Papua New Guinea NDC

Implementation Roadmap, for Agriculture, Forestry, and Other Land Use (AFOLU) Sector.

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Abbreviations

AFOLU	Agriculture, forestry and other land use
ART	Architecture for REDD+ Transaction
BUR	Biennial update report
CACC	Central Agency Coordination Committee
CBD	Convention on Biodiversity
CBIT	Capacity-building Initiative for Transparency
CCA	Community conservation area
CCDA	Climate Change and Development Authority
CCMA	Climate Change Management Act
CEPA	Conservation and Environment Protection Authority
CFRN	Coalition For Rainforest Nations
CIC	Coffee Industry Corporation
CIMC	Consultative Implementation and Monitoring Council
CO2e	Carbon dioxide equivalents
DA	direct action
DAL	Department of Agriculture and Livestock
DLPP	Department of Lands and Physical Planning
DNPM	Department of National Planning and Monitoring
DPLLG	Department of Provincial and Local Level Government
DSS	Decision Support System
EA	Enabling action
ER	Emission reduction
ETF	Enhanced Transparency Framework
EU	European Union
FAO	Food and Agriculture Organization
FCA	Forest Clearance Authority
FCPF	Forest Carbon Partnership Facility
FMA	Forest management authority
FOLUR	Food Systems, Land Use and Restoration (Project)
FRIMS	Forest Resource Information Management System
FRL	Forest Reference Level
GCCA	Global Climate Change Alliance
GCF	Green Climate Fund
GEF	Global Environment Facility
Gg	Gigagram
GHG	Greenhouse gas
GoPNG	Government of Papua New Guinea
ha	Hectares
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
K	Papua New Guinea Kina (currency)
KRA	Key Results Area

LEAF	Lowering Emissions by Accelerating Forest Finance (Project)
LLG	Local-level government
LNG	Liquefied natural gas
LUIS	Land use information system
LULUCF	Land use, land use change and forestry
LUP	Land use plan
MoU	Memorandum of understanding
MRV	Measurement, reporting & verification
mt	million tons
MTDP	Medium-Term Development Plan
MVF	Markets for Village Farmers
NC	National Communication
NDC	Nationally Determined Contribution
NEC	National Executive Council
NFA	National Fisheries Authority
NFMS	National Forest Monitoring System
NISIT	National Institute of Standards and Industrial Technology
NLUIS	National land use information system
NSCCF	National steering committee on climate finance
NSLUP	National Sustainable Land Use Plan
OPIC	Oil Palm Industry Corporation
pa	Per annum
PA	Protected area
PACD	Papua New Guinea Agricultural Commercialization and Development Project
PAPIP	Protected Areas Policy Implementation Plan
PCCC	Provincial Climate Change Committee
PHARMA	Pacific Horticultural and Agricultural Market Access Program
PNG	Papua New Guinea
PNGFA	Papua New Guinea Forestry Authority
RBP	Results-based payment
Red List	IUCN's Red List of Threatened Species
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, and the Role of Conservation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks in Developing Countries
SABL	Special agricultural business lease
SDG	Sustainable Development Goal
SLUP	Sustainable land use plan
SPREP	Secretariat of the Pacific Regional Environment Programme
STAR	System for Transparent Allocation of Resources
STREIT	Support to Rural Entrepreneurship and Trade
STWC	Sub-technical working committee
TREES	The REDD+ Environmental Excellence Standard
TWC	Technical working committee
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States dollars
USAID	United States Agency for International Development
WMA	Wildlife Management Area

Roadmap at a Glance

Papua New Guinea's (PNG) forests are vulnerable to land use change and degradation, with reported emissions from the sector above 39,000 gigagrams of carbon dioxide ($GgCO_2$) per annum.

PNG's Enhanced Nationally Determined Contribution (NDC) set out a conditional target to reduce these by 10,000 $GgCO_2$ per annum against 2015 levels by 2030 through action to reduce deforestation and degradation and support forest planting.

Recent interim emissions assessments indicate that PNG has already achieved reduced emissions by close to 15,000 $GgCO_2$ per annum (against 2015 levels), based on reduced levels of deforestation and forest degradation.

These reductions are, however, vulnerable to reversal without targeted interventions to support their permanence.

This document provides a roadmap for PNG to consolidate and enhance the permanence of current emissions reductions (ERs) and to further enhance its ambition towards a 50% ER against 2015 levels.

All actions should, however, be seen as conditional and based on enhanced international support in line with the conditional nature of PNG's NDC commitments.

The identified direct action pathways have significant potential to deliver ERs. Based on assessments against 2015 emissions data, it is estimated that they could deliver more than 111,946 $GgCO_2$ equivalents (e) in cumulative ERs by 2030, with annual ERs and additional sequestration of over 20,000 $GgCO_2e$ per annum against 2015 levels.

This roadmap builds on existing sector and broader government strategies, including PNG's Climate Compatible Development Policy, National Reforestation Strategy, Protected Areas Policy, National Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, and the Role of Conservation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks in Developing Countries (REDD+) Strategy, National REDD+ Finance and Investment, Protected Areas Finance and Investment Plan, Medium-Term Development Plan (MTDP), and National Strategy for Responsible and Sustainable Development.

It links closely with PNG's recently developed Climate Change (Management) (Nationally Determined Contribution) Regulation 2021, which provides a legal basis for several key action areas in the roadmap and focuses on action to ensure these regulations are implemented.

It is targeted towards key stakeholders in the government of Papua New Guinea (GoPNG) as well as development partners and other interested groups working to support ERs and PNG's sustainable and responsible approach to climate compatible development.

It sets out actions over a 10-year period, with a focus on actions within the first five years of implementation. These are divided into:

- **Direct action pathways:** Organized by sector (forestry, environment, lands and agriculture) and focused on actions that either directly deliver or provide support environments for further investments in actions linked to ERs.
- **Enabling action pathways:** Focused on establishing the key elements of a climate governance framework, including actions on governance, safeguards, monitoring, reporting and verification and financial management.

Within these areas, a number of priority actions and target jurisdictions are also identified for early action.

In the final section, it considers the enabling environment needed for implementing the roadmap .

US$500 million the indicative costs of implementing the AFOLU roadmap over the coming 10 years

111,946 Gg of cumulative ERs estimated to be delivered between 2021–2030 against 2015 levels

20,528 $GgCO_2$ of annual ERs against 2015 levels by 2030

6.5 million hectares of additional forest under conservation — over 8 million hectares of terrestrial protected areas — meeting PNG's targets under the Convention of Biodiversity

470 threatened species with habitat secured

200,000 hectares of native forest planted

US$75 million in sustainable forest products

US$2 billion plantation stock

50% increase in cocoa and coffee production and increases in palm oil production

Enhanced unit values of agricultural commodities

Enhanced food security for rural communities

Note: All cost and ER figures should be treated with caution as they are estimates and will vary based on several factors, including:

- Costs: who holds them (private sector, communities or government?), the final nature of actions and implementation, and so on
- ERs: updated information on impacts of logging practices, nature of plantation development and how ERs from lower levels of agricultural clearing are attributed to interventions, such as environmental permits, improved land use planning, and so on

Key recommendations focus on:

1. **Continued investment in PNG's enabling climate governance architecture** (in line with Climate Change (Management) (Nationally Determined Contribution) Regulation 2021), with additional impetus on:
    - Establishing a central coordination system for climate action (EA.1.1)
    - Ensuring mechanisms and agreements for data sharing and management are in place and operational (EA.1.4)
    - Establishing effective, highly robust and transparent systems for targeting access to and the subsequent management of climate finance (identifying and communicating which types of finance PNG is pursuing and how it will be used) (EA.1.3)
    - Mainstreaming climate targets into key sector and cross-sector plans, with an immediate focus on PNG's Fourth MTDP (MTDP 4) and action towards including climate targets in performance agreements at subnational level (EA.1.1)

2. **Consolidating existing ER progress:** With a focus on key jurisdictions, prioritize actions that will help increase the permanence of existing ERs, particularly those linked to reduced rates of commercial logging and palm oil expansion (both of which have shown more than a 50% decline in area of land impacted 2015 to 2019,[1] with possible further reductions in 2020 and 2021[2]).

This can be achieved through a combination of support to strengthen the policy and enforcement environment around timber operations (DA1.1. and DA1.4) support to transition away from logging for those areas where production has ceased (DA1.5). It is noted that within this, there will be a need for local-level action within several target action areas, including work on designating and financing conservation areas (DA2.2), action on land use planning (DA3.3 in particular) and improving productivity of family and commercial agricultural activities (DA4.2–4.5). Identifying how these can best be targeted at a jurisdictional and landscape level is therefore a key priority. Action in this area has already been initiated through work on PNG's Palm Oil Platform but fast-tracking and enhancing this process can be seen as a priority.

3. **Establishing structures and approaches to promote further finance:** This will partially be achieved through actions under EA1.3 noted above, but should also be viewed at a sector level with regard to establishing effective financing strategies and reviewing how best to mobilize private sector finance to help promote sustainable and productive land use activities over the long term, with particular consideration to tree planting (DA1.3), protected area (PA) management (DA2.2), provision of extension systems (DA4.2) and sustainable palm oil, cocoa and coffee sectors (DA4.3, 4.4 and 4.5).

4. **Ensuring effective coordination across support areas:** PNG is estimated to receive close to US$60 million annually in development partner finance that is 'aligned' to this roadmap and is likely to see increases in finance linked to results-based payments (RBPs). Significant recurrent finance is also invested through PNG's national and subnational governments. Ensuring the coordination and alignment of how this finance is used is of critical importance to PNG's ability to deliver on its climate targets, attract further finance and critically support its people to gain enhanced, secure and sustainable livelihoods.

1. PNG Land Use, Land Use Change and Forestry Assessment 2016–2019
2. Based on log export data.

Executive Summary

Context

PNG's Enhanced NDC 2020 increased the scope and level of ambition of PNG's emission targets, including adding specific targets for the agriculture, forestry and other land use (AFOLU) sector. Within this sector, PNG's NDC set conditional targets of reducing emissions linked to deforestation and forest degradation by 10,000 $GgCO_2e$ by 2030, through a 25% reduction in the areas of land impacted against 2015 levels while also supporting increased levels of tree planting.

Work to update PNG's emission assessment to 2020 indicates that the country has already achieved the targets laid out in the Enhanced NDC 2020 through significant declines in both deforestation and forest degradation. While impressive, this progress must also be seen as vulnerable to reversals unless action is taken to ensure ER permanence and further enhancement.

Approach

The **goal** of this roadmap is to enhance coordinated action and investment towards the delivery and further enhancing of PNG's targets within the AFOLU sector.

Its **objective** is to provide a clear AFOLU NDC Implementation Roadmap around which action and investment can be mobilized.

While pursuing this goal and objective, the document limits its **scope** to:

- The AFOLU sector — more specifically, on how the targets of the Enhanced NDC 2020, which focuses on the land use land use change and forestry (LULUCF) sector, will be achieved and furthered through action on PNG's key emissions sources and sinks, as currently measured and reported on by PNG; and
- The data management and reporting improvements required to strengthen PNG's capacity to report on and take action in other areas of the AFOLU sector.

It does not include actions to revisit targets outside of the LULUCF sector.

The **time line** reflects the implementation plan, which covers the 10-year period of PNG's enhanced NDC. But is anticipated to be reviewed and updated within five years to reflect the ongoing changing context in PNG and globally.

The **target audience** for this document is the PNG government and development partners who may be seeking to support implementation of NDC action. Summaries of the document are also expected to be developed for other stakeholder groups, including private sector and landholding communities.

In developing this approach and the target pathways, the document has built on existing plans and strategies across government and has gone through an extensive process of stakeholder engagement and validation.

Pathways

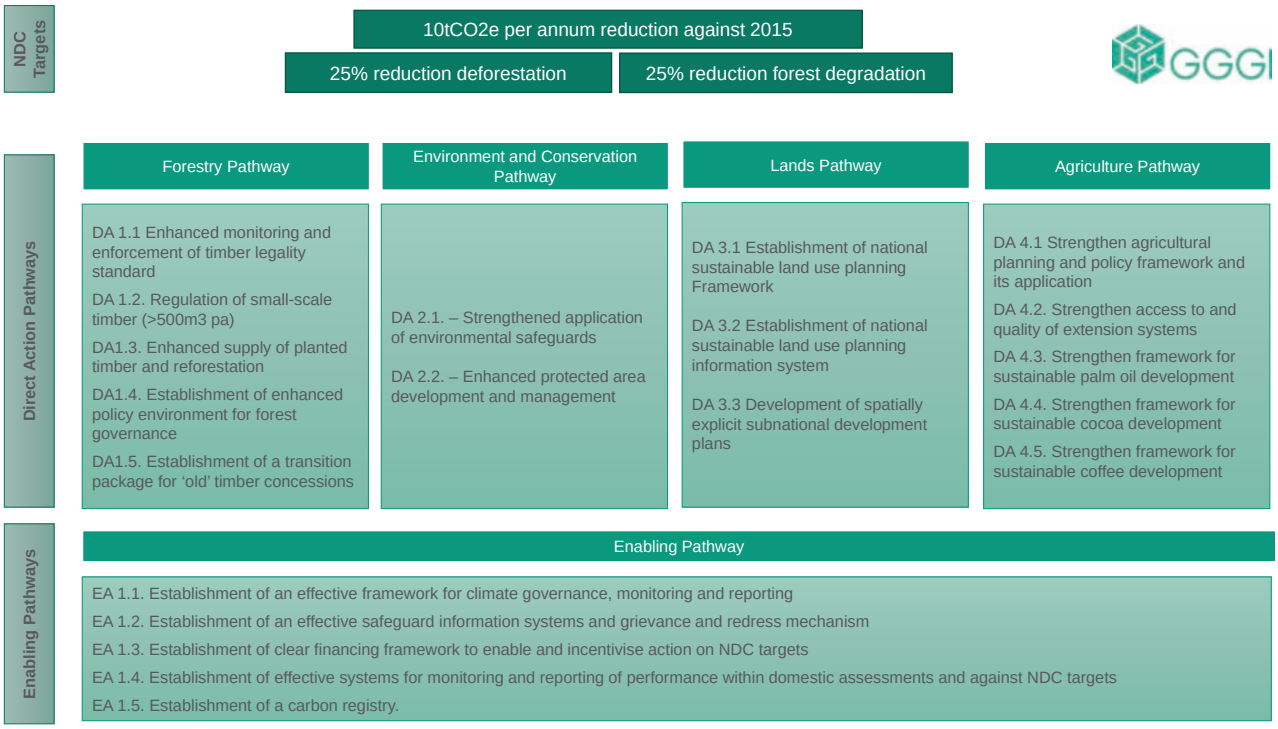
This roadmap sets out pathways to achieving and furthering PNG's NDC targets. These are linked to key sector agencies in recognition of the need to work with PNG's existing institutional arrangements, especially as PNG moves towards a stronger mainstreaming of climate targets and potential results-based finance into sector action. Pathways are divided into:

Direct action pathways, which are focused on sector-based actions that link to delivering ERs and direct changes in the way that land is managed; and

Enabling pathways, which are focused on key elements of PNG's climate governance framework required to ensure PNG can effectively coordinate actions, report emissions and manage finance linked to mitigation actions within the AFOLU sector.

The main pathways are shown in Figure S1, and summary tables are provided at the end of this Executive Summary.

Figure S1. AFOLU roadmap theory of change



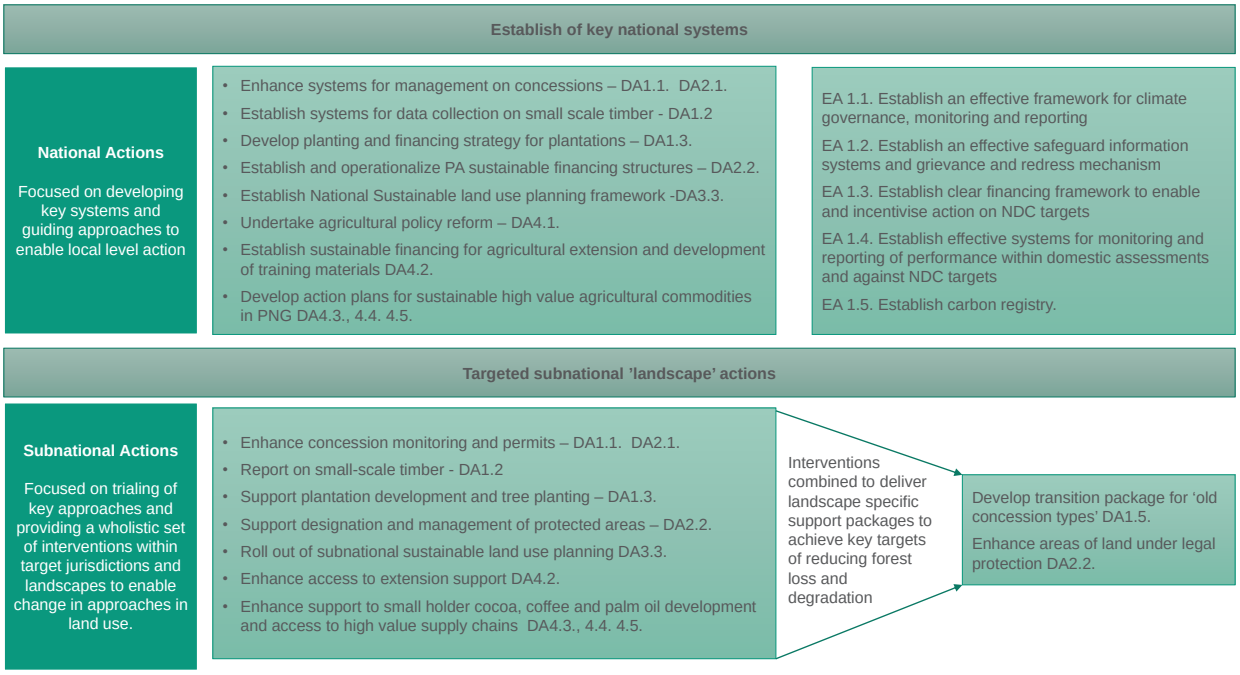
The roadmap notes the need to prioritize several of these actions and target initial actions within distinct geographical areas to help deliver compound impacts that show the potential for integrated cross-sector action. On this basis, it identifies several key national and subnational actions. The former were prioritized according to their potential to deliver ERs, feasibility and need to support other actions — for example, enabling pathway actions, work on land use planning. Target jurisdictions for the latter (Box S1) were prioritized according to potential for avoided emissions and existing levels of support that can act as a catalyst to wider action. It is also noted that provinces with Provincial Climate Change Committees (PCCCs) can also be considered for prioritization.

BOX S1

Proposed target provinces for early subnational action

- East New Britain
- West New Britain
- East Sepik
- West Sepik
- Enga
- Eastern Highlands
- Western Highlands

Figure S2. National and subnational action paths



Roadmap Governance

The overall governance of roadmap implementation is intrinsically based on PNG's broader structures for climate governance. As such, the approach is based on the mandates and requirements outlined in key policy and legislation, most notably the Climate Change Management Act (CCMA) (2015) and revised CCMA Amendments Bill (2021), as well as the existing development planning framework laid out in the National Planning and Monitoring Responsibilities Act (2015) and subnational planning and financial management guidance.

In line with these documents and the experience of NDC implementation, the proposed approach is based on a stepwise process of further mainstreaming climate actions while establishing key governance and financing structures *(Figure S3)*.

Figure S3. Pathway to implementing the roadmap

This approach links with several of the key enabling action areas noted above, two of which are critical to early implementation and scaling up of actions within the roadmap:

EA 1.1. Establish an effective framework for climate governance, monitoring and reporting

- Mainstream climate action into development planning
- Establish a system for coordinating action and prioritizing resources

EA 1.3. Establish a clear financing framework to enable and incentivize action on NDC targets

- Establish a mechanism to receive and allocate resources

To help establish an effective framework for climate governance, monitoring and reporting (EA1.1), Figure S4 illustrates the proposed approach for integrating the roadmap into the wider planning framework.

Figure S4. NDC and roadmap integration and development planning process

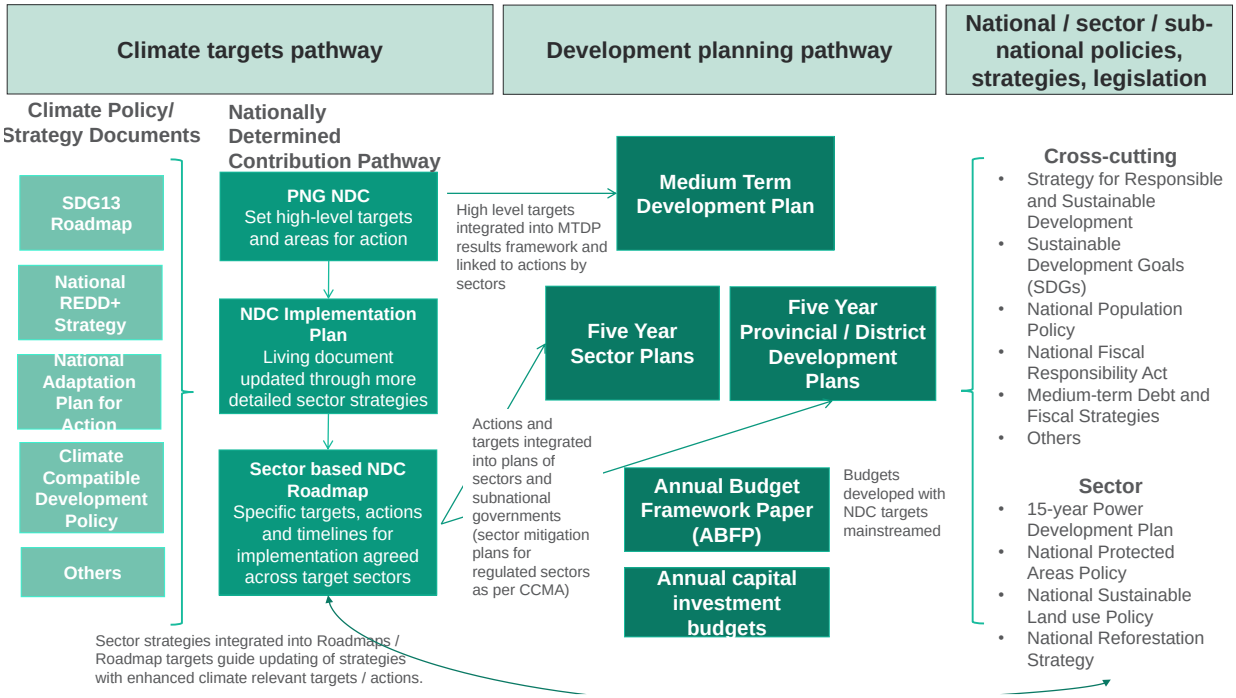
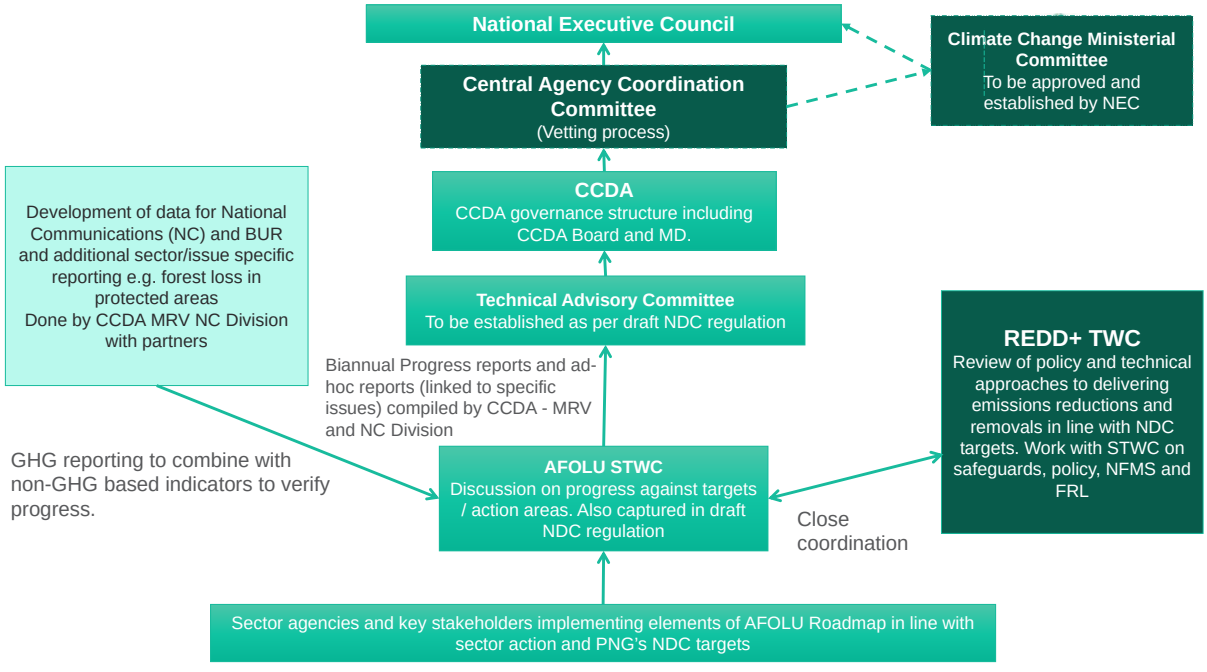


Figure S5 outlines the proposed baseline structures for implementing the roadmap and monitoring progress. Alongside this, the following priority steps are necessary to ensure effective progress:

1. Develop a memorandum of understanding (MoU) between key sector agencies and other bodies to facilitate coordinated action and data sharing on climate change-related issues and commit to establishing a central coordination body (committee) and or interim climate change and NDC performance committee.
2. Maintain ongoing engagement with REDD+ process and REDD+ Technical Working Committee (TWC) to strengthen links and clarify mandates.
3. Maintain quarterly meetings of the AFOLU Sub-Technical Working Committee (STWC) to support engagement and coordination across sectors.
4. Develop draft terms of reference for a central coordinating body on climate action and climate finance that can be presented for review by the Central Agency Coordination Committee (CACC).
5. Establish that body.

Figure S5. Proposed governance structure for implementing the AFOLU roadmap



Financing Implementation

PNG has potential to mobilize significant finance for the AFOLU sector to help achieve its targets. Annual RBPs for historic and projected future ERs if downward trends in emissions continue are estimated to rise from just over US$10 million (for 2014–15) to over US$170 million (for 2021–26). These can be accessed through existing multilateral initiatives that will provide finance at a national scale, though in each case, the funds will need to be channeled through an accredited entity and require clear financial management and data reporting systems. These funds have the potential to deliver significant benefits but are not guaranteed over the long term. As such, they should be used to support the development of an effective enabling environment that in turn will support effective forest management and economically beneficial but environmentally sustainable industries that can deliver long-term investment. Existing development partner and government funds should also be used to support these areas, help attract more sustainable private sector investment and target actions that may not deliver immediate ERs but support the long-term sustainability of change.

To help mobilize results-based finance, investments must continue to prioritize key enabling environment pathways to ensure the country has the technical and implementation capacity to meet reporting standards for both emissions and governance elements of different financing systems.

Key Recommendations

1. **There must be continued investment in PNG's enabling climate governance architecture,** in line with the Climate Change (Management) (Nationally Determined Contribution) Regulation (2021) with additional impetus on:
    - Establishing a central coordination system for climate action (EA.1.1);
    - Ensuring mechanisms and agreements for data sharing and management are in place and operational (EA.1.4);
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    - Mainstreaming climate targets into key sector and cross-sector plans, with an immediate focus on PNG's MTDP 4 and action towards including climate targets in performance agreements at subnational level (EA.1.1).

2. **Consolidating existing ER progress:** With a focus on key jurisdictions, prioritize actions that will help increase the permanence of existing ERs, particularly those linked to reduced rates of commercial logging and palm oil expansion (both of which have shown more than a 50% decline in area of land impacted 2015 to 2019,[3] with possible further reductions in 2020 and 2021[4]).

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3. **Establishing structures and approaches to promote further finance:** This will partially be achieved through actions under EA1.3 noted above, but should also be viewed at a sector level with regard to establishing effective financing strategies and reviewing how best to mobilize private sector finance to help promote sustainable and productive land use activities over the long term, with particular consideration to tree planting (DA1.3), PA management (DA2.2), provision of extension systems (DA4.2) and sustainable palm oil, cocoa and coffee sectors (DA4.3, 4.4 and 4.5).

4. **Ensuring effective coordination across support areas:** PNG is estimated to receive close to US$60 million annually in development partner finance that is 'aligned' to this roadmap and is likely to see increases in finance linked to RBPs. Significant recurrent finance is also invested through PNG's national and subnational governments. Ensuring the coordination and alignment of how this finance is used is of critical importance to PNG's ability to deliver on its climate targets, attract further finance and critically support its people to gain enhanced, secure and sustainable livelihoods.

3. PNG Land Use, Land Use Change and Forestry Assessment 2016-2019
4. Based on log export data.

Forestry pathway

The proposed actions are estimated the be able to deliver close to 54,000 $GgCO_2e$ in ERs and removals by 2030, against 2015 levels (Table S1).

Achieving this will require significant investment of more than US$110 million over 10 years, but will also help deliver:

- Increased market access for PNG timber and potential price premiums for sustainably produced timber;
- Enhanced production from planted forests and potential linked investment in downstream processing;
- Over 220,000 hectares of trees planted within an indicative split of 60,000 hectares of environmental planting, 60,000 hectares of community planting and 100,000 hectares of commercial plantations;
- Estimated US$70 million in wood products in 10 years and a future asset worth close to US$2billion if effectively maintained and harvested; and
- Options for improved approaches to forest management and sustainable revenue generation from the sector.

Priority actions include:

- Strengthening forest information and monitoring systems (DA1.1)
- Piloting woodlot / plantation development in key locations (DA1.3)
- Piloting a transitional model for old timber permits (DA1.5)

Critical linkages: The unique nature of land ownership in PNG, the high proportion of population living and relying on rural land for their livelihoods, and the importance of viewing landscapes as part of an integrated system mean it is crucial to link approaches to transitioning old concession areas with other action areas, namely those linked to PA development (DA2.2), land use planning (DA3.3) and those supporting agricultural development (DA4.2–4.5).

Further information on all action areas is shown in the sections below.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP 3

KRA1. Increase revenue and wealth generation

1.2. Increasing value of exports, through increased unit value of timber with higher legality assurance

1.3. Creating employment and economic opportunities, through enhanced capacity for forest management as well as tree planting

KRA7. Promote PNG's environmental sustainably, by reducing forest depletion rates

Sustainable Development Goals (SDGs)

13. Climate action

15. Life on land

15.1 Conservation and rehabilitation of forest areas

15.2 Sustainable use of forest resources

SDG 13 Roadmap

10. REDD+ results delivered
11. Internationally recognized timber legality standard
12. Increased environmental and commercial planting
13. Enhanced strategies for secondary forest utilization
14. Enhanced information on forests

National REDD+ Strategy

2.3.2.2. Strengthening forest management and enforcement practices

Table S1. Forestry pathway action matrix

Action or activity	Indicator	Short and medium-term targets	Lead implementing agencies	Potential ERs ($GgCO^2e$)	Budget (US$ millions)	Progress to date	Link with NDC action-based targets	Funding source	Support needs
DA1.1. Enhance monitoring and enforcement of timber legality standard	Percentage of all forestry concession types (over $500m^3$) (including Forest Clearance Authorities (FCAs) with full legal certification)	50% of concessions (including FCA timber) by 2025 100% of concessions (including FCA timber)	PNG Forest Authority (PNGFA)	2025: 1,119 per annum (3,338 cumulative) 2030: 2,398 per annum (12,931 cumulative)	99.9	Timber legality criteria (standard) has been approved and work is moving for early trialing PNGFA have a number of systems in place to support data availability	Strengthen monitoring of FCA permits Enhanced application of timber legality	Existing and proposed support through a number of development partner initiatives, including the Global Environment Facility's (GEF) GEF6 Capacity-building Initiative for Transparency (CBIT) and two GEF7 projects administered by United Nations Development Program (UNDP) and the Food and Agriculture Organization (FAO) Additional support on systems development is possible through a proposed Japan International Cooperation Agency (JICA) project for forest sector and the Green Climate Fund (GCF) RBP project as well as FAO-administered GCF-supported REDD+ registry development work	To roll out and monitor legality standards
DA1.2. Regulate small-scale timber (>$500m^3$ per annum (pa))	Enhanced information on nature of small-scale production	Quantification of impacts of small-scale timber in place (2022) Measures identified to enhance small-scale timber harvesting management (2025) Review of approach and target (2025)	PNGFA	2030: 647 cumulative by 2030	2.5	No existing funding	Initial work assessing and reviewing options for small-scale operations Information needs updating	None	For early action on assessment
DA1.3. Enhance supply of planted timber and reforestation	Hectares (ha) of new planted timber	110,000 ha (2025) 220,000 ha (2030)	PNGFA	2025: 1,328 per annum (4,367 cumulative) 2030: 2,564 per annum (14,435 cumulative)	6.6	Initial awareness-raising materials developed	Promoting the Painim Graun Planim Diwai and Planting 10 Million Trees initiatives	None	To develop targeted strategies for key provinces and national financing plan
DA1.4. Establish enhanced policy environment for forest governance	Enhanced forest policy environment	Draft forest policy by 2023 Updated forest policy by 2025	PNGFA	2025: 600 per annum (1,669 cumulative) 2030: 1,199 per annum (6,465 cumulative)	2	Work conducted on legislative review	Enhancing timber legality Promoting REDD+ Promoting downstream processing	Possible GCF RBP finance and support through JICA forestry project	For policy review
DA1.5. Establish a transition package for 'old' timber concessions	Level of reduction in concessions under 'old' license types	60% reduction in number of 'old' concession types	90% by 2030	2025: 1,799 per annum (5,007 cumulative) 2030: 3,597 per annum (19,396 cumulative) *	TBC	None	Enhancing timber legality Promoting REDD+	Possible GCF RBP finance	To develop approach for multi-agency engagement at subnational level

Note: * Delivering a 30% reduction in emissions levels from forest degradation due to commercial timber operations — which is in line with the proposed phase out 'old' concession types — is estimated to deliver significantly higher ER levels (in excess of 8,000 $GgCO_2e$ per annum by 2030). However, only 30% of ER from degradation (including ERs linked to improved legality) is allocated to DA1.5; the remaining ERs are attributed to other areas due to the contribution that actions such as support to agriculture and or land use planning will have in shifting land use practices.

Environment pathway

The proposed actions are estimated the be able to deliver around 18,600 $GgCO_2e$ in ERs against 2015 levels by 2030, while also:

- Placing over 6 million hectares of forest under protection, giving PNG over 8 million hectares of terrestrial PA, thus meeting its Aichi targets under the Convention on Biodiversity (CBD);
- Increasing protection for PNG's unique biodiversity, including the over 400 species identified on the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (Red List);

Maintaining provision of environmental services and access to non-timber forest How much in this one?

- resources; and
- Providing opportunities for enhanced tourism development linked to conservation areas.

Costs of implementation and potential financing: The estimated costs of the proposed actions range from US$35 million to over US$55 million, with significant discrepancies in the proposed PA development costs in the PA Policy Implementation Plan (US$18 million) and the more recent Protected Areas Finance and Investment Plan (which estimates $60m for expansion of areas and an additional annual operating budget of $75m[5]).

Priority action areas include:

- Establishing an environmental management information system (DA2.1, Action 2.1.1)
- Piloting subnational monitoring and enforcement of environmental regulations (DA2.1, Actions 1.1.4 and 1.1.5)
- Establishing effective financing system for PAs (DA2.2, Action 1.2.5)
- Strengthening engagement with subnational governments (DA2.2, Actions 1.2.1, 1.2.4 and 1.2.5
- Support to gazettement and full establishment of 10 PAs (DA2.2, Actions 1.2.1, 1.2.4 and 1.2.5). There are currently 22 PAs.

