank and other development actors’ interactions with these institutions; and (c) an in-depth analysis of environmental priorities in forestry, fisheries, solid waste management and pollution, and EIA systems. These analyses included a detailed examination of trends, sector policies and strategies, and investment priorities. The CEA primarily drew on analysis of existing data sources and a variety of expert opinions, supplemented by systematic review of institutional data and field visits and consultations.

EXECUTIVE SUMMARY

Myanmar is rich in natural resources and is a global biodiversity hotspot. It is also a country in the midst of a huge political and social change. For three decades, Myanmar was ruled by a military junta. In 2015, free elections were held, and since then the government has been grappling with the challenge of tackling poverty and developing the country. However, the government is aware of the importance of managing its natural wealth in a sustainable way as expressed in the Myanmar Sustainable Development Plan (MSDP). This vision is supported by a recent World Bank *The Changing Wealth of Nations* report that argues that the management of natural resources is critical to long-term sustainable development (Lange, Wodon, and Carey 2018).

Myanmar's forests and fishing industry are two significant contributors to the economy, and yet these sectors are also potentially under threat from overexploitation and mismanagement. The management of solid waste, air pollution, and the use of plastics provides another growing challenge. In addition, the role of government and other stakeholders in the management of these sectors and issues is central to whether the government will succeed in reversing the current trends and be able to find a long-term sustainable solution to the problem.

This report explores the issues and challenges faced and the legal and institutional context. Through a lens of poverty reduction, social inclusion and participation, and economic growth, the report tells a story of an urgent need for institutional support and reform, improvements in the enforcement against illegal extraction of resources, behavior change in all relevant stakeholders, institutional capacity building, increased funding, and improvements in data collection and analysis. If these recommendations are acted on, then Myanmar can reverse the negative trends and lead its environment on a path toward a more sustainable future.

Despite diminishing stocks, renewable natural resources continue to play an important role in Myanmar's economy

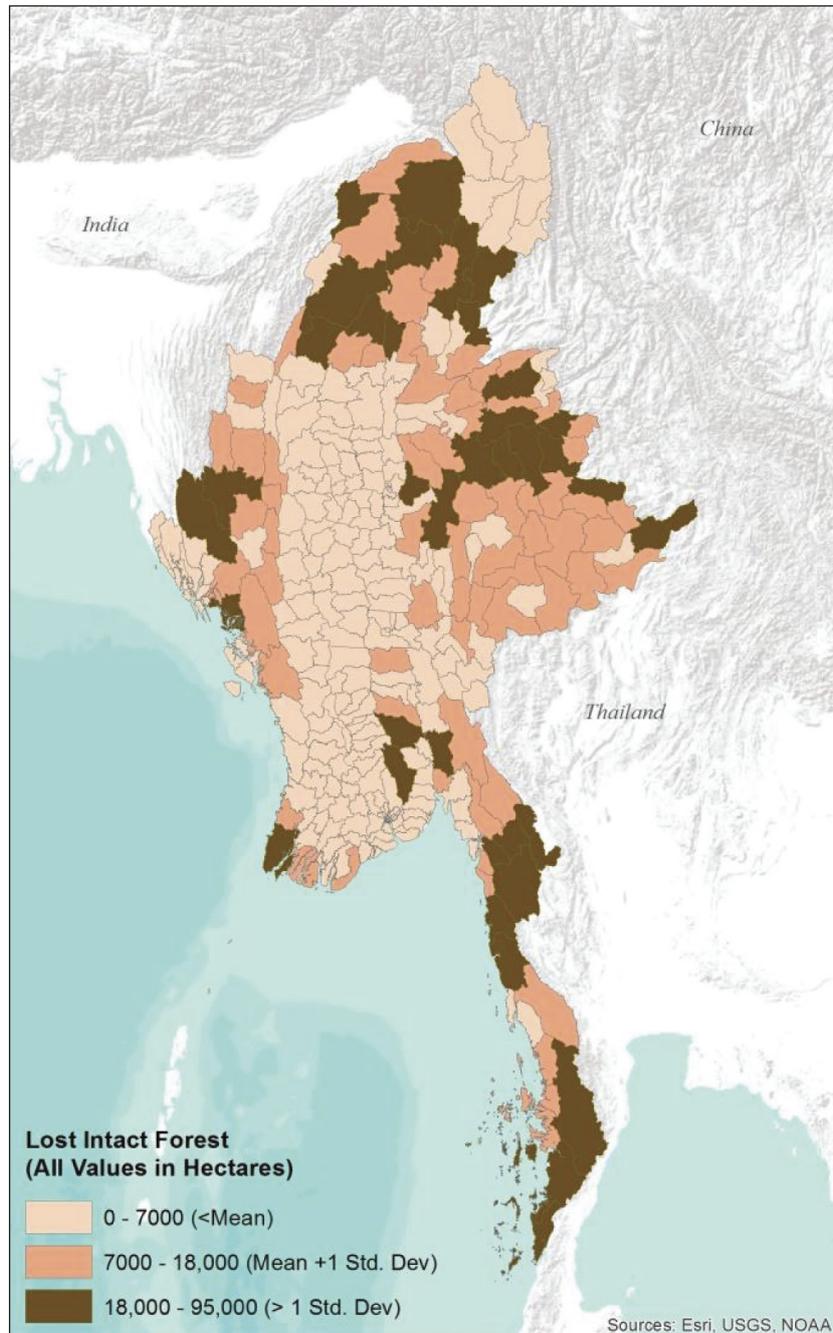
Natural resources, particularly commercial teak exports, have traditionally played a major economic role in Myanmar. The economy of colonial Burma was oriented around the extraction and export of natural resources, particularly teak, oil, and rubies. During the colonial era, Burmese teak accounted for up to 85 percent of global teak production and by the end of the 19th century provided approximately 45 percent of net government revenues for the whole of British India (Bryant 1997). Myanmar's forests also form some of the world's most critically important biodiversity 'hotspots'.

