Directorate General of Forest, Coffee, and Industrial Plants (DGFCIP)
Ministry of Agriculture and Fisheries