Critical linkages: Due to the unique nature of land ownership in PNG, the high proportion of population living and relying on rural land areas for their livelihoods, and the importance of viewing landscapes as part of an integrated system, approaches to PA development and broader environmental management must form part of an integrated land use approach. It is therefore proposed that action within these areas focus within specific geographical locations and link in particular with efforts noted in DA1.5 to create a transitional package of interventions that can be targeted at existing and former timber concession areas to provide effective support to ensure the conservation of key remaining habitats within these landscapes and support the development of an effective model for integrated landscape-level engagement.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP3

KRA7.1 – Promote PNG's environment sustainably, by putting areas under legal protection and through improved permitting

KRA7.2 – Manage and reduce the risk of natural disasters, through maintenance of ecosystem services

SDGs

13 Climate Action

15. Life on Land

15.1 Conservation and rehabilitation of forest areas

15.2 Sustainable use of forest resources

SDG 13 Roadmap

25. Biodiversity integrated into productive landscapes

26. Climate resilient protected areas network

National REDD+ Strategy

2.3.2.3 Strengthening conservation and environmental management

CBD Aichi Targets

17% of terrestrial areas under conservation

5. GoPNG (2021) Protected Area Finance and Investment Plan. Available at http://pngbiodiversity.org/

Table S2. Environment pathway action matrix

Action or activity	Indicators	Short and medium-term targets	Lead implementing agencies	Potential ERs ($GgCO_2e$)	Budget (US$ millions)	Progress to date	Link with NDC-action based targets	Funding source	Support needs
DA2.1. Strengthen application of environmental safeguards	Environmental assessments, permits and management plans for land use projects are updated and publicly available Subnational governments engaged in environmental monitoring and enforcement	Documents for 50% of projects updated and publicly available by 2025 Documents for 100% of projects updated and publicly available by 2030 By 2025 3 subnational jurisdictions operating with designated authority on environmental monitoring and enforcement By 2030 6 subnational jurisdictions operating with designated authority on environmental monitoring and enforcement	Conservation and Environment Protection Authority (CEPA)	2025: 680 per annum (1,192 cumulative) 2030: 1,361 per annum (7,354 cumulative)	17	Work undertaken on a data repository for environmental information under the Secretariat of the Pacific Regional Environment Programme (SPREP)	Enhancement of timber legality Strengthened monitoring of FCA permits Certification system for climate-friendly agriculture products	Inform Project (SPREP) GEF7 Food Systems, Land Use and Restoration (FOLUR) Project	Establishment of environmental management information system (Action 2.1.1) Piloting of subnational monitoring and enforcement of environmental regulations (Action DA2.1.4 and 2.1.5)
DA2.2. Enhance PA development and management	Enhanced terrestrial PA coverage	By 2025, additional 3 million ha of PAs added to network against 2020 levels of which at least 30% is identified as at high risk of land use conversion By 2030, additional 6 million ha of PAs added to network against 2020 levels of which at least 30% is identified as at high risk of land use conversion	CEPA	2025: 1,034 per annum (2,974 cumulative) 2030: 2,069 per annum (11,249 cumulative)	From 18 by 2030* to 40 by 2030 with costs at 20 per annum hencefo rth	Significant support to PAs already in place through development partner programs with GEF6 PA finance also currently working to establish and capitalize a funding mechanism	Enhanced land use planning Promoting REDD+	Lukautim Graun Project, United States Agency for International Development (USAID) GEF6, PA Finance UNDP GEF7 FOLUR GEF7 System for Transparent Allocation of Resources (STAR), FAO GEF7 STAR, United Nations Environment Programme (UNEP)	Establishment of effective financing system for PAs (Action 2.2.5) Support to gazettement and full establishment of 10 PAs. (2.2.1, 2.2.4 and 2.2.5)
	PA effectiveness enhanced	By 2025, reduction in levels of forest loss within PA by 30% against 2020 levels By 2030, reduction in levels of forest loss within PA by 80% against 2020 levels							
	PAs sustainably financed	By 2025, 60% PAs included within subnational budgets and $10 million mobilized per annum to support PA management By 2030, 100% PAs included within subnational budgets and $20 million mobilized per annum to support PA management							

Note: * This amount is CEPA's Protected Areas Policy Implementation Plan (PAPIP) proposed budget, with the higher figure based on independent UNDP assessment.

Lands pathway

The proposed actions are estimated to be able to deliver more than 17,600 $GgCO_2e$ in ERs against 2015 levels by 2030.

Costs of implementation and potential financing: The estimated cost of proposed actions is close to US$25 million, with the most significant costs linked to rolling out planning actions at subnational level.

Priority action areas include:

- Establishing a central coordination system for sustainable land use planning that works to bring together existing support linked to land use planning (DA3.1.1)
- Reviewing how to integrate land use planning into subnational development planning
- Finance to support early scoping work on how to integrate proposed approaches within the National Sustainable Land Use Policy (NSLUP) into subnational planning activities.

Critical linkages: Due to the unique nature of land ownership in PNG, the high proportion of population living and relying on rural land areas for their livelihoods, and the importance of viewing landscapes as part of an integrated system, approaches to land use planning must also be linked with other actions — including agricultural support, support to transitioning of 'old' concessions, and conservation actions — so that early efforts on land use zoning can also be linked with resources to fulfil plans.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP3

KRA1 – Increased revenue and wealth creation, through options for improved mobilization of land into commercial use

SDGs

1 End poverty in all its forms, by avoiding the displacement of communities from their land

National REDD+ Strategy

2.1.1 Strengthened land use and development planning

Table S3. Lands pathway action matrix

Action or activity	Indicator	Short and medium-term targets	Lead implementing agencies	Potential ERs ($GgCO_2e$)	Budget (US$ millions)	Progress to date	Link with NDC action-based targets	Funding source	Support needs
DA3.1. Establish national sustainable land use planning framework	Guiding policy and regulatory framework for sustainable land use planning in place	NSLUP approved by National Executive Council (NEC) by 2022 2 regulations supporting implementation developed by 2023 Draft national land use plan (LUP) developed by 2025 Updated NSLUP and regulations approved by NEC by 2030 Full national LUP in place by 2030	Department of Lands and Physical Plannning (DLPP)	2025: 338 per annum (989 cumulative) 2030: 677 per annum (3,697 cumulative)	1.1	NSLUP at final phase of development Provincial physical planning offices established in a number of provinces Provincial Physical Planning Boards (11 already established)	Enhance land use planning	GEF7 – FOLUR New Britain GEF7 STAR – Highlands (UNEP and FAO) European Union (EU) Global Climate Change Alliance (GCCA) – Enga	Establishment of central coordination system for sustainable land use planning that works to bring together existing support linked to land use planning (DA3.1.1)
DA3.2. Establish national sustainable land use planning information system	Establishment of a fully operational land use information system (LUIS)	Central LUIS in place by 2025 System integrated with systems at provincial level in four provinces by 2025 System with interim links with other sector systems by 2025 System fully operational with fully linked with other sector systems by 2030 System operational within all provinces	DLPP	2025: 397 per annum (1,166 cumulative) 2030: 795 per annum (4,344 cumulative)	3.1	Existing systems in place but in need of updating and strengthening of integration	Enhance land use planning	GEF7 – FOLUR New Britain GEF7 STAR – Highlands (UNEP and FAO) EU GCCA – Enga	Technical support to system design
DA3.3. Develop spatially explicit subnational development plans	Spatially explicit plans in place at provincial level	Spatially explicit LUPs in place for five provinces by 2025 Spatially explicit land use plans in pace for all provinces 2030	DLPP	2025: 878 per annum (2,511 cumulative) 2030: 1,753 per annum (9,562 cumulative)	20	Work done on site-specific LUPs		GEF7 – FOLUR New Britain GEF7 STAR – Highlands (UNEP and FAO) EU GCCA – Enga	Technical support to development of subnational approach Support to the coordination of existing development partner initiatives working on subnational land use planning

Agriculture pathway

The proposed actions would deliver avoided emissions of 18,500 $GgCO_2e$ over 10 years. This is 3,400 $GgCO_2e$ per annum by 2030, based on avoided deforestation from agriculture against 2015 levels. The actions would also support:

- Improved food security;
- Improved revenue from agricultural production, including enhanced value per unit; and
- Enhanced productivity per unit area

Costs of implementation and potential finance: The estimated cost of the proposed actions is in excess of US$300 million over the coming decade, with most of this investment coming in upfront costs linked to supporting small-scale farmers to enhance productivity and quality of production.

Priority action areas include:

- Developing an approach to effective financing of extension systems (DA4.2.3)
- Developing action plans for palm oil, cocoa and coffee (DA4.3.1, DA4.4.1, DA4.5.1)

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP3

KRA1 – Increased wealth creation, by increasing the value of exports of all commodities, creating more employment, reducing imports, and creating wealth by promoting small and medium-sized enterprise development and direct investments

KRA7.2 – Manage and reduce the risk of natural disasters

SDGs

8. Sustainable and inclusive economic development

13. Action on climate change

15. Zero hunger

SDG 13 Roadmap

18. Climate-resilient agribusiness supply chains
19. Climate compatible sustainable palm oil sector
20. Establishment of national sectors for carbon farming and climate-smart agriculture
22. Targeted extension and support services

National REDD+ Strategy

2.3.3.1. Development of a sustainable commercial agriculture sector

Table S4. Agriculture pathway action matrix

Action or activity	Indicator	Short and medium-term targets	Lead implementing agencies	Potential ERs ($GgCO_2e$)	Budget (US$ millions)	Progress to date	Link with NDC action-based targets	Funding source	Support needs
DA4.1. Strengthen agricultural planning and policy framework and its application	Enhanced policy and legislative framework	Climate-Smart National Agricultural Development Policy by 2023 Passage of updated agriculture sector legislation by 2025	DLPP	2025 :40 per annum (121 cumulative) 2030: 81 per annum (445 cumulative)	1	Draft agriculture bills developed Work on commodity-based climate-smart agriculture policies under development	Promoting climate-friendly agriculture Enhancing community-level agriculture productivity Certification system for climate-friendly agriculture products Enhancing value chain of climate-friendly agriculture products	PHARMA PACD MVF GEF7 FOLUR	Technical support to development of and consultation on documents
DA4.2. Strengthen access to and quality of extension systems	Establishment of effective extension development and financing system	Framework for extension financing agreed and in place by 2025 Full financing in place for extension by 2030	DLPP	2025: 1,114 per annum (3,291 cumulative) 2030: 2,229 per annum (12,206 cumulative)	32	Trials one on provision of privatized extension systems for oil palm. Support to improved family and commercial crop extension systems through donor programs	Promoting climate-friendly agriculture Enhancing community-level agriculture productivity	PHARMA PACD GEF7 FOLUR	Technical support to development of effective systems for the financing of extension systems
	Number of local-level governments (LLGs) with trained agricultural extension officers in place	30% increase in number of extension officers by 2025 296 agriculture extension officers operating in all (296) LLG in the country by 2030	DLPP						
DA4.3. Strengthen framework for sustainable palm oil development	Policy framework in place and changed in percentage of sustainably certified exports	Palm oil action plan agreed by 2022 Palm oil policy by 2023 90% of palm oil exports sustainably certified in 2025 and in 2030	DLPP Oil Palm Industry Corporation (OPIC)	2025: 459 per annum (1,352 cumulative) 2030: 919 per annum (5,027 cumulative)	90	Initial scoping studies for Palm Oil Platform and operations conducted Initial reviews on high-conservation value/high carbon stock classifications in PNG as well as possible market access and options for future development	Promoting climate-friendly agriculture Enhancing community-level agriculture productivity Certification system for climate-friendly agriculture products Enhancing value chain of climate friendly agriculture products	GEF7 FOLUR	Support to development of action plan
DA4.4. Strengthen Framework for sustainable cocoa development	Policy framework in place and changed in percentage of sustainably certified exports.	Cocoa action plan agreed by 2022 Cocoa policy by 2023 30% of cocoa exports sustainably certified by 2025 60% of cocoa exports sustainably certified by 2030	DLPP Cocoa Board	2025: 193 per annum (552 cumulative) 2030: 385 per annum (2,093 cumulative)	90	Operational working groups for cocoa development and development partner support to improved quality of production and market access	Promoting climate-friendly agriculture Enhancing community-level agriculture productivity Certification system for climate-friendly agriculture products Enhancing value chain of climate friendly agriculture products	PHARMA PACD GEF7 FOLUR	Support to development of action plan
DA4.5. Strengthen framework for sustainable coffee development	Policy framework in place and changed in percentage of sustainably certified exports	Coffee action plan agreed by 2022 Coffee policy by 2023 30% of coffee exports sustainably certified by 2025 60% of coffee exports sustainably certified by 2030	DLPP Coffee Industry Corporation (CIC)	2025: 193 per annum (552 cumulative) 2030: 385 per annum (2,093 cumulative)	90	Draft Climate-Compatible Coffee Strategy developed	Promoting climate-friendly agriculture Enhancing community-level agriculture productivity Certification system for climate-friendly agriculture products Enhancing value chain of climate friendly agriculture products	PHARMA PACD GEF7 FOLUR	Support to development of action plan

Enabling pathways

Table S5. Summary of enabling pathways

Action or activity	Indicator	Short and medium-term targets	Lead implementing agencies	Potential ERs	Budget (US$ millions)	Progress to date	Link with NDC actions to improve monitoring and actions on enabling environment	Funding source	Support needs
EA 1.1. Establish an effective framework for climate governance, monitoring and reporting	Establishment of Climate Governance arrangements Integration of NDC targets and actions in key development activities	National NDC Technical Advisory Committee (or other form of senior-level cross-sector climate focused coordination body) and supporting framework for climate action and finance decision making established by 2022 Climate targets (AFOLU sector) mainstreamed into MTDP 4 targets for key sector agencies 2024	Climate Change and Development Authority (CCDA) Department of National Planning and Monitoring (DNPM)	NA	1.5	Outline of roles of a committee developed in draft terms of reference by DNPM and SPC. Requirement for committee noted in PNG Climate Change (NDC) Regulation 2021	NDC Institutional Arrangements and planning	None GoPNG Potential GCF REDD+ RBP finance	Initial financing of set up and operation
EA 1.2. Establish an effective safeguard information systems and grievance and redress mechanism	Operations of the Safeguard Information System	Safeguard Information system linked to reporting on REDD+ fully operational.	CCDA	NA	1	Work done on Safeguard Information System and plan for improvement through the Forest Carbon Partnership Facility's (FCPF) Readiness support to REDD+	Commitment to application of safeguards as per NDC committments	None GoPNG Potential GCF REDD+ RBP finance	Support to further development of system
EA 1.3. Establish clear financing framework to enable and incentivize action on NDC targets	Level of finance for climate action within the AFOLU sector mobilized	Mobilize US$20 million per annum in AFOLU focused climate finance by 2025 Mobilize US$50 million per year in AFOLU focused climate finance by 2030	CCDA DNPM Treasury	NA	1.5	Work on reviewing possible structures and initial action taken to develop a Biodiversity and Climate Fund	Action to mobilize finance	GEF6 Protected Areas Financing Project Potential GCF REDD+ RBP finance	Further support to initial operation of fund Initial fund capitalization
EA 1.4. Strengthen greenhouse gas measurement and reporting system linked to NDC targets and commitments to raised ambition across new sectors	Effective submission of PNG's reporting commitments under United Nations Framework Convention on Climate Change (UNFCCC) with improved data	Submit PNG's National Communication and biennial update report (BUR) in a timely manner and in line with the Enhanced Transparency Framework (ETF) Establish enhanced emission factors for PNG's forests and land use change categories – in particular impacts of logging on forest areas	CCDA PNGFA	NA	20	Action plan for enhanced monitoring capacity and application of ETF developed	**Actions on:** Completing National Forest Inventory Revitalizing Permanent Sample Plots Assessment of forest and pre-2000 land use Improving logging concession monitoring	GCF Registry development project GEF CEBIT Potential GCF REDD+ RBP finance	Further support to development of systems and strengthening of their policy application
EA 1.5. Establish a carbon registry	Operation of carbon registry for emissions from AFOLU sector	Structure and prototype registry agreed and operational 2022 Initial registry fully operational 2025	CCDA PNGFA	NA	2	Work done to develop options for a registry	Ensuring application of the ETF and transparency of any carbon transactions	GCF Registry development project GEF CEBIT Potential GCF REDD+ RBP finance Coalition For Rainforest Nations (CFRN) MoU	Further support to development of systems

1 Introduction

Key messages:

- PNG's Enhanced NDC 2020 increased the scope and ambition of PNG's emission targets across all sectors.
- The target for the AFOLU sector is a 10,000 $GgCO_2e$ reduction by 2030, reducing annual rates of deforestation and forest degradation by 25% and increasing tree planting with all quantitative targets set against a baseline of 2015 data.
- These reductions will be supported through development partner finance to related action areas — forestry, land use planning, conservation, agricultural support, and climate action support — currently averaging approximately US$60 million per annum across all intervention areas.
- Work to update PNG's emissions assessment to 2020 indicates that PNG has already achieved the targets laid out in its Enhanced NDC 2020 through significant declines in both deforestation and forest degradation.
- While impressive, this progress must also be seen as vulnerable to reversals unless action is taken to ensure the permanence and further enhancement of ERs.

PNG was the first country to submit its Intended NDC to the UNFCCC in 2015. It subsequently submitted its Enhanced NDC in December 2020, with increased ambition on climate action. Through this enhancement process, PNG has broadened the ambition of its NDC to include targets for the AFOLU sector, focused on action on emissions associated with LULUCF.

PNG reported its greenhouse gas (GHG) emissions in the LULUCF subsector from 2000 to 2015 in its first biennial update report (BUR1) in 2019. The country's emissions in the LULUCF subsector have steadily increased over the reporting period due to increases in deforestation and forest degradation, caused predominantly by the expansion of agriculture and commercial logging.

Net emissions from the LULUCF sector amounted to 1,716.46 $GgCO_2e$ in 2015 compared to -21,653.94 $GgCO_2e$ in 2000, which is a total decrease of removals amounting to 23,370.40 $GgCO_2e$. Such a significant shift from removal to emissions is due to a combination of a loss of areas of regenerating forest, which reduced in the rate of removals, and increases in levels of forest conversion to cropland, which saw close to a threefold increase in emissions over the reporting period (13,574.04 $GgCO_2e$ in 2015 compared to 5,434.83 $GgCO_2e$ in 2005). To combat this increasing trend, PNG has for the first time set targets for the AFOLU and specifically LULUCF sector in the Enhanced NDC 2020 (Box 1), which build on the existing policy framework and developments in REDD+ readiness work within PNG. Table 1 outlines the key documents consulted.

BOX 1

PNG's NDC Enhanced Targets

GHG - Absolute Target

By 2030, annual net emission from deforestation and forest degradation due to agriculture expansion and commercial logging is reduced by 10,000 $GgCO_2e$ comparing to 2015 level.

GHG - Relative Target

LULUCF will be converted from net GHG source (1,716 $GgCO_2e$) in 2015 to net GHG sink (-8,284 $GgCO_2e$) by 2030 to mitigate emissions from other sectors.

Non-GHG Quantitative Targets

- The area of annual deforestation is reduced by 25% of 2015 level by 2030 (equating to a reduction of 8,300 ha of annual deforestation).
- The area of forest degradation is reduced by 25% of 2015 level by 2030 (equating to a reduction of 43,300 ha of annual degradation).
- The area of planted forest and forest restoration is increased.

Table 1. Key policy and strategy documents consulted while developing this roadmap

Document Type	Document			
National Strategies	Papua New Guinea Vision 2050 Strategic Development Plan 2030 Strategy for Responsible and Sustainable Development MTDP 3			
National Climate Strategies	SDG13 Roadmap Climate Compatible Development Policy PNG's Action Plan for Enhanced Transparency Framework on AFOLU and REDD+ National Forest Monitoring System (2021–2025) National REDD+ Strategy (2017) PNG REDD+ Finance and Investment Prospectus (2020)			
Sectors	**Forestry**	**Environment and Conservation**	**Lands**	**Agriculture**
Policy	National Reforestation Policy 2020	Protected Areas Policy (2014) Protected Areas Policy Implementation Plan	Draft National Sustainable Land Use Policy	National Agricultural Development Policy (Draft)
Other relevant reports	Forest and Land use Change in Papua New Guinea 2000–15 (PNGFA 2019) Development of Future Scenarios for Private Sector Engagement in PNG's Forest Sector (UNDP 2020)	GoPNG (2021) Protected Areas Finance and Investment Plan Institutional and GoPNG (2021) Regulatory Report of Protected Area Management and Financing in Papua New Guinea		

1.1 Existing Levels of Development Partner Support and Additional Financing

PNG has been able to access several development partner projects and programs that will support the delivery of its AFOLU roadmap. Table 2 summarizes these, grouping projects within the main action pathways. It should be noted, however, that many projects combine actions across a number of pathways (see column 2); as such, their grouping is based on area of most significant specific investment and does not represent exclusive support to that pathway. More information and links to specific pathways is outlined in Section 3.5.

Table 2. Existing and planned development partner support within the AFOLU sector

Project	Links to pathways[6]	Budget (millions)	Duration	Donor	Activities	Implementing agencies	National executing agencies	Target areas
Forestry pathway								
Support to forest management and monitoring	DA1.1	To be finalized	2022–	JICA	To be finalized	To be finalized	PNGFA	To be finalized
GCF RBP Finance	DA1.1	US$20 approx	2022–	GCF	Application of timber legality standard, development of integrated action at jurisdictional level, support to development of CC enabling conditions	FAO	CCDA, PNGFA, CEPA	To be finalized
Environment pathway								
Biodiversity Conservation in Madang and Bismarck Range	DA2.2 (DA1.1) (DA3.3) (DA4.2)	US$19 million	2019–2024	USAID	Support to YUS Conservation area and Bismark Forest Corridor	Cardno	CEPA	Madang and Morobe
GEF6 – Sustainable Finance of Papua New Guinea's Protected Area Network	DA2.2	US$11.5	2019–2025	GEF	Support to PA financing including establishment of trust fund and strengthening of PA network	UNDP	CEPA	Sepik Wetlands, Mt Wilhelm National Park and the surrounding community-owned areas, and Kimbe Bay
Lands and Environment pathways								
EU GCCA	DA2.2 DA3.1 DA3.3 (DA1.1) (DA 1.3)	€5	2021–2024	EU	Sustainable land use in Enga	UNDP	Provincial governments CCDA	Enga Province
GEF7 FOLUR	DA2.2 DA3.1 DA3.2 DA3.3 DA4.1 DA4.3 DA4.4	US$12	2021–2025	GEF	Sustainable oil palm and cocoa production in New Britain Island	UNDP	CCDA CEPA Provincial governments	New Britain Island
GEF7 STAR, FAO	DA2.2 DA3.1 DA3.2 DA3.3	US$7	2022–2025	GEF	Sustainable land use in WHP & EHP	FAO	CEPA	West and Eastern Highlands Provinces
GEF7 STAR, UNEP	DA2.2 DA3.1 DA3.2 DA3.3	US$4	2022–2025	GEF	Sustainable land use in Hela & SHP	UNEP	CEPA	Hela and Southern Highlands Province
Sustainable landscapes in Papua New Guinea	To be finalized	US$20	2022–2026	USAID	To be defined project formerly Timber legality in PNG and Solomon Islands	To be finalized	PNGFA	As yet unspecified
Agriculture pathway								
Support to Rural Entrepreneurship and Trade (STREIT)	DA4.1 DA4.4	€85	2020–2026	EU	Agriculture value chain in Sepik provinces	FAO, UNDP, etc.	Provincial governments Department of Agriculture and Livestock (DAL) National Fisheries Authority (NFA)	East and West Sepik
Markets for Village Farmers	DA4.1 DA4.2	US$25	2020–2026	International Fund for Agricultural Development	Agri policy and value chains	GoPNG	DAL	Jiwaka, Western Highlands, Simbu, Eastern Highlands, Morobe and East New Britain
PACD	DA4.1 DA4.2 DA4.4 DA4.5	US$40	2020–2025	World Bank EU	Support to cocoa and coffee supply chains and production as well as other small-scale agri-production	World Bank	DAL Cocoa Board CIC	Southern, Eastern and Western Highlands, Chimbu, Enga, Jiwaka, Madang, East New Britain, Autonomous Region of Bougainville, and Morobe, New Ireland and West New Britain
PHARMA Plus	DA4.1 DA4.2 DA4.4 DA4.5	US$ 23 (across 6 countries)	2018–2022	Australia Department of Foreign Affairs and Trade New Zealand Ministry of Foreign Affairs and Trade	Support to enhancing market access and quality of key ag commodities (coffee / cocoa / coconut)	DT Global		

6. No parenthesis indicate primary link, parenthesis indicate secondary link.

Enabling pathway								
Readiness for registry and nesting system to facilitate climate-related investments in agriculture, forest and land use (AFOLU) sector in Papua New Guinea	EA1.1 EA1.2 EA1.3 EA1.4	US$1	2020–2022	GCF	Support to development of registry and nesting systems in PNG	FAO	CCDA	
Strengthening capacity in the agriculture and land-use sectors for enhanced transparency in implementation and monitoring of Nationally Determined Contributions (NDCs) under the Paris Agreement in Papua New Guinea	EA1.4	US$0.9	2018–2021	GEF	Support to application of the ETF for reporting to UNFCCC	FAO	CCDA	

1.2 Updated AFOLU Secto Emissions Assessment

Key messages:

- PNG has seen significant declines in emissions from the AFOLU sector since 2015 and has already achieved its NDC GHG target of 10 $mtCO_2e$ reduction in emissions against 2015 levels.
- It has the potential to sustain and further increase this progress but is also vulnerable to reversals of the trend.
- The most significant shift has come from significant reductions in levels of commercial logging.

Recent work to update information on PNG's emissions from the original Forest Reference Level (FRL) and BUR reporting has shown that the country has made significant progress in altering its emission profile and levels of emissions within the forest sector.

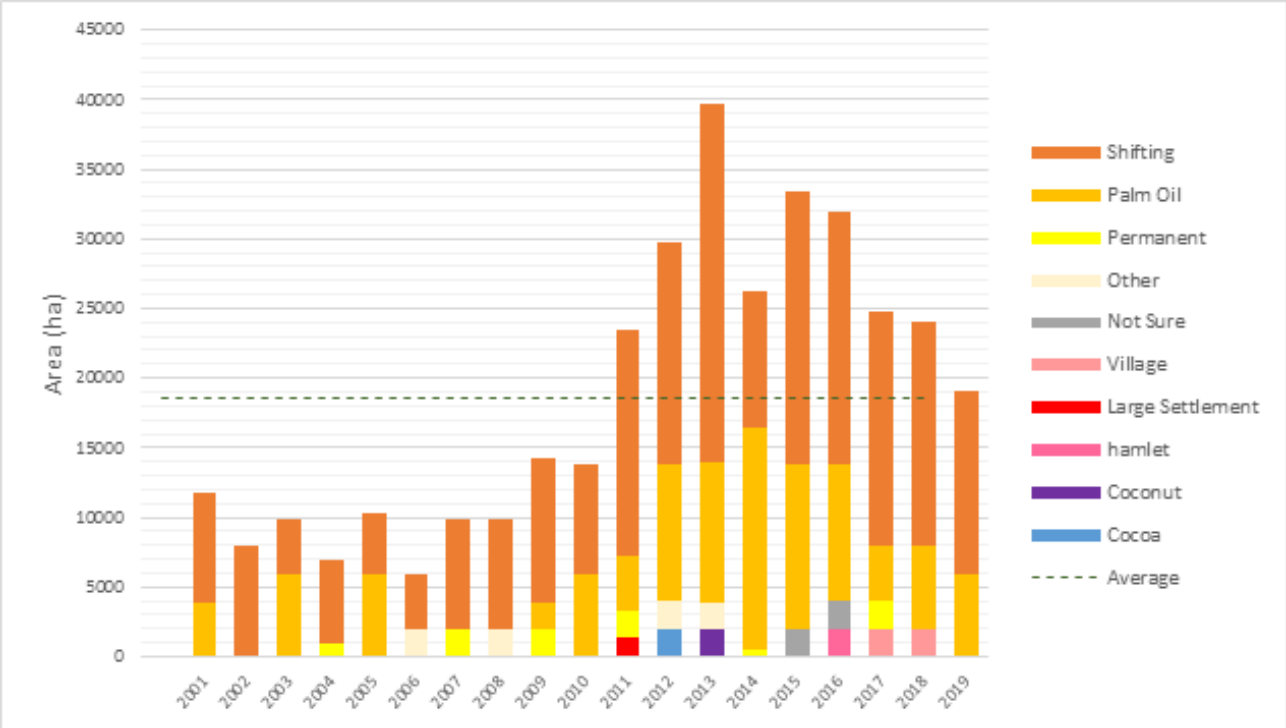
Land Use, Land Use Change and Forestry Assessment 2016-2019

Information in this section is taken from the draft LULUCF Assessment 2016–2019. As such, all figures are presented as indicative and cannot be considered final or represent the views and or reporting needs of the PNG government.

Activity data on land use change have shown that, despite peaks between 2012 and 2017, levels of deforestation have decreased but remain higher than they were at the turn of the century (Figure 1) . This decline is linked largely to a reduction in the rates at which forest is converted to oil palm development and/or shifting agriculture. Some of this can be linked to the cancellation of many of the special agricultural business leases (SABLs), with challenges to their operation preventing over 5 million hectares of allocated land converting or transitioning to permanent agriculture.

The rapidity at which SABL licenses were issued and rates of loss increased from just over 10,000 to over 40,000 hectares per year indicates the relative fragility of recent declines in rates of loss.

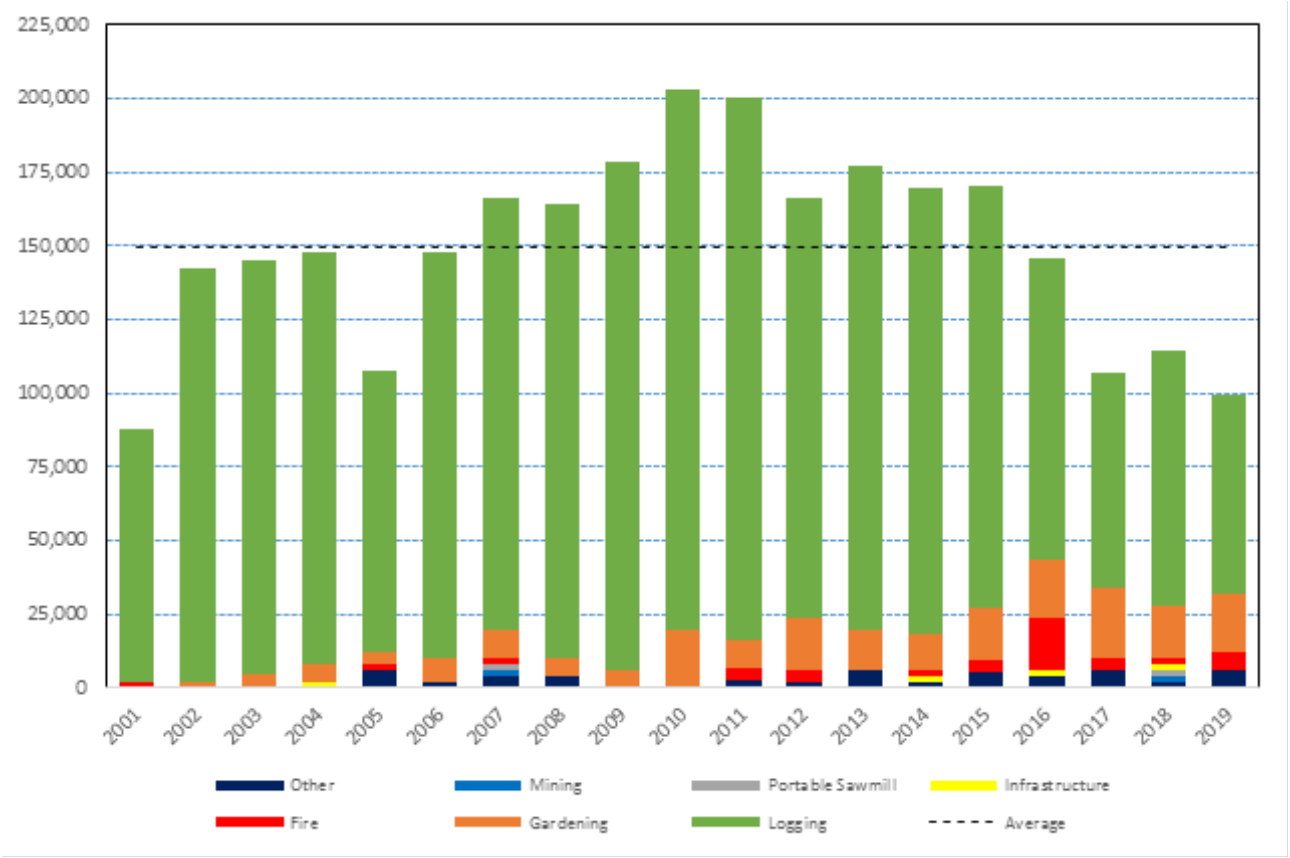
Figure 1. Annual rates of deforestation in PNG (2001–2019)



Source – Based on data from LULUCF Assessment 2016-2019

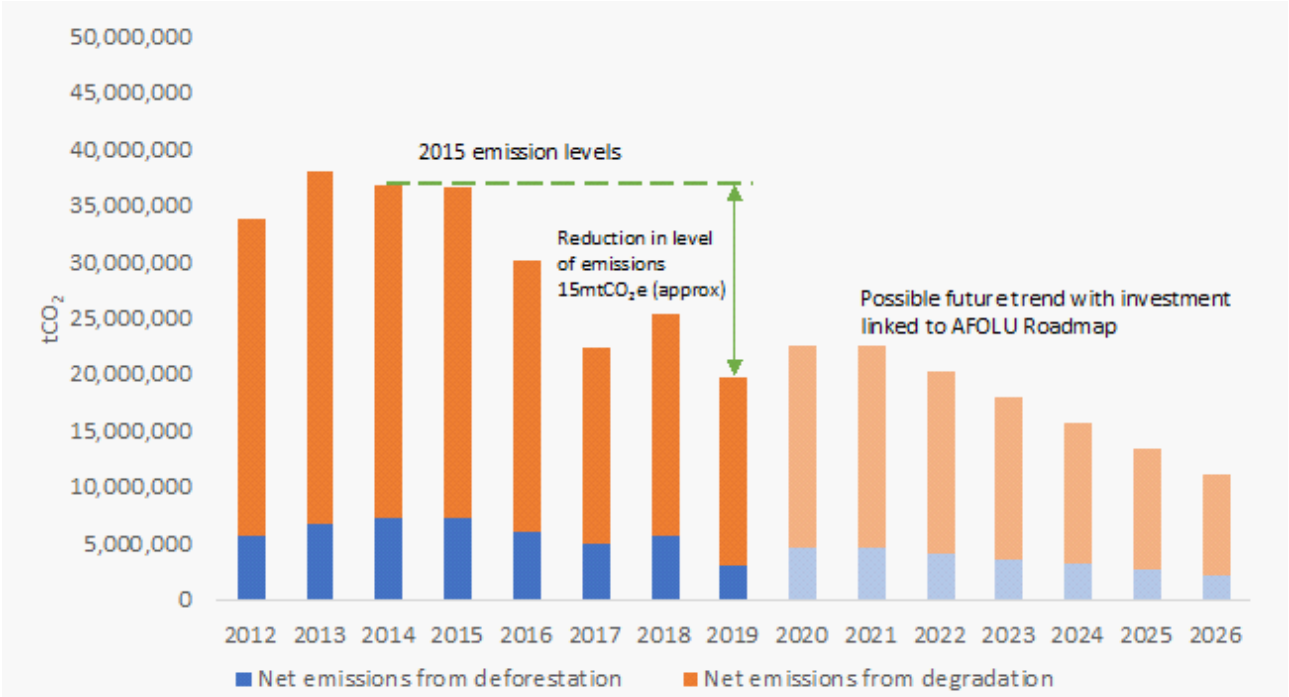
Levels of forest degradation have also fallen significantly over the past decade, particularly after 2015, with an annual decrease of close to 100,000 hectares between 2015 and 2017 (Figure 2). This has been driven mainly by a fall in commercial timber harvesting, the result of domestic regulation changes (including recent increases in log export tax), controls on SABLs — which in some areas had been logged over as an initial step towards clearing — and changing international markets. While this transition marks a return to closer to pre-2000 levels of logging, progress must be seen as fragile. For these changes to become more permanent, tangible benefits must reach areas that have moved away from logging or remain under concessions.