In more recent decades, there have been dramatic declines in forest and fisheries resources. Between 1990 and 2015, forest cover declined at an average rate of 1.2 percent a year, a total of 10 million hectares (ha) (FAO 2015). In addition, during 2010–2015, Myanmar experienced the third largest absolute forest loss globally (FAO 2015). Figure

1 shows the extent of intact forest loss across different areas in the country from 2002 to 2014. Since 1980, marine fish stocks are estimated to have fallen by as much as 90 percent for pelagics and 50 percent for demersals (Krakstad et al. 2015). Large declines in many high-value species of freshwater fish are reported throughout the Ayeyarwady River Basin, which covers around 60 percent of Myanmar's land area (Baran et al. 2018).

Figure 1

Intact forests (ha) lost between 2002 and 2014



Source: Bhagwat et al. 2017

Against a backdrop of strong industry- and services-led gross domestic product (GDP) growth, official statistics suggest that renewable resources now make only a modest contribution to the formal economy. Myanmar's GDP grew at a high rate of 7.2 percent in the 2013–2018 period.² The recorded share of forestry in GDP in Fiscal Year (FY) 2015/16 was just 0.2 percent or US\$130 million at constant 2018 prices,³ and forest exports earned some US\$270 million or 2.5 percent of total export earnings (Central Statistics Organization 2016; MMSIS 2018). The fisheries sector is not recorded as a separate line in GDP statistics but combined with livestock contributed 8 percent of GDP in 2015/16 (of which fisheries probably contribute the minor share). The Department of Fisheries (DOF 2017) records the total value of fish exports at over US\$600 million for 2016/17.

However, formal GDP statistics vastly underestimate the economic and social importance of natural resources. Direct contributions to economic production are undervalued due to illicit and informal use of natural resources. Estimates put the value of unlicensed or illegal timber exports at four times the documented value (Raitzer, Samson, and Nam 2015; UNODC 2013), and timber is estimated to account for a small proportion of the total volume of forest products. Over 80 percent of woody biomass extracted in 2017 was for wood fuels (based on FAO 2018a). Substantial quantities of marine fish are thought to be illegally exported to Thailand. In addition, while about half of the animal-source foods consumed in Myanmar is fish (Belton et al. 2015), a substantial proportion of that consumption comes from subsistence fishing, which is not reflected in the formal economy.

Including both their direct contribution to production and other ecosystem services, the total annual value attained from Myanmar's ecosystems has been estimated to be up to 10 times higher than reflected in formal GDP figures for forestry and fisheries:

- **Forest ecosystem services were valued at around US\$5.5 billion** not including mangroves (Emerton and Aung 2013). In the hills and coastal areas in particular, forests help maintain stream flow in the dry season and retain sediments and thus purify water, particularly in the northern mountainous part of the country. They also help mitigate the impact of climate change.
- **The value of marine and coastal ecosystem services was estimated at US\$8.5 billion a year**, almost 60 percent of which is contributed by mangrove and coral reef ecosystems (BOBLME 2014).

One important dimension of ecosystem services is to reduce Myanmar's vulnerability to climate change and natural disasters. Myanmar is highly vulnerable to natural disasters—floods, drought, cyclones, landslides, and earthquakes. In 2016, the country ranked second in the Global Climate Risk Index⁴ (Kreft, Eckstein, and Melchior 2017), with natural disasters causing an average loss of US\$2 billion per year (3 percent of the GDP). For example, the estimated cost of the damage from floods and landslides in July–August 2015 was US\$1.51 billion (World Bank 2015a). Forests reduce flood and landslide risk, and recent modeling has estimated that mangroves reduce the impact of natural disasters on the coast by an average of US\$165 million per year (Losada et al. 2018).

² <https://data.worldbank.org/country/myanmar>.

³ All U.S. dollar values referred to in this section are expressed at constant 2018 U.S. dollar, deflated using the Consumer Price Index for that year and then converted at the 2018 exchange rate.

⁴ Based on weather-related loss events from 1996 to 2015.

Forestry and fisheries also generate high employment. Over 3.2 million people are currently engaged directly in the fisheries sector, including 800,000 full-time and 2.4 million part-time workers. In some coastal areas, fisheries employment rates are as high as 34 percent (Tezgo et al. 2018). The forestry sector provided as many as 886,000 jobs in 2015/16—the equivalent of just over 4 percent of national employment. It also generated up to US\$95.5 million in wage earnings (MEITI 2019).

Natural resources are particularly important to the poor . . .

Poverty is more concentrated in rural, natural-resource dependent areas of Myanmar.

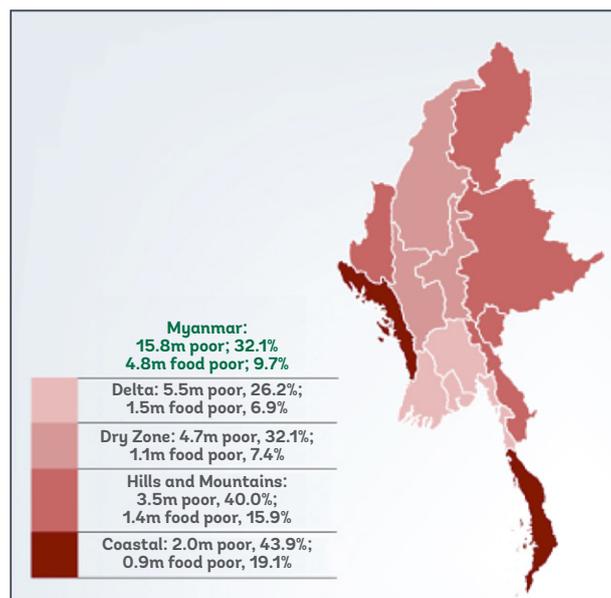
An updated poverty assessment in 2017 concluded that the headcount poverty level is 32.1 percent in 2015, declining from 48.2 percent in 2004/05 (World Bank 2017a). This means that about one-third (or 16.98 million people) of the current estimated population of 52.89 million are poor. Around 10 percent are food poor. Poverty is significantly higher in rural areas (38.8 percent of population), compared to urban areas, where it is now around 14.5 percent and is declining more rapidly. About 35 percent of Myanmar’s population is rural. This means that 87 percent of all poor are in rural areas, compared to 13 percent in urban areas.