Figure 2. Annual rates of forest degradation in PNG (2001–2019)

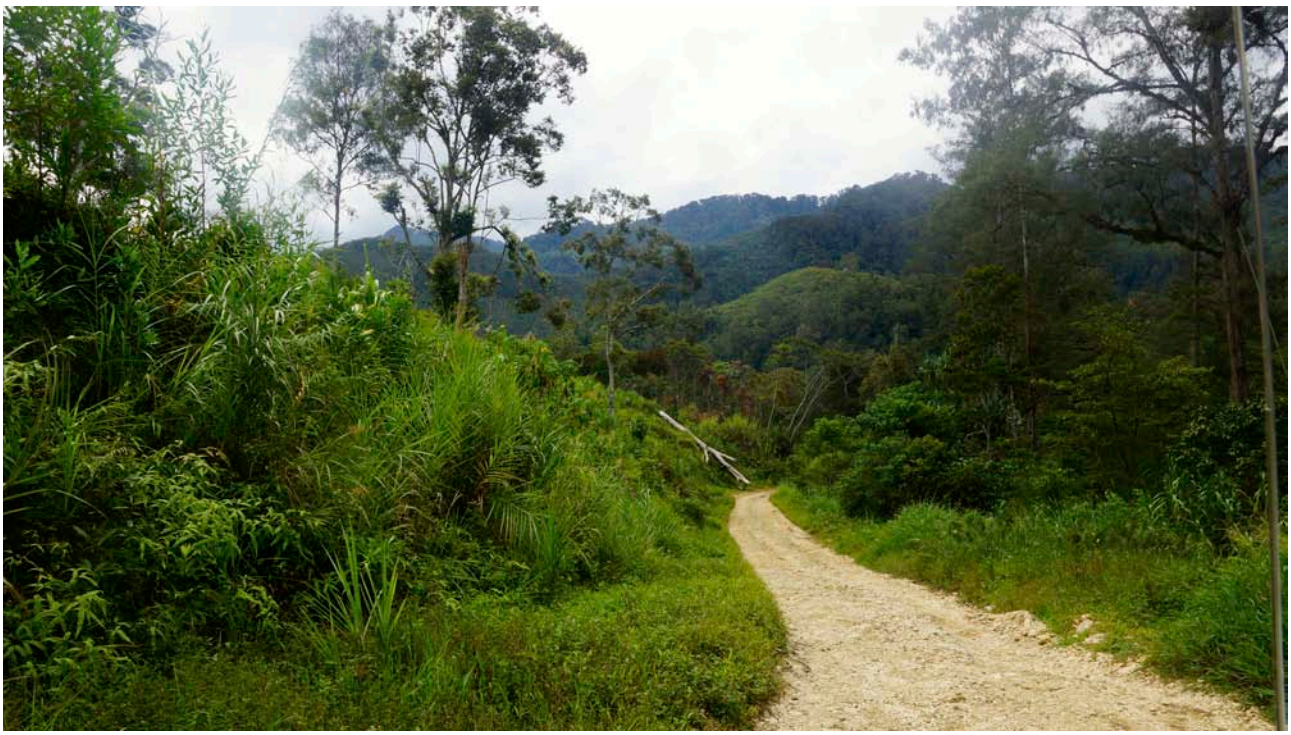


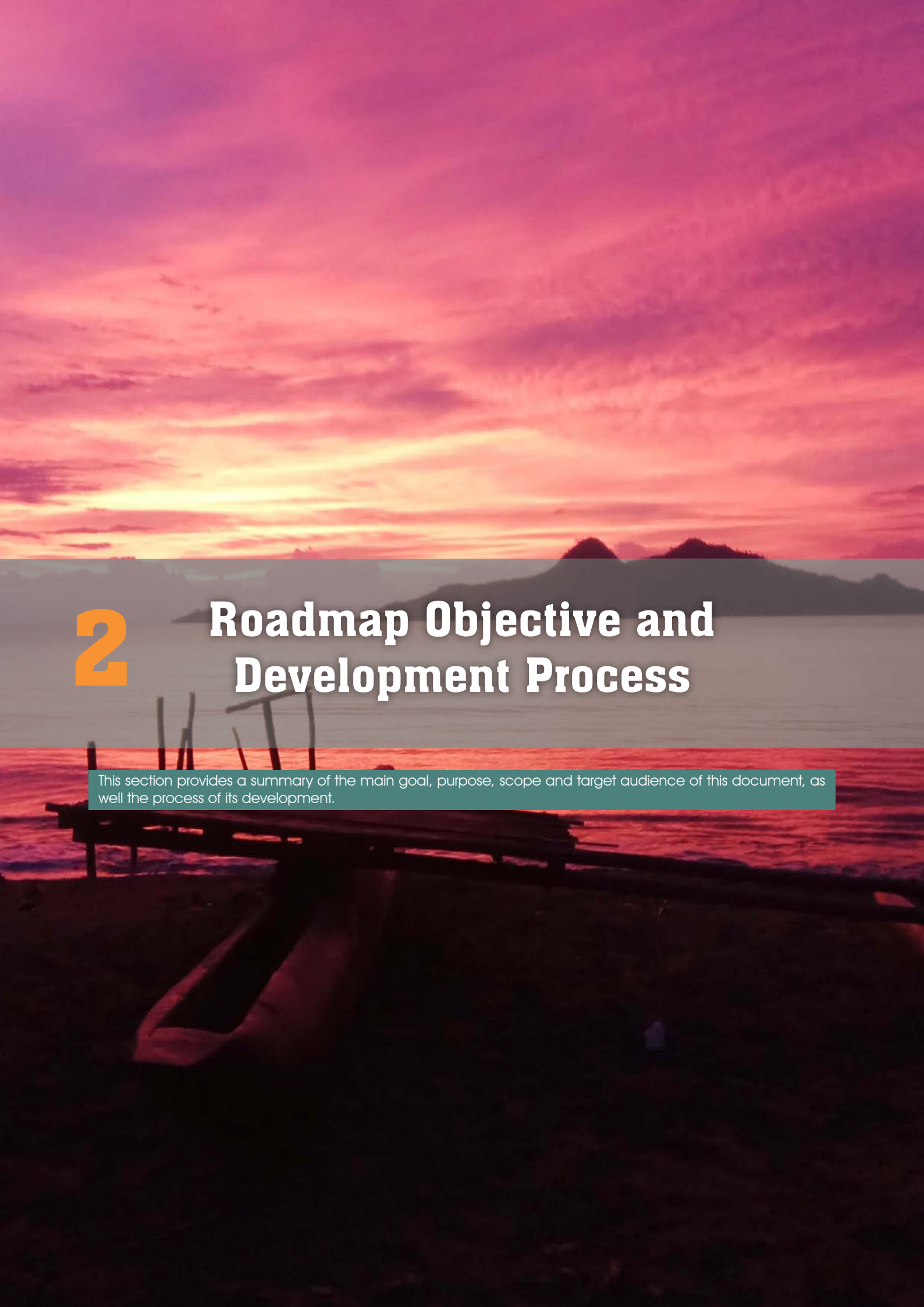
Changes in deforestation and forest degradation levels have resulted in a corresponding decrease in emissions linked to the forestry sector. This has resulted in early indications that PNG already achieved its Enhanced NDC target of a more than 10,000 $GgCO_2e$ reduction against 2020 levels *(Figure 3)*. It is possible to sustain this level of ERs and continue the downward trajectory — sustaining the environmental services that PNG's forests provide to its people, while also helping to address the global fight against climate change — and PNG will be able to receive significant financial support for this. However, it is important to understand that these gains and future progress are not permanent; nor is it inevitable that they will continue. They appear to have been driven by a range of policy and market forces, and these have the potential to fluctuate, as demand for land in PNG increases along with the domestic population and global demand for timber and agricultural products.

Figure 3. Annual emissions levels from the forestry sector (2012–2026)



Note: Calculations for this figure use the approach required for LEAF (Lowering Emissions by Accelerating Forest finance Coalition: https://leafcoalition.org/) financing, and are based on the methods outlined in the ART (Architecture for REDD+ Transaction: https://www.artredd.org/about/) TREES (The REDD+ Environmental Excellence Standard: https://www.artredd.org/trees/) methodology. While this uses the same base data as PNG's LULUCF assessment and UNFCCC reporting, variations in approach will result in changes in exact reporting volumes. As such, the figures should not be seen as directly comparable with PNG's UNFCCC reporting on which NDC targets are based. Variation in this area is most significant regarding how the country addresses post-deforestation and forest degradation GHG removals (due to regrowth within impacted areas). Further information on this can be found in PNG's LUCUCF Assessment 2016–2019.





2 Roadmap Objective and Development Process

This section provides a summary of the main goal, purpose, scope and target audience of this document, as well the process of its development.

2.1 Goal and Purpose of the current document

The goal of this roadmap is to enhance coordinated action and investment towards the delivery and further enhancing of PNG's targets within the AFOLU sector.

Its objective is to provide a clear AFOLU NDC Implementation Roadmap around which action and investment can be mobilized.

While pursuing this objective, the document limits its scope to :

- The AFOLU sector — more specifically, on how the targets of the Enhanced NDC 2020, which focuses on the LULUCF sector, will be achieved through action on the country's key emissions sources and potential sinks within the AFOLU sector, as identified within the NDC; and
- The data management and reporting improvements needed to strengthen PNG's capacity to report on and take action with other areas of the AFOLU sector.

It does not include action to revisit targets outside of the LULUCF sector.

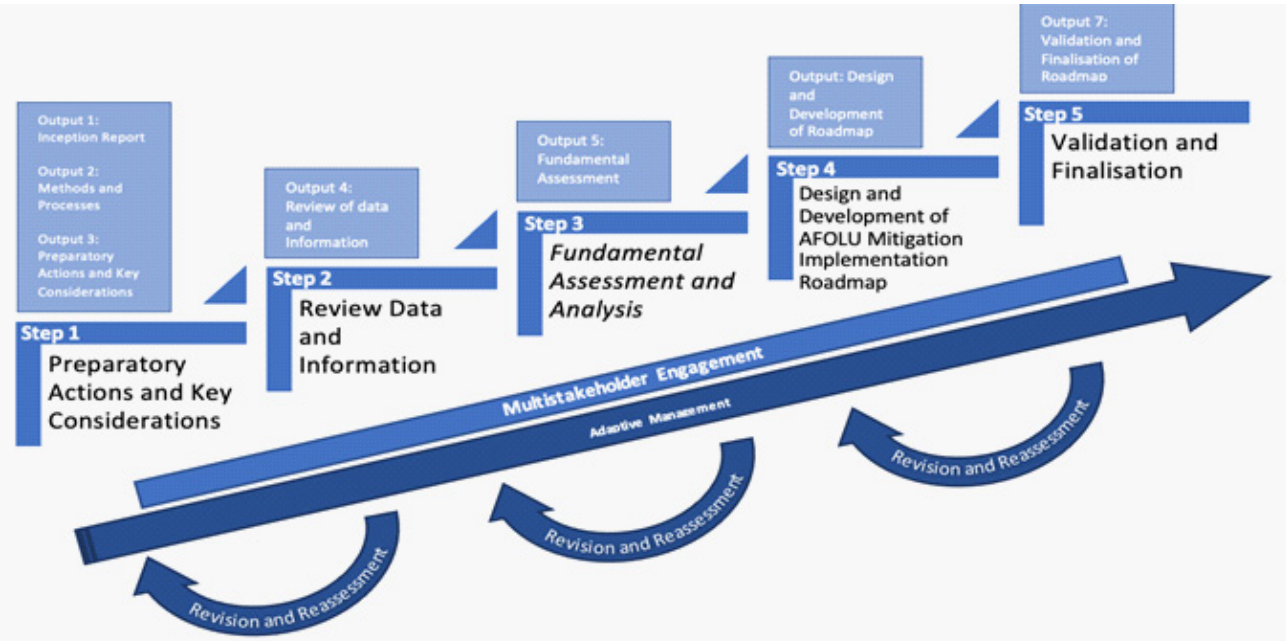
The time line reflects the implementation plan, which covers the 10-year period of PNG's Enhanced NDC. But is anticipated to be reviewed and updated within five years to reflect the ongoing changing context in PNG and globally.

The target audience for this document is the PNG government and development partners who may be seeking to support implementation of NDC action. It is also suggested that summary information documents linked to key strategies and actions areas be developed to help support private sector interests, and other targeted materials developed to help landholding communities understand the linkages between international agreements and commitments and action within PNG as part of PNG's broader action on engaging communities in action on climate change.

2.2 Process of Roadmap Development

The development of the roadmap followed GGGI guidance on NDC implementation roadmap development,[7] drew on other international experience and roadmap documents, and was tailored to the PNG context. This approach divided the development process into five distinct but overlapping steps *(Figure 4)*, outlined below.

Figure 4. Roadmap development process

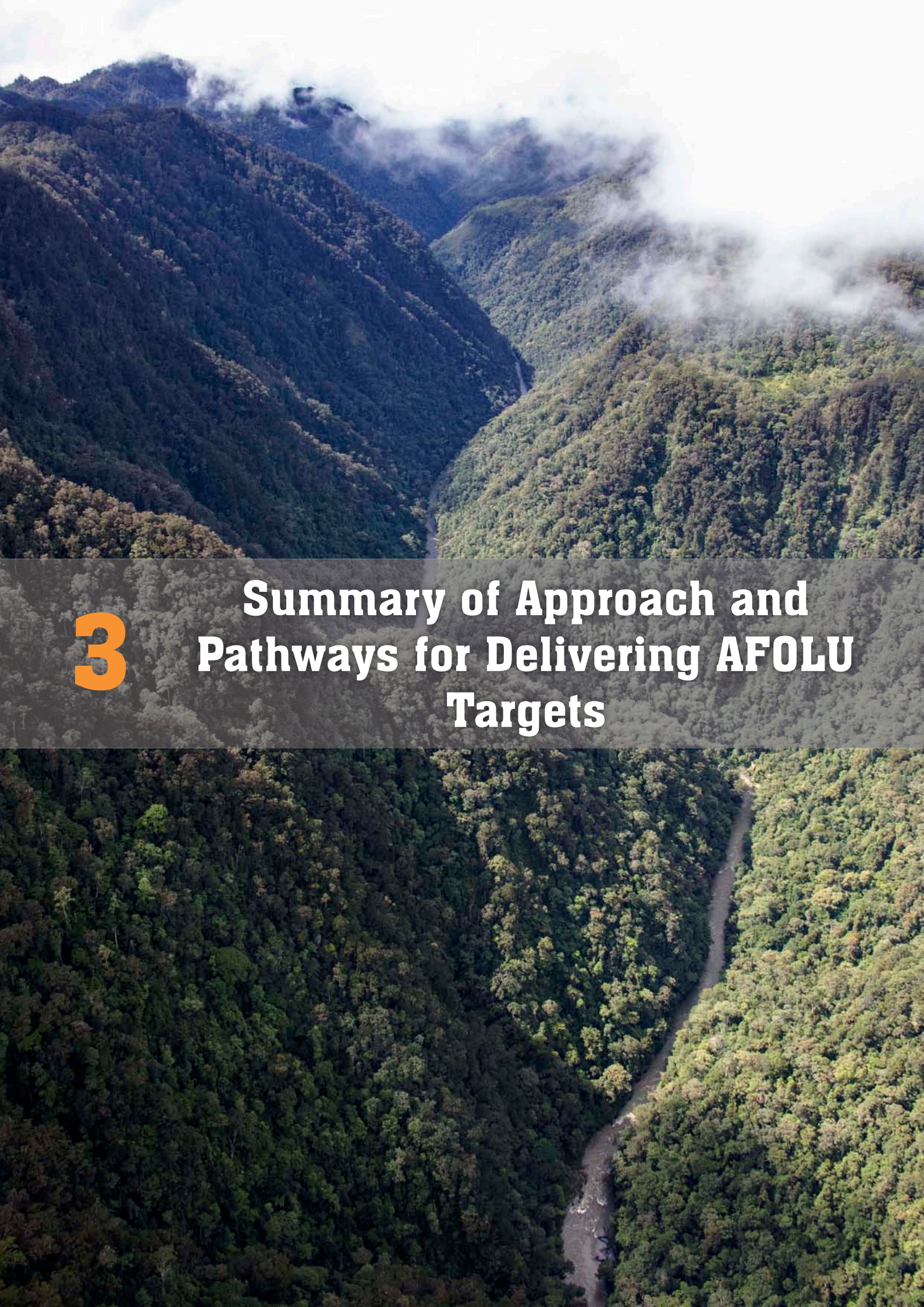


STEP 1	STEP 2	STEP 3	STEP 4
Preparatory actions and key considerations:	**Review of Data and Information**	**Fundamental Assessment and Analysis and Step 4 Design and Development**	**Validation and Finalisation**
Initial discussions were held between the team working on the roadmap and decision makers within CCDA to ensure a clear understanding of the roadmap's objectives, scope and target audience and to review the proposed approach. This information, along with the document's proposed overall design and structure, was then presented at the AFOLU STWC to gain broader feedback and inputs.	Action was taken to review existing documents and available information to ensure that the roadmap built on existing knowledge and was in line with key government documents. One-to-one consultations were initiated with key sector agencies to verify information and gain initial feedback.	A draft version of the roadmap was developed, based on information from Step 2. This process took place in parallel with an analysis and assessment of the mitigation potential and costs of different action areas. A key sector 'lockdown' session allowed additional focused time for presenting the roadmap information to key sector agencies and for them to review it. An ongoing process of engagement was then maintained with these agencies to ensure their full engagement with the document.	The document underwent a final review by key stakeholders before being presented at a national workshop for further review and comment. This was followed by a final key stakeholder lockdown session to ensure that comments were addressed. The final version was then circulated.

7. GGGI, GGGI Technical Guideline No 5: NDC Implementation Roadmap Development: Guidelines for Small Island Developing States (2018), https://gggi.org/site/assets/uploads/2020/10/GGGI-NDC-Implementation-Roadmap-Development-A-Guideline-for-Small-Island-Developing-States.pdf)

Table 3. Key engagement structures and methods used in developing this roadmap

Structure/method	Details	Timings
AFOLU STWC	Comprising representatives of key government agencies, nongovernmental organizations (NGOs), private sector and development partners, this STWC led work on developing the AFOLU elements of the revised NDC, mostly through half-day sessions	March 25, 2021: Outline of method and approach June 2, 2021: Initial findings and document structure July 30, 2021: Review of key areas of questions and key findings
Key stakeholder 'lockdown' sessions	These sessions bought together key stakeholders, predominantly within target government agencies, for 2–3 days of discussion on the AFOLU roadmap, often in combination with work on the energy sector roadmap	May 26–28, 2021: Review of draft documents and strengthening of action areas
One-to-one meetings	Targeted sector meetings and document review and development processes, focused on key sector agencies as well as DNPM	Ongoing throughout the roadmap development process
Engagement with other initiatives	The process has sought to link with, input into and draw on other ongoing development processes in PNG, particularly work on: • The review and development of climate-related regulations (supported by UNEP); • Developing a GCF REDD+ RBP proposal; and • Updating the AFOLU sector emissions assessment.	Ongoing throughout the roadmap development process



3 Summary of Approach and Pathways for Delivering AFOLU Targets

3.1 Overall Implementation Approach

The proposed implementation approach builds and seeks to update and further develop plans and information provided through the Enhanced NDC 2020, NDC Implementation Plan, National REDD+ Strategy, SDG 13 Roadmap, CCMA, and key sector documents, and can be summarized as follows.

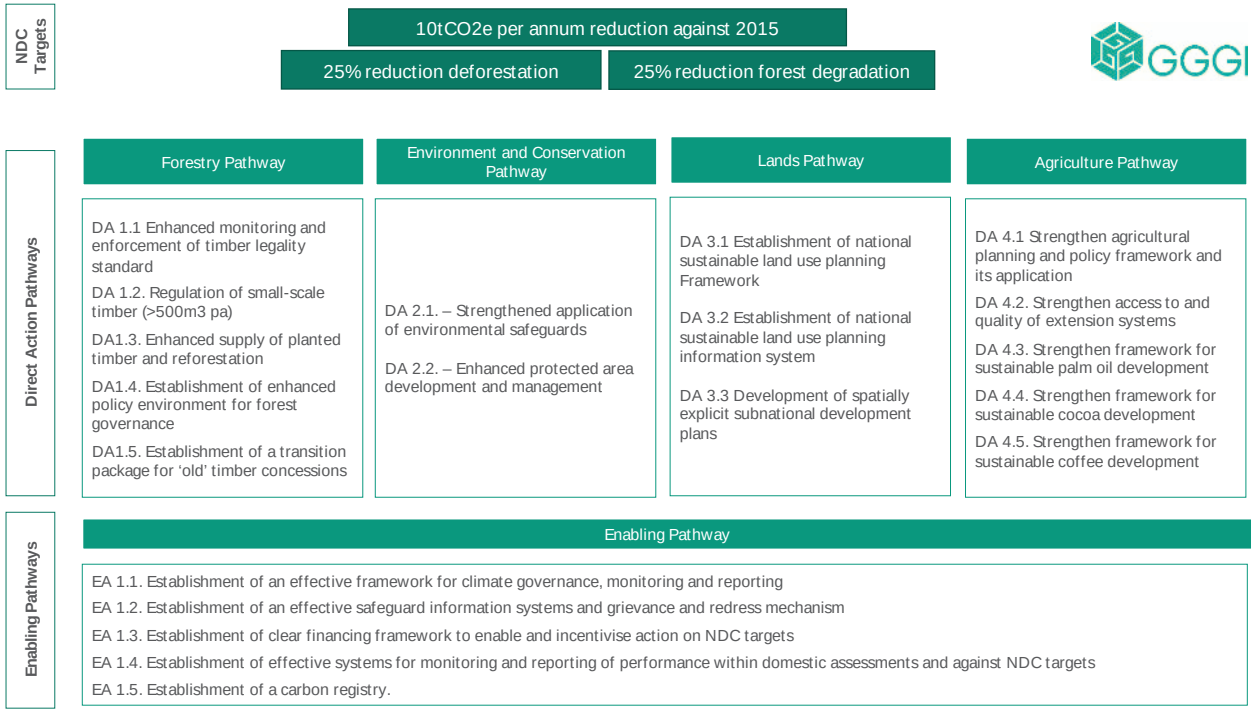
- PNG will adopt an approach to achieving NDC targets primarily through national systems with results in terms of emissions reported at national level and actions implemented by responsible mandated government agencies in partnership with communities and the private sector.
- In line with this, PNG will seek to monetize any ERs at national scale, distributing finance from this process on a set benefit-sharing framework linked to PNG's policy objective.
- Private sector or NGO action that seeks to monetize credits directly through access to international or domestic buyers will continue to be permitted but will require approval from CCDA and relevant line agencies and geographical jurisdictions. They will need to follow all guidelines and regulations linked to emissions accounting, benefits sharing and safeguard applications.
- Approaches to developing a domestic mechanism for offsetting emissions across regulated sectors within PNG will also be considered.

See Sections 5.1 and 5.2 for further information on how these elements will be integrated within the governance of the AFOLU roadmap and how the implementation will be financed.

3.2 Pathways of Change

This roadmap lays out a series of pathways of change that are intended to help deliver the NDC targets for the AFOLU sector while supporting PNG's long-term sustainable development. These pathways are illustrated in Figure 5 and further expanded in the tables in Appendix A and Section 4.

Figure 5. AFOLU roadmap theory of change



3.3 Overall ER Potentials and Implementation Cost

The identified direct action pathways have significant potential to deliver reduced emissions. Based on assessment against 2015 data, it is estimated that they could deliver more than 111,946 $GgCO_2e$ in cumulative ERs by 2030, with annual reductions and additional sequestration of over 20,000 $GgCO_2e$ per annum against 2015 levels.

Actions would also deliver significant domestic economic, social and environmental benefits and help PNG achieve its global targets on conservation action (Box 2).

Achieving these targets will require significant investment, estimated at close to US$500 million for direct actions and US$40 million for enabling actions over the coming 10 years.

Investment needs are anticipated to be highest within the first five years of implementation, as new policies, systems and capacity are developed and operationalized and investment is directed to new action areas.

A breakdown of these costs and potential ER benefits are summarized in Tables 4–6, and discussed in Sections 3.5.and 3.6 and in Appendix A.

While the presented figures provide an indication of potential benefits and costs, it should be noted that the current estimates have significant limitations, based on several factors, including:

- Attribution of ERs;
- Use of baseline data; and
- Variation in cost estimates.

Information on how PNG intends to address these investment needs is provided in Section 4.2.

Box 2. AFOLU roadmap at a glance

US$500 million the indicative costs of implementing the AFOLU roadmap over the coming 10 years

111,946 Gg of cumulative ERs estimated to be delivered between 2021–2030 against 2015 levels

20,528 $GgCO_2$ of annual ERs against 2015 levels by 2030

6.5 million more hectares of forest under conservation – over 8 million hectares of terrestrial PAs – meeting PNG's targets under the CBD

470 threatened species with habitat secured

200,000 hectares of native forest planted

US$75 million in sustainable forest products

US$2 billion plantation stock

50% increase in cocoa and coffee production and increases in palm oil production

Enhanced unit values of agricultural commodities

Enhanced food security for rural communities

Note – all figures on costs and emission reductions should be treated with caution as they only represent estimates and will vary based on a number of factors including:

Costs - who holds the costs (private sector / communities and government) and final nature of actions and implementation

Emission reductions – updated information on impacts of differing logging practices, nature of plantation development, and how attribution of emissions reductions from lower levels of agricultural clearing are attributed to different interventions, e.g. environmental permits, improved land use planning etc)

3.3.1. Summary of ERs

As noted in Section 1.2, PNG has already achieved ERs in the region of 15,000 $GgCO_2e$ against 2015 levels, representing close to a 40% decline in emissions.

This roadmap sets out to solidify these gains and progress towards a position of ERs of over 20,000 $GgCO_2e$ per annum representing a reduction of just over 50% of 2015 levels. With cumulative ERs in excess of 111,000 $GgCO_2e$ *(Figure 6)*.

ER estimates are based on calculating percentage declines in emissions against 2015 levels, with ERs from these decreases 'attributed' to the proposed direct action areas based on their estimated impacts.

Commercial logging is the most significant source of emissions, making up nearly 70% of emissions in 2015, and a similar amount in other time periods. It is therefore within this area that ERs are greatest: they are estimated at close to 12,000 $GgCO_2e$ per annum by 2030 against 2015 levels, which is close to 60% of estimated annual ERs *(Figure 7)*. Despite these significant declines, the sector will remain the most significant source of emissions. However, improved harvesting practices and a stronger long-term strategy for forest management will help transition the sector towards carbon neutrality once regrowth levels are more accurately accounted for (actions to improve this accounting are included within EA1.4). It should also be noted that current estimates are based on levels of commercial logging declining by 30% compared to

2015 levels. This is significantly lower than identified levels of change within the Forest and Land use Assessment, which notes a 50% decline in logging activity. There may therefore be potential for further increases in ER levels, should changes in logging activity become permanent. Information on ERs by pathway is shown in Figure 6 and Table 4

Figure 6. Indicative cumulative ERs by pathway ($GgCO_2e$)

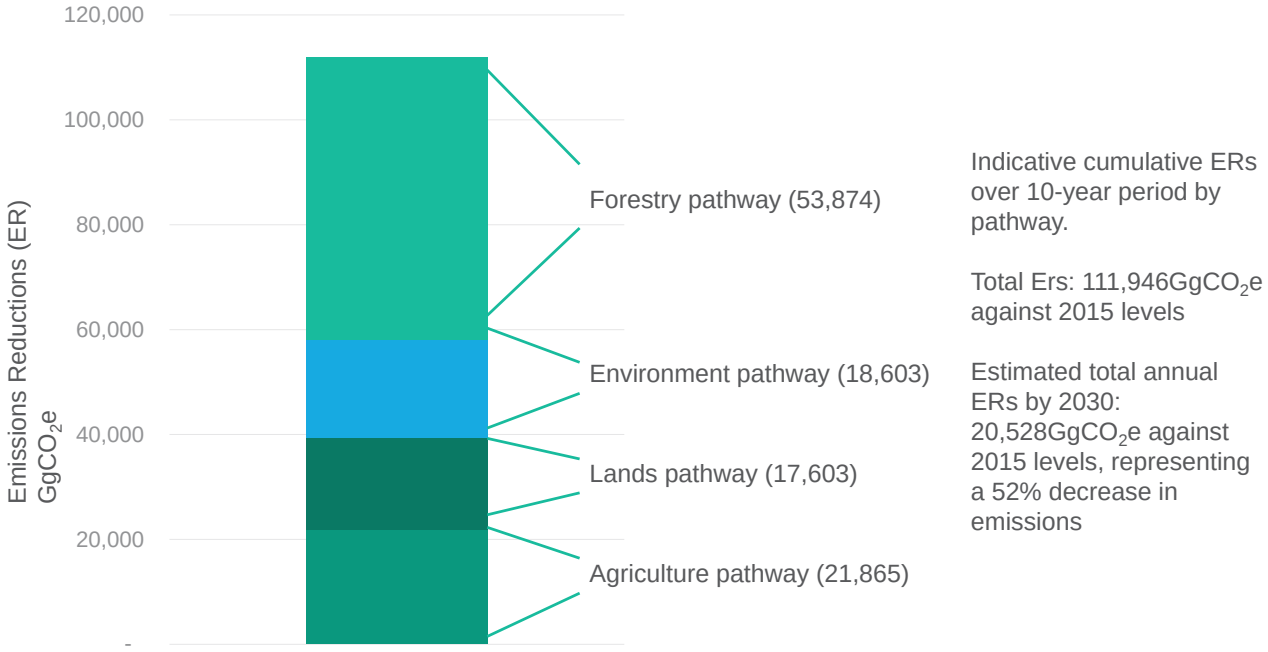


Figure 7 Emissions reductions by source ($GgCO_2e$)

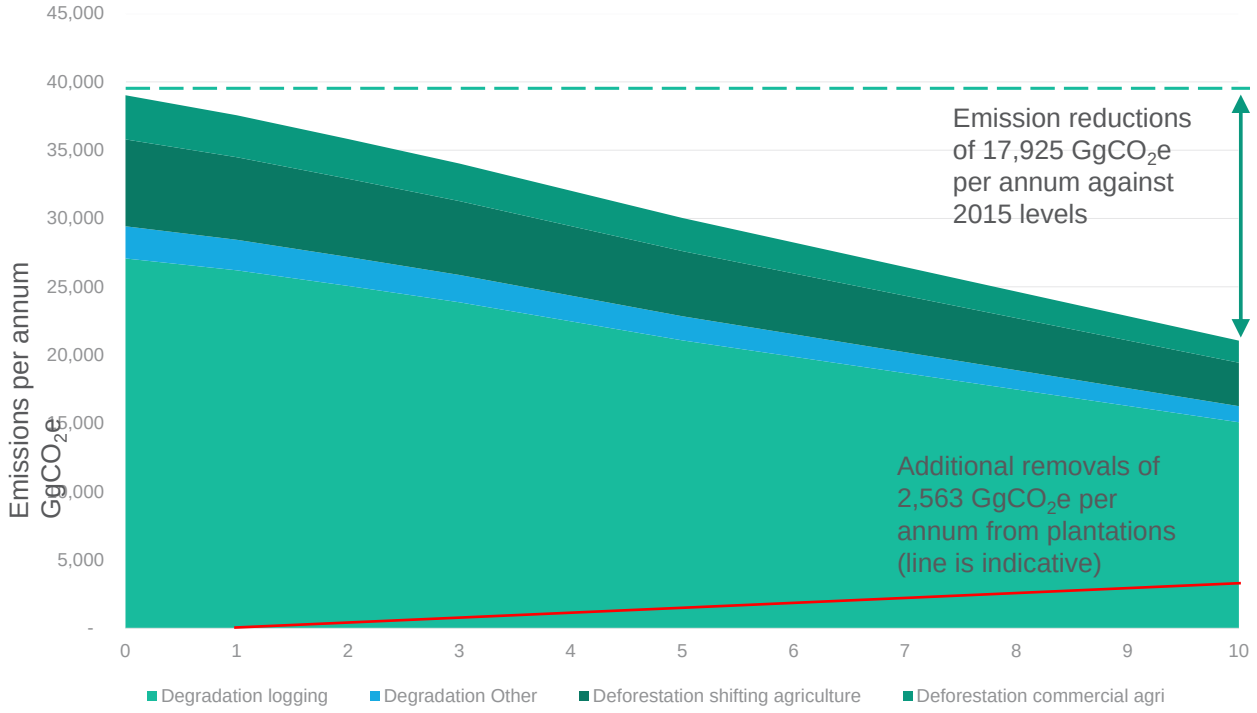


Table 4. Projected emissions reductions by pathway, 2021–2030

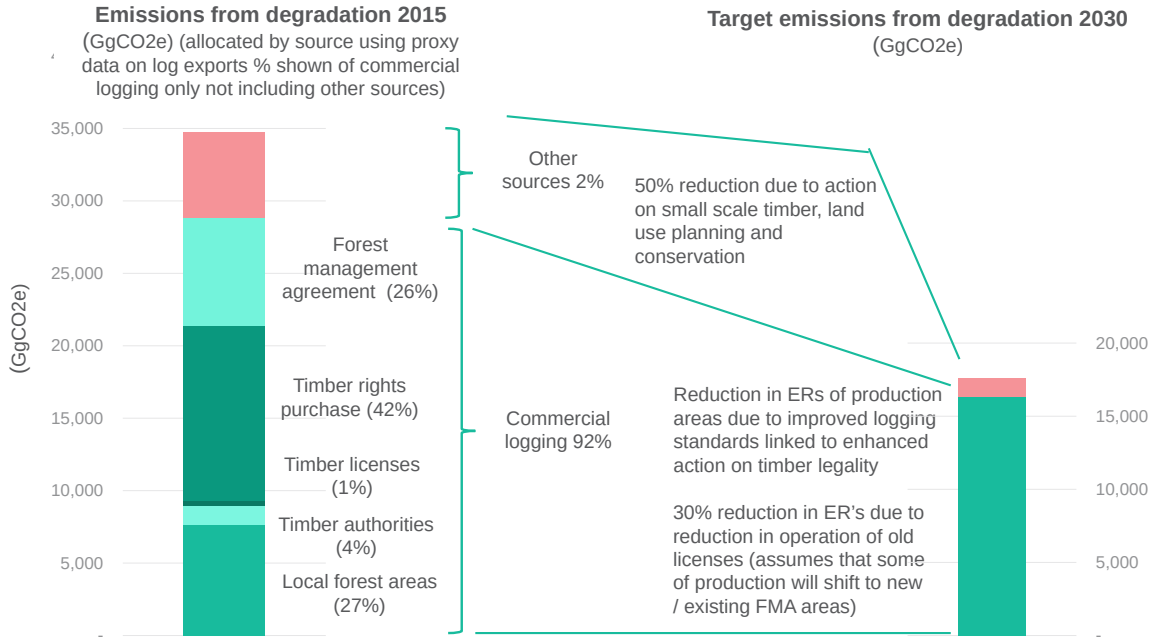
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total:
Total projected ERs and additional sequestration ($GgCO_2e$)	**1,777**	**3,907**	**6,055**	**7,970**	**10,310**	**12,198**	**14,345**	**16,323**	**18,532**	**20,528**	**111,946**
Forestry pathway totals	**843**	**1,932**	**3,013**	**3,786**	**4,984**	**5,806**	**6,888**	**7,801**	**8,945**	**9,876**	**53,874**
DA1.1. Enhance monitoring and enforcement of timber legality standard	174	402	642	921	1,199	1,439	1,679	1,918	2,158	2,398	**12,931**
DA1.2. Regulate small-scale timber (>500m^3 pa)	12	24	35	47	59	71	82	94	106	118	**647**
DA1.3. Enhance supply of planted timber and reforestation	309	701	1,052	977	1,328	1,419	1,770	1,952	2,364	2,564	**14,435**
DA1.4. Establish enhanced policy environment for forest governance	87	201	321	460	600	719	839	959	1,079	1,199	**6,465**
DA1.5. Establish a transition package for 'old' timber concessions	261	603	963	1,381	1,799	2,158	2,518	2,878	3,237	3,597	**19,396**
Environment pathway totals	**277**	**609**	**952**	**1,333**	**1,715**	**2,058**	**2,401**	**2,744**	**3,087**	**3,430**	**18,603**
DA2.1. Strengthen the application of environmental safeguards	103	233	370	525	680	816	953	1,089	1,225	1,361	**7,354**
DA2.2. Enhance PA development and management (medium-impact scenario)	174	375	582	808	1,034	1,241	1,448	1,655	1,862	2,069	**11,249**
Lands pathway totals	**290**	**606**	**929**	**1,270**	**1,612**	**1,934**	**2,257**	**2,579**	**2,902**	**3,224**	**17,603**
DA3.1. Establish national sustainable land use planning framework	61	128	195	267	338	406	474	542	609	677	**3,697**
DA3.2. Establish national sustainable land use planning information system	73	151	231	314	397	477	556	636	715	795	**4,344**
DA3.3. Develop spatially explicit subnational development plans	156	327	503	689	876	1,052	1,227	1,402	1,577	1,753	**9,562**
Agriculture pathways totals	**367**	**761**	**1,161**	**1,580**	**2,000**	**2,399**	**2,799**	**3,199**	**3,599**	**3,999**	**21,865**
DA4.1. Strengthen agricultural planning and policy framework and its application	8	16	24	32	40	48	57	65	73	81	**445**
DA4.2. Strengthen access to and quality of extension systems	210	430	653	884	1,114	1,337	1,560	1,783	2,006	2,229	**12,206**
DA4.3. Strengthen the framework for sustainable palm oil development	85	76	268	364	459	551	643	735	827	919	**5,027**
DA4.4. Strengthen the framework for sustainable cocoa development	32	69	108	150	193	231	270	308	347	385	**2,093**
DA4.5. Strengthen the framework for sustainable coffee development	32	69	108	150	193	231	270	308	347	385	**2,093**

3.3.2. Calculating emission reductions

All ERs have been calculated by estimating levels of impact that proposed actions will have on aggregated national data, using additional proxy data where possible to help guide this process. For commercial logging, for example, log exports from different concession license types was used to estimate their contribution to total emissions and thus the impact of action to shift production away from 'old licenses'. To estimate the impacts of commercial agriculture land use change, information on the relative impact of the drivers of land use change — oil palm, subsistence agriculture, cocoa, coffee or other — was used.