Poverty is more prevalent and severe in the hilly, mountainous, and coastal agro-ecological zones of Myanmar, compared with the Delta and Dry Zone (Figure 2).

There is also a strong correlation at the township level between forest cover and deprivation as measured by the World Bank Group’s Multidimensional Index (MDI)⁵ (see Figures 3 and 4). About 520,000 rural households were estimated to be living adjacent to forests in 2012 (Emerton and Aung 2013).

Figure 2

Poverty headcount by agro-ecological zone

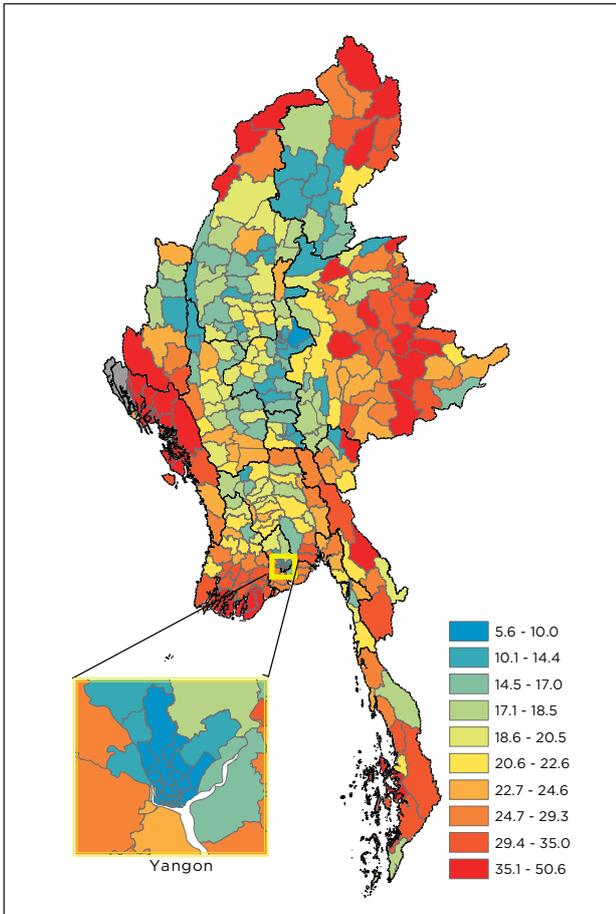


Source: MOPF and World Bank 2017.

⁵ See <http://hdr.undp.org/en/content/what-multidimensional-poverty-index>.

Figure 3

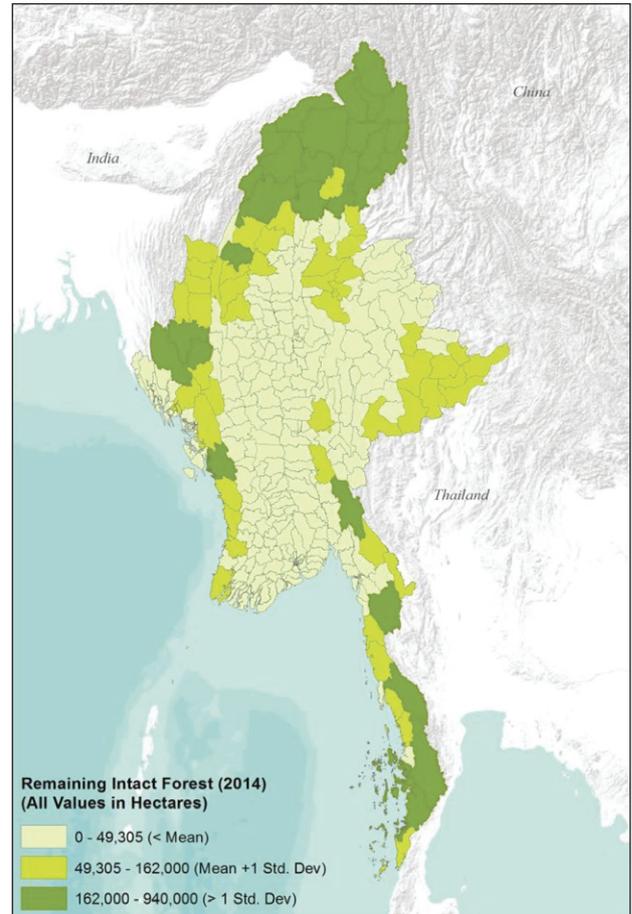
MDI by township



Source: World Bank 2018b

Figure 4

Remaining intact forests by township (2014)



Source: Bhagwat et al. 2017.

The poor are also highly reliant on forests and natural ecosystems. Wood fuel remains the most important energy source in rural areas, and non-timber forest products (NTFPs) are a major source of income and housing materials for the poor. Similarly, 1.9 million households live in divisions and townships located in the coastal zone, mostly dependent on marine and coastal resources (BOBLME 2014). Given their high reliance on natural resources, the poor suffer the most when these resources are degraded or depleted. A recent natural capital assessment also suggests that the biophysical supply of key services—such as sediment retention, waterflow regulation, and flood control—is concentrated in the relatively poorer areas in the north and northwest of the country (Mandle et al. 2017; WWF 2016a).

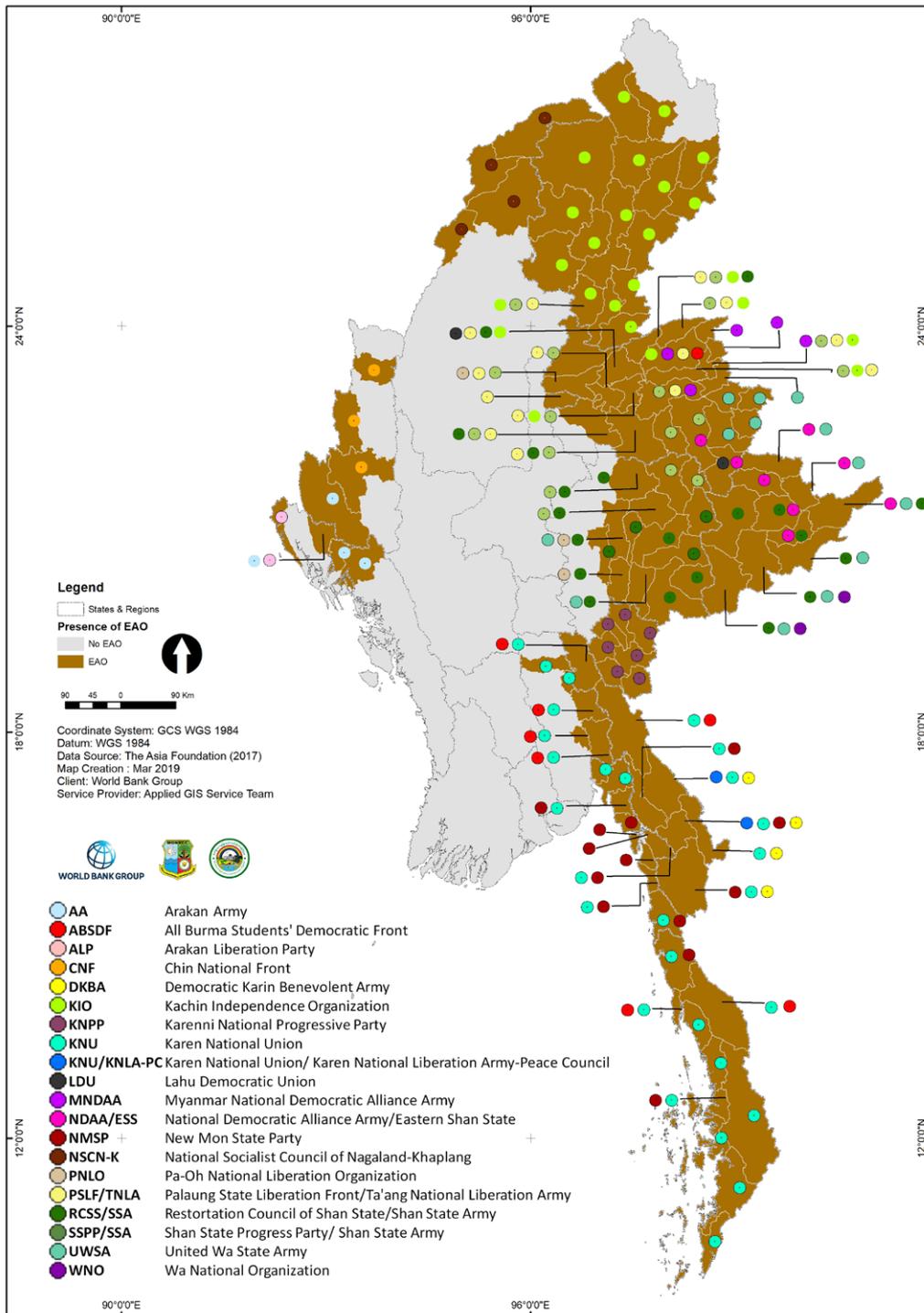
.. and have a role in peace-building and inclusion

Myanmar has been more deeply affected by subnational conflict than any other country in Asia, fueled in part by abundant natural resources. Across the country, there are at least 20 major ethnic armed organizations (EAOs) as well as hundreds of smaller splinter groups and government-affiliated militia.

While Myanmar's subnational conflicts are not driven solely by economic interests, the great natural resource wealth found in many contested parts of the country is a significant factor. Natural resources and control over trade routes can generate wealth to sustain EAOs or support the Tatmadaw (the Myanmar Armed Forces). In 2016, it was estimated that 118 out of 330 townships in Myanmar were affected by active or latent conflict (TAF 2017) (Figure 5).

Figure 5

Presence of EAOs in Myanmar



Source: The Asia Foundation 2017.

Participatory natural resources management can support Myanmar's ongoing peace process. Around two-thirds of Myanmar's remaining forests are in areas managed by non-Bamar ethnic groups, in many cases through customary tenure systems, with much of this forest located in conflict areas. The demands for greater subnational control over natural resources are strong, especially among EAOs. In addition, the ruling National League for Democracy (NLD) has committed to establishing a federal state that allocates certain responsibilities for natural resources to subnational governments. Both forestry and fisheries can make an important contribution to devolving power at the subnational level and creating income and employment opportunities in rural areas.

Rapid economic development is bringing new environmental challenges

There are growing concerns around the impacts of the large-scale development, particularly from the mining sector. While the national economic transition has facilitated the entrance of more efficient machinery in the mining industry, the increased level of activity has also intensified pressure on water resources and competition for land. Mining and other land concessions, including for agriculture, have led to deforestation, land degradation, deterioration of water quality, flooding and landslides, biodiversity loss, and depletion of inland and coastal fisheries.

Acute environmental health issues are on the rise, caused by rapid urbanization and industrialization. In 2017, over 45,000 deaths in Myanmar were attributed to air pollution. Air pollution is a higher mortality risk factor in Myanmar than in other countries in the region, at almost twice the average for Southeast Asia (GBD 2017). Yangon and Mandalay have the highest particulate matter (PM) concentration, PM₁₀, among the cities in Southeast Asia (Raitzer, Samson, and Nam 2015).

Urban waste also increases the risk of environmental health issues. In 2016–2017, Yangon city dumpsites received 855,000 tons of solid waste, a 20 percent increase from the previous year.⁶ However, it is assessed, on the basis of estimated waste generation and landfill records, that the waste collection coverage in Yangon is only 49 percent, in Mandalay 80 percent, and in Taunggyi 64 percent, with waste ending up instead around the city and in water streams. Plastic littering is also increasing. In both Yangon and Mandalay, most waste is collected and handled manually, with negative consequences for health (IGES and CCET 2016).