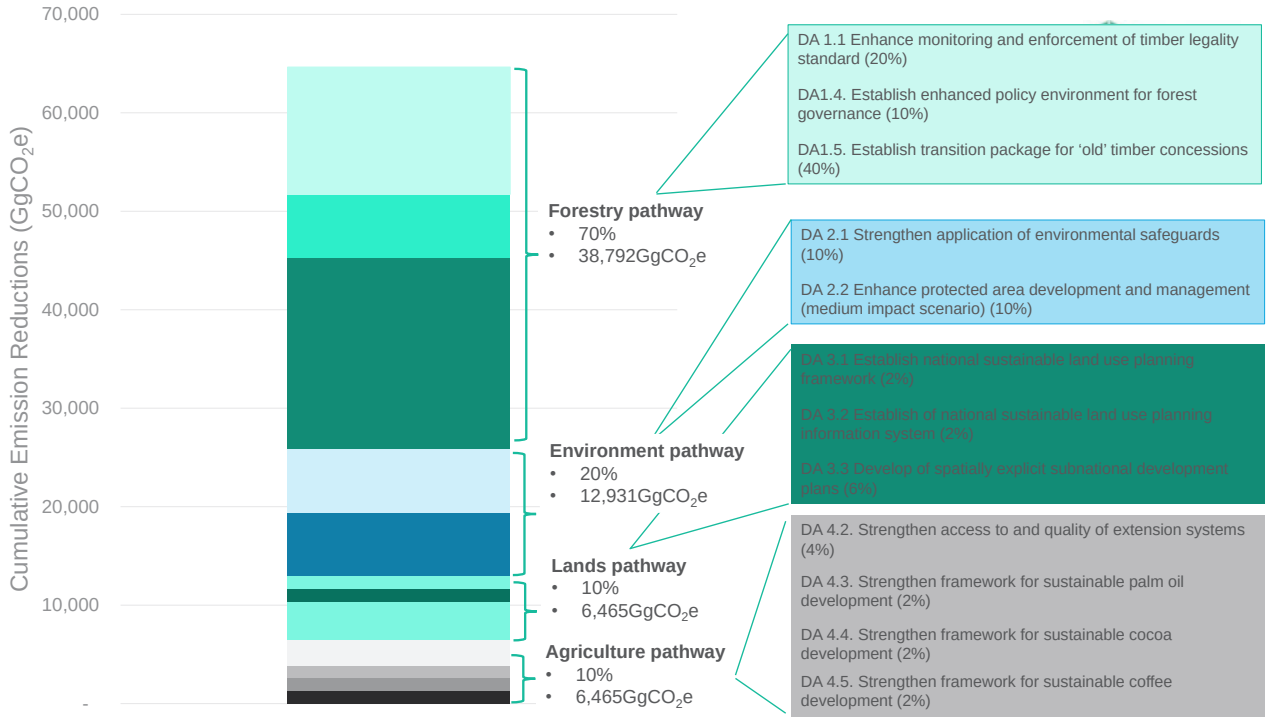
The resultant ERs from the overall declines in deforestation or forest degradation were then 'attributed' to different action areas, based on their anticipated contribution to delivering change. For example, the most significant of these reductions is estimated to come from action to phase out production from 'old' concession types (DA1.5). It is, however, recognized that success in this area will require integrated actions across a significant number of action areas and as such, ERs are 'attributed' across a number of direct action areas. This process of identification and estimated levels of impact for commercial logging are summarized in Figures 8 and 9. For a more detailed description of calculations, see Appendix B.

Figure 8 Process of identifying levels of ER from forest degradation



Applying the ER process in Figure 8 results in a total of 64,653 $GgCO_2e$ in ERs over 10 years, 'attributed' across the different action areas identified as driving the change in land use practices *(Figure 9)*.

Figure 9. Attributing ERs from the decline in commercial logging to action areas



(Based on data from PNG's draft updated land use and forest assessment 2015-2019)

This attribution process is undertaken for all ERs for two reasons. First, data on emissions are only available in an aggregated form, making it difficult to breakdown the impacts of individual action areas. Second, it is assumed that impacts will be achieved only through a combination of activities that engage landholding communities, decision makers and those who directly implement activities. For example, when an 'old' concession is presented for renewal, improvements in timber legality monitoring mean that all permits must be fully in place, putting pressure on firms to not short cut approaches. Environmental permits will be fully applied, which could help constrain poor applications and local-level land use planning will give communities a better view on where they would and would not like logging to occur. At the same time, support to conservation and sustainable agriculture provides options for alternative land uses to renewing logging permits.

It is important to remember, therefore, that identified ERs are estimates based on aggregated data analysis and a number of assumptions, as extensive site-specific analysis is not possible at this time or when looking at impacts at a national scale. The ERs linked to an action area are not independent; in many cases, they rely on the implementation of other action areas to ensure effective implementation. For this reason, it is recommended that early action is targeted at landscape-scale interventions that combine a number of action areas to deliver change.

Further information on the ER calculation and attribution process is provided in Appendix B.

3.3.3. Cost Estimations

The estimated costs of implementing an action area have, where possible, been based on existing government plans or baseline data — for example, unit costs and or metrics for number of officers or equipment required to manage proposed areas or level of production such timber operations, or number of extension officers needed. This information has also been supplemented and in places compared with estimates developed by independent experts (development partner programs, academic or private sector groups). Where government figures do not exist, estimates have been made using GoPNG unit costs where available or 'best case' assumption based on expert opinions of costs (Table 5 and Appendix A).

Table 5. Estimates of implementation costs, by direct pathway

Areas and indicators	Estimated costs of implementation (US$ millions)
Forestry pathway totals	**111**
DA1.1 Enhance monitoring and enforcement of timber legality standard	99.9
DA1.2. Regulate small-scale timber (>500m^3 pa)	2.5
DA1.3. Enhance the supply of planted timber and reforestation	6.6
DA1.4. Establish enhanced policy environment for forest governance	2
DA1.5. Establish a transition package for 'old' timber concessions	No cost estimate available
Environment pathway totals	**35 by 2030**
DA2.1. Strengthen the application of environmental safeguards	17 to 2030
DA2.2. Enhance protected area development and management	18 by 2030 or 40 by 2030, with costs at 20 per annum henceforth
Lands pathway totals	**24.2 by 2030**
DA3.1. Establish a national sustainable land use planning framework	1.1
DA3.2. Establish a national sustainable land use planning information system	3.1
DA3.3. Develop spatially explicit subnational development plans	20
Agriculture pathways totals	**303 by 2030**
DA4.1. Strengthen the agricultural planning and policy framework and its application	1
DA4.2. Strengthen access to and quality of extension systems	32
DA4.3. Strengthen the framework for sustainable palm oil development	90
DA4.4. Strengthen the framework for sustainable cocoa development	90
DA4.5. Strengthen the framework for sustainable coffee development	90

Challenges in the way these costs have been calculated include:

- **Levels of cost inclusion:** Identifying a clear line for what costs to include within estimates is a complex process as it is also impacted by the proposed approach to be taken. For example, within the plantation sector, there are costs linked to several steps, including regulations, strategies, establishing nurseries, transporting seedlings, preparing land, planting, and so on. Who covers these costs — government, the private sector or communities — impacts both their likely level and the way they are presented. Clarification requires clear agreement on how actions will be implemented, which in many cases is still evolving. For example, within the plantations area, there is wide a discrepancy between the government's and non-governmental groups' estimates — which are US$6.6 million and over US$300 million, respectively.

- **Defining additional finance and investment gap:** These costs represent an estimate of additional finance needed, indicating the gap in investment between current and future needs. This is based on the assumption that actions are not always being completed, despite some having budget allocated towards their delivery. Equally, there are challenges in disaggregating GoPNG budgets and development partner project funds to clearly see levels of finance allocated to activities. However, quantifying the gap between what is and is not being financed is beyond the scope of this assessment; as such, only a gross figure for additional finance is presented.

- **Inter-relation of activity impacts:** All cost calculations are based on assessment against the status quo, and do not fully address changes in costs that would be linked to the potential impact of NDC implementation. This is most significant within forest monitoring costs, as estimates are based on existing log export levels and number of concessions. Should these numbers fall significantly, cost levels would also reduce and could be 'redeployed' to other areas, such as support for tree planting, or silvicultural management training.

- **Interaction and attribution of ERs:** There are significant cross-cutting challenges on calculating emissions and costs and effectively attributing ERs to different actions. This is due to both the scale at which they operate and the interaction between different drivers of change. Approaches are therefore developed to provide 'indicative' numbers. This means overall numbers are broadly realistic, but how to achieve this is more difficult to project. This issue is also present for cost estimates. For example, there have already been significant ER reductions from PNG's logging sector and there may be more still. And, while some of this may come from enhanced monitoring of concessions, it may also be driven by improved land use planning resulting in landholding communities choosing to use their land in a different way. Reduced logging levels would change the impact of actions to improve the quality of logging and the costs needed to monitor concessions, thus changing predicted costs and impacts of other action areas. As such, without improved data or scenario modelling, the figures presented must be considered indicative.

3.3.4. Enabling Pathways

The enabling pathways represent core actions needed to ensure that direct actions are coordinated, climate elements are mainstreamed within them, and that they can be linked with international and domestic climate finance mechanisms. The total estimated costs — just over US$40 million over 10 years (under 10% of the total proposed budget) — fall well within international norms and could be reduced, depending on how different areas of climate action share funds and use key governance and implementation structures, such as finance mechanisms.

Table 6. Estimated implementation costs, by enabling pathway

Target		Estimated costs of implementation (US$ millions)	
		To 2025	To 2030
EA 1.1.	Establish an effective framework for climate governance, monitoring and reporting	1.5 to 2025	2.5 to 2030
EA 1.2.	Establish an effective safeguard information systems and grievance and redress mechanism	1 to 2025	2 to 2030
EA 1.3.	Establish a clear financing framework to enable and incentivize action on NDC targets	1.5 to 2025	3 to 2030
EA 1.4.	Strengthen the GHG measurement and reporting system linked to NDC targets and commitments to raise ambition across new sectors	20 to 2025	30 to 2030
EA 1.5.	Establish of a carbon registry	2 to 2025	3 to 2030
Total:		**26 to 2025**	**40.5 to 2030**

3.4 Priority Actions

The theory of change outlined above (Figure 5) provides a summary of the framework of action for the AFOLU sector. While many of these actions are already underway or planned, it is recognized that the required levels of investment — and indeed, human and technical capacity necessary to implement them throughout PNG — will not be realized within the short to medium term (that is, the next two to five years). As such, it is proposed that the government develop a strategic five-year approach that focuses action within a number of key national systems and target landscapes so that the multifaceted nature of interventions can be fully tested and realized. As well as showing other geographical areas (jurisdictions) the potential opportunity for change, this approach will place PNG in line with global interest in scaling land use interventions at jurisdictional level, facilitating future access to finance.

Central to this approach are two phased concepts: consolidating gains with action taken to reduce timber harvesting levels and commercial agricultural expansion and prioritizing action in the provinces that are most vulnerable to expansion. Initial assessments indicate that PNG has seen significant ERs between 2015 and 2019, mostly by reducing commercial logging and palm oil expansion. Actions to support the permanence of these changes should therefore be a priority.

Consolidate reductions in commercial timber operations: Between 2015 to 2019, there was more than 50% decline in the area of land impacted by commercial logging,[8] with further reductions possible in 2020 and 2021.[9] Consolidating and enhancing the permanence of any ERs linked to this fall in commercial logging levels is therefore a significant priority. This can be achieved by combining support to strengthen the policy and enforcement environment around timber operations (DA1.1 and DA1.4) with support for transitioning away from logging in areas where production has ceased (DA1.5). It is noted that there will be a need for local-level action on several action areas, including designating conservation areas and their financing (DA2.2), land use planning (DA3.3 in particular), and improving productivity of family and commercial agricultural activities (DA4.2–5) . Identifying how these can best be targeted at a jurisdictional and landscape level is therefore a key priority.

Key proposed action areas:

- **DA1.1.** Enhance monitoring and enforcement of timber legality standard
- **DA1.4.** Establish enhanced policy environment for forest governance
- **DA1.5.** Establish a transition package for 'old' timber concessions, with support from other action areas at landscape scale

Control rapid commercial agricultural expansion: Emissions linked to land clearing for commercial agriculture rose rapidly between 2009 and 2015, most significantly driven by increases in clearing for palm oil. Initial assessments of land use change through to 2019 indicate that rates of clearing for palm oil alone have fallen by over 50%. Ensuring that this level is maintained or further reduced and that there is not another rapid increase in rates of clearing are therefore priorities. Action in this area has already been initiated through work on PNG's Palm Oil Platform, but fast-tracking and enhancing this process should also be a priority.

Key proposed action area:

- DA4.3. Strengthen the framework for sustainable palm oil development

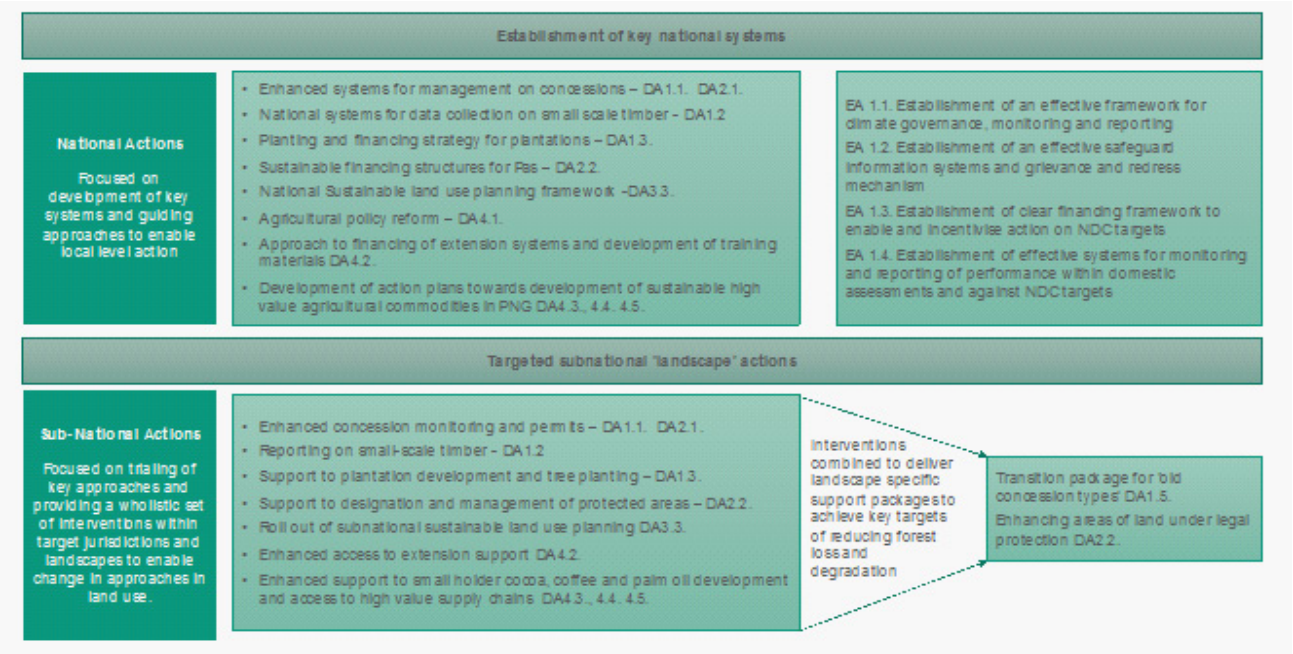
While these action areas can be seen as priorities to be fast-tracked for early implementation, the interconnectedness of approaches to land use require actions across almost all areas to help establish a full framework for improved management. This includes actions that will support the achievement of the high priority actions and build long-term sustainability of change.

Figure 10 provides an overview of this approach and the balance of developing national systems while targeting early implementation in several key provinces. The rest of this section provides further detail on target jurisdictions and key actions. The key enabling actions are prioritized due to their important role in attracting and managing finance and ensuring a coherent, coordinated approach to action.

8. PNG Land Use, Land Use Change and Forestry Assessment 2016–2019.

9. Based on log export data.

Figure 10. National and subnational action paths



3.4.1. Target Jurisdictions

It is proposed that subnational action over the coming five years focus on several target jurisdictions Table 7). These areas have been identified due to their high levels of historic and potential future forest loss, existing actions, existing levels of development partner support and private sector action.

Table 7. Priority Jurisdictions for Action

Jurisdiction	Past levels of forest loss / degradation	Existing support	Key areas of additional support needs
East and West New Britain Provinces	High levels of timber exports (degradation and forest clearance) High levels of oil palm production and new expansion	**GEF7 FOLUR,** providing support to: Enhance the capacity of provincial and subnational actors to undertake environmental monitoring Test approaches to PA designation in landscape and management support Develop sustainable LUPs in two provinces, four districts and four LLGs Action on land use planning **PACD,** providing support to strengthen smallholder cocoa, coffee and livelihood diversification	Roll out of subnational land use planning across more districts and LLGs Transition from 'old' concessions
East and West Sepik Provinces	High levels of timber exports	**GEF6 (Sustainable Finance of PNG's Protected Area Network),** providing support to conservation work in Sepik Wetlands **EU STREIT**, providing support to agricultural value chain development for cocoa, coffee and vanilla in provinces	Enhanced land use planning Concession monitoring Reforestation and plantation development
Enga Province	High levels of historic forest loss and degradation PCCC established and MoU on climate action signed	**EU GCCA**, providing support to land use planning, coffee value chain development, reforestation actions **PACD**, providing support to strengthening of smallholder cocoa, coffee and livelihood diversification	PA designation and management
Western and Eastern Highlands	Historic forest loss, opportunities for	**GEF Landscape management project** (under development) **PACD**, providing support to strengthening of smallholder cocoa, coffee and livelihood diversification	Enhanced land use planning Reforestation and plantation development Agricultural value chains PA designation and management

In addition to these jurisdictions, consideration should be given to provinces that have already taken steps to establish a framework for climate action by signing an MoU with CCDA and establishing a PCCC. These provinces are:

1. Enga - (PCCC established and MoU to be signed between provincial government and CCDA)
2. Milney Bay - (PCCC established and MoU to be signed between provincial government and CCDA)
3. New Ireland - (PCCC established and MoU to be signed between provincial government and CCDA)
4. Morobe - (PCCC established and MoU to be signed between provincial government and CCDA)
5. Manus - (PCCC established and MoU to be signed between provincial government and CCDA)

3.5 Direct Action Pathways

DA pathways are the sector-based action areas required to help reduce emissions and enhance removals from the sector. While it is difficult to quantify the specific emissions-based impacts of some actions, such as enhanced land use planning, these action areas will directly impact the way sector agencies, subnational governments and other stakeholders manage land. They are differentiated from enabling actions (Section 3.6), which are primarily focused on the elements of climate governance that will create the enabling conditions for delivering direct actions. The direct actions are presented here under four, sector-based pathways: forestry, environment, lands and agriculture.

DA1 Forestry Pathway

The forestry pathway action matrix is based on targets and actions identified within the National REDD+ Strategy, REDD+ Implementation Plan as well as actions within the SDG13 Roadmap and NDC Implementation Plan and key sector documents such as the National Reforestation Strategy 2020.

Based on this existing framework for action a number of key targets and actions have been identified (Table 8). These elements are intended to form the basis for PNGFA's Sector Mitigation Plan and can also support the integration of climate change planning into future planning documents including MTDP 4.

Potential impacts

Table 8 shows that the proposed actions could deliver around 54,000 $GgCO_2e$ in ERs and removals by 2030 against 2015 levels. Actions are also likely to:

- Increase market access for PNG timber and price premiums for sustainably produced timber
- Enhance production from planted forests and linked investment in downstream processing
- Plant over 220,000 hectares of trees, including 60,000 hectares of environmental planting, 60,000 hectares of community planting and 100,000 hectares of commercial plantations
- Create an estimated US$70 million in wood products within 10-years and a future asset worth of nearly US$2 billion if effectively maintained and harvested
- Increase options for improved approaches to forest management and sustainable revenue generation from the sector
- Reduce timber export levels by 30% against 2015 levels, leading to a fall in export taxes, levies and other royalty payments, some of which may be offset by changes in the tax regime (PNG's recent increases in export tax have offset the higher than proposed fall in export levels) as well as increases in export value of timber that is recognized as having higher production standards.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP 3

KRA1. Increased revenue and wealth generation:

1.2. Increasing value of exports, by increasing the unit value of timber with higher legality assurance

1.3. Creating employment and economic opportunities, through enhanced forest management capacity and tree planting.

KRA7. Promote PNG's environment sustainably, by reducing forest depletion rates

SDGs

13. Climate action

15. Life on land

15.1 Conservation and rehabilitation of forest areas

15.2 Sustainable use of forest resources

SDG 13 Roadmap

10. REDD+ results delivered
11. Internationally recognized timber legality standard
12. Increased environmental and commercial planting
13. Enhanced strategies for secondary forest utilization
14. Enhanced information on Forests

National REDD+ Strategy

2.3.2.3. Strengthening forest management and enforcement practices

Table 8. Forestry pathway: summary of targets and estimated implementation costs

Areas and indicators	Mid-term targets (by 2025 if not otherwise stated)	Long-term targets (by 2030 if not otherwise stated)	Means of verification	Estimated ERs per annum against 2015 ($GgCO_2e$)	Estimated costs of implementation (US$ millions)
DA1.1. Enhance monitoring and enforcement of timber legality standard					
Percentage of all forestry concessions types (over 500m^3) (including FCAs) with full legal certification	50% of concessions (including FCA timber)	100% concession	Concession monitoring reports National Forest Monitoring System (NFMS) with publicly available information on concession legality (permits, management plans, etc.)	2025: 1,119 per annum (3,338 cumulative) 2030: 2,398 per annum (12,931 cumulative)	99.9
DA1.2. Regulate small-scale timber (>500m^3 pa)					
Enhanced information on nature of small-scale production	Quantification of impacts of small-scale timber in place by 2022 Measures identified to enhance management of small-scale timber harvesting by 2025	No target – approach and target to be reviewed by 2025 based on data collected	PNGFA reports	2030: 647	2.5
DA1.3. Enhance supply of planted timber and reforestation					
Hectares of new planted timber	110,000 hectares	220,000 hectares by 2030	Field-based monitoring reports	2025: 1,328 per annum (4,367 cumulative) 2030: 2,564 per annum (14,435 cumulative)	6.6
DA1.4. Establish enhanced policy environment for forest governance					
Enhanced forest policy environment	Draft forest policy by 2023 Updated forest policy by 2025	No targets – to be reviewed in 2025	Draft policy documents consulted on Final policy approved by NEC	2025: 600 per annum (1,669 cumulative) 2030: 1,199 per annum (6,465 cumulative)	2
DA1.5. Establish a transition package for 'old' timber concessions					
Decrease in area under under 'old' license types	40% of total concessions	10% by 2030	Number of concessions Information publicly available on NFMS	2025: 1,799 per annum (5,007 cumulative) 2030: 3,597 per annum (19,396 cumulative)	

Implementation costs and potential financing

The proposed actions are estimated to cost in excess of US$110 million. This is a conservative estimate, as there needs to be further consideration of how private sector costs are included or represented, as increases in the standards of forestry operations linked to enhanced monitoring are liable to involve additional costs to producers. Equally, estimated plantation costs vary significantly between those included within government documents (US$6.6 million) and those of development partners and private sector groups, which are in excess ofUS$300 million.

Existing development partner finance provides the opportunity to take early action in developing and strengthening key systems that will guide further investment and private sector action, with particular focus on the need to strengthen action on monitoring existing operational forest concessions (DA1.1) and developing an approach to transitioning 'old' concession areas towards sustainable land use activities (DA1.5)

Establishing effective approaches to financing reforestation and plantation development actions also provides a key opportunity for mobilizing additional finance.

Priority actions

Several key priority areas have also been identified for action.

DA1.1. Enhance monitoring and enforcement of timber legality standard: With current commercial logging levels estimated to be close to 30% below 2015 levels, early action to operationalize key elements of the legality standard will help control any future increases, helping to reduce its impact on emissions. It is therefore crucial that data management systems be updated to provide a more efficient and transparent means for providing information on concession operations (DA1.1.2) and that these systems are linked with field testing of certification processes (DA1.1.3). Having transparent systems will reduce the costs of applying further certification processes and empower other actors, such as buyers and NGOs, to be fully informed on the status of specific timber operations. This in turn, will help PNGFA enforce standards through selective purchasing, advocacy and awareness raising.

Support needs: Engage certifiers to 'test' the system and identify key gaps and weaknesses in existing legality standards as well as key information needs to support implementation (finance may be available through USAID Lukautim Graun Project and WWF-implemented project. There are also options for further support through proposed JICA and USAID projects and the GCF RBP proposal.

DA1.3. Pilot woodlot or plantation development in key locations: A clear business plan and financing strategy must be developed to identify how planting can be effectively managed (DA1.3.2). This can be combined with targeted site interventions to demonstrate effectiveness at different scales and in different geographies — for example, through links with commercial plantations or processing facilities, such as Bulolo (DA1.3.6), and community/household plantings, ideally within different climatic regions (highlands and coastal areas) (DA1.3.5).

Support needs: Developing a business plan, support to engage with private sector group in developing a public-private partnership approach to plantation development, action to support community-level planting (included within proposals under the GEF7 FOLUR project and the EU GCCA project in Enga.

DA1.5. Pilot a transitional model for old timber permits: Early action should be taken to trial approaches at several concessions that have ceased operation or are approaching the end of their permits.

Support needs: Technical support to help coordinate existing partner support programs and identify and target possible concessions.

Critical linkages

Due to the unique nature of land ownership in PNG, the high proportion of population living in rural land areas and relying on them for their livelihoods, and the importance of viewing landscapes as part of an integrated system, approaches to transitioning old concession areas must be linked with other action areas, namely those linked to PA development (DA2.2) and land use planning (DA3.3), and to those supporting agricultural development (DA4.2–5). The rest of this section examines all action areas in more detail.

DA1.1. Enhance monitoring and enforcement of timber legality standard

Intervention logic: Commercial timber operations accounted for over 80% of PNG's emissions from the sector in 2015 and 90% of emissions from degradation. While this has fallen in recent years due to changes in export tax and global supply chains, it remains a key source of emissions and one where recent progress must be secured and maintained to prevent a recurrence of the highest level of impact. Enhancing the quality and nature of production within concession areas is expected to both reduce impacts on forests from logging activities (quantifying this will require additional field assessment) and result in lower production levels as those not adhering to legal standards cease to operate.

Baseline: There has been progress on developing a timber legality standard for PNG that has broader government, civil society and private sector buy-in. This has been approved by National Institute of Standards and Industrial Technology (NISIT).

Targets: 50% concessions (including FCA timber) certified legal by 2025, 100% concession (including FCA timber) certified legal by 2030.

Potential impacts: Estimated ERs against 2015 levels of 1,119 $GgCO_2e$ per annum (3,338 $GgCO_2e$ cumulative) by 2025 and 2,398 GgCO2e per annum (12,931 $GgCO_2e$) cumulative by 2030, based on logging standard being implemented, resulting in logging operations reducing their impacts on forest carbon stocks from 35% loss to 30% level, hence a 5% ER. Improved data and monitoring capacity may allow for improvements in this level of estimation and future accounting.

Other: Potential for significant environmental benefits through reduced impacts of logging on concession areas and waterways. Also potential options for accessing higher-value markets for PNG timber.

Key sub-actions

DA1.1.1. Raise awareness on timber legality standards: Actions include developing awareness-raising materials and rolling out materials across PNG.

Estimated costs: US$1.7 million.

Existing support: No current support but potential support through the GCF RBP proposal.

DA1.1.2. Strengthen information management and monitoring systems: Actions include reviewing current status of systems and options for linking existing systems (Decision Support System (DSS), Forest Resource Information Management System (FRIMS), NFMS, and Timber Legality Verification System), populating key databases with baseline production and concessions data, updating system and equipment, establishing a remote deforestation alert system.

Estimated costs: US$900,000.

Existing support: GEF6 CBIT project has supported the early development of a PNG Near-real Time Deforestation Alerts and Monitoring system. Further support is programed within two GEF7 projects (UNDP and FAO-administered), while the proposed JICA forest sector project, the GCF RBP project, and the FAO administered, GCF-supported REDD+ registry development work could also provide systems development support.

DA1.1.3. Strengthen field monitoring capacity: Actions include staffing increases to meet PNGFA metrics of field officers to levels of timber harvesting, ensuring that officers are equipped with vehicles and accommodation, and increased use of remote monitoring technology such as drones for rapid and regular assessments.

Estimated costs: US$35 million.

Existing support: No existing support; possible support may come from the proposed JICA forest sector project and the GCF RBP project.

DA1.1.4. Increase action on forest rehabilitation: Actions focus on engaging with communities to support PNGFA's 'regeneration naturally' approach that helps communities conduct post-harvest cleaning activities to promote key tree species regeneration.

Estimated costs: US$26 million.

Existing support: none.

DA1.1.5. Establish a third-party verification system: Actions focus on establishing a third-party verification system to strengthen international recognition of legality standards.

Estimated costs: US$35 million, based on existing SGS costs.

Existing support: Initial testing of legality standards and option for improvement supported through USAID Lukautim Graun Project and a WWF-implemented project, while the proposed JICA and USAID projects and the GCF RBP proposal could also provide systems development support..

Total DA1.1 estimated costs of implementation: US$ 99.4 million.

Gaps and barriers: Availability of third party verifier; costs of enhanced staffing and technology to monitor concessions and manage data; limited market demand for enhanced standard within current export markets.

Priority support needs: Developing a core data management framework; piloting standards within targeted concessions.

DA1.2. Update policy and information on small-scale (>500m3) level

Intervention logic: Small-scale logging presents a potentially significant threat to PNG's forests as population levels and densities increase and there is enhanced demand for timber, which could also be driven by stronger controls on commercial operations.

Links with existing policy documents: There are no quantified ERs at present.

Baseline: Data on sawmill and small-scale processing activity levels are limited. Work to revise the Forestry Act will enhance legal requirements for small-scale operations permits. To help strengthen this process and prevent the expansion of illegal activities, it will be important to enhance provincial officers' capacity to collect information on existing actions and work with national-level officers and development partners on policies and programs that help regulate the small-scale timber sector.

Targets: Quantify impacts of small-scale timber by 2022; measures to enhance small-scale timber harvesting management by 2025.

Potential impacts: Estimated total ERs against 2015 levels of 647 $GgCO_2e$ by 2030, based on contributions to reducing degradation levels outside of commercial concession areas.

Key sub-actions:

DA1.2.1. Carry out an initial assessment of existing timber production levels and potential future demand.

DA1.2.2. Build provincial officers' capacity to collect information on small-scale timber operations.

DA1.2.3. Carry out an initial policy review to support improved data collection on small-scale operations.

DA1.2.4. Carry out the second phase of the policy review, based on additional data availability and information.

Estimated costs of implementation: US$2.5 million

Gaps and barriers: Lack of data availability and resources to conduct assessment; limited political will to regulate the sector.

Priority support needs: Technical support for collecting and assessing data and potential management mechanisms.

DA1.3. Enhance supply of planted timber and reforestation

Intervention logic: By establishing a permanent forest estate of managed plantations, PNG would reduce pressure on natural forest areas while also potentially increasing the economic benefits of its harvests through improved timber quality and enhanced options for downstream processing.

Reforestation of degraded and deforested areas would allow for enhanced levels of forest cover as well as improved environmental services and household-level timber supply, poles, firewood, and so on.

Baseline: PNG has 70,000 hectares of government-run plantation and two commercial ones. Reforestation and plantation development is a government priority. Leaflets and other forms of information relevant to landholders have been distributed.
The National Reforestation Strategy, developed and approved in 2020, provides a more in-depth breakdown of proposed areas of action.

Targets: 22,000 hectares planted each year; 220,000 hectares by 2030.

Potential impacts: Estimated ERs against 2015 levels of 1,328 $GgCO_2e$ per annum (4,367 $GgCO_2e$ cumulative) by 2025 and 2,564 $GgCO_2e$ per annum (14,435 $GgCO_2e$ cumulative) by 2030.

Key sub-actions:

DA1.3.1. Stocktake of existing plantation resource.

DA1.3.2. Develop a business plan for plantation development, including a review of reforestation levy and financing.

DA1.3.3. Develop information and communication materials.

DA1.3.4. Develop training materials.

DA1.3.5. Woodlot development / reforestation, including awareness-raising activities, establishing nurseries, and providing training.

DA1.3.6. Commercial plantations: targeted business plan development for key plantations areas; review of tax incentives; awareness raising; delineation of land; and partnership development.

Estimated costs of implementation: US$6.6 million (based on Panim Graun Planim Diwai budget; nongovernmental estimates indicate much higher total costs, in excess of US$300 million.

Gaps and barriers: There are significant barriers to mobilizing large-scale planting, particularly with private sector investment, due to access to land and security of tenure for any developer, access to information for communities, future access to markets and costs of establishing a plantation. A more comprehensive assessment of challenges is presented in the National Reforestation Strategy 2020.

Box 3. Differential cost estimates for plantation development

The costs presented here are a conservative estimate of the investment needed for effective plantation development. Initial analysis of costs based on basic labor levels and equipment inputs for teak woodlots being established within ENB provide indicative figures of over US$1,424 per hectare for establishing and maintaining a woodlot over a 25-year period. Based on these figures, establishing and maintaining plantations at the scale proposed within PGPD would require investment of more than US$300 million, a figure close to 50 times higher.