Treatment and proper sanitary waste disposal remain limited, even in formal landfills which are operated as open dumpsites without any environmental controls. This is far from the targets established in the National Waste Management Strategy and Master Plan for Myanmar to: (i) achieve solid waste collection for all citizens (70 percent collection by 2020, 85 percent collection by 2025, and 100 percent collection by 2030) and (ii) eliminate the uncontrolled dumping and burning in the cities and mandate the operation of environmentally sound waste disposal facilities (ECD and MONREC 2018).

⁶ Yangon City Development Committee presentation on current situation of solid waste management, 2018.

Income from solid waste management services is insufficient to cover the costs of solid waste collection and disposal and represents 25–50 percent of the operational expenditures. Amortization costs that can allow for the cost recovery of the solid waste investments are not covered at all. There is a need to optimize costs and increase the revenues of solid waste management and increase the waste collection coverage specifically in the larger cities to increase the financial sustainability of the waste operations and improve the environmental sustainability of both waste collection and proper disposal in environmentally compliant landfills.

The Government of Myanmar has begun modernizing its environment and natural resources management systems.

Environment and natural resources management systems need to catch up with the new challenges and opportunities presented by rapid economic development, and the related increase in environmental pressures, and the peace process. This includes the following:

- Adopting a more holistic approach to forest management that embraces a range of forest functions. These include community livelihoods and inclusion, environmental services that support and protect the productivity of other sectors (such as agriculture and tourism), and traditional timber industries.
- Moving from a focus on collection of fishing license fees to the recognition of fisheries as finite and exhaustible resources that require active management to maximize social benefits.
- Developing effective systems for environmental assessment, monitoring, and compliance.

In each of these areas, there are opportunities to learn lessons from other countries, avoid pitfalls, and develop robust systems while retaining substantial natural assets.

The Government of Myanmar (GoM) has made impressive progress recently in developing a set of national strategies and action plans to manage natural resources. Planning frameworks and instructions include the following:

General planning frameworks

- **MSDP 2018**

It recognizes the importance of environment and natural resources (ENRs) for economic growth. Goal 3 identifies the need to build infrastructure to facilitate economic growth and also establishes effective social and environmental safeguards against negative impacts of infrastructure development.

- **National Environmental Policy (NEP) 2019**

It covers three strategic areas: (a) clean environment and healthy and functioning ecosystems, (b) sustainable economic and social development, and (c) the mainstreaming of environmental protection and management.

- **Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2018–2030**

It aims to support the public and private sectors and vulnerable communities to respond to climate change.

Forestry

- **National Forest Master Plan (NFMP) (2002–2031)**

It commits to increasing reserved forest (RF) and protected public forest (PPF) to 30 percent of total land area by 2030 (up from 24.5 percent) and protected areas (PAs) to 10 percent (up from 5.75 percent) and to establish around 920,000 ha under community forestry (CF).

- **Myanmar Reforestation and Rehabilitation Program (MRRP) 2017–2026**

It includes ambitious targets to restore close to 1 million ha of degraded and deforested land within RF and PPF, including establishing over 311,746 ha under CF.

Fisheries

- **Agricultural Development Strategy (ADS) 2018–19 to 2022–23**

It establishes objectives for fisheries and aquaculture.

- **Draft National Aquaculture Development Plan**

It sets out long-term national objectives for the sustainable development of the sector.

Environmental and pollution management

- **Environmental Conservation Law (2012)**

It is supported by the Environmental Conservation Rules (ECR) 2014 and the Environmental Impact Assessment (EIA) Procedure (2015) and establishes the legal framework for environmental assessment and regulation.

- **National Waste Management Strategy and Master Plan (2018–2030)**

It aims to implement waste collection for all citizens and eliminate uncontrolled disposal and open burning of waste.

The rapidly expanding policy framework establishes many ambitious objectives but translating these into achievable action steps and budgeted and financed investments remains a major challenge.

However, significant work remains in the management of forestry . . .

In the years before the democratic transition, forest areas were largely over-logged. This resulted in widespread degradation of the Permanent Forest Estate (PFE). Illegal logging and corrupt practices still occur. However, in 2014 a temporary log export ban was imposed to stop the plunder, after which a series of reforms were enacted to better control and manage the resources.

The new forest reforms emphasize restoration and include CF. The MRRP and the revised 2016 Community Forestry Instruction (CFI) provide the framework for a long-needed program that has the potential to address many of the social and inclusion legacy issues in the sector. [The recently amended CFI (2019) was released in May 2019 as the report was being finalized; its analysis is not included in the report]. The MRRP sets clear targets for forest restoration and scaling-up of community forestry, which, if implemented as planned, will be a significant step forward. Global experience shows that CF and smallholder plantations are financially and socially viable and can meaningfully contribute to generation of rural income, trust, and business opportunities, if secure tenure and incentives are in place (World Bank 2019d).

Despite progress, there are substantial opportunities for improvement and higher ambition. Although there is high political ownership by the government and society, the sector still lacks the financial and human resources to accelerate reforms and implementation of programs, attract the needed private capital and technology, and develop an inclusive enabling environment for forest communities and private forest enterprise. Key opportunities to add value to the sector include the following:

- **More diverse ways of recognizing and enabling existing forms of community-based forest management and enabling new community engagement are needed.** CF should be mainstreamed within the PFE. Outside the PFE, existing forms of customary forest management should receive legal recognition and where necessary technical support. Agricultural expansion and concessions, conversion for infrastructure, and overharvesting are the main causes of forest cover loss and degradation. A pragmatic approach is needed to manage forested land across different land classifications and ecosystems, including Vacant, Fallow, and Virgin (VFV) land and mangroves, which are mostly under de facto control of communities.
- **Wood fuel is used as the main energy source by 60–80 percent of the rural population, but it is not widely recognized as a priority area for action.** A concerted cross-sectoral response is needed, involving incentives for the establishment of wood fuel plantations, introduction of more efficient technologies, and fuel substitution (by extension of the national grid and off-grid electricity provision).
- **The targets for expanding private plantations in the MRRP (within the PFE) could be significantly increased if the right enabling environment is created to attract reputable international companies.** These companies could facilitate and support technology transfer, sustainable practices, and outgrower schemes for a modern, sustainable, and competitive wood-based industry.
- **Myanmar's limited and low-quality processing of some of the world's most valuable timber represents a huge opportunity cost in terms of export and rural jobs.** For example, Vietnam invested heavily in high value-added processing and forest small and medium enterprises (SMEs) over the last 10 years. Today, it is the fifth largest wood products exporter globally, with related revenue exceeding that of Myanmar more than twenty-fold.