Such costs can be offset by income from the sale of timber, with analysis indicating that a teak woodlot (as an example) would become cashflow-positive after nine years. However, this figure relies on all funds being provided without subsequent interest payments and then recouped in their entirety from initial revenue. Table 9 provides an alternative costing for activities with a significantly smaller area of plantation development, based on an average of 2,500 hectares being planted each year over the 10 year period. Additional elements needed within this estimate include the costs of land registration or securitization.

It is recognized that, while on small-scale woodlots, communities may provide additional labour to reduce direct cash costs, on larger plantations, private sector finance would be sought to deliver activities. Consideration of these costs, however, is important when considering what incentive framework to put in place to help mobilize both landholding community and private sector action.

Table 9. An alternative costing for activities with a significantly smaller area of plantation development

Activity	Indicative cost over 10 years (US$)
Developing plantation development business strategy	453,660
Raising awareness of landowning communities within target areas	808,920
Training program for lead farmers	4,836,640
Woodlot development	10,958,278
Commercial plantation development	16,437,417
Environmental plantings	5,479,139
Total costs	**38,974,054**

Notes: Based on an average of 2,500 hectares (1,000 hectares of woodlots, 1,500 hectares of commercial plantations and 500 hectares of environmental planting) being planted each year over the 10-year period. Indicative cost includes 5% inflation.

DA1.4. Establish enhanced policy environment for forest governance

Intervention logic: Establishing a clear process for reviewing policy and updating the intervention will allow the development of a clear approach to sustainable forest management with reduced impacts on natural forests. Due to the strong role of landholding communities and subnational governments in the forest sector, sufficient resources and time are required to ensure all groups are fully informed and engaged in the process.

Baseline: Policy dialogue linked to timber legality has been developed over the past five years linked to work on timber legality and development of the national forest inventory. A future scenarios assessment, undertaken in 2019–2020, also provides options for the future direction of the PNG forest sector.

This action area will also be supported by improvements in information management systems (DA1.1) and improved data on forests through enhanced monitoring information (EA1.4).

Targets: Draft forest policy by 2023; updated forest policy by 2025.

Potential impacts: Estimated ERs against 2015 levels of 600 $GgCO_2e$ per annum (1,669 $GgCO_2e$ cumulative) by 2025 and 1,199 $GgCO_2e$ per annum (6,465 GgCO2e cumulative) by 2030.

Key sub-actions:

DA1.4.1. Review existing production costs and benefits within production systems.

DA1.4.2. Policy dialogue on private sector engagement.

DA1.4.3. Review options for public, private, community partnerships in forestry, including harvesting and plantation development.

Estimated costs of implementation: US$2 million

Gaps and barriers: Creating a guiding policy framework for forest use across customary land; limited

availability of forest and forest regeneration data; the importance of timber revenue for central government and communities.

Priority support needs: Technical support for reviewing the existing value of the timber industry, future market trends and options for strengthened revenue generation.

DA1.5. Establish a transition package for 'old' timber concessions

Intervention logic: A high proportion of PNG's timber production comes from 'old' forms of timber concession: in 2020, timber from timber rights purchase (TRP – an 'old' form of permit) areas accounted for 47% of exports, while timber from forest management authorities (FMAs the permit type developed under the most recent significant reform of permitting) accounted for just 16%. Many of the existing timber rights purchase areas are either approaching or at the end of their initial 40-year permit period. While some have already been renewed / reactivated (when production had ceased but permit remained valid), there is an opportunity to transition away from timber production and support other forms of sustainable land use.

Developing a 'transitional package' for landholding communities could support them to move to updated permit conditions — for example, by making permit renewals conditional on forming an FMA — or transition to other land use management approaches, such as zoning plantation development areas, sustainable agriculture and conservation, allowing for a significant decrease in harvesting levels within natural forest areas.

Baseline: Limited assessment has been conducted on the current status and nature of 'expiring concessions'.

Targets: 40% decrease in area under 'old concession' types by 2025; 90% decrease by 2030.

Potential impacts: 1,799 $GgCO_2e$ per annum (5,007 GgCO2e cumulative) by 2025 and 3,597 $GgCO_2e$ per annum (19,396 $GgCO_2e$ cumulative) by 2030 It should be noted that delivering a 30% reduction in emissions levels from forest degradation due to commercial timber operations, which is in line with the proposed phase-out of old concession types, is estimated to deliver significantly higher levels of ER (in excess of 8,000 $GgCO_2e$ per annum by 2030). However, only 30% of ERs from degradation — including ERs linked to improved legality — are allocated to DA1.5; the remaining ERs are attributed to other areas due to the contribution that actions such as support to agriculture and land use planning will make to shifting land use practices.

Key sub-actions:

DA1.5.1. Review existing permits and expiry dates.

DA1.5.2. Field-based assessment of expiring permits to review timber stock, existing land uses and community needs.

DA1.5.3. Cross-sector and stakeholder engagement on 'transitional package'.

DA1.5.4. Develop pilot transitions within a number of concessions.

DA1.5.5. Develop structured model for transition.

Estimated costs of implementation: Yet to be estimated. This will build on elements of other action areas and as such, presenting figures may result in double counting of potential impacts.

Gaps and barriers: Limited information on status of concessions; high logistical costs of engaging in concession areas; existing commercial interests within concession areas; historical harvesting and royalty payment trends.

Priority support needs: Technical support for developing a transitional model; financial support for logistics of engaging in pilot areas; initial financing of transitional activities.

DA2 Environment and Conservation Pathway

The environment and conservation pathway focuses on a series of actions that address both enhanced application of environmental safeguards for land use change and increasing action to enhance areas under conservation.

It builds on actions identified within the National REDD+ Strategy, REDD+ Implementation Plan, the SDG13 Roadmap, the NDC Implementation Plan, the Protected Areas Policy, the Protected Areas Policy Implementation Plan (PAPIP), the Protected Areas Finance and Investment Plan, and the Protected Areas Institutional and Policy Review.

The intervention logic is twofold. Applying environmental safeguards will help strengthen the management of development projects (mainly in commercial agriculture and forestry, but with benefits to other areas). As such projects are the most significant drivers of land use emissions, strengthening the application of these safeguards will reduce the impacts of development on high-value forest areas. At the same time, increasing areas under conservation will help secure forest areas against poorly planned development actions that may go against the interests of the majority of the landholding community.

This section provides more information on the proposed action areas and is structured on the proposed key intervention areas and targets shown. Table 10 outlines the targets of these actions, which are also proposed for inclusion within CEPA's medium-term targets within PNG's development planning program. These are intended to form the basis for CEPA's Sector Mitigation Plan and can also support the integration of climate change planning into future planning documents, including MTDP 4.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP 3

KRA7.1. Promote PNG's environment sustainably, by placing areas under legal protection and through improved permitting

KRA7.2. Manage and reduce the risk of natural disasters, by maintaining ecosystem services.

SDGs

13. Climate action

15. Life on land

15.1 Conservation and rehabilitation of forest areas

15.2 Sustainable use of forest resources

SDG 13 Roadmap

25. Biodiversity integrated into productive landscapes

26 Climate resilient PA network

National REDD+ Strategy

2.3.2.3 Strengthening conservation and environmental management

CBD Aichi Targets

17% of terrestrial areas under conservation

Table 10. Environment pathway: summary of targets and estimated implementation costs

Target	Mid-term targets (by 2025 if not otherwise stated)	Long-term targets (by 2030 if not otherwise stated)	Means of verification	Estimated ERs per annum against 2015 ($GgCO_2e$)	Estimated costs of implementation (US$ millions)
DA2.1 Strengthen the application of environmental safeguards				2025: 680 per annum (1,192 cumulative) 2030: 1,361 per annum (7,354 cumulative)	17 to 2030
Environmental assessments, permits and management plans for land use projects are updated and publicly available	Documents for 50% of projects updated and publicly available	Documents for 100% of projects updated and publicly available	Plans available on environmental information system website and NFMS		5 to 2030
Subnational governments engaged in environmental monitoring and enforcement	3 subnational jurisdictions operating with designated authority on environmental monitoring and enforcement	6 subnational jurisdictions operating with designated authority on environmental monitoring and enforcement	MoUs with provincial governments Annual monitoring reports		12 to 2030
DA2.2 Enhance protected area development and management				2025: 1,034 per annum (2,974 cumulative) 2030: 2,069 per annum (11,249 cumulative)	18 by 2030 or 40 to 2030, and 20 per annum thereafter
Enhanced terrestrial PA coverage	An additional 3 million hectares of PAs are added to network against 2020 levels of which at least 30% is identified as at high risk of land use conversion.	An additional 6 million hectares of PAs are added to network against 2020 levels of which at least 30% is identified as at high risk of land use conversion.	Gazettal announcements for new PAs		
PA Effectiveness Enhanced	Reduction in levels of forest loss within PA by 30% against 2020 levels	Reduction in levels of forest loss within PA by 80% against 2020 levels	Forest loss assessments		
PAs sustainably financed	60% PAs included within subnational budgets	100% PAs included within subnational budgets	Sub-national budget reports		
	US$10 million mobilized per annum to support PA management	US$20 million mobilized per annum to support PA management	National budget and PA trust fund account		

Potential impacts

The proposed actions are estimated to be able to deliver 18,600 $GhgCO_2e$ in ERs against 2015 levels by 2030 while also:

- Placing over 6 million hectares of forest under protection, bringing PNG's terrestrial PA area to over 8 million hectares, this meeting its Aichi targets under the CBD
- Increasing protection for PNG's unique biodiversity, including the over 400 species identified on the IUCN's Red List
- Maintaining environmental services provision and access to non-timber forest resources
- Providing opportunities for enhanced tourism development linked to conservation areas.

Implementation costs and potential financing

The estimated cost of the proposed actions ranges from US$35 million to over US$55 million, as a result in the significant variation in proposed costs for PA development in the PA Policy Implementation Plan (US$18 million) and the more recent PA Finance and Investment Plan (which estimates $60m for expansion of areas and an additional annual operating budget of $75m[10]).

Within DA2.1, existing development partner finance provides the opportunity to establish baseline systems and data management approaches, as well as designating authority for key aspects of environmental management and regulatory enforcement to the subnational level (elements supported within the GEF7 FOLUR and EU GCCA Enga projects). However, further finance will be required to roll out these action areas beyond the three target provinces covered by these projects.

Within DA2.2, initial finance through the GEF6 PA finance project provides an opportunity to establish financing structures for PAs with additional support to on-the-ground designation of areas through other projects, such as the GEF7 FOLUR, EU GCCA Enga project, and USAID's Biodiversity Conservation in Madang and Bismarck Range Project).

Further consideration is needed on sustainable financing for PA systems and integrating action across sectors to support ongoing sustainable livelihoods within PAs. This, in turn, will help mobilize finance for sustainable timber production or agricultural development and integrate PAs with subnational land use and development planning and budgeting systems.

Priority areas of intervention and support

This section and the action matrices in Appendix A provide information on the significant number of actions needed to fully achieve the proposed targets. The roadmap development process identified the following priority actions based on their potential impact on emissions as well as their political, social and economic feasibility, co-benefit levels, and alignment with existing government priorities.

DA.2.1. Enhance Protected Area development and management

Establish an environmental management information system (DAs 2.1.1) to enable environmental permitting and management information to be publicly available and integrated with other systems, such as NFMS.

Support needs: Technical support to development of effective online platform, digitized form and digitized submission and approvals processes.

Pilot subnational monitoring and enforcement of environmental regulations (Actions DAs1.1.4 and 1.1.5), focused on testing an approach to designating authority for monitoring and enforcement actions to subnational government and other bodies, such as the National Forest Service.

Support needs: Technical support to ongoing development of remote monitoring and field levels; tools and finance to support early training and piloting.

DA2.2. Enhance PA development and management

Establish effective financing system for PAs (DAs 1.2.5): Given the existing financial shortfalls, an effective financial support system is crucial for developing all actions linked to the maintaining and expanding the PA network and must therefore be seen as the most significant short-term priority.

Support needs: To ensure the coordination of PA financing approach with broader climate action. Existing finance in place through GEF6 Sustainable Financing Project.

Strengthen engagement with subnational governments (DAs 1.2.1, 1.2.4 and 1.2.5): Effective engagement with subnational governments will be crucial for strengthening environmental enforcement actions (DA pathway 2.1) and supporting conservation action.

Support needs: To coordinate the development of training materials and roll-out of training linked to existing and new support projects.

Support to gazettement and full establishment of 10 PAs (DAs 1.2.1, 1.2.4 and 1.2.5): To date, 22 areas (Table 11) have received early support towards formal PA designation. However, as a result of the ending of donor support and other (predominantly financial) challenges, they have yet to gain formal designation. Continued support to these areas is critical to ensure that momentum does not decrease, and that the social and political capital gained and used (by CEPA and other actors at provincial and local levels) in the initial efforts is not lost.

Support needs: Targeted support to gazettement and initial operation of target areas in the short to medium term, while longer-term sustainable financing systems are established.

Critical linkages

Due to the unique nature of land ownership in PNG, the high proportion of the population living on rural land areas and relying on them for their livelihoods, and the importance of viewing landscapes as part of an integrated system, approaches to PA development and broader environmental management must form

10. GoPNG (2021) Protected Area Finance and Investment Plan. Available at http://pngbiodiversity.org/

part of an integrated land use approach. It is thus proposed that action within these areas focus within specific geographical locations and link in particular with efforts noted in DA1.5 to create a transitional package of interventions that can be targeted at existing and former timber concession areas. This would provide effective support to ensure conservation of key remaining habitats within these landscapes and develop an effective model for integrated landscape-level engagement.

DA2.1 Strengthen the application of environmental safeguards

Intervention logic: Although PNG has a strong framework of environmental safeguards, there is little detailed guidance on their application and limited monitoring and enforcement capacity. This has resulted in gaps in their application and, in some places, significant environmental impacts, including forest degradation and loss. Strengthening the application of these safeguards — through improved guidance on their use, better management of information on their application, which will also help other agencies implement their own regulations, and increased monitoring and enforcement capacity — will help reduce environmental degradation levels, particularly when linked to poorly planned and implemented forestry or agricultural projects that are driving land use change.

Baseline: PNG's Environment Act provides a strong basis for environmental management. Base data management systems have been established and work is underway to develop remote monitoring and reporting tools, such as a remote deforestation tool and ground-level environmental impact monitoring apps. A number of these initiatives are also receiving additional support from development partners.

Targets: 50% of environmental assessments, permits and management plans for land use projects are updated and publicly by 2025 and 100% by 2030, with plans made available on an environmental information system website and NFMS; three subnational jurisdictions operating with designated authority on environmental monitoring and enforcement by 2025, and six by 2030, with MoUs in place with provincial governments and annual monitoring reports.

Potential impacts and links with NDC Targets: 680 $GgCO_2e$ per annum (1,192 $GgCO_2e$ cumulative) by 2025; 1,361 $GgCO_2e$ per annum (7,354 $GgCO_2e$ cumulative) by 2030, based on 7.5% of ERs generated by reducing deforestation from shifting agriculture, 10% of ERs generated by reducing levels of deforestation from commercial agriculture, and 10% of ERs from reduced commercial logging levels.

Key sub-actions:

DA2.1.2. Enhance awareness of environmental regulations.

DA2.1.2. Review existing legislation and guidance.

DA2.1.3. Establish an environmental management information system.

DA2.1.4. Develop and operationalize remote monitoring and reporting tools, including a remote deforestation alert system in partnership with PNGFA and CCDA and an environmental infringement reporting app.

DA2.1.5. Enhance capacity of subnational governments and other stakeholders to monitor and report against environmental regulations.

Estimated costs of implementation: US$17 million to 2030.

Gaps and barriers: Complex process for updating of environmental permit information, existing IT capacity and finance, limited capacity at subnational level, need for updated institutional arrangements to allow for monitoring and reporting at subnational level.

Priority actions and support needs: Integrating the environmental permitting information into publicly available and accessible formats that link with other LUISs, such as NFMS; designating authority to subnational government (technical support and facilitation); and piloting an environmental infringement app.

DA2.2 Enhance protected area development and management

Intervention logic: PNG has a strong culture of community-level forest management and conservation and a significant network of PAs. However, as a result of gaps in support to and management of existing PAs and support to areas seeking protection, deforestation and degradation has continued in some areas, while areas that are yet to be legally recognized have experienced enhanced levels of threat of conversion. By ensuring the development of an effective PA network that recognizes communities' rights to use land and supports sustainable livelihoods while protecting against large-scale land use conversion, PNG will be able to maintain high-value forest areas that are currently at risk of conversion.

Links with existing policy documents: This approach is in line with PNG's PA policy and its commitments under the CBD to progress towards 17% of terrestrial areas under conservation.

Baseline: PNG has 56 terrestrial PAs covering 2.14 million hectares of land, and although many are supported by community action and customary commitments to conservation, NGO action, development partner support, and private sector action, most are almost totally unfinanced and receive little direct support from central government. The government has, however, approved a new PA policy in 2015, presented a PA Bill

to the National Executive Committee and developed the PAPIP to support PA implementation. Several development partner projects have also offered support, including intended to support the PA network. CEPA has identified 6 million hectares of additional PAs, which would take PNG slightly ahead of the Aichi targets of 17% of terrestrial area under conservation.

Targets:
All targets link with those in:

- NDC Implementation Plan - Promoting biodiversity & watershed conservation (including reestablishment of wildlife and PAs)
- Protected Areas Policy (2015)

Enhanced terrestrial PA coverage

- An additional 3 million hectares of PAs are added to network against 2020 levels of which at least 30% is identified as at high risk of land use conversion by 2025
- An additional 6 million hectares of PAs are added to network against 2020 levels of which at least 30% is identified as at high risk of land use conversion by 2030

They will be verified through Gazettal announcements for new PAs

Enhanced PA effectiveness

- Reduction in levels of forest loss within PA by 30% against 2020 levels by 2025
- Reduction in levels of forest loss within PA by 80% against 2020 levels by 2030

Verified through a forest loss assessment

Sustainably financed Pas

- 60% Pas included within subnational budgets by 2025
- US$10 million mobilized per annum to support PA management by 20250
- 100% of PAs included within subnational budgets by 2025
- US$20 million mobilized per annum to support PA management by 2030

Verified by sub-national budget reports and national budget and PA trust fund account

Potential impacts: Estimated ERs against 2015 levels of 1,034 $GgCO_2e$ per annum (2,974 $GgCO_2e$ cumulative) by 2025 and 2,069 $GgCO_2e$ per annum (11,249 $GgCO_2e$ cumulative) by 2030, based on attributing 10% of ERs generated by reducing deforestation from shifting agriculture, 5% of ERs generated by reducing levels of deforestation from commercial agriculture, 10% of ERs from reduced commercial logging levels and 4% of ERs from reduced levels of other degradation.

This overall ER level is also in line with the estimated 5,000–10,000 $GgCO_2e$ over 10 years in PNG's Protected Areas Finance and Investment Plan,[11] which uses average rates of forest loss for provinces containing target PAs and assumes that each PA would reduce forest loss by 10% within its boundary.

Key sub-actions
The actions outlined here have been adapted from the PAPIP, where they are referred to as objectives. They also build on work conducted with CEPA on PA financing and an institutional and policy review undertaken to see what was needed to strengthen PA development – the results of these are summarized in Box 4 and 5 below as well as Appendix C.

DA2.2.1. PA governance and management: Actions focus on strengthening the legal and institutional framework for PA management at two levels — at national level, by developing legislation, regulations and operating procedures and establishing a registry of areas, and at subnational level,[12] by training actors (particularly customary landowning groups), ensuring subnational policies, laws and regulations are in line with national legislation, integrating PAs into provincial development plans, and ensuring that 10% of priority conservation areas are integrated and aligned with resource sector conservation planning by 2025.

DA2.2.2. Sustainable livelihoods for communities: Actions focus on ensuring that sacred sites are effectively protected and sustainable livelihood options in PAs are supported, including through capacity building for small enterprises, as well as supporting the development of benefit sharing agreements with communities as part of PA management.

DA2.2.3. Effective and adaptive biodiversity management: Actions focus on strengthening monitoring and management capacity in all PAs, including by developing species and land use management plans for target areas and guidance documents for PA management, clearly identifying resource requirements for PAs, building CEPA capacity, strengthening PA management in provincial, district and local-level governments, recruiting and training wildlife rangers, and establishing information systems linked to the central PA registry. Other actions include establishing a management advisory group and PA network board, developing business plans for PA management, and creating 10 to 25 zones and PAs in five locations, guided by management planning guidelines by 2025.

DA2.2.4. Managing the PA network: Actions focus on developing, enhancing and managing a PA network that

11. GoPNG (2021) Protected Area Finance and Investment Plan. Available at http://pngbiodiversity.org/

12. Initial work is proposed to focus on eight pilot provinces (Central, Northern, East and West Sepik, East and West New Britain, Morobe and Madang), with additional sites specified under GEF6.

is relevant to the local communities and landscape, protects the diversity of life and forms a well-connected and resilient system. This includes reclassifying old PAs into new legislation, training community representatives, establishing networks of community conservation areas (CCAs), supporting regional trainings for CCA representatives, and strengthening the assessment of target areas for conservation and management and a system for identifying and managing areas.

DA2.2.5. Sustainable and equitable financing for PAs: Actions focus on establishing a PA management financing framework, which includes integrating PAs within national and subnational budgets and establishing a biodiversity and climate trust fund that can access finance from multiple sources, increasing access to finance through small grants by 20%. This action area also supports alternative livelihoods for landowning communities, by raising awareness of opportunities, identifying priority livelihood actions, and providing training to communities on those actions in an indicative 120 pilot areas. It also notes the need to support community projects (again, in 120 pilot areas) and communities to strengthen self-reliance.

Box 4. Recommendations from the Protected Areas Institutional and Context Review

The institutional and context review, conducted to consider the steps required to help strengthen implementation of PNG's PA network, identified the following 10 recommendations:

1. Role and functions of CEPA is clearly promoted to stakeholders
   Action 1.1. CEPA initiate interagency working groups to support action on PAs
2. Provincial-level budgets to be allocated to PA management and planning, supporting provincial-level climate change and environment departments
   Action 2.1. Establish provincial PA roundtables
   Action 2.2. Formalize the signing of an MoU with partners (particularly provincial governments)
3. CEPA to provide advisory support to provincial government and communities and reward them for protecting the environment
   Action 3.1. CEPA to provide advisory support or training to provincial governments and communities
4. Legal support
   Action 4.1 CEPA to collaborate with legal experts, firms and agencies to support provinces and local communities
5. PA law enforcement
   Action 5.1. Promote enforcement and monitoring of PAs and train rangers through a national ranger program
6. Monitoring and reporting obligations of the PA conducted effectively
   Action 6.1. CEPA officers and communities are trained to monitor and report on PAs across the country
7. Determination of conservation-compatible economic options
   Action 7.1. A list of conservation compatible economic options and minimum conservation standards for PA sites must be developed to demonstrate how the actions are supporting biodiversity conservation and sustainable rural development
8. Partnership and collaboration
   Action: Sign MoU with partner organizations for collaborative work
9. Key priorities to improve conservation outcomes
   Action: Establish an intergovernmental group to address policies, legal and conservation issues, focused on strengthening PNG's environmental and conservation legislation to support PA operation
10. PA management support from environmental NGOs
    Action: Government to recognize and support conservation NGOs' work to achieve better conservation outcomes, by supporting closer links with CEPA and developing formats for planning and reporting that help NGOs link more closely with CEPA's work

For more detail on these recommendations, see Appendix C.

Source: Protected Areas Institutional and Context Review,

Estimated costs of implementation: Estimated costs vary significantly. CEPA's Protected Areas Implementation Plan indicates an overall cost (which does not include specific hectares under conservation targets) of US$18 million by 2030. However, more recent assessments, part of the work to establish a sustainable financing system for PNG's PAs, estimated significantly higher costs, requiring approximately US$40 million more to achieve targets by 2030, with annual running costs of US$20 million.

Box 5. PA development costs, financing options and pre-feasibility assessments
Source GoPNG (2021) Protected Area Finance and Investment Plan. Available at http://pngbiodiversity.org/

A review of PA financing to update existing estimates of the baseline costs of maintaining and expanding PNG's PA network provided the following concluded that:

- Total available financing for the current PA system from all funding sources is estimated at US$3.3 million
- To meet funding requirements, an additional US$9 million is needed annually (Scenario 1)
- To achieve 50% of its commitments under Aichi Target 11 (17% terrestrial ecosystems conservation, 10% marine ecosystems conservation), PNG requires US$35 million annually (Scenario 2)
- To achieve 100% of the target, PNG requires US$75 million annually (Scenario 3)
- The relative per hectare costs of US$2.8 for Scenario 2 and US$2.9 for Scenario 3 are well within international cost ranges

From this, the analysis draws two key conclusions:

- No single finance solution will satisfy the funding gap; rather, a portfolio or range of solutions are required.
- Large, national-level solutions are required. The current site-based financing approach will not satisfy the funding gap.

The review recommends the following seven options for financing:

1) Earmarking revenues from taxes, fees and royalties in the PNG extractive industries: increasing royalty rates (0.5%) or levies (1%) could raise US$23–27 million per annum for PA management costs.
2) Promoting commodities through project-based REDD+: this option could deliver US$2.7–15.5 million in revenue, depending on future market rates for carbon.
3) Biodiversity-offsets: the conservative funding potential of these is US$0.5–5 million per year.
4) Debt-for-nature swaps
5) Payments for ecosystem services
6) Third-party PA management
7) Tax-exemption on donations

The review also proposes that further analysis be conducted in 2021/2.

Gaps and barriers: Establishing effective sustainable financing systems for PAs, establishing clear land tenure and management arrangements, integrating areas into subnational and sector plans to avoid conflicts in proposed land use.

Priority action areas and support needs:

Establish an effective PA financing system (DA 1.2.5): Given the existing financial shortfalls, an effective financial support system is critical to developing all actions linked to maintaining and expanding the PA network and must therefore be considered the most significant short-term priority. Priority actions include:

Support needs: To ensure coordination of PA financing approach with the country's broader climate action approach. Existing finance in place through GEF6 Sustainable Financing Project.

Strengthen engagement with subnational governments (DAs 1.2.1, 1.2.4 and 1.2.5): Effective engagement with subnational governments will be crucial for both strengthening environmental enforcement actions (DA2.1) and supporting conservation action. Priority actions include:

- Establishing or renewing MoUs in provinces and districts where CEPA will have capacity to provide support in the coming years, based on existing or planned budgets and development partner support programs
- Developing targeted training and capacity-building systems for subnational officers and communities
- Supporting national-level links with other projects and programs to help target resources within and around conservation landscapes.

Support needs: To coordinate development of training materials and roll out of training linked to existing and new support projects.

Support to gazettement and full establishment of 22 PAs (DAs 1.2.1, 1.2.4 and 1.2.5): To date, 22 areas have received early support towards formal PA designation (Table 11). However, as a result of ending donor support and other (predominantly financial) challenges, they have yet to gain formal designation. Continued support to these areas is critical to ensure that momentum does not decrease and that social and political capital gained and used (by CEPA and other actors at the provincial and local level) in initial efforts is also not lost. Priority actions include:

- Setting a schedule for gazettement of target areas in consultation with key stakeholders and ensuring information and steps are clearly communicated to communities, other government bodies and development partners to support momentum and catalyze financial support
- Providing training to and building capacity of stakeholders in target areas.

Support needs: Targeted support to gazettement and initial operation of target areas in the short to medium term, while longer-term sustainable financing systems are established.

Table 11. Proposed Protected Areas

Year of designation	Sites for PA designation	Province	Area (hectares)	Cumulative area total
2022	Nakanai Range Site: Sulei (Toimtop) at Pomio District	East New Britain	2,480	
	Kaijende Highlands	Enga	120,000	
	Headwaters of Strickland	Hela	200,000	
	Annual total		**322,480**	**322,480**
2023	Torricelli Mountains at Aitape-Lumi District, Tenkile	West Sepik	185,000	
	Owen Stanley Range, Brown River Catchment & Kokoda Track Region	Central & Northern	238,000	
	Nakanai Range Sites, including Tavolo Extension	East & West New Britain	17,400	
	Lake Lamo Auru - Hargy	East & West New Britain	1,860	
	Ainbul	East & West New Britain	25,590	
	Kuk World Heritage Site	Western Highlands	196	
	Annual total		**468,046**	**790,526**
2024	Huon Terraces at Finshafen and Tewai-Siassi Districts	Morobe	49,877	
	Nakanai Range Sites, ARM	East & West New Britain	53,495	
	Muruk & Manginun	East & West New Britain	50	
	Wanang	Madang	10,770	
	Tonda Wildlife Management Area (WMA) Extension	Western	500,000	
	Annual total		**614,192**	**1,404,718**
2025	Lakekamu	Morobe, Gulf & Central	165,000	
	Upper Sepik Wetlands	East Sepik	2,440,000	
	Karamui	Simbu	14,000	
	Nakanai Range Sites	East & West New Britain	454,523	
	Annual total		**3,073,523**	**4,478,241**
2026	Collinwood Bay	Northern	80,000	
	Volotige WMA	Eastern Province	6,073	
	Hindenberg Wall	Western	41,585	
	Kikori River Basin WHS	Southern Highlands & Gulf	2,000,000	
	Annual total		**2,127,658**	**6,605,899**

DA3 Lands Pathway Matrix

The lands pathway action matrix is based on actions identified within the National REDD+ Strategy, REDD+ Implementation Plan, SDG13 Roadmap, and NDC Implementation Plan. It also builds on recent policy developments in the draft National Sustainable Land Use Policy and actions under the Land Mobilization Program.

The approach is based on the intervention logic that rapid land use change has been able to proceed partially due to the lack of subnational LUPs to help guide land use decision making. As result, a minority of individuals often make land use decisions, and wider communities are excluded from the process. Enhancing engagement with and the establishment of a framework of sustainable land use planning will help engage more stakeholders in decisions on how land is used, ensure better understanding and protection of areas that are needed for long-term sustainable outcomes, and reduce poorly designed high impact projects.

This section outlines action areas for this pathway, which are summarized in Table 12.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP3

KRA1 – Increased revenue and wealth creation, by improving mobilization of land into commercial use

SDGs

1. **End poverty in all its forms, by avoiding the displacement of communities from their land**

National REDD+ Strategy

2.1.1 Strengthened land use and development planning

Table 12. Lands pathway: summary of targets and estimated implementation costs

Areas and indicators	Mid-term targets (by 2025 if not otherwise stated)	Long-term targets (by 2030 if not otherwise stated)	Means of verification	Estimated ERs per annum against 2015 ($GgCO_2e$)	Estimated implementation costs (US$ millions)
DA3.1. Establish national sustainable land use planning framework				2025: 338 per annum (989 cumulative) 2030: 677 per annum (3,697 cumulative)	1.1
Guiding policy and regulatory framework for sustainable land use planning in place	NSLUP approved by NEC by 2022 2 regulations supporting implementation developed by 2023 Draft National LUP developed by 2025	Updated NSLUP and regulations approved by NEC Full national LUP in place	NEC decisions Draft NSLUP Updates to be provided through AFOLU STWC until other structures established (see enabling environment)		
DA3.2. Establish national sustainable land use planning information system				2025: 397 per annum (1,166 cumulative) 2030: 795 per annum (4,344 cumulative)	3.1
Establishment of a fully operational LUIS	Central LUIS in place by 2025 System integrated with systems at provincial level in four provinces by 2025 System with interim links with other sector systems	System fully operational with fully linked with other sector systems by 2030 System operational within all provinces	Updates to be provided through AFOLU STWC until other structures established (see enabling environment) Draft National Sustainable Land Use Policy		
DA3.3. Develop spatially explicit subnational development plans				2025: 878 per annum (2,511 cumulative) 2030: 1,753 per annum (9,562 cumulative)	20
Spatially explicit plans in place at provincial level	Spatially explicit LUPs in place for 5 provinces by 2025	Spatially explicit LUPs in pace for all provinces 2030	Updates to be provided through AFOLU STWC until other structures established (see enabling environment)		

Potential impacts

The proposed pathway is estimated to be able to deliver over 17,600 GgCO2e in ERs against 2015 levels by 2030.

Implementation costs and potential financing

The estimated cost of the proposed actions is close to US$25 million, with the most significant costs linked to the subnational roll-out of planning actions.

Initial development partner finance is planned to support the establishment of national systems (DA3.1) (through GEF7 FOLUR and the EU GCCA Enga Project). A number of other projects are also focused on supporting sustainable land use planning and actions at the subnational level.

It will be critical to ensure that DLPP can coordinate and centralize the approach implemented by these projects to ensure that finance is directed to developing and rolling out a coherent approach to land use planning.

Priority actions

Across these areas, several key priority areas have been identified for action, including:

DA3.1.1. Establish a central coordination system for sustainable land use planning that works to bring together existing support linked to land use planning: At least four significant development partner projects include support to sustainable land use planning at national and subnational levels (Table 2). Effective coordination of these projects provides the opportunity to deliver significant progress. However, without coordination, there is a risk that disparate approaches to land use planning are developed across the country.

Support needs: Effective engagement of development partners by DLPP and provincial governments; organizing joint working meetings to identify a structured and coordinated approach to LUP development.

DA3.3.1. Review how to integrate land use planning into subnational development planning: The NSLUP provides a key document and policy direction towards sustainable land use planning. However, this will need to be implemented at the local level; and for plans to be fully effective, it should also be integrated into the development planning process. As such, there is a need to identify practical and immediate steps towards integrating the NSLUP approach and subnational development planning process.

Support needs: Finance for early scoping work on how to integrate proposed approaches within NSLUP into subnational planning activities.

Critical linkages

Due to the unique nature of land ownership in PNG, the high proportion of population living in rural land areas and relying on them for their livelihoods, and the importance of viewing landscapes as part of an integrated system, it is crucial that approaches to land use planning also be linked with other actions. These include support for agriculture, for transitioning old concessions, and conservation actions so that early efforts on land use zoning can be linked with resources to fulfil plans.

DA3.1 Establish a national sustainable land use planning framework

Intervention logic: Limited coordination and weaknesses in land use decision making systems have led to rapid and unsustainable levels of land use change in parts of PNG. Establishing a national framework that will enhance transparency and help provide additional guidance, checks and balances on land use change will not only help address these limitations but also strengthen the role of landholding communities in land use decision making. This will help guide investors and decision makers on where best to support development actions.

Baseline: A draft National Sustainable Land Use Policy has been developed and undergone broad consultation. Current legislation requires the need for national and subnational LUPs.

Targets: NSLUP approved by NEC by 2022; two regulations supporting implementation developed by 2023; draft National LUP developed by 2025.

Potential impacts: Estimated ERs against 2015 levels of 338 $GgCO_2e$ per annum (989 $GgCO_2e$ cumulative) by 2025 and 677 $GgCO_2e$ per annum (3,697 $GgCO_2e$ cumulative) by 2030, based on attributing 7.5% of ERs generated by reducing deforestation from shifting agriculture, 5% of ERs generated by reducing levels of deforestation from commercial agriculture, 2% of ERs from reducing commercial logging levels, and 10% of ERs from reducing levels of other degradation.

Key sub-actions:

DA3.1.1. Final NSLUP review and approval

DA3.1.2. Awareness raising on NSLUP

DA3.1.3. Establish a sustainable land use plan (SLUP) coordination system

DA3.1.4. Develop NSLUP implementation plan

DA3.1.5. Review existing LUPs and information

DA3.1.6. Establish legal requirements for NSLUP implementation

DA3.1.7. Develop regulations to support SLUP

Estimated costs of implementation: US$1.1 million based on estimated needs for consultation and technical support on plan policy and regulation development.

Gaps and barriers: Complex environment with highly politicized discussion on lands; different land use planning for different sectors; conflicting and competing

land uses; limited coordination or coordination mechanism; limited availability of information on different land use planning activities; funding to support further NSLUP development and review; supporting legal and institutional framework.

Priority support needs: To establish coordination system for existing projects and programs to ensure that central vision and approach to SLUP is mainstreamed across projects.

DA3.2 Establish a national sustainable land use planning information system

Intervention logic: Limited coordination and weaknesses in land use decision making systems have led to rapid and unsustainable levels of land use change in parts of PNG. Establishing an effective land use planning information system will help increase transparency in the planning process, enable improved access to information, and support coordination across key stakeholders.

Baseline: DLPP have several baseline information management systems, but these are not well integrated and some lack a spatial visualization component. Several sectors have their own land use planning and mapping systems, such as the Minerals Resource Authority's mining cadastre portal (http://portal.mra.gov.pg/Map/), which provide information on mining concessions, the CEPA's plans to develop a spatial map of conservation areas, and the PNGFA's National Forest Monitoring Portal (http://png-nfms.org/portal/), which provides spatial information on different concession types.

Targets: National land use information system (NLUIS) action plan in place by 2022; prototype NLUIS operational by 2023; fully operational NLUIS by 2025.

Potential impacts: Estimated ERs against 2015 levels of 397 $GgCO_2e$ per annum (1,166 $GgCO_2e$ cumulative) by 2025 and 795 GgCO2e per annum (4,344 $GgCO_2e$ cumulative) by 2030, based on attributing 7.5% of ERs generated by reducing deforestation from shifting agriculture, 5% of ERs generated by reducing levels of deforestation from commercial agriculture, 2% of ERs from reducing commercial logging levels and 20% of ERs from reducing levels of other degradation.

Key sub-actions:

DA3.2.1. Establish data sharing agreements and protocols across agencies

DA3.2.2. Develop NLUIS design

DA3.2.3. Develop NLUIS and capacity building on use

DA3.2.4. Pilot system

Estimated costs of implementation: US$3.1 million for technical support, equipment purchases and training.

Gaps and barriers: Complex environment with highly politicized discussion on lands; land use planning for different sectors managed through different systems; low levels of data availability and sharing; high internet and communication costs; low levels of human and technical capacity.

Priority support needs: Technical support for holistic design of country-appropriate system.

DA3.3 Develop spatially explicit subnational development plans

Intervention logic: Limited coordination and weaknesses in land use decision making systems have led to rapid and unsustainable levels of land use change in parts of PNG. Establishing LUPs at subnational level will provide the basis for national planning and create locally owned and understood plans that will help manage land use change.

Baseline: A considerable number of local-level LUPs have been developed through development partner projects and with NGO support, but many have been neither integrated into government planning systems nor linked in scale to government jurisdictions. Three existing projects and one planned project focus on increasing the scale and operation of land use planning actions.

Targets: 4 provincial plans, 6 district and 10 ward plans in place by 2025; draft regulation for subnational development planning in place by 2022.

Potential impacts: Estimated ERs against 2015 levels of 397 $GgCO_2e$ per annum (1,166 $GgCO_2e$ cumulative) and 795 GgCO2e per annum (4,344 $GgCO_2e$ cumulative) by 2030, based on attributing 20% of ERs generated by reducing deforestation from shifting agriculture, 10% of ERs generated by reducing levels of deforestation from commercial agriculture, 6% of ERs from reducing commercial logging levels, and 20% of ERs from reducing levels of other degradation.

Key sub-actions:

DA3.3.1. Review existing subnational plans and planning process, including how to integrate them with the development planning framework

DA3.3.2. Develop guidance and training materials for subnational planning

DA3.3.3. Train subnational planning groups

DA3.3.4. Establish provincial physical planning offices

Estimated costs of implementation: US$20 million over 10 years for rolling out plans across all PNG,

with US$200,000 per district for training and initial plan development. Funding for plans in a number of districts in New Britain and Enga as well as Eastern and Western Highlands already planned through GEF and EU support.

Gaps and barriers: Complex environment with highly politicized discussion on lands; land use planning for different sectors managed through different systems; low levels of data availability and sharing; high internet and communication costs; low levels of human and technical capacity.

Priority support needs: Technical support for developing a subnational approach; support for coordinating existing development partner initiatives working on subnational land use planning.

DA4. Agriculture pathway matrix

The agriculture pathway action matrix is based on actions identified within the National REDD+ Strategy, REDD+ Implementation Plan, SDG13 Roadmap and NDC Implementation Plan. It also seeks to align with upcoming developments in agricultural policy, strategy and legislation.

Conversion of agriculture represents the principal driver of emissions from forest loss, representing over 85% as in PNG's FRL reporting, split across family (55%) and commercial (30%) agriculture in 2015.

The intervention logic for engaging with family agriculture is based on the very low productivity, diversity and commercialization levels in many family production systems. Interventions are therefore targeted at improving agricultural methods through enhanced access to, and quality of, agricultural extension services increase the productivity and resilience of family farming systems per hectare. As well as helping to address losses in soil nutrients and productivity, these improvements will help reduce pressure for expanding production areas or using expansive rotational systems. The approach, which is primarily targeted around rapidly growing small and medium settlement areas, is linked to additional land use planning and zoning support to ensure that agriculture areas are well situated and that improved income per hectare does not result in rapidly increasing production areas.

The intervention logic for engaging with commercial agriculture is that securing enhanced access to high-value and sustainably focused markets will enable PNG to secure long-term market access and higher prices, enhance levels of sustainability in the production system, and increase resilience to environmental shocks. Targets are focused on the coffee, cocoa and oil palm sectors due to their dominance in terms of communities engaged, levels of export and potential future impacts on land use change.

The production systems and levels of market access and investment in the oil palm sector are different from those in the coffee and cocoa sectors. PNG's oil palm production is primarily sustainable, with access to high-value markets. This approach should be further strengthened and integrated into national policies, strategies and regulations, even with expansion of production. Production in the coffee and cocoa sectors, on the other hand, is based on low-impact processes that are vulnerable to environmental shocks, have limited access to high-value markets and are vulnerable to both rapid efforts towards unsustainable expansion and conversion to other crops. As such, interventions are targeted at supporting enhanced access to high-value markets through a combination of policy support and enhanced extension services. Table 13 summarizes the key action areas within these approaches.

National and Global Linkages

The proposed pathway is fully integrated with the following domestic and international policy targets:

MTDP3

KRA1 – IIncrease wealth creation, by increasing the value of exports of all commodities, creating more employment, reducing imports, and promoting small and medium-sized enterprise development and direct investments

KRA7.2 – Manage and reduce the risk of natural disasters

SDGs

8. Sustainable and inclusive economic development
13. Action on climate change
15. Zero hunger

SDG 13 Roadmap

18. Climate-resilient agribusiness supply chains
19. Climate-compatible sustainable palm oil sector
20. Establish national sectors for carbon farming and climate-smart agriculture
22. Targeted extension and support services

National REDD+ Strategy

2.3.3.1. Development of a sustainable commercial agriculture sector

Box 6. Benefits of sustainable investment in agriculture

Over 80% of PNG's population is engaged in agriculture, mostly through small-scale family and commercial systems. However, limited investment in the sector has resulted in low levels of productivity improvements in planting stock. As such, production techniques could deliver significant increases in production and opportunities to access premium markets.

Cocoa: Smallholder yields are as low as 10% of potential; improvements raising 50% of PNG's production areas would deliver an addition 200 kiloton of cocoa per annum.

Coffee: Smallholder yields are 50% the of global average; improvements raising 50% of PNG's production areas to global average would deliver 34 kilotons of coffee per annum.

Oil Palm: With smallholder yields in many areas below potential, the initial assessment of the potential impacts of support to 20,000 smallholder plots could:

- Increase income for smallholders by US$4,500 per household per annum, due to increases in yield from 15 to 26 tons of fresh fruit bunch per hectare;
- Increase income from mills by US$10 million per annum; and
- Avoid over 10 metric tons (mt)CO_2e in emissions due by avoid deforestation of forest areas to meet production increase levels.

Opportunities also exist for revitalizing PNG's coconut industry, but this assessment has not had the opportunity to develop these in depth.

Note: For oil palm, figures for economic income are taken at year 15 after replanted trees have matured while ERs is calculated over the full 15 year period.

Table 13. Agriculture pathway summary of targets and estimated implementation costs

Areas and indicators	Mid-term targets (by 2025 if not otherwise stated)	Long-term targets (by 2030 if not otherwise stated)	Means of verification	Estimated ERs per annum against 2015 ($GgCO_2e$)	Estimated costs of implementation (US$ millions)	Existing support
DA4.1 Strengthen the agricultural planning and policy framework and its application				2025: 40 per annum (121 cumulative) 2030: 81 per annum (445 cumulative)	1	PHARMA PACD MVF GEF7 FOLUR
Enhanced policy and legislative framework	Climate-Smart National Agricultural Development Policy by 2023 Passage of updated agriculture sector legislation by 2025		NEC decisions Updates to be provided through AFOLU STWC until other structures established (see enabling environment)			
DA4.2. Strengthen access to and quality of extension systems				2025: 1,114 per annum (3,291 cumulative) 2030: 2,229 per annum (12,206 cumulative)	32	PHARMA PACD GEF7 FOLUR
Establishment of effective extension development and financing system	Framework for extension financing agreed and in place	Full financing in place for extension	NEC decisions on financing framework Updates to be provided through AFOLU STWC			
Number of LLGs with trained agricultural extension officers in place	30% increase in number of extension officers	296 agriculture extension officers operating in all (296) LLG in the country	Updates to be provided through AFOLU STWC			
DA4.3. Strengthen the framework for sustainable palm oil development				2025: 459 per annum (1,352 cumulative) 2030: 919 per annum (5,027 cumulative)	90	GEF7 FOLUR
Policy framework in place and changed in percentage of sustainably certified exports	Palm oil action plan agreed by 2022 Palm Oil policy by 2023 90% of palm oil exports sustainably certified	90% of palm oil exports sustainably certified.	Updates to be provided through AFOLU STWC NEC decisions on policy Export data			
DA4.4. Strengthen the framework for sustainable cocoa development				2025: 193 per annum (552 cumulative) 2030: 385 per annum (2,093 cumulative)	90	PHARMA PACD GEF7 FOLUR
Policy framework in place and changed in percentage of sustainably certified exports	Cocoa action plan agreed by 2022 Cocoa policy by 2023 30% of cocoa exports sustainably certified	60% of cocoa exports sustainably certified	Updates to be provided through AFOLU STWC NEC decisions on policy Export data			
DA4.5. Strengthen the framework for sustainable coffee development				2025: 193 per annum (552 cumulative) 2030: 385 per annum (2,093 cumulative)	90	PHARMA PACD GEF7 FOLUR
Policy framework in place and	Coffee action plan agreed by 2022	60% of coffee exports	Updates to be provided			
changed in percentage of sustainably certified exports	Coffee policy by 2023 30% of coffee exports sustainably certified	sustainably certified	through AFOLU STWC NEC decisions on policy Export data			

Potential impacts

It is estimated that the proposed actions would deliver avoided emission of 21,875 $GgCO_2e$ over 10 years against 2015 levels. It would also help to support improvements in food security, improvements in revenue from agricultural production, including enhanced value per unit (Boxes 6 and 7), and enhanced productivity per unit area.

Implementation costs and potential financing

It is estimated that delivery of the proposed actions will cost more than US$300 million over the coming decade, with the majority of this investment coming in upfront costs linked to helping small-scale farmers enhance productivity and quality of production.

It is anticipated that many of these costs can be linked to enhanced private sector investment within the cocoa, coffee and oil palm sectors with support for improved production systems within these areas also being linked with stronger support for diversified farming practices that help enhance food security. Investment is also anticipated to deliver broader economic and social gains, with enhanced value and quality of production systems delivering more jobs and better income for farmers and having downstream impacts on the economy (Boxes 5 and 6).

Significant existing finance is available through key development partner projects (an indicative estimate of US$40 million per annum, based on current project commitments with higher values when including cross-cutting projects such as GEF7 FOLUR (Table 2) that have the potential to support action throughout the value chain and work on the enabling environment from policy to infrastructure.

Strong government coordination and integration of these programs is essential to ensure coherent policy responses.

Priority actions

Across these areas, a number of key priority areas have been identified for action, including:

Importance of development partner coordination

Several development partner projects are operational or planned for operation within the coming months or year that have linked objectives around supporting an enabling environment for key agri-commodities. It is essential that development partners work with the GoPNG to bring these projects and resources together to help establish a coherent policy approach, avoid duplicating efforts and engage with key stakeholders.

DA4.2.3. Develop an approach to effective financing of extension systems: There is a significant shortfall in available finance for extension systems and challenges in the way that private sector groups can effectively engage in providing extension support. Work to identify how best to finance support delivery will help to provide opportunities for scaling up financing and developing public-private partnerships to provide them.

Support needs: To facilitate and input into the review of existing approaches (with partial finance already programed through GEF7 FOLUR program)

DA4.3.1, 4.4.1, 4.5.1 Develop action plans for palm oil, cocoa and coffee: Establishing shared visions within each of the key commodities on the actions need for a climate-smart and sustainable development pathway will be crucial for helping to mobilize investment in the sector and ensure long-term sustainability and profitability. Working through commodity-based platforms or working groups to develop clear and agreed action plans will provide the basis for future planning and growth.

Support needs: Finance and technical support to coordinate stakeholders and development partners, on top of existing finance through the World Bank's PACD, PHARMA+ and programed GEF7 FOLUR projects).

This rest of this section summarizes each of the action areas, and further information is provided in Appendix A.

DA4.1 Strengthen agricultural planning and policy framework and its application

Intervention logic: PNG's agricultural policy provides limited guidance around climate action and does not consider the value of maintaining forest cover within existing targets. Enhanced mainstreaming of climate targets within central agricultural policy will help establish a guiding framework around which commodity specific action can be taken. The planning and approval processes for agricultural concessions also face several limitations that have allowed permits to be issued in areas that can be considered of limited viability for development. Strengthening the permit approval process (including its transparency) will help ensure new developments do not impact forest areas without the potential for long-term, high-value agricultural investments.

Baseline: The National Agricultural Development Plan is being updated and could be strengthened to further improve recognition of climate considerations.

Targets: Climate-smart national agricultural development policy by 2023; updated agriculture sector legislation by 2025.

Potential impacts: Estimated ERs against 2015 levels of 40 $GgCO_2e$ per annum (121 $GgCO_2e$ cumulative) by 2025 and 81 $GgCO_2e$ per annum (445 $GgCO_2e$ cumulative) by 2030, based on attributing 0% of ERs generated by reducing deforestation from shifting agriculture, 5% of ERs generated by reducing levels of deforestation from commercial agriculture, and 0% of ERs from reduced commercial logging levels or other forms of degradation.

Key sub-actions:

DA4.1.1. Develop an updated climate-smart national agricultural development policy.

DA4.1.2. Review and update central agricultural legislation.

Estimated costs of implementation: US$1 million, based on consultation and technical support costs.

Gaps and barriers: Complex environment with multiple levels of government, other statutory bodies, private sector and communities engaged in agricultural development.

Priority support needs: Technical and operational support to review and develop national agriculture strategy; technical support to develop guidance and criteria for reviewing and approving agricultural developments.

DA4.2. Strengthen access to and quality of extension systems

Intervention logic: PNG's population is heavily rural (over 80%), and almost all of this population relies on small-scale family agriculture. Population levels are increasing rapidly, enhancing demand for agricultural produce for subsistence and small-scale trade. But productivity levels across these systems is extremely limited, with farmers receiving little technical support to improve approaches, address disease and use improved crop varieties. Increasing support to farmers will help improve productivity, reducing pressure for ongoing expansion of agricultural areas.

Baseline: There is some development partner and private sector support to extension systems for key commercial crops (oil palm, cocoa and coffee).

Target: An established and sustainably financed network of 296 extension officers.

Potential impacts: Estimated ERs against 2015 levels of 1,114 $GgCO_2e$ per annum (3,291 $GgCO_2e$ cumulative) by 2025 and 2,229 $GgCO_2e$ per annum (12,206 $GgCO_2e$ cumulative) by 2030, based on attributing 55% of ERs generated by reducing deforestation from shifting agriculture, 0% of ERs generated by reducing levels of deforestation from commercial agriculture, 4% of ERs from reducing commercial logging levels (based on impacts to help transition areas away from concessions towards sustainable agri-production), and 0% of ERs from reduced levels of other degradation.

Key sub-actions:

DA4.2.1. Develop and test improved training materials.

DA4.2.2. Recruit, train and deploy extension officers.

DA4.2.3. Develop an approach to effective financing of extension systems.

Estimated costs of implementation: US$32 million

Gaps and barriers: Challenges in sustainably financing a wide-ranging extension system. Complex environment with multiple levels of government, other statutory bodies, private sector and communities engaged in agricultural development.

Priority support needs: Technical support to assess how extension services can be financed and develop training materials and methods.

DA4.3. Strengthen framework for sustainable palm oil development

Intervention logic: With PNG's palm oil industry historically focused on sustainable production through two major companies, the sector has had no specific policy or guiding regulations. In the 30 years up to 2005, expansion into forest areas was limited, but subsequent changes in legislation — combined with an increase in pressure for development and access to land — saw the rapid clearing of a number of areas for oil palm development. Some of these saw no further successful plantings, and further areas have been earmarked for development. Strengthening the central policy framework for oil palm development and regulations that link with international sustainability standards would help ensure further developments meet high international standards, retain the country's key environmental services, and safeguard land for family agriculture. It would also maintain and develop premium market access and price premiums, helping to deliver higher levels of return to PNG for the areas under cultivation.

Baseline: Over 90% of palm oil exports are from sustainably certified sources. Initial work has been done to establish a PNG Palm Oil Platform, which will provide a multistakeholder forum for collaboration and engagement.

Targets: Palm oil action plan agreed by 2022; palm oil policy by 2023; 90% of palm oil exports sustainably certified, by maintaining high levels of certification.

Potential impacts: Estimated ERs against 2015 levels of 459 $GgCO_2e$ per annum (1,352 $GgCO_2e$ cumulative) by 2025 and 919 $GgCO_2e$ per annum (5,027 $GgCO_2e$ cumulative) by 2030, based on attributing 0% of ERs generated by reduced deforestation from shifting agriculture, 42% of ERs generated by reducing levels of deforestation from commercial agriculture, 2% of ERs

from reducing commercial logging levels (based on impacts to help transition areas away from concessions towards sustainable agri-production), and 0% of ERs from reducing levels of other degradation. See Box 6 for other benefits of sustainable investment in agriculture.

Key sub-actions:

DA4.3.1. Establish a collaborative framework for sustainable palm oil development.

DA4.3.2. Implement enhanced standards for palm oil development in PNG.

DA4.3.3. Support increases in smallholder productivity.

Estimated costs of implementation: TBC

Gaps and barriers: Complex environment with multiple levels of government, other statutory bodies as well as private sector and communities engaged in agricultural development. Unclear market signals in terms of price differentials.

Priority support needs: To develop a functioning oil palm platform and action plan and for technical assessments on high-conservation value/high carbon stock coverage and for integrating international and domestic standards.

DA4.4. Strengthen the framework for sustainable cocoa development

Intervention logic: PNG's cocoa industry contributes an estimated 3.78% of total GDP in PNG.[13] With 90% of this production classified as smallholder subsistence production, it forms a central part of livelihoods in rural communities, engaging some 16% of PNG rural population, rising to over 30% in coastal areas.[14] Production levels are low, at 300 kilograms per hectare per annum (compared to potential yields of over 1,000 kilograms). Quality is mixed, so exports are predominantly destined for low-value bulk markets. Just 1% of PNG cocoa goes to specialty markets and a similar level is entered within certification standards[15]. This low productivity results from low levels of inputs, replanting, access to improved planting stock, and technical support. Production systems are also ill-equipped to address pests, disease and climate shocks *(Box 7)*.

Low productivity has seen a trend towards clearing land for new plantations and a move away from cocoa to other crops, particularly oil palm, with its associated forest clearance.

By establishing an improved policy, regulatory and enabling environment — including changes to taxes and export requirements and support to transparent traceability systems — and enhancing levels and quality of technical support to farmers, interventions will help increase the industry's value and sustainability, reducing pressure for a transition to other forms of land use and associated land clearing. Coupled with increased engagement with and access to high-value and certification-focused markets, this will help increase value per hectare of production without also increasing expansion of areas under production within forest areas.

Baseline: A low proportion of exports are from sustainably certified sources. existing working groups exist for collaboration of stakeholders on cocoa but have limited formal status and are often linked to a single development partner project.

Targets: Cocoa action plan agreed by 2022; cocoa policy by 2023; 30% of cocoa exports sustainably certified by 2025; 60% of cocoa exports sustainably certified by 2030.

Box 7. Case study: Creating green growth impacts in the cocoa sector

According to the 2000 Census, **16% of all PNG households — around one million people — depend on cocoa for their livelihood.**

As a largely smallholder crop, support in this sector can benefit many rural people. As well as being a major driver of the rural cash economy, **the cocoa industry generates an indirect value add of about 15%** (estimated at K30 billion).

Although the country is heavily reliant on cocoa, **the industry decreased by 20% between 2008 and 2018**, largely due to the devastation caused by the cocoa pod borer. **Simple interventions could have a huge impact, raising production by 50%** and delivering an additional 200 kilotons of cocoa per annum.

As well as increasing yield, sustainable agriculture interventions can improve quality, by facilitating access to certification mechanisms. **Benefits from certified cocoa include higher returns for smallholders and fermentaries, technical support for fermentary owners, and reinvestment of part of the profits in community development projects**. Certification is also increasingly important for market access, as the world's major cocoa buyers are trending towards only buying certified cocoa.

Source: Based on data from Lescuyer et al., Value Chain Analysis of the Cocoa Industry in Papua New Guinea (2018).

13. Lescuyer et al., "Cocoa Annex", in Value Chain Analysis of the cocoa industry in Papua New Guinea. CIRAD-CIFOR Report, Final version (2018).
14. Lescuyer et al., 2018. Value Chain Analysis of the cocoa industry in Papua New Guinea. CIRAD-CIFOR Report, Final version (2018).
15. AECOM, PNG Specialty Cocoa Market Study (2017).

Potential impacts: Estimated ERs against 2015 levels of 193 $GgCO_2e$ per annum (552 $GgCO_2e$ cumulative) by 2025 and 385 $GgCO_2e$ per annum (2,093 $GgCO_2e$ cumulative) by 2030, based on attributing 0% of ERs generated by reducing deforestation from shifting agriculture, 9% of ERs generated by reducing levels of deforestation from commercial agriculture, 2% of ERs from reduced commercial logging levels (based on impacts to help transition areas away from concessions towards sustainable agri-production), and 0% of ERs from reduced levels of other degradation. See Box 6 for other benefits of sustainable investment in agriculture.

Key sub-actions:

4.4.1. Establish a collaborative framework for sustainable cocoa development.

4.4.2. Develop enhanced traceability systems for cocoa production.

4.4.3. Support increases in smallholder productivity.

Estimated costs of implementation: US$90 million, based on costs of developing a collaborative approach and initial support finance.

Gaps and barriers: Complex environment with multiple levels of government, other statutory bodies, private sector and communities engaged in agricultural development. Highly disaggregated production systems and highly varied levels of capacity across producer communities.

Priority support needs: To develop a shared action plan for a high-value cocoa sector in PNG.

DA4.5. Strengthen the framework for sustainable coffee development

Intervention logic: Coffee is PNG's most significant smallholder crop, with 85% of production smallholder-based. But the industry has been in decline, impacted by high operating costs, low productivity, and quality inconsistencies. These are the result of both a large, decentralized labor force of independent, smallholder farmers and the broader challenges of PNG's business environment. Most farmers live in rural areas — with limited access to wet milling, transportation, or storage facilities — which leads to quality defects. As a result, PNG's green coffee sells, on average, nearly 13% below commodity exchange prices, leading to pressure for a shift of land use to other production systems and expansion to new areas, presenting a risk for increased forest loss.

Interventions will work to address key production and domestic regulatory issues and strengthen supply chain linkages to enhance export values and access to high-value markets. Increasing the value and quality of PNG coffee will help reduce pressure for transition to other land uses, while a focus on premium and certified markets would also support control on any further expansion of production into forest areas.

Baseline: A low proportion of exports are from sustainably certified sources. Existing working groups exist for collaboration of stakeholders on coffee but have limited formal status and are often linked to a single development partner project.

Targets: Coffee action plan agreed by 2022; coffee policy by 2023; 30% of coffee exports sustainably certified by 2025; 60% of coffee exports sustainably certified by 2030.

Potential impacts: Estimated ERs against 2015 levels of 193 $GgCO_2e$ per annum (552 $GgCO_2e$ cumulative) by 2025 and 385 $GgCO_2e$ per annum (2,093 $GgCO_2e$ cumulative) by 2030, based on attributing 0% of ERs generated by reducing deforestation from shifting agriculture, 9% of ERs generated by reducing levels of deforestation from commercial agriculture, 2% of ERs from reducing commercial logging levels (based on impacts to help transition areas away from concessions towards sustainable agri-production), and 0% of ERs from reduced levels of other degradation. See Box 6 for other benefits of sustainable investment in agriculture.

Key sub-actions:

4.5.1. Establish a collaborative framework for sustainable coffee development.

4.5.2. Develop enhanced traceability systems for coffee production.

4.5.3. Support increases in smallholder productivity.

Estimated costs of implementation: US$90 million based on costs of development of collaborative approach and initial support finance.

Gaps and barriers: Complex environment with multiple levels of government, other statutory bodies, private sector and communities engaged in agricultural development. Highly disaggregated production systems and high variety of capacity levels across producer communities.

Priority support needs: To coordinate coffee sector development.

3.6 Enabling Pathways

To support the delivery of the DA pathways noted in Section 3.5, several cross-cutting enabling actions (EAs) must also be taken to deliver a clear set of governance, safeguards, grievance and redress, finance, and monitoring and reporting frameworks (Table 13). This section presents short summaries of the proposed actions for each area. For further information on governance and implementation arrangements, see Section 4.

Table 14. Summary of enabling pathways

Target	Targets (by 2025 if not otherwise stated)	Means of verification	Estimated costs of implementation (US$, millions)
EA1.1. Establish an effective framework for climate governance, monitoring and reporting	National Climate Finance Steering Committee (or other form of senior-level cross-sector climate focused coordination body) and supporting framework for climate action and finance decision making established by 2022 Climate targets (AFOLU sector) mainstreamed into MTDP 4 targets for key sector agencies	Climate-related indicators in MTDP 3	1.5 to 2030
EA1.2. Establish an effective safeguard information system and grievance and redress mechanism	Safeguard Information system linked to reporting on REDD+ fully operational	Statements of information on safeguards submitted to UNFCCC	1 to 2030
EA1.3. Establish a clear financing framework to enable and incentivize action on NDC targets	Mobilize US$20 million per annum in AFOLU-focused climate finance by 2025 Mobilize US$50 million per year in AFOLU focused climate finance by 2030	Reporting by fund and climate change committee	1.5
EA1.4. Strengthen the GHG measurement and reporting system linked to NDC targets and commitments to raised ambition across new sectors	Submission of PNG's National Communication and BUR in a timely manner and in line with the ETF Establish enhanced emission factors for PNG's forests and land use change categories, particularly impacts of logging on forest areas	Submission of reports to UNFCCC	20
EA1.5. Establish a carbon registry	Structure and prototype registry agreed and operational 2022 Initial registry fully operational 2025	Operational registry	2

EA1.1. Establish an effective framework for climate governance, monitoring and reporting

Intervention logic: A clear framework for climate governance is needed to ensure that decisions on how resources are allocated towards climate action are in line with key government targets and that contradictory policies and programs are not adopted.

Baseline: The CCMA provides a central mandate for establishing a Climate Change Board and relevant committees, including a Climate Finance Committee. But this framework is not well enough integrated within PNG's broader development planning and budgeting system, as highlighted by the absence of any climate targets in sector agency performance indicators in MTDP 3, with all climate targets currently held solely by CCDA.

An enhanced approach to linking these systems will be critical to support effective governance, coordination and decision making and to establish an effective incentive system for key sectors to take action on climate change.

Targets: A national climate finance steering committee (NSCCF) or other form of senior-level, cross-sector, climate-focused coordination body and supporting framework for climate action and finance decision making established by 2022; AFOLU sector climate targets mainstreamed into MTDP 4 targets for key sector agencies.

Potential impacts: No direct quantitative impacts on emissions.

Key sub-actions:

- Maintain AFOLU STWC operations
- Establish a cross-agency MoU on cooperation and data sharing
- Establish the Climate Finance Steering Committee
- Develop an approach and mechanisms for integrating climate action into planning cycles and a framework for engaging the private sector, including monitoring and reporting requirements (linking with EA1.4)

Estimated costs of implementation: US$1.5 million.

Gaps and barriers: Absence of climate change board.

Priority support needs: Technical support to facilitate development of framework and early implementation.

EA1.2. Establish an effective safeguard information systems and grievance and redress mechanism

Intervention logic: For the actions noted above to be successful, they must not have negative environmental and social impacts within PNG. Stakeholders must also be able to raise issues within implementation and these should be addressed in a clear and transparent way. All actions must also comply with international safeguards to facilitate access to finance.

Baseline: PNG has a central framework of safeguards and mechanisms for grievance and redress within key legislation (Environment Act, labor laws, and so on). Other work is focused on linking these with actions to deliver REDD+ results and an initial statement of information on safeguards for REDD+ has been submitted to the UNFCCC.

Targets: A fully operational safeguard information system linked to REDD+ reporting.

Potential impacts: No quantitative impacts on emissions.

Key sub-action: Establish a safeguard information system.

Estimated costs of implementation: US$0.5 million for full establishment, with another US$0.5 million to support operation to 2030.

Gaps and barriers: Limited technical expertise in key agencies on safeguard monitoring and reporting. Limited data collection and reporting capacity.

Priority support needs: Technical support to develop the system.

EA1.3. Establish a clear financing framework to enable and incentivize action on NDC targets

Intervention logic: Effective financing is a key barrier in almost all direct action area and many of the enabling actions. Yet, there are also significant opportunities to access climate and development partner finance linked to these proposed actions. Establishing an effective financial management system will help increase investor confidence, improve allocation efficiency and effectiveness, incentivize the delivery results, and help catalyze non-climate-focused private sector investment.

Baseline: The CCMA lays out a structure for climate finance management based around forming an NSCCF (Sec14a) and establishing a resilience and green growth trust account (Sec37). Work has also been undertaken to establish a biodiversity and climate fund with support from GEF finance. Other support and engagement is linked to PNG's proposals to access results-based finance through the voluntary carbon markets, the GCF, and the CFRN's REDD+ registry system.

Targets: Mobilize US$20 million per annum in AFOLU-focused climate finance by 2025 and US$50 million per annum by 2030

Potential impacts: No quantitative impacts on emissions.

Key sub-actions:

- Establish a central governance framework (EA1.1)
- Address key reforms linked to legal ownership of carbon and structures for benefit-sharing and performance-based payments, including required domestic performance indicator structures
- Establish an independent climate trust fund that meets international standards for financial management and governance and has capacity to provide integrated support to government priorities

Estimated costs of implementation: US$1.5 million. Finance for establishing a trust fund linked to biodiversity is already in place and has potential for supporting the development of a multi-use fund.

Gaps and barriers: Challenges in allocating institutional mandates and financial management responsibilities. Poor track record of PNG-based trust funds and financing structures.

Priority support needs: Technical support to develop the fund.

EA1.4. Strengthen the GHG measurement and reporting system linked to NDC targets and commitments to raise ambition across new sectors

The proposed actions in this area were developed in line with the PNG Action Plan for Enhanced Transparency Framework on AFOLU and REDD+ National Forest Monitoring System (2020–2025), identified within the PNG NDC Implementation Plan.

Intervention logic: Enhanced capacity to monitor and report on PNG's progress and targets is central to developing effective policy responses, gaining access to finance and ensuring a clear and transparent means to report on performance. This must include both technical GHG reporting for international audiences, necessary internal monitoring, and reporting protocols appropriate to domestic capacity and needs.

Baseline: Significant work has been done to develop PNG's capacity for monitoring and reporting on land use change, establish baseline emissions factors for land use change, develop key land use change measurement and reporting systems — such as Open Foris's Collect Earth, TerraPNG, and the PNG REDD+ and National Forest Monitoring Web-Portal — and develop the Near Real-time Deforestation and Degradation Alerts and Monitoring System.

Targets: Submit PNG's National Communication and BUR in a timely manner and in line with the ETF; establish enhanced emission factors for PNG's forests and land use change categories, particularly impacts of logging on forest areas.

Potential impacts: No quantitative impacts on emissions.

Key sub-actions:

- Strengthen institutional framework on the ETF
- Enhance transparency and awareness of AFOLU and REDD+ monitoring
- Update and improve NFMS and REDD+ FRL
- Conduct and improve an AFOLU GHG inventory
- Monitor AFOLU-related adaptation
- Produce and submit climate change reports (third National Communication (NC3), BUR2, and BTR1) that meet ETF standards
- Develop blue carbon inventory and policy
- Identify and conduct other important activities

Estimated costs of implementation: US$20 million to 2025, based on costings presented with the PNG Action Plan for Enhanced Transparency Framework on AFOLU and REDD+ National Forest Monitoring System (2020–2025).

Gaps and barriers: Limited technical capacity outside a small group of experts; limited IT systems and data connections; high costs of field-based monitoring activities.

Priority support needs: Ongoing technical support.

EA1.5. Establish a carbon registry

Intervention logic: To access results-based finance linked to ERs within the AFOLU sector, PNG must be able to show that there has been no double counting of ERs and transactions. Establishing an effective registry will allow PNG to transparently track ERs and show how those reductions have been used.

Baseline: PNG has already received initial support to develop a registry by reviewing options and is working with FAO (with support from the GCF) on the "Readiness for registry and nesting system to facilitate climate-related investments in agriculture, forest and land use (AFOLU) sector in Papua New Guinea" project, which will support further development of a registry system. There is also an MOU with CFRN to link with the CFRN REDD+ Registry.

Target: Fully operational forest carbon registry.

Potential impacts: No quantitative impacts on emissions.

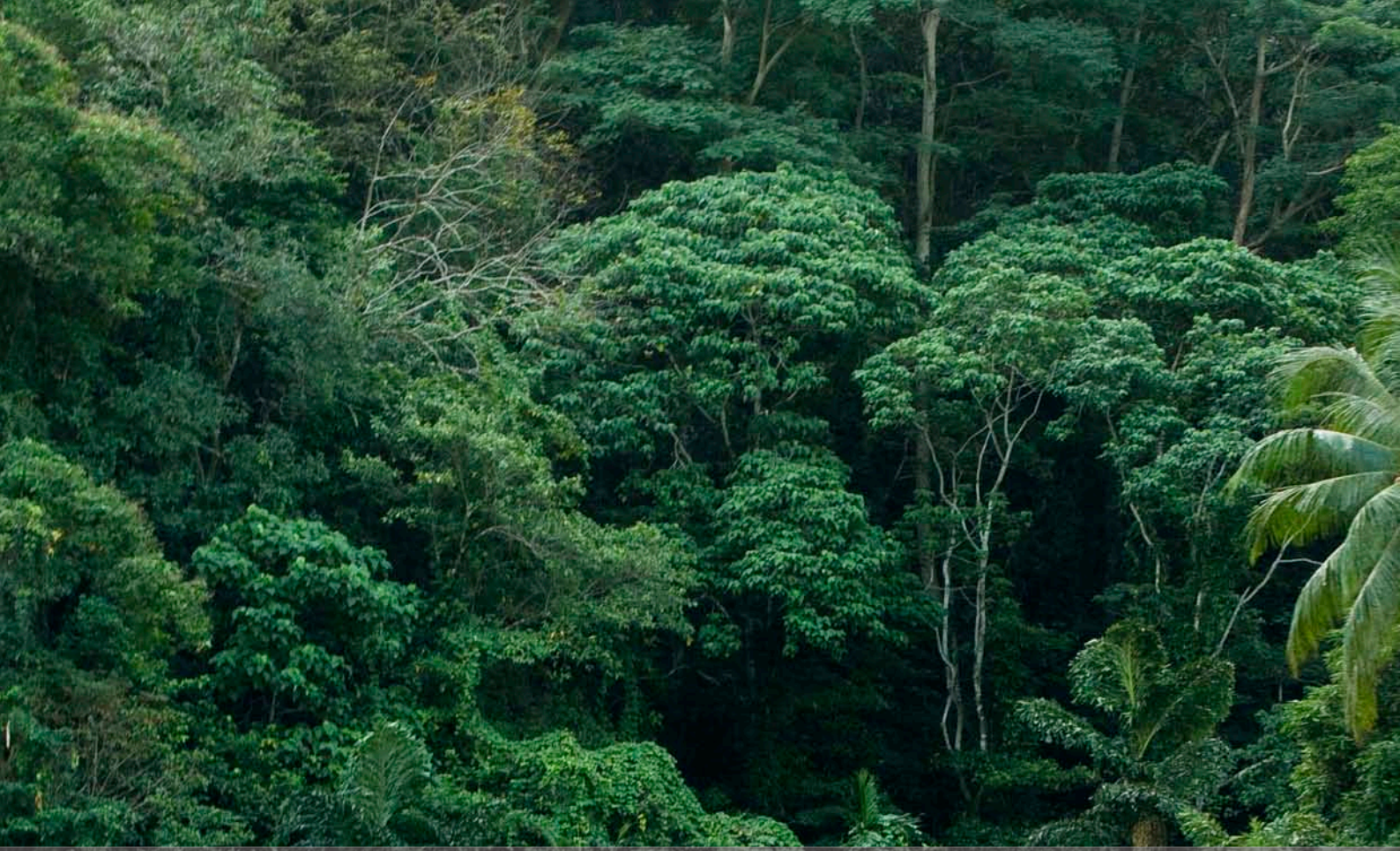
Key sub-actions:

- Review approaches to registry development
- Develop registry system
- Train key stakeholders on registry operation

Estimated costs of implementation: US$2 million to 2025.