...fisheries

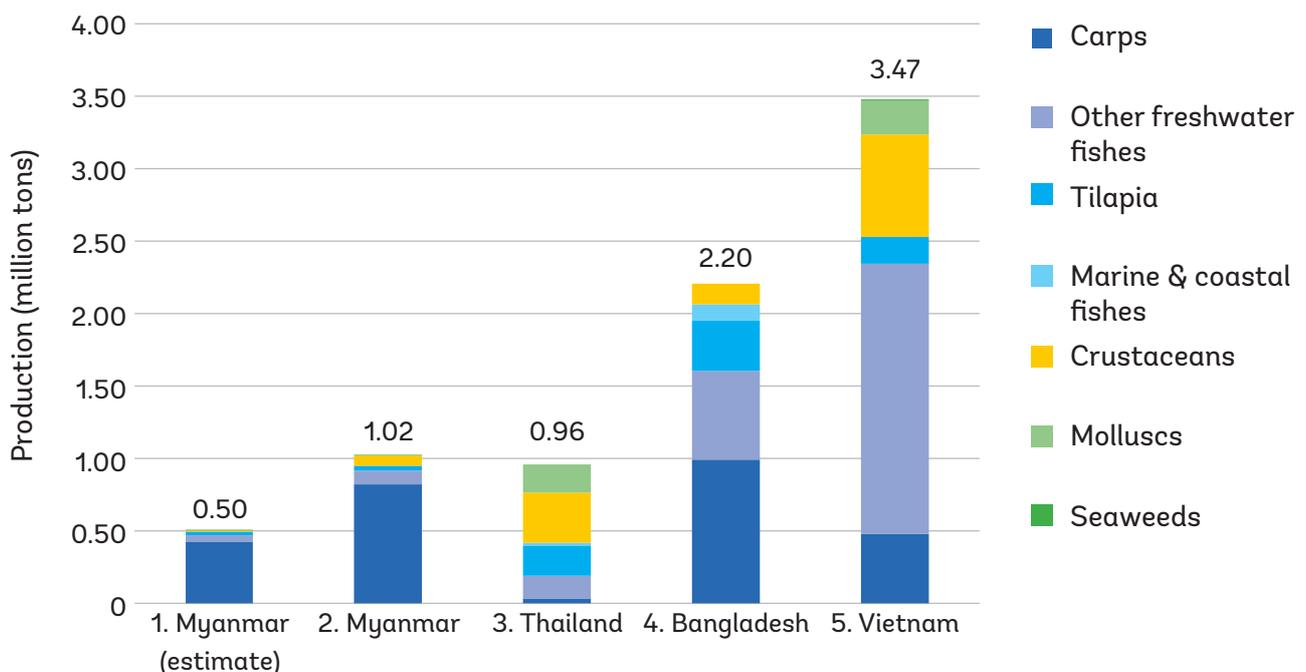
There is a scarcity of scientific data on which to base the management of Myanmar's fisheries. Official catch estimates show an inexorable rise in marine fisheries' production (DOF 2017; FAO 2018b). Yet, these estimates are contradicted by a variety of other economic and research data, and there are discrepancies between what is officially reported and other sources. Periodic visits of the *Fritjof Nansen* research vessel have provided vital information on Myanmar's marine stocks, but more routine and lower-cost stock assessment methods are needed.

The potential economic opportunities from improving fisheries management are substantial. Ballpark estimates suggest that current production from marine fisheries alone falls short of their biological potential by potentially US\$1 billion per annum. Bioeconomic modelling of marine fish stocks in Rakhine and Tanintharyi is expected to also show large potentials for yield increases.

The value of aquaculture production could be increased. This could be done by raising productivity, diversifying production to include more valuable species, and allowing expansion of the area under production. It is estimated that Myanmar's actual aquaculture production is about half of Thailand's, one-quarter of Bangladesh's, and one-seventh of Vietnam. Figure 6 compares the volume and composition of aquaculture production in Myanmar, Bangladesh, Thailand, and Vietnam.

Figure 6

Aquaculture production for Myanmar, Thailand, Bangladesh, and Vietnam, 2016



Source: FAO 2018; author's own calculations⁷.

⁷ Column 1 is an alternative estimate of likely levels of production for Myanmar, based on yields of fish and shrimp derived from farm surveys. This alternative estimate suggests that Myanmar's actual aquaculture production is about half of reported production.

It is clear that fisheries and aquaculture value chains are underperforming (Belton et al. 2015; FAO 2018). This is apparent in areas including limited value-added processing, limited diversity of available fish seed, low levels of adoption of pelleted feeds in aquaculture, and extremely limited veterinary and diagnostic services. This situation is made worse by a lack of access to formal credit and insufficient provision of basic infrastructure to support market access.

Community-based fisheries management provides opportunities to resolve some of the issues faced by the fisheries sector. It would promote more equitable distribution of benefits from inland and inshore fisheries and help balance the competing demands between improving fisheries governance and safeguarding the livelihoods of the poor. However, legal reforms and community capacity-building would be needed to expand existing pilots. Increasing access to affordable credit could also help address equity and poverty among fishers. Myanmar ranks 178 of 190 countries for access to credit by SMEs, and most fishers are locked into debt dependency relationships with traders.