Gaps and barriers: Limited technical capacity outside a small group of experts; limited IT systems and data connections; high costs of field-based monitoring activities.

Priority support needs: Ongoing technical support.



4 Enabling Environment for Roadmap Implementation

The proposed arrangements outlined in this section focus on supporting the delivery of the targets and actions outlined in this roadmap and hence PNG's NDC targets. However, the integrated nature of climate action means that they inevitably touch on the need for an enhanced enabling environment for climate action across PNG. The information presented here will allow PNG to strengthen the enabling environment over time.

4.1 Governance

Development of this roadmap was led by CCDA — specifically, its Measurement, Reporting & Verification (MRV) and National Communication (NC) Division— in close partnership with key sectors, with inputs from civil society, private sector actors, and the AFOLU STWC, which operates as a subcommittee to the NDC TWC. This approach is in line with CCDA's mandate under the CCMA (Sections 10 and 11) to promote action on climate change, ensure NDC development, and facilitate and promote actions to achieve climate targets. CCDA has also formed a functioning operational system to facilitate cross-sector discussion on climate action.

However, effective delivery and reporting on progress against this plan heavily rely on the creation of key enabling elements linked to the governance, financing and monitoring of PNG's climate targets. These elements help transform climate action from technical discussions to an integrated concept in PNG's development approach supported by technical monitoring systems, effective governance arrangements and financial incentives. The core elements of this are laid out in Section 3.6; here, the focus is on the initial steps for operationalizing this roadmap.

The information presented is based on the mandates and requirements outlined within the CCMA (2015), the revised CCMA Amendments Bill (2021), the existing development planning framework laid out in the National Planning and Monitoring Responsibilities Act (2015), and guidance on subnational planning and financial management.

In line with these documents and PNG's experience of NDC implementation, the proposed approach is based on a stepwise process of further mainstreaming climate actions while also establishing key governance and financing structures (Figure 11).

Figure 11. Pathway to implementation

This approach links with the following key enabling action areas:

EA1.1. Establish an effective framework for climate governance, monitoring and reporting:

- Mainstream climate action into development planning
- Establish a system for coordinating action and prioritizing resources

EA1.3. Establish a clear financing framework to enable and incentivize action on NDC targets:

- Establish a mechanism to receive and allocate resources.

4.1.1. Mainstream climate action into development planning

PNG's development planning is structured around a top-down and bottom-up system which links

subnational planning and national priorities. Existing planning frameworks are guided by long-term sector and national plans, such as Papua New Guinea Vision 2050. This in turn guide medium-term planning, which is coordinated through DNPM and is represented by a central MTDP, developed in collaboration with sectors and subnational governments. These plans guide the development of the Annual Budget Framework Paper — which outlines recurrent and capital budget envelopes — and of sector and subnational annual plans.

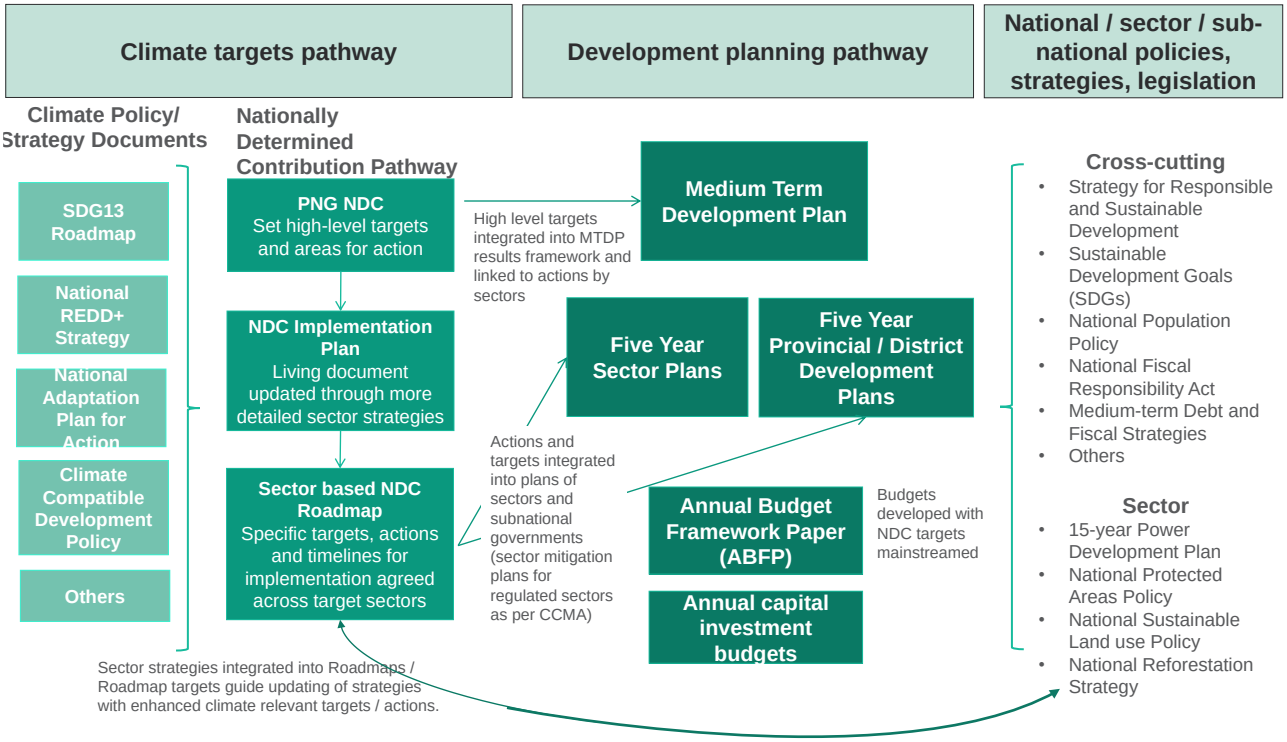
Although climate change is integrated within this process, it is 'siloed' under the mandate of CCDA within existing development plans (MTDP 3), rather than being mainstreamed across responsible sector agencies. As such, there is limited incentive within the planning framework for sectors to act on climate change.
Addressing the need to mainstream climate targets across sectors within the central planning and budgeting framework in line with the CCMA (under the principles of regulated sectors and requirements for sector mitigation plans) and the National Planning and Monitoring Responsibilities Act, is crucial to delivering on existing targets and establishing a framework for ongoing enhanced ambition.

Figure 12 outlines the approach to mainstreaming climate targets across sectors and the role of this roadmap in the process. Priority steps to help enable this process include:

1. **Integrating climate targets within a sector planning framework to develop the MTDP 4:** To mainstream climate targets from AFOLU and energy sector roadmaps into sector targets under MTDP 4, there must be early engagement with DNPM and sectors to gain a clear understanding of the relevance and links of sector climate targets and ongoing CCDA engagement throughout the MTDP 4 development process to ensure there is enough technical support on how to integrate targets and actions can be integrated.

2. **Developing formats for climate change planning, monitoring and reporting:** Developing formats for sector mitigation planning and reporting and templates for climate project proposals, potentially linked to those currently used for project investment proposals.

Figure 12. NDC and roadmap integration and development planning process



4.1.2. Establish system for coordinating action and prioritizing resources

PNG has a well-developed, effective system for sector coordination and decision making through its development planning process and key bodies such as the CACC and Consultative Implementation & Monitoring Council (CIMC). Action on climate change, on the other hand, has been coordinated through technical committees within CCDA, including the REDD+ TWC and the AFOLU STWC. But there is no senior-level, cross-sector mechanism that these bodies can feed into, which would facilitate decision making and coordinated action on climate change.

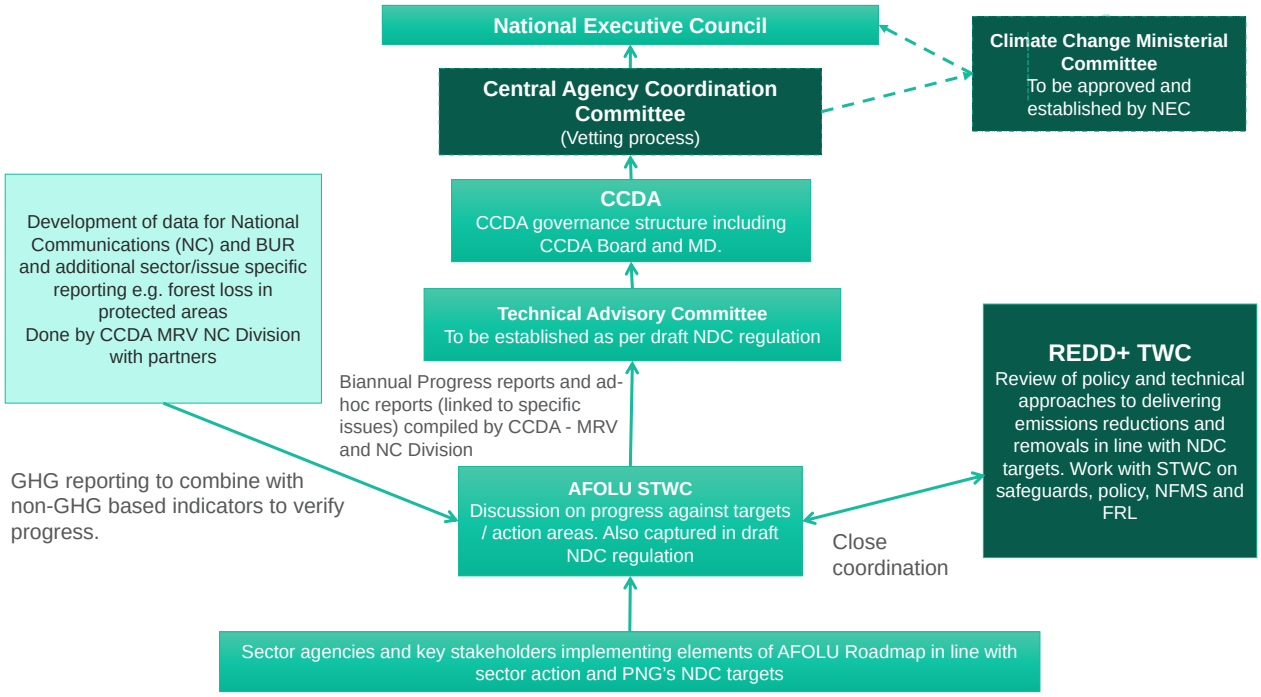
The CCMA (2015) mandates the establishment of a national climate change board and a climate finance committee. A 2018 review of climate finance opportunities by DNPM also recommended the

establishment of a cross-sectoral NSCCF that would allow for senior-level decision making on climate and prioritize action to access finance. Establishing such a structure is crucial for ensuring the effective mainstreaming of climate priorities and would provide a focused body for coordinating and prioritizing actions and help ensure the mobilization of effective levels of finance support action on climate change.

While this is necessary, a basic framework for NDC implementation is already in place and can be operationalized to help monitor NDC progress and provide information to the NEC level. Should the proposed targets noted in this document be integrated effectively into sector and subnational plans and linked to incentive systems, this interim system would allow early progress to be made. The base structure of this approach is outlined in Figure 13, and priority steps for its development and functioning include:

- Developing an MoU between key sector agencies and other bodies that facilitate coordinated action and data sharing on issues linked to climate change and commitments to establishing a central coordination body (committee) and or interim climate change and NDC performance committee
- Ongoing engagement with the REDD+ process and REDD+ TWC to strengthen links and clarify mandates
- Maintaining quarterly AFOLU STWC meetings to support engagement and coordination across the sector
- Developing draft terms of reference for a central coordinating body on climate action and climate finance (CCDA and DNPM) that can be presented for review by CACC
- Establishing the central coordinating body.

Figure 13. Proposed governance structure for implementing the AFOLU roadmap



4.1.3. Establish mechanism to receive and allocate resources

PNG has a central domestic system for allocating budgets that is guided through the planning processe discussed above. The DNPM also works with the Department of Foreign Affairs and technical agencies to mobilize additional finance through development partner agreements. This mobilized finance is either held 'off-budget' within government-controlled trust accounts and channeled to service providers or provided directly to service providers. However, a clear mechanism for managing climate finance is required to help mobilize finance and provide access to different types of finance.

The CCMA mandates CCDA to establish a green growth trust fund and introduce a 7% levy on all forms of climate finance. Support is also provided (through GEF6 finance to UNDP in partnership with CEPA) to develop a biodiversity and climate trust fund to sustainable financing of the PA system.

Priority steps for developing this mechanism include:

- Consolidating existing information on assessments of potential financing streams for the AFOLU sector
- Establishing a versatile fund mechanism for receiving international finance
- Establishing a fund mechanism for managing domestic climate finance.

4.2 Finance

Key messages:

PNG has potential to mobilize significant finance for the AFOLU sector to help achieve its targets.

Results-based payments for historic ERs and projected ERs if downward trends in emissions continue are estimated to rise from just over US$10 million per annum for 2014–15 to more than US$170 million per annum for 2021–2026.

RBPs can be accessed through existing multilateral initiatives that will provide finance at a national scale, though it will need to be channeled through an accredited entity and will require clear financial management systems and quality data reporting.

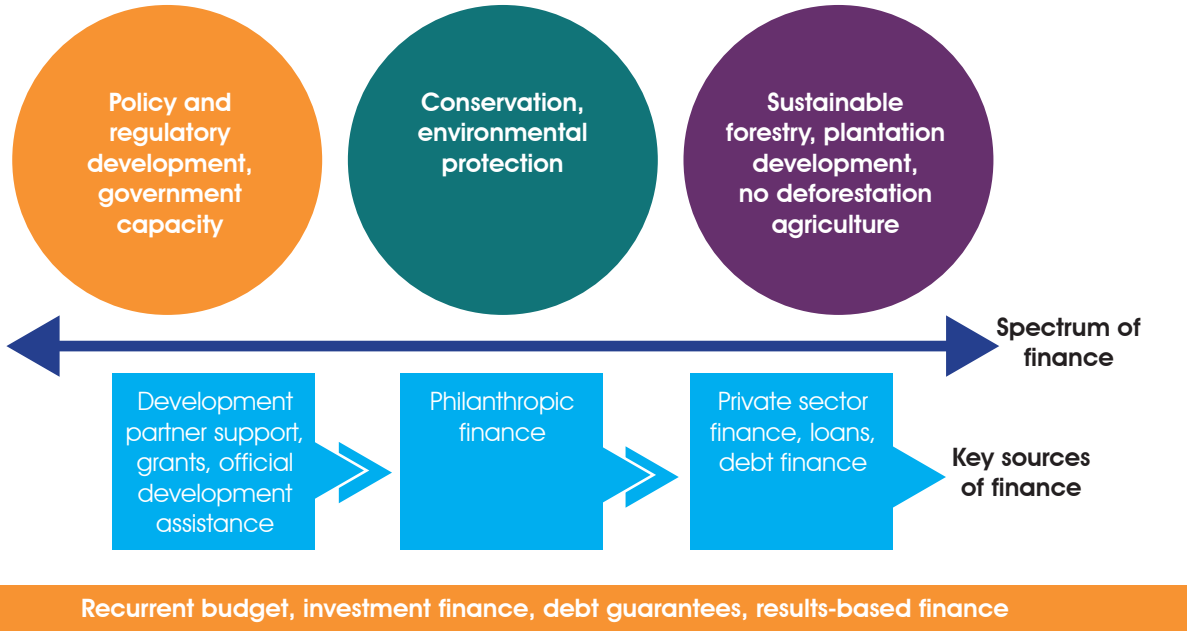
These funds could deliver significant benefits but are not guaranteed over the long term. As such, they should be used to help develop an effective enabling environment that supports effective forest management and economically beneficial, but environmentally sustainable, industries that can deliver long-term investment. Existing development partner and government funds should also be used to support these areas, help attract more sustainable private sector investment, and target actions that may not deliver immediate ERs but support the long-term sustainability of change.

PNG's NDC and supporting roadmap lay out the level of ambition for the AFOLU sector. They also note the significant gap between levels of finance already allocated through domestic budgets and those needed to fully deliver and sustain ERs from the sector while also continuing to promote a strong and resilient society.

Based on this gap, PNG has presented its NDC targets as conditional on further international community support, which includes the development of effective international financing systems to support climate action.

In line with this, PNG has adopted a multi-source approach to finance that seeks to catalyze a range of finance opportunities while also using these to drive private sector investments within productive sectors. This approach seeks to maximize PNG's access to finance and allow financing sources to be tailored to specific areas of interest *(Figure 14)*.

Figure 14. Spectrum of financing options and key areas of action



4.2.1. Domestic finance

The GoPNG has a significant operating budget that could support key actions across sectors and catalyze further action by developing effective incentive systems and undertaking key policy and regulatory reforms that help promote private sector investment within target action areas. This includes, for example, reforms linked to privatized extension systems in agriculture, reduced taxes on sustainable businesses, and enhanced costs for non-sustainable business practices.

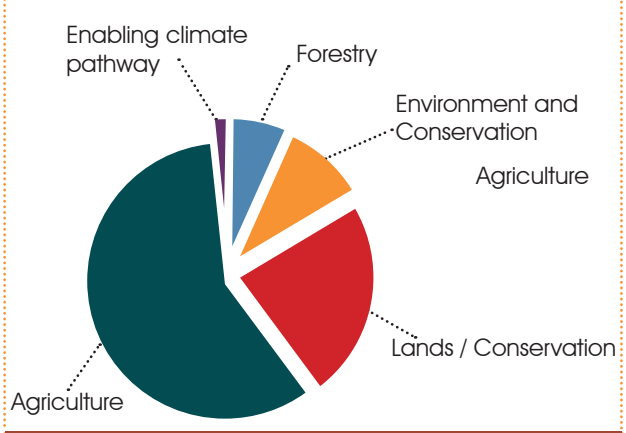
Within the specific climate sphere, redirecting and expanding levies on fuels will also help generate significant revenue for the CCDA. It is also worth considering establishing a domestic offsetting system for PNG's liquefied natural gas (LNG) and other resource extraction sectors to allow for the sale of carbon neutral products from PNG.

4.2.2. Development partner finance

PNG has strong partnerships with several development partners (Table 2 for partner projects and Figure 15 for spending by sector) and their support has been critical to developing several key program areas. Maintaining and continuing these partnerships is seen as crucial, particularly for developing key action areas that have lower direct impact on emissions and/or are less relevant to private sector investment. This includes support for land use planning actions, work on policy formulation, or government capacity building — for example, by establishing frameworks to better access other forms of finance such as results-based or green bonds.

Existing annual related finance (indicative): US$60 million per annum.

Figure 15. Levels of development partner spending, by main action area



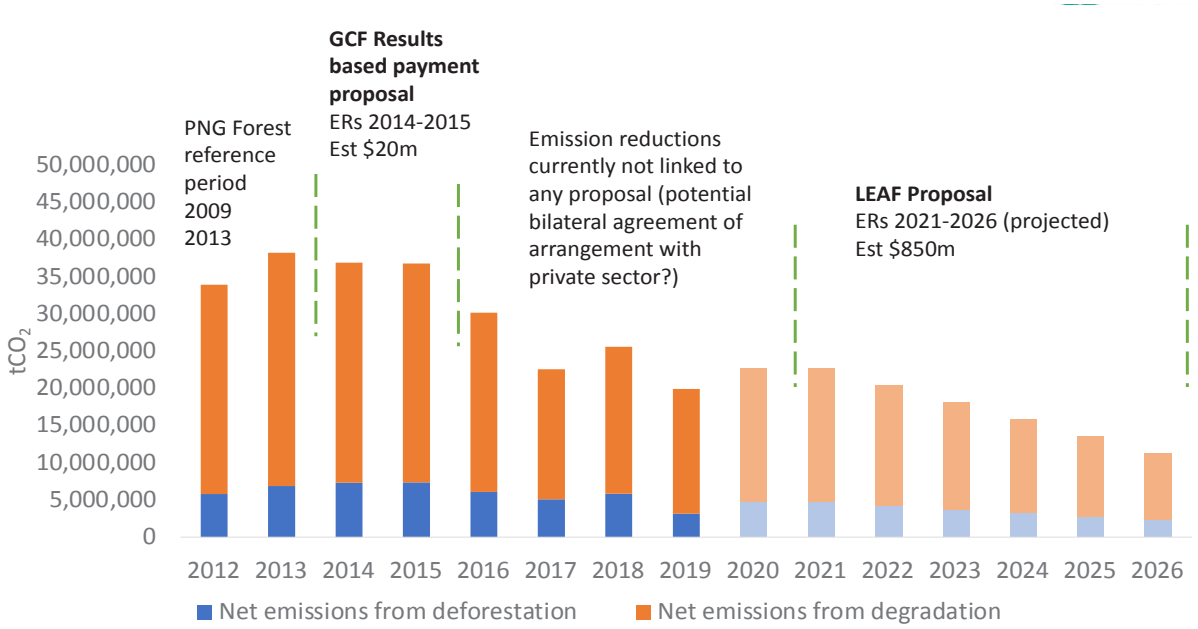
Development partner finance is most significant in agriculture — and is linked to two major projects. But this sis also in line with higher levels of spending to help mobilize a productive sector. Direct investment in forestry and pure conservation is relatively low, and there has been a rise in integrated landscape projects.

4.2.3. Results-based finance

PNG's significant levels of forest cover and historically high emissions levels make the country well placed to target RBP mechanisms and to engage with the voluntary market. In line with the National REDD+ Strategy and the overall approach noted in this document, the current focus is on multilateral and UNFCCC-linked results-based finance with some information also provided on the voluntary market. Figure 16 shows current and projected ER trends (above and beyond NDC targets) with their potential revenue values. It also shows the current period (2016–2020) within which ERs have been achieved but where financing support has yet to be identified.

Potential finance from RBF: US$10–170million per annum.

Figure 16. PNG ER and RBF proposals and concept note applications, looking at national-scale reporting



4.2.4. Key schemes and PNG's likely engagement within them

Green Climate Fund (GCF) REDD+ RBF Pilot: Initially capitalized with US$500 million, these funds have already been committed to eight countries. PNG is seeking to access RBP from the next round of GCF REDD+ Results-Based Pilot Programme finance in 2021.

- **ER vintages:** REDD+ results between 2013 and 2015 as reported in PNG's first BUR.
- **Estimated ERs:** 6,000 $GgCO_2e$
- **Potential finance:** US$20 million (based on US$5 per tonne, but with additional discounts due to gaps in ER data accuracy, total number of credits eligible for payment will be lower).
- **Additional notes:** As GCF finance has to be managed through an accredited entity and no PNG institution has yet attained this, FAO will work as the implementing agency on the project.

Lowering Emissions by Accelerating Forest Finance (LEAF) Coalition:[16] Launched in late April 2021, LEAF includes several important REDD+ donors (such as Norway, US, and the private sector) and offers funding at least US$ 1 billion using ART/TREES[17] for 2022–2026. PNG is seeking to access finance through the mechanism and is preparing a concept note for submission in 2021.

- **ER vintages:** 2022–2026 (exceptions).
- **Forward purchase** with payment on delivery of ER — that is, around 2023–2024.
- Proceeds must be channeled through **an intermediary** (GCF accredited entities eligible, fees will apply).
- Potential ERs (2022–26): Based on PNG's current trajectory and an enhancement of targets above the proposed NDC targets to achieve a 10,000 $GgCO_2e$ reduction against 2020 levels by 2026, resulting in cumulative ERs of 85,000 $GgCO_2e$, which includes an upward adjustment of PNG's emissions baseline (against which progress is judged) due to PNG's status as a high-forest cover low-deforestation country.
- **Potential finance:** US$850 million over a five-year period.

CFRN REDD+ Registry: The CFRN have established a REDD+ registry to allow private sector groups to purchase ERs reported by countries within the UNFCCC cycles as part of voluntary offsetting activities. The process is at an early stage, and the PNG has achieved one sale of 60,000 ERs to date. CFRN is providing support to help PNG engage with the system and establish the necessary ER registries and financial management systems to make the process effective.

ER vintages: All vintages reported to UNFCC.

Price per tonne: US$11 (% held by CFRN).

4.2.5. Voluntary carbon markets

Voluntary carbon markets offer an existing market for PNG projects. Indeed, PNG was one of the first countries to have a fully operational forest carbon project, which could sell ERs from its initial verification period (2009–12).

16. http://www.leafcoalition.org
17. https://www.artredd.org/trees/

Project development continues to provide opportunities for discrete and direct action in target landscapes, with opportunities to continue testing approaches to engaging landholding communities. New developments in methodologies also provide opportunities for developing jurisdictional-level approaches that could form the basis for larger long-term agreements with major private sector actors, such as oil majors or airlines — an opportunity modified by COVID19 travel restrictions — or provide reporting methods for a domestic offsetting system *(Box 7)*.

4.2.6. Article 6 Agreements

There are significant opportunities for Article 6-based and these will be explored in line with UNFCCC guidance.

4.2.7. Other finance instruments

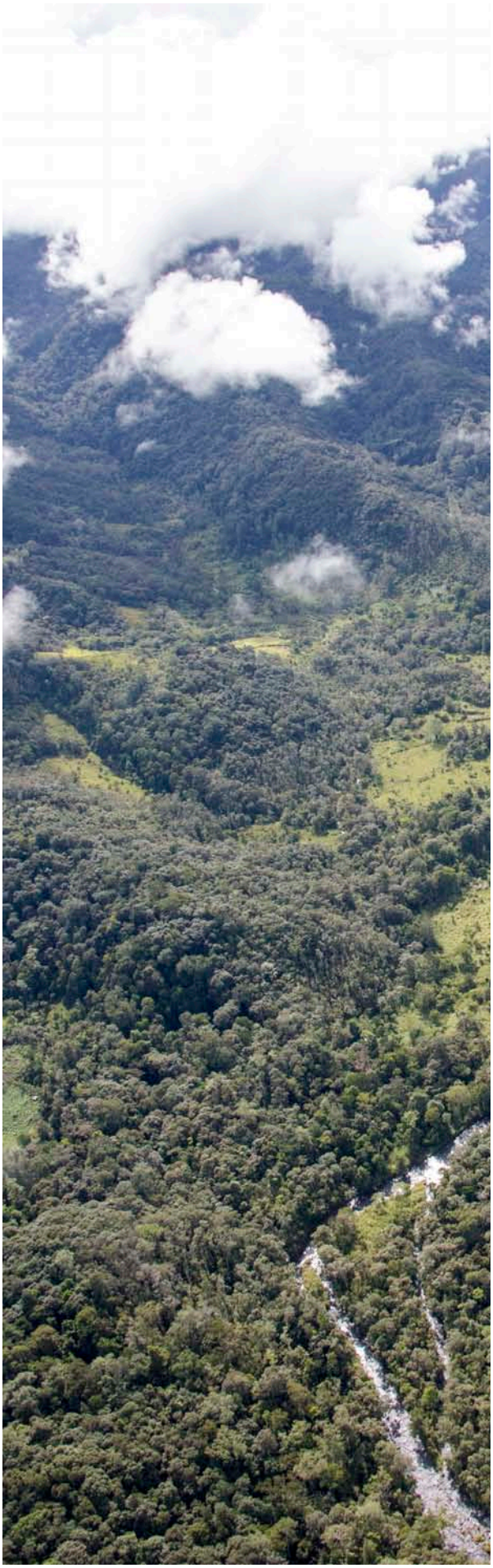
Significant other opportunities exist to help finance actions in this roadmap through sources that do not directly target ERs but seek improved production standards or a positive investment structure. These options can be combined with the elements discussed above to help enhance and further catalyze finance. Key measures include:

- **Sector-focused private investment:** PNG has a significant private sector, and investment in key areas — such as agricultural commodities — is increasing. For PNG to be able to sustain current progress, actions to help drive further private sector investments in sustainable production systems will be crucial, ensuring that long-term sustainable economic activities are in place that avoid pressure for forest clearance. Key opportunities for this exist within the agricultural and forestry sectors, forming a basis for actions within those DA pathways outlined in Section 3.5.
- **Green bonds:** Green bond markets, which have seen rapid growth in the past decade, provide opportunities to mobilize significant levels of capital based around a series of key sustainable action areas. The approach provides an opportunity for PNG to package key actions that would also help deliver on a number of key environmental benchmarks such as adaptation impact, ERs, conservation, and so on.

Box 7. Links with PNG's energy commitments: offsetting fossil fuel production

In its Enhanced NDC, PNG identifies the need to establish a framework for offsetting fossil fuel to help address emissions linked to domestic fuel consumption and provide a mechanism for PNG to export 'carbon neutral' energy products.

This approach, which is also identified in PNG's SDG13 Climate Action Roadmap, provides a significant potential revenue stream for PNG, which has been exporting over 8 million tonnes of LNG per annum. This produces around 3mtCO_2e in production and would require another 4-5mtCO_2e in offsets fully offset production and consumption.



Appendix A.

Detailed Pathways

DA1. Forestry pathway

The forestry pathway action matrix is based on actions identified in PNG's National REDD+ Strategy, REDD+ Implementation Plan, the SDG13 Roadmap and NDC Implementation Plan.

No	Pathways	Targets	Implementing agency	Policy plan link –	Mitigation potential	Estimated investment needs	Existing progress	Gaps/barriers	Existing support	Key support needs
DA1.	**Enhance monitoring and enforcement of timber legality standard**	50% of all concessions classified as fully legally compliant by 2025, 100% fully compliant by 2030	PNGFA	KRA1. Increased Revenue and Wealth Generation KRA7. Promote PNG's Environment Sustainably SDGs 15. Life on Land			Timber Legality Criteria approved NISIT	Absence of international certifier	WWF GCF – possible significant component of GCF RBP USAID JICA	Identify potential sites for trialing of systems
DA1.1.1	Raise awareness of timber legality standards	100% of the forest industry is aware of the standards by 2025	PNGFA							
DA1.1.2	Strengthen information management and monitoring systems	DSS and FRIMS operational and populated at national level 2023 DSS and FRIMS operational in 50% of provinces by 2025 DSS and FRIMS operational across all provinces by 2030	PNGFA							
DA1.1.3	Strengthen in-field monitoring capacity	Logging code of practice updated by 2022 Full monitoring reports for 50% of concessions provided by 2025 Full monitoring reports developed for all concessions by 2030	PNGFA							
DA1.1.4	Increase action on forest rehabilitation	Increase natural forest management areas through application silvicultural practices by 5000 ha annually	PNGFA							
DA1.1.5	Establish a third party verification system	System established and operational by 2025	PNGFA							
DA1.2.	**Update policy and information on small-scale levels (>500m^3)**	Quantification of impacts of small-scale timber in place by 2022 Measures identified to enhance management of small-scale timber harvesting by 2025	PNGFA	KRA1. Increased Revenue and Wealth Generation 1.3. Creating employment and economic opportunities KRA7. Promote PNG's Environment Sustainably			Revision of forestry act underway to include small-scale producers	Limited data on existing operations Low levels of capacity in saw mill sector to meet legality standards	None	Support to assessment work of existing status Capacity building of provincial officers to collect and manage information on sector Support to updating of policy framework based on new information
DA1.2.1	Initial assessment of existing levels of timber production and potential future demand	Baseline on levels of small-scale production established by 2022	PNGFA							
DA1.2.2	Build capacity of provincial offices to collect information on small-scale timber operations	Initial data reports by 2023	PNGFA / Provincial governments							
DA1.2.3	Initial policy review to support improved data collection on small-scale operations	Revised policy and regulations supporting data collection in place by 2022	PNGFA							
DA1.2.4	Second phase of policy review based on additional data availability and information	Draft policy developed and consulted on by 2024	PNGFA							
DA1.3	**Enhance supply of planted timber and reforestation**	22,000 ha planted per annum, 220,000 ha by 2029	PNGFA	KRA1. Increased Revenue and Wealth Generation 1.2. Increasing value of exports – through increased unit value of timber with higher legality assurance 1.3. Creating employment and economic opportunities KRA7. Promote PNG's Environment Sustainably			Reforestation Strategy 2020 approved	Limited availability of finance Challenges in land availability Limited levels of Private Sector investment	None	Stocktake of existing plantations Development of business plan for plantation development

DA1.3.1	Stocktake of existing plantation resource									
DA1.3.2	Develop business plan for plantation development, including review of reforestation levy and financing	Business plan completed by 2023								
DA1.3.3	Develop information and communication materials	Materials developed by 2023								
DA1.3.4	Develop training materials									
DA1.3.5	Woodlot development / reforestation									
DA1.3.5.1	Awareness raising activities									
DA1.3.5.2	Establish nursery									
DA1.3.5.3	Provide training									
DA1.3.6	Commercial plantation									
DA1.3.6.1	Develop targeted business plan for key plantations areas	Plan developed by 2025								
DA1.3.6.2	Review tax incentives	Review completed by 2023								
DA1.3.6.3	Raise awareness	Awareness raising materials updated 2022 Plantation forum 2024								
DA1.3.6.4	Delineate land									
DA1.3.6.5	Develop partnerships									
DA1.4	**Establish enhanced policy environment to increase PNGFA capacity for policy development planning, training and research**	Forestry Act revised by 2022 Updated forest policy by 20205 PNGFA's capacity to provide technical support to PNG's forest management decision making is increased	PNGFA	KRA1. Increased Revenue and Wealth Generation 1.3. Creating employment and economic opportunities KRA7. Promote PNG's Environment Sustainably			Work on review of forestry act Forest sector scenario analysis completed	Limited data on status of concessions and levels of timbe regrowth	GCF RBP proposal	
DA1.4.1	Review existing production costs and benefits within production systems									
DA1.4.2	Policy dialogue on PS engagement									
DA1.4.3	Review options for public, private, community partnerships in forestry including harvesting and plantation development									
DA1.5	**Establish a transition package for 'old' timber concessions**	Decrease in area under 'old concession' types by 40% by 2025, and 90% by 2030	PNGFA	KRA1. Increased Revenue and Wealth Generation 1.3. Creating employment			Limited initial work on integrated approach	Coordination between sectors and levels of government as well as local	GEF7 FOLUR provides options to support elements	Review of exiting permits Support to establishment of cross-sector
				and economic opportunities KRA7. Promote PNG's Environment Sustainably						
DA1.5.1	Review existing permits and expiry dates									
DA1.5.2	Field-based assessment of expiring permits to review timber stock, existing land uses and community needs									
DA1.5.3	Cross-sector and stakeholder engagement on 'transitional package'									
DA1.5.4	Develop pilot transitions within a number of concessions									
DA1.5.5	Develop structured model for transition									