Improved fisheries governance and management offers significant opportunities to reduce local conflicts in coastal and floodplain areas. Major sources of conflict in the fisheries sector are (a) competition in marine fisheries between commercial offshore vessels and small-scale inshore fishers, (b) conflict between farmers and fishers over the management of water levels on floodplains, and (c) conflict between large fish farms and former rice growers and fishers over confiscated land. The planned establishment of a vessel monitoring system (VMS) for the offshore fleet will be instrumental in addressing these local conflicts.

...the environmental impact assessment (EIA) system

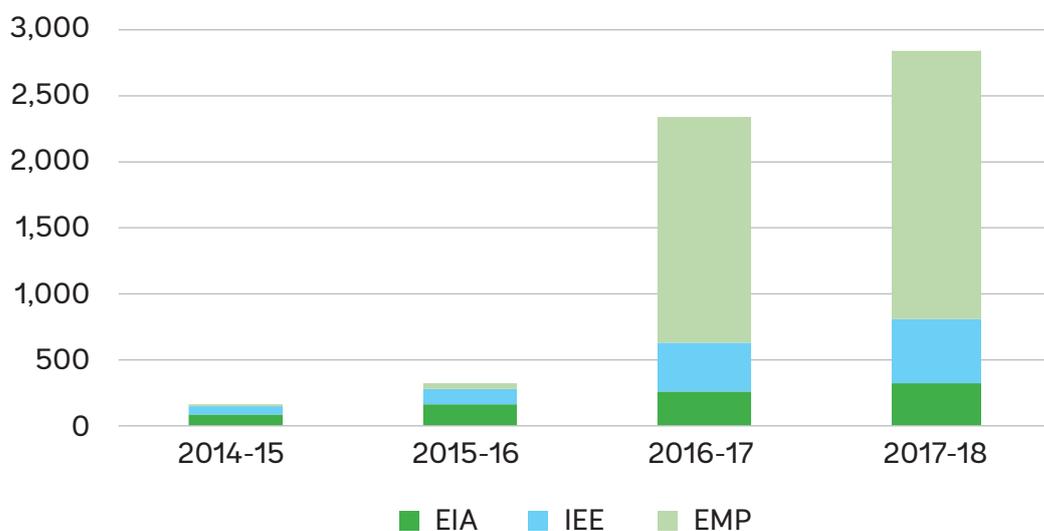
Myanmar's EIA system is struggling to cope with the demands it faces from an environment sector that is increasingly under stress. EIAs are critical to identifying and managing the potential impacts of large-scale development and striking the balance between economic development, environmental conservation, and social inclusion (IFC 2017; Raitzer, Samson, and Nam 2015). Significant recent progress has been achieved in establishing the legal and regulatory framework. The government has set up an EIA Division in the Environmental Conservation Department (ECD) to oversee the review and approval of EIAs, initial environmental examinations (IEEs), and environmental management plans (EMPs).

However, EIA systems need to ensure that the government has a transparent information system for managing the EIA process. The ECD also needs to be equipped with the technical capacity, tools, budget, and resources to become a more effective environmental regulator. This includes improving the tracking and transparency of EIAs, IEEs, and EMPs; strengthening ECD's capacity; operationalizing financial mechanisms for the review and approval of reports; and shifting focus toward inspection, monitoring, and audit.

A huge number of EIA, IEE, and EMP reports have been submitted. This is a major achievement, but the limited capacity of ECD and poor-quality of reports has led to major backlogs in approval. By February 2019, a total of 2,783 reports had been submitted (Figure 7). A breakdown of these submissions by sector shows that a high proportion are for the mining sector. While nearly all reports have been replied to (90 percent in total), only 6.9 percent (192) have been approved. A further 250 EIAs, 482 IEEs, and 1,859 EMPs await approval.

Figure 7

EIA/IEE/EMP received from FY2014/15 to FY2017/18



Source: World Bank Group 2019

Currently, compliance visits are only carried out in response to complaints from local community, and there is not an effective regime for regular inspection and monitoring. In Myanmar, less resources are committed to compliance and monitoring as the ECD is dealing with the review and approval of a significant volume of reports. This is a common issue in the other Mekong Region countries (ERI 2016). Myanmar would benefit from developing a compliance strategy to help focus the post EIA environmental inspection and compliance efforts on achieving measurable environmental outcomes.

...and solid waste, plastic, and air pollution

In order to reach the targets of the National Waste Management Strategy and Master Plan of 100 percent waste collection coverage, a road map for the development and implementation of a plastic action plan is required. This needs to include an analysis of the negative economic impacts of plastics mismanagement and define the policy actions and investments that will reduce plastic use and leakage into waterways. Part of this analysis exercise needs to identify the top 10 priority plastic items found in the environment and the effectiveness and efficiency of potential plastic policies, based on international experience and the Myanmar context. In addition, information on plastic leakage into the waterways from priority cities is needed, as is an analysis of municipal investments and policies that could significantly reduce such leakage and the use of plastic.

Establishing an ambient air quality monitoring network and enforcement of emission guidelines would support the monitoring and control/enforcement of air pollution as a first step in air quality management. Myanmar needs a systematic long-term assessment of pollutant levels through provision of equipment and expertise to measure the quantity and types of pollutants as well as the key sources of air pollution. This could include the provision of low-cost air monitoring sensors and of training in case of calibration with fixed reference air monitoring stations. The development of an air pollution emission inventory for key cities will also be required. With the assistance of air quality modelling on the basis of actually monitored air quality, source apportionment, and emission inventories, the cost-effective policies and investments to reach air quality targets can be established and form the basis for an air quality management plan.

Forestry

1. Create delivery mechanisms to scale up CF within PFE.

The Forest Department (FD) needs to simplify and accelerate the handover processes for CF establishment. Developing an efficient delivery mechanism to scale up the establishment and implementation of CF, including providing CF services to ethnic communities, will help facilitate this process.

2. Undertake an inventory of forest stocks, strengthen control mechanisms, lead on cross-agency enforcement, and reform the Myanmar Timber Enterprise (MTE).

While sustainable production forestry is still viable in some natural forest areas, the FD should (a) undertake an inventory of forest stocks to decide on how to proceed on the restoration of forests and how best to manage private, community, and public efforts; (b) improve the timber legality assurance system (TLAS) to support high-value production and export; (c) strengthen planning and control mechanisms and lead a cross-agency dialogue on law enforcement; and (d) reform the MTE considering the entire value chain.

3. Promote an enabling environment for private plantations to attract reputable and chain of custody-certified private companies and investment.

Myanmar would benefit from the preparation of an Industrial and Commercial Plantation Strategy, in close cooperation with wood-based industry. This would address constraints related to transparent licensing, safeguards, competitive partnership agreements (public-private partnerships), financing, fiscal incentives; and create an enabling environment for forest SMEs.

4. Increase protected areas to 10 percent of total land area.

Planning, gazettelement, and management of PAs should continue taking into account communities' preexisting rights. The FD should consider (a) creating a more effective management framework to promote ecotourism, (b) protecting and restoring mangroves as a priority, and (c) assessing the possibility of introducing Payment for Environmental Services (PES), including carbon payments, to support PAs and watershed restoration.

5. Build the capacity of the FD to implement a challenging reform process.

The support needed includes skills development, an increased budget, technological support, and better civil society engagement. Specific skills needed in the FD include bottom-up planning, community engagement, facilitation, livelihoods expertise, business development, and private sector partnerships.

Fisheries

6. Strengthen enforcement of existing fisheries laws and regulations and move toward quota-based systems.

Existing fisheries laws and regulations need to be more strongly enforced. This includes enforcing closed seasons and gear restrictions in marine and freshwater capture fisheries, clearly defining inshore and offshore zones with global positioning system (GPS) markers, and applying VMS to the entire offshore fleet. In addition, the capacity of partnerships as well as procedures to bring cases to court need to be developed. Quota-based systems also need to be implemented. Over time, the development of stock assessment and monitoring should provide a foundation for establishment of quotas and auctioning of quota-based licenses, at least in marine fisheries.

7. Expand protection of aquatic habitats.

This includes protection of freshwater wetlands, mangroves, and coral reefs, including the establishment of additional Marine Protected Areas (MPAs). Legal and institutional frameworks for coastal resources management and incorporation of protections for freshwater fisheries into agriculture and water resources policies are also important.

8. Strengthen co-management to mobilize fishing communities to support improved governance.

Expanding current co-management pilots within inshore and to freshwater fisheries will require the expansion of legal frameworks for secure tenure and establishing local institutions such as fishers' associations and cooperatives. Analysis of credit constraints and options for community-based fisheries enterprises is also important.

9. Create the space for a more productive aquaculture sector.

The first step should be to assess the biophysical and market potentials for different types of aquaculture. Legal frameworks need to be reformed to remove the constraints on aquaculture development within farmland and reservoirs and to develop regulations for coastal cage fisheries. In addition, investment strategies need to be prepared to address basic market access infrastructure, extension, biosafety and quality control services, the provision of commercial hatcheries and feed production, and the introduction of selective breeding programs.

10. Data collection and management.

It should cover fish consumption (potentially through including modules in standard household surveys), monitoring of fish stocks and landings, a registry of vessels and VMS, a geographic information system (GIS) registry of inns and tenders, and a GIS registry of fish farms.

11. Build the capacity of the DOF to implement this broad management agenda.

The support needed includes skills development, an increased budget, more staff, and technological support. This will enhance the DOF's ability to deliver on monitoring, control, and surveillance (MCS); stock assessment and management; community engagement and business development; aquaculture and biosafety; and fisheries monitoring and spatial statistics.

The EIA system

12. Establish a transparent Environmental Management Information System (EMIS).

A transparent EMIS is needed to track the status of EIA, IEE, and EMP preparation and review and to facilitate the monitoring of their implementation and compliance by regulators and stakeholders. Public participation and attention to environmental assessment can greatly help mitigate the existing institutional capacity constraints.

13. Adopt risk-based and outcome-focused approach to EIA review, approval, and monitoring.

This includes extending the current focus on EIA documents review to a systematic follow-up on their implementation and compliance. Focus should be on prioritizing high environmental risk projects and delegation, and accelerating EIA approvals based on risk. A clear compliance strategy is also needed for engaging regulated industries and simplifying the Environmental Compliance Certificates (ECCs) for practical compliance monitoring.

14. Operationalize dedicated financial mechanisms to cover the costs of environmental assessment and compliance.

This includes operationalization of the Environmental Management Fund (EMF) to provide funding to improve the implementation of the EIA procedure and environmental inspection and monitoring (Schulte and Baird 2018). Generating environmental funding can also be facilitated through the establishment of systems for Payment for Environmental Services (PES).

15. Strengthen environmental management institutions and mobilize resources to boost capacity at national and subnational levels.

The staffing and resourcing of the ECD and other institutions responsible for environmental and pollution management at national and subnational levels needs to align with the expanding regulatory requirements and growth of the regulated economic sectors. Other institutional strengthening actions include establishment of a third-party review mechanism to support the ECD with the review of EIAs and IEEs; a functional review of the EIA Division and Pollution Control Division (PCD) regarding compliance, inspection, and monitoring; and strengthening of the Safeguards Learning Center (SLC) for staff and stakeholder capacity.

Solid waste and air pollution

16. Prepare a road map for a plastic action plan.

It is important to systematically plan to address the plastic menace. This plan could include the following: analyze the impact plastic has on the environment, identify top priority plastics to act upon, and decide a time frame and budget for implementation.

17. Improving financial sustainability and waste collection services.

Options to optimize costs and increase revenue for solid waste management will be analyzed in the subnational expenditure review. Measures to increase solid waste collection and options to rehabilitate dumpsites to sanitary landfills or new landfills will be defined as part of the ongoing World Bank analytical work on solid waste and pollution management.

18. Invest in monitoring air quality and waste streams.

It is important to understand the impacts of solid waste and air pollution and the available management options. This can be done by establishing a national air quality monitoring network, focusing initially on large population centers, and investing in solid waste analysis and management, taking advantage of simple cost-effective technologies.



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