DA2. CEPA pathway

No	Pathways and sub-actions	Targets and sub-actions	Implementing agency	Policy plan link	Mitigation Potential	Estimated investment needs (US$)	Existing progress	Gaps/barriers	Existing support	Key support needs
DA2.1	**Strengthen environmental safeguards**	Documents for 50% of projects updated and publicly available by 2025, 100% of projects by 2030 3 subnational jurisdictions operating with designated authority on environmental monitoring and enforcement	CEPA	**MTDP 3** KRA7. Promote PNG's Environment Sustainably Through actions linked to KRA7.1. Promote PNG's Environment Sustainably – through areas being under legal protection and improved permitting KRA7.2. Manage and reduce the risk of natural disasters – through maintenance of eco-system services			Environmental web portal in development	Limited coordination across agencies, sectors and levels of government of permit information Limited quality of IT systems No staff presence at provincial level Gaps in linkages between national and subnational levels.	Inform Project (SPREP)	Establishment of Environmental management information system (Action 2.1.1) Piloting of subnational monitoring and enforcement of environmental regulations (Action DA1.1.4 and 1.1.5)
DA2.1.1	**Enhance awareness of environmental regulations** Develop awareness raising strategy Develop communication and awareness raising materials and easy to access IT platform Hold targeted awareness raising events Ensure sustainable finance for platform	Target: 50% improvement in awareness of environmental regulations across target actors by 2025 against baseline to be developed during strategic planning	CEPA	CEPA Strategic Direction 2017–2021			Environmental web portal PA Registry	Lack of coordination and effective communication strategies Lack of funding	Inform Project (SPREP)	
DA2.1.2	**Review existing legislation and guidance**	Legislative review completed by 2023	CEPA	CEPA Strategic Direction 2017–2021				Gaps in legislative requirements linked to land use and carbon-based activities	None	
DA2.1.3	**Establish an environmental management information system** Develop MoU on data sharing with other agencies Establish IT system to manage process of receipt and review and approval of environmental permits as well as enhanced public access to them	60% of environment permits are publicly available through an online portal by 2025 100% of environmental permits are available through an online portal by 2030	CEPA Provincial government Other sector agencies	CEPA Strategic Direction 2017–2021				Lack of monitoring and evaluation of existing programs Lack of coordination and effective communication strategies Lack of funding	None	Technical support to, design and establishment of portal and its interface with other information systems and training on its use
2.1.4	Develop and operationalize remote monitoring and reporting tools including a remote deforestation alert (in partnership with PNGFA and CCDA) system and environmental infringement reporting app	Test system in place 2022 Fully operational system by 2025	CEPA PNGFA CCDA	CEPA Strategic Direction 2017–2021			Prototype system being developed	Limited in capacity and data availability Coordination across agencies Capacity to roll out and integrate with subnational action	GEF6	Support to further development and field testing of systems
DA2.1.5	Enhance capacity of subnational governments and other stakeholders to monitor and report against environmental regulations Develop targeted training for provincial and subnational officers on environmental regulations and enforcement Provide training Develop financing structure for subnational operations	3 subnational jurisdictions operating with designated authority on environmental monitoring and enforcement	CEPA Provincial government Other sector agencies NGOs Private sector Donors	CEPA Strategic Direction 2017–2021			Establishment of PA roundtables	Lack of monitoring and evaluation of existing programs Lack of coordination and effective communication strategies	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	To develop target training materials

DA2.2.	**Enhance protected area development and management**	By 2029 at least 6 million ha protected By 2020, at least 17% of terrestrial and in land water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of PAs and other effective area-based conservation measures, and integrated into the wider landscape and seascape		KRA7. Promote PNG's Environment Sustainably through actions linked to KRA7.1. Promote PNG's Environment Sustainably – through areas being under legal protection and improved permitting KRA7.2. Manage and reduce the risk of natural disasters – through maintenance of eco-system services. CBD COP 10 Decision X2 (2010) PNG Policy on Protected Areas			PA Registry	Lack of monitoring and evaluation of existing programs Lack of funding	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	Establishment of effective financing system for PAs (Action 1.2.5) Support to gazettement and full establishment of 10 PAs (1.2.1, 1.2.4 and 1.2.5)
DA2.2. 1	PA governance and management	Standard of governance by government in CEPA is improved and strengthened by 2025 A new PA legislation developed by 2025 Related legislation relevant to PA establishment, reviewed and amended by 2025	CEPA	PNG Constitution and National Goals and Directive Principles PNG Vision 2050 National Strategy for Responsible		3,601,667	Establishment of PA roundtables Protected Area Bill	Lack of monitoring and evaluation of existing programs Lack of funding	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	Plan activities through annual implementation plans Do follow-ups, reviews and propose areas of improvement Allocate funding, staffing and
		Develop standard operating procedures by 2025 Integrated provincial (5 years) development plans for eight target provinces to reflect PA management activities, its annual budget and LUPs by 2025		Sustainable Development MTDP 2 MTDP 3 Planning and Monitoring Responsibility Act 2016 CBD SDGs PNG Policy on Protected Areas						additional resources Forge strategic alliances with partners and donors Establish and sustain a committed and dedicated team
DA2.2. 2	Sustainable livelihoods for communities	Improve support for livelihoods within identified PAs by 2023 In the targeted PAs, customary landowners' economic livelihood initiatives are developed/enhanced and supported by 2023 Candidates from targeted PAs are trained in business management, marketing and related initiatives linked to PA management by 2023	CEPA Provincial government Other sector agencies NGOs Private sector Donors	PNG Constitution and National Goals and Directive Principles PNG Vision 2050 National Strategy for Responsible Sustainable Development MTDP 2 MTDP 3 Planning and Monitoring Responsibility Act 2016 CBD SDGs PNG Policy on Protected Areas		4,733,333	Establishment of PA roundtables Protected Area Bill	Lack of monitoring and evaluation of existing programs Lack of coordination and effective communication strategies Lack of funding	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	Plan activities through annual implementation plans Do follow-ups, reviews and propose areas of improvement Allocate funding, staffing and additional resources Forge strategic alliances with partners and donors Establish and sustain a committed and dedicated team
DA2.2. 3	Effective and Adaptive Biodiversity Management	Species management plans developed for selected culturally important species (IUCN, Convention on International Trade in Endangered Species and PNG protected fauna) by 2023 Improve capacity of CEPA by 2023 Improve capacity for provincial administrations, district development	CEPA	PNG Constitution and National Goals and Directive Principles PNG Vision 2050 National Strategy for Responsible Sustainable Development MTDP 2 MTDP 3		3,843,333	Establishment of PA Roundtables Protected Area Bill	Lack of monitoring and evaluation of existing programs Lack of coordination and effective communication strategies Lack of funding	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	Plan activities through annual implementation plans Do follow-ups, reviews and propose areas of improvement Allocate funding, staffing and additional resources
		authorities and LLGs by 2023 Regulations on the appointment of rangers for PAs developed and/or incorporated under PA legislation by 2022 A systematic integrated information system linking a PA register developed by 2022		Planning and Monitoring Responsibility Act 2016 CBD SDGs PNG Policy on Protected Areas						Forge strategic alliances with partners and donors Establish and sustain a committed and dedicated team

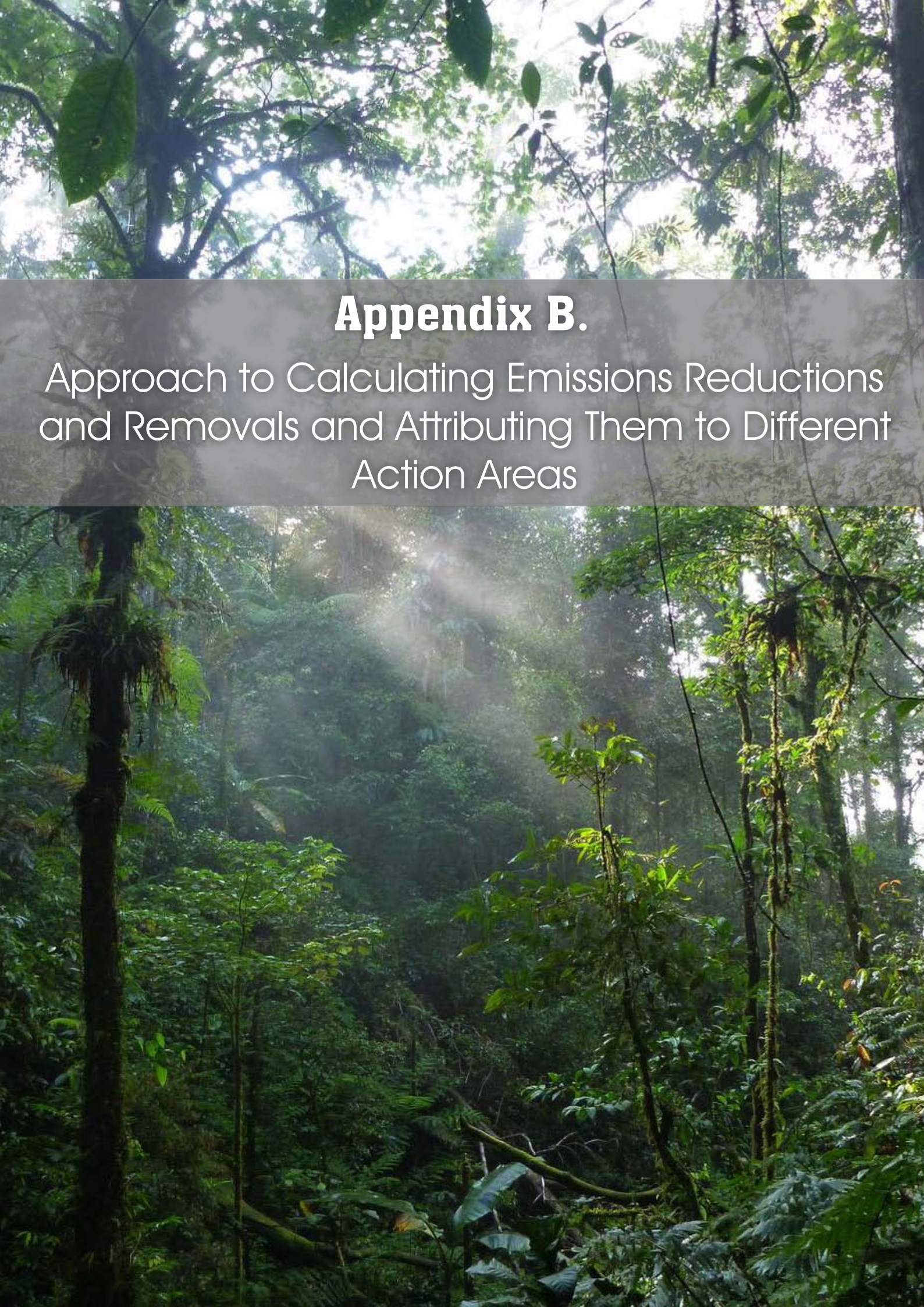
DA2.2.4	Managing the PA network	PNG PAN strengthened by 2026. 20% increase in research partnerships entered into between CEPA and other partners by 2026 A relevant, comprehensive, adequate, representative and resilient PNG PAN is established by 2026 Develop and integrate Biodiversity information System by 2026	CEPA	PNG Constitution of PNG and National Goals and Directive Principles PNG Vision 2050 National Strategy for Responsible Sustainable Development MTDP 2 MTDP 3 Planning and Monitoring Responsibility Act 2016 CBD SDGs PNG Policy on Protected Areas		2,749,333	Establishment of PA Roundtables Protected Area Bill Protected Area Registry	Lack of monitoring and evaluation of existing programs Lack of coordination and effective communication strategies Lack of funding	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	Plan activities through annual implementation plans Do follow-ups, reviews and propose areas of improvement Allocate funding, staffing and additional resources Forge strategic alliances with partners and donors Establish and sustain a committed and dedicated team
DA2.2.5	Sustainable and equitable PA financing	Biodiversity Trust Fund established and operational by 2026 20% increase in small grants funding directly to local PA communities by 2026 All budgets at national and subnational levels to include appropriations for PA by 2026	CEPA	PNG Constitution and National Goals and Directive Principles PNG Vision 2050 National Strategy for Responsible Sustainable Development MTDP 2 MTDP 3 Planning and Monitoring Responsibility Act 2016 CBD SDGs PNG Policy on Protected Areas		3,505,000	Establishment of PA Roundtables Protected Area Bill	Lack of monitoring and evaluation of existing programs Lack of coordination and effective communication strategies Lack of funding	Lukautim Graun Project, USAID GEF6, UNDP GEF7 FOLUR GEF7 STAR, FAO GEF7 STAR, UNEP	Plan activities through annual implementation plans Do follow-ups, reviews and propose areas of improvement Allocate funding, staffing and additional resources Forge strategic alliances with partners and donors Establish and sustain a committed and dedicated team

DA3. Lands Pathway

No	Pathways	Targets	Implementing agency	Policy plan link	Mitigation potential	Estimated investment needs (US$)	Existing progress	Gaps/barriers	Existing support	Key support needs
3.1	**Establish National Sustainable Land Use Planning Framework** Final review and approval of NSLUP Raise awareness on NSLUP Establish SLUP coordination system Develop NSLUP implementation plan Review existing LUPs and information Legal needs for NSLUP implementation Develop regulations to support SLUP	NSLUP approved by NEC by 2022 2 regulations supporting implementation developed by 2023 Draft National LUP developed by 2025	DLPP	PPA 1989 and Regulation NSLUP STaRS Sector plans	Promote and implement sustainable land use and management		Provincial physical planning offices established in a number of provinces Provincial Physical Planning Boards (11 already in place) Province, district, LLG, and ward plans	Different LUPs for different sectors Conflicting and competing land uses No coordination Lack of information Funding	GEF7 – FOLUR New Britain GEF7 STAR – Highlands (UNEP and FAO) EU GCCA - Enga	Establishment of central coordination system for sustainable land use planning that works to bring together existing support linked to land use planning (DA3.1.1)
3.2	**Develop an NLUIS** Establish a central spatial information system that can be used to provide information from across sectors and support planning. Costs include design, development and capacity building	Update Physical Planning Guidelines Update, identify and audit all the LUPs Stakeholders consultations and awareness of LUP information	DLPP	NSLUP Environment Act PPA and Regulations Forest Act Land use stakeholders policies and legislation	Making accurate and adequate LUP information for proper and informed decision making for LUP	3,075,600	Provincial physical planning offices Provincial Physical Planning Boards Province, district, LLG, and ward plans	Different LUPs for different sectors Conflicting and competing land uses No coordination Lack of information Funding	GEF7 – FOLUR New Britain GEF7 STAR – Highlands (UNEP and FAO) EU GCCA - Enga	Technical support to system design
3.3	**Develop spatially explicit subnational development plans**	4 provincial plans, 6 district and 10 ward plans in place by 2025 Draft regulation for subnational development planning in place by 2022	DLPP	NSLUP Environment Act PPA and Regulations Forest Act Land use stakeholders policies and legislation	Coordinated and integrated planning system	7,203,400 Costings of awareness raising, training and roll out of planning process.	Provincial physical planning offices Provincial Physical Planning Board Province, district, LLG, and ward plans PLUSMA – how different levels link DPLLG	Different LUPs for different sectors Conflicting and competing land uses No coordination Lack of information Funding	GEF7 – FOLUR New Britain GEF7 STAR – Highlands (UNEP and FAO) EU GCCA - Enga	Technical support to development of subnational approach Support to coordinate existing development partner initiatives working on subnational land use planning

No	Pathways	Targets	Implementing agency	Policy plan link	Mitigation potential	Estimated investment needs (US$)	Existing progress	Gaps/barriers	Existing support	Key support needs
4.1	**Establish and apply climate-smart agricultural planning and policy framework**								PHARMA PACD MFF GEF7 FOLUR	
4.1.1	Develop updated Climate-Smart National Agricultural Development Policy	Climate-Smart National Agricultural Development Policy by 2023	DAL	MTDP 3 KRA7. Responsible Sustainable Development		500,000	Drafts developed	Lack of financial assistance	PACD, MFF, GEF7 FOLUR all have key components on supporting development of positive enabling policy environment for agri- development	Funding required for conducting wider consultation
4.1.2	Review and updating on central agricultural legislation	Passage of updated agriculture sector legislation by 2023	DAL	MTDP 3 KRA5. Improve Service Delivery KRA6. Improve Governance KRA7. Responsible Sustainable Development		2,000,000 There are two different bills: Agriculture Administration Adjustment Bill and Agriculture Investment Corporation Bill	Drafts developed	Lack of expertise Lack of funding assistance	As above	Hiring of consultants to finalize and review the legislations and conducting wider consultation
4.2	**Strengthen access to and quality of extension systems**								PHARMA, PACD, GEF7 FOLUR	Development of approach to effective financing of extension systems (DA4.2.3)
4.2.1	Develop and test improved training materials	Updated training materials approved by 2025	DAL/National Agriculture Research Institute	MTDP 3 KRA7. Responsible Sustainable Development		4,000,000	Some work has been done	Lack of funding assistance	GEF7 FOLUR has specific focus on supporting extension systems in East New Britain/West New Britain as well as work on sustainable finance of extension, PACD focused on extension for coffee and cocoa, other projects have key elements on supporting enabling environment which may include elements of extension provision development	Funding to conduct research on new planting materials that suits different agroecological zones in the country and development of training manual
4.2.2	Recruit, train and deploy extension officers	296 agriculture extension officers operating in all (296) LLGs by 2029 funded through provincial governments	DA Provincial government	MTDP 3 KRA5. Improve Service Delivery		10,000,000 Costs include resourcing the officers and may spread over 10 years	Some provinces have recruited Research Officer	Lack of funding support from the government Lack of coordination and collaboration	GoPNG Provincial government	Funding/technical assistance
4.2.3	Develop approach to effective financing of extension systems	All mechanisms in place by 2023 to effect the financing of extension services	DAL in collaboration with other line agencies including development partners	MTDP 3 KRA5. Improve Service Delivery			None	Lack of funding support from the government Lack of coordination and collaboration		Funding/technical assistance
4.3	**Strengthen framework for sustainable palm oil development**									Development of action plan
4.3.1	Establish a collaborative framework for sustainable palm oil development	Palm oil action plan agreed by 2022 Climate-smart palm oil policy by 2023	DAL/CCDA /DNPM	KRA 7. Responsible Sustainable Development		2,175,685	A lot of work has been done on development palm oil platform	Changing political environment.	GEF7 FOLUR -------	Full establishment of platform and development of action plan. -
4.3.2	Implement enhanced standards for palm oil development in PNG	By 2024, PNG should be implementing the enhanced standards By 2029, 90% of PNG's palm oil certified sustainable.	DAL in collaboration with key stakeholders	MTDP 3 KRA1. Increase Revenue and Wealth Creation KRA7. Responsible Sustainable Development		10,088,325	None	Lack of resources to conduct compliance, monitoring and evaluation during the implementation phase	None	Require finance, technical and human resource

4.3.3	Support to increases in small holder productivity	By 2025, 50% of all smallholders engaged in support programs By 2029 – 30% increase in productivity per ha from participating smallholders	DAL	MTDP 3 KRA1. Increase Revenue and Wealth Creation KRA7. Responsible Sustainable Development		46,023,056	None	Lack of expertise Lack of resources (finance and equipment/machinery)	None	Finance and training of smallholder farmers
4.4	**Strengthen framework for sustainable cocoa development**									Development of action plan
4.4.1	Establish a collaborative framework for sustainable cocoa development	Cocoa action plan agreed by 2022 Climate-smart cocoa policy by 2023 30% of exports sustainably certified by 2025 60% of exports sustainably certified by 2030	DAL/CCDA /DNPM	KRA7. Responsible Sustainable Development		2,175,685	None	Lack or no funding support	None	Funding support
4.4.2	Development of enhanced traceability systems for cocoa production	Develop a fully functional traceability system for cocoa by 2024	DAL/CCDA /DNPM	KRA7. Responsible Sustainable Development		2,500,000	None	No funding and technical Support	None	Funding and technical support
4.4.3	Support to increases in small holder productivity and market access	By 2029, 100% of the smallholders in the industry must be registered and fully participating in the program 40% increase in productivity per ha of participating smallholders by 2029 20% increase in unit price gained by participating smallholders by 2030	DAL	MTDP 3 KRA1. Increase Revenue and Wealth Creation KRA7. Responsible Sustainable Development		46,023,056	None	Lack of expertise Lack of resources (finance and equipment/machinery)	None	Finance and training of smallholder farmers
4.5	**Strengthen framework for sustainable coffee development**									Development of action plan.
4.5.1	Establishment of a collaborative framework for sustainable coffee development	Coffee action plan agreed by 2022 Climate-smart coffee policy by 2023 30% of exports sustainably certified by 2025 60% of exports sustainably certified by 2030	DAL/CCDA /DNPM	KRA7. Responsible Sustainable Development		2,175,685	None	Lack or no funding support	None	Funding support
4.5.2	Develop enhanced traceability systems for coffee production	Develop a fully functional traceability system for cocoa by 2024	DAL/CCDA /DNPM	KRA7. Responsible Sustainable Development		2,500,000	None	No funding and technical Support	None	Funding and technical support
4.5.3	Support to increases in smallholder productivity	By 2029, 100% of the smallholders in the industry must be registered and fully participating in the program 40% increase in productivity per ha of participating smallholders by 2029 20% increase in unit price gained by participating smallholders by 2030	DAL	MTDP 3 KRA1. Increase Revenue and Wealth Creation KRA7. Responsible Sustainable Development		46,023,056	None	Lack of expertise Lack of resources (finance and equipment/machinery)	None	Finance and training of smallholder farmers



Appendix B.

Approach to Calculating Emissions Reductions and Removals and Attributing Them to Different Action Areas

B.1. ERs from Forest Degradation

ER estimates have been developed based on information contained in PNG's FRL and BUR reporting. The below provides a short summary how these have been estimated within each action area as well as key cross cutting challenges / assumptions that create inherent weaknesses in the analysis.

PNG reported emissions from forest degradation of 29,430 $GgCO_2e$ in 2015. It identified that 92% of this was linked to emissions from commercial logging while 8% came from other sources.

B.1.1. Calculating ERs from commercial logging

This was estimated through the following process:

ERs linked to reducing operations of 'old' timber concessions (DA1.5)

No data on emissions from different concession types is available thus a proxy of timber exports was used to estimate the relative role of different concession types.

In 2015 log exports from TRPs equated to 42% of exports. It is assumed that is it these that would be phased out over the implementation period but that some areas would be reassigned as FMAs and or timber operations would increase in other areas as firms move their focus to other concession types – primarily FMAs. Hence a total reduction of 30% was assumed. This would be achieved based on a linear decline in operations over the ten year period. As such emissions were assumed to reduce by 3% each year over 10 years.

ERs linked to enhanced monitoring and enforcement of timber legality standard (DA1.1).

The current FRL is based on estimate that logging results in a 35% loss of carbon stock. This is based on an average across sample plot areas. Areas that are 'well managed' were identified as resulting in an indicative 30% loss of carbon stock (based on studies by Fox et al). The current estimation thus assumes that all areas are currently 'not well managed' (in line with FRL estimation' but that improved monitoring will result in liner improvements of 10% per year over 10 years to areas progressing to 'well managed' levels of impact (30% loss of carbon stock as opposed to 35%).

It was assumed that improvements would occur in a linear way from 0 to 100% with increases of 10% per annum.

This improvement was applied to the estimated 'remaining' operations after the above discounts for retiring 'old' concessions was achieved.

These calculations are show in the table below.

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total emissions (2015 GgCo2e)	27,076	27,076	27,076	27,076	27,076	27,076	27,076	27,076	27,076	27,076
Removal of old concession types	3%	6%	9%	12%	15%	18%	21%	24%	27%	30%
ERs per annum from removal of old concessions against 2015	677	1,625	2,437	3,249	4,061	4,874	5,686	6,498	7,310	8,123
Remaining emissions	26,399	25,451	24,639	23,827	23,014	22,202	21,390	20,577	19,765	18,953
Reductions from application of TLS	5%	10%	20%	35%	50%	60%	70%	80%	90%	100%
Emissions on which the level of reduction is being applied	1,354	2,708	5,415	9,476	13,538	16,245	18,953	21,660	24,368	27,076
ERs based on improved standards within areas of application	193	387	774	1,354	1,934	2,321	2,708	3,094	3,481	3,867.94
Total annual ERs	**870**	**2,011**	**3,210**	**4,603**	**5,995**	**7,194**	**8,393**	**9,592**	**10,792**	**11,991**

Attributing ERs

The total ERs from this process was then 'attributed' to different action areas based on their estimated level of contribution to delivering these ERs. This attribution process is shown in the table below.

Action area	Attribution	Justification
Forestry pathway totals		
DA1.1. Enhance monitoring and enforcement of timber legality standard	0.2	Based on impact of applying legality standards across operational areas. It is also assumed that application of the standard may 'force' some old concessions to cease/ not restart operation due to requirements for full documentation and higher operating standards.
DA1.2. Regulate small-scale timber (>500m^3 pa)		
DA1.3. Enhance supply of planted timber and reforestation*		
DA1.4. Establish enhanced policy environment for forest governance	0.1	Based on impact of having a clear policy environment to guide forest investment and action
DA1.5. Establish a transition package for 'old' timber concessions	0.3	Based on impact of developing a targeted approach to engaging in old concessions
Environment pathway totals		
DA2.1. Strengthen the application of environmental safeguards	0.1	Based on impact of improved application of environmental regulations on concession areas
DA2.2. Enhanced PA development and management (medium-impact scenario)	0.1	Based on contribution of designation of conservation areas on taking areas of logging concession out of operation
Lands pathway totals		
DA3.1. Establish national sustainable land use planning framework	0.02	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and reclassifying of land away from logging
DA3.2. Establish national sustainable land use planning information system	0.02	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and reclassifying of land away from logging
DA3.3. Develop spatially explicit subnational development plans	0.06	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and reclassifying of land away from logging
Agriculture pathways totals		
DA4.1. Strengthen agricultural planning and policy framework and its application		
DA4.2. Strengthen access to and quality of extension systems	0.04	Based on contribution of improved support to family agriculture in target concession areas helping to support communities move away from logging
DA4.3. Strengthen the framework for sustainable palm oil development	0.02	Based on contribution of improved support to commercial agriculture in target concession areas helping to support communities move away from logging
DA4.4. Strengthen the framework for sustainable cocoa development	0.02	Based on contribution of improved support to commercial agriculture in target concession areas helping to support communities move away from logging
DA4.5. Strengthen the framework for sustainable coffee development	0.02	Based on contribution of improved support to commercial agriculture in target concession areas helping to support communities move away from logging

Notes: * For DA.1.3. (Enhanced supply of planted timber), the calculation was based on planting *Eucalyptus deglupta* with a mean annual increment of 25m3 per annum, wood density of 0.34, resulting in mean annual dry matter biomass growth rate of 8.5m/hectares/year and a ratio of above ground biomass to below-ground biomass of 0.28. It was estimated that 22,000 hectares planted per year (in line with PNGFA targets) with an assumption of a 15% failure rate of newly planted areas, and with thinning at an intensity of 44% of planting occurring after Year 4. The estimates also assumed that no planting occurred within the baseline scenario and no discount was made for potential other land uses and removals linked to these that could occur on plantation land areas. All ERs from this action were allocated to DA1.3, although it is noted that there would be a contribution of other action areas such as land use planning to helping to mobilize land for production.

B.1.2. Calculating ERs from other forest degradation

Other forest degradation was identified as contributing 2,354 $GgCO_2e$ in emissions in 2015.

It was estimated that action across action areas would help to deliver a 50% reduction in this level of emissions with improvements occurring on a linear basis with a 5% improvement per annum.

These ERs were then allocated on the following basis:

Action area	Attribution	Justification
Forestry pathway totals		
DA1.1. Enhance monitoring and enforcement of timber legality standard		
DA1.2. Regulate small-scale timber (>500m^3 pa)	0.1	Based on longer term impact of improvements of small-scale logging operations
DA1.3. Enhance supply of planted timber and reforestation*		
DA1.4. Establish enhanced policy environment for forest governance		
DA1.5. Establish a transition package for 'old' timber concessions		
Environment pathway totals		
DA2.1. Strengthen the application of environmental safeguards		
DA2.2. Enhanced PA development and management (medium-impact scenario)	0.4	Based on contribution of designation of conservation areas on preventing degradation
Lands pathway totals		
DA3.1. Establish national sustainable land use planning framework	0.1	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and reclassifying of land away from other degradation actions
DA3.2. Establish national sustainable land use planning information system	0.2	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and reclassifying of land away from other degradation actions
DA3.3. Develop spatially explicit subnational development plans	0.2	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and reclassifying of land away from other degradation actions
Agriculture pathways totals		
DA4.1. Strengthen agricultural planning and policy framework and its application		
DA4.2. Strengthen access to and quality of extension systems		Based on contribution of improved support to family agriculture in target concession areas helping to support communities move away from other degradation actions
DA4.3. Strengthen the framework for sustainable palm oil development		Based on contribution of improved support to commercial agriculture in target concession areas helping to support communities move away from other degradation actions
DA4.4. Strengthen the framework for sustainable cocoa development		Based on contribution of improved support to commercial agriculture in target concession areas helping to support communities move away from other degradation actions
DA4.5. Strengthen the framework for sustainable coffee development		Based on contribution of improved support to commercial agriculture in target concession areas helping to support communities move away from other degradation actions

B.1.3. Calculating ERs from deforestation

Emissions from deforestation were identified as being 9,594 $GgCO_2e$ in 2015 of which 66% was attributed to shifting agriculture and 34% to impacts of commercial agriculture.

Deforestation from Shifting Agriculture

It was estimated that actions could deliver a 50% reduction in levels of deforestation from shifting agriculture with this applied based on a linear level of improvement of 5% per annum over the implementation period.

These ERs were then attributed to different action areas as shown below:

Action area	Attribution	Justification
Forestry pathway totals		
DA1.1. Enhance monitoring and enforcement of timber legality standard		
DA1.2. Regulate small-scale timber (>500m^3 pa)		
DA1.3. Enhance supply of planted timber and reforestation		
DA1.4. Establish enhanced policy environment for forest governance		
DA1.5. Establish a transition package for 'old' timber concessions		
Environment pathway totals		
DA2.1. Strengthen the application of environmental safeguards		
DA2.2. Enhanced PA development and management (medium-impact scenario)	0.1	Based on contribution of designation of conservation areas on reducing shifting agriculture
Lands pathway totals		
DA3.1. Establish national sustainable land use planning framework	0.075	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and strengthening zoning of agriculture
DA3.2. Establish national sustainable land use planning information system	0.075	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and strengthening zoning of agriculture
DA3.3. Develop spatially explicit subnational development plans	0.2	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and strengthening zoning of agriculture

Agriculture pathways totals		
DA4.1. Strengthen agricultural planning and policy framework and its application		
DA4.2. Strengthen access to and quality of extension systems	0.55	Based on contribution of improved support to family agriculture helping to reduce rates of expansion of area by allowing for improved productivity of existing area
DA4.3. Strengthen the framework for sustainable palm oil development		
DA4.4. Strengthen the framework for sustainable cocoa development		
DA4.5. Strengthen the framework for sustainable coffee development		

Deforestation from Commercial Agriculture

It was estimated that actions could deliver a 50% reduction in levels of deforestation from commercial agriculture with this applied based on a linear level of improvement of 5% per annum over the implementation period.

These ERs were then attributed to different action areas as shown below:

Action area	Attribution	Justification
Forestry pathway totals		
DA1.1. Enhance monitoring and enforcement of timber legality standard		
DA1.2. Regulate small-scale timber (>500m^3 pa)		
DA1.3. Enhance supply of planted timber and reforestation		
DA1.4. Establish enhanced policy environment for forest governance		
DA1.5. Establish a transition package for 'old' timber concessions		
Environment pathway totals		
DA2.1. Strengthen the application of environmental safeguards	0.1	Based on contribution of improved application of environmental safeguards helping to control increases in levels of commercial agricultural expansion
DA2.2. Enhanced PA development and management (medium-impact scenario)	0.05	Based on contribution of designation of conservation areas on reducing areas available for commercial agricultural expansion
Lands pathway totals		
DA3.1. Establish national sustainable land use planning framework	0.05	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and strengthening zoning of agriculture
DA3.2. Establish national sustainable land use planning information system	0.05	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and strengthening zoning of agriculture
DA3.3. Develop spatially explicit subnational development plans	0.1	Based on impact of improved land use planning helping subnational-level engagement on decision making on land use and strengthening zoning of agriculture
Agriculture pathways totals		
DA4.1. Strengthen agricultural planning and policy framework and its application	0.05	Based on impacts of broader policy reforms that affect way commodity boards and DAL interact
DA4.2. Strengthen access to and quality of extension systems		
DA4.3. Strengthen the framework for sustainable palm oil development	0.42	Based on impacts of action plan and policy reform as well as technical support with allocation across commodities (oil palm / cocoa and coffee) based on their relative contributions to levels of land use change in 2015
DA4.4. Strengthen the framework for sustainable cocoa development	0.09	Based on impacts of action plan and policy reform as well as technical support with allocation across commodities (oil palm / cocoa and coffee) based on their relative contributions to levels of land use change in 2015
DA4.5. Strengthen the framework for sustainable coffee development	0.09	Based on impacts of action plan and policy reform as well as technical support with allocation across commodities (oil palm / cocoa and coffee) based on their relative contributions to levels of land use change in 2015

Appendix C.

Recommendations and Findings of Conservation Reviews

C.1. Institutional and Context Review Recommendations

The review presented ten recommendations and linked actions:

1. Role and functions of CEPA is clearly promoted to stakeholders

- **Action 1.1.** CEPA initiate interagency working groups to support action on PAs

2. Provincial-level budgets to be allocated to PA management, planning and supporting provincial-level climate change and environment departments

- **Action 2.1.** Establishment of provincial Protected Area Roundtables
- These are intended to provide a forum to support integration of action on PAs into provincial planning and budgeting as well as identify areas in which capacity building and support from CEPA to subnational governments is needed.
- **Action 2.2.** Formalize signing of MoU with partners
- Signing of formal MoUs with subnational governments will provide a framework for better cooperation and coordination of action as well as increase progress towards the allocation of finance to PA at subnational level.

3. CEPA to provide Advisory support or training to provincial government and communities and reward them for protecting the environment.

- **Action 3.1.** CEPA to provide advisory support or training to provincial governments and communities
- Intended to increase capacity of provincial and other subnational officers to undertaken action on PAs.

4. Legal support

- **Action 4.1.** CEPA to collaborate with legal experts, firms and agencies to support provinces and local communities
- Legal support would help subnational agencies to better address the legal requirements of PA development as well as supporting communities in ensuring that their lands are protected and that they can take steps to formalize those protections.

5. PA law enforcement

- **Action 5.1.** Enforcement and monitoring of PAs is promoted and rangers are trained through a national ranger program – Support to training of rangers as well as community groups on key legislation as well as monitoring and enforcement techniques.

6. Monitoring and reporting obligations of the PA conducted effectively

- **Action 6.1.** CEPA officers and communities are trained to do monitoring and reporting of PAs across the country
- Monitoring training to focus on broad effectiveness and operation of PAs including use of adapted METT.

7. Determination of conservation-compatible economic options

- **Action 7.1.** A list of conservation compatible economic options and conservation standards for PA sites must be developed to demonstrate how the actions are supporting biodiversity conservation and sustainable rural development
- Enhanced guidance on actions that are compatible with PA will improve land use planning as well as helping to provide a framework to help promote investment in these areas and production systems linked to 'conservation commodities'.

8. Partnership and collaboration

- **Action 8.1.**: Signing of MoU with partner organizations for collaborative work
- Signing of MoUs with a range of key government agencies and other partners to enhance collaboration and coordination on conservation action.

9. Key priorities to improve conservation outcomes.

- **Action 9.1**: An Inter-governmental group is established to address policies, legal and conservation issues
- Focused on strengthening PNG's environmental and conservation legislation to support PA operation.

10. PA management support from Environmental NGOs.

- **Action 10.1**: Conservation NGOs work is recognized and supported by the government to achieve better conservation outcomes – This can be achieved through supporting closer links with CEPA as well as developing formats for planning and reporting that help NGOs link more closely with CEPAs work.

C.2. PA Finance and Investment Plan

A review of PA financing has also been conducted, which updates estimates of the baseline costs of maintaining and expanding PNG's PA network. While estimates include support to marine areas, they also indicate the significant financial shortfall within PNG's PA financing structures.

The assessment identifies several potential financing options that can be developed and also notes the importance of establishing an effective governance structure that supports the development of these options.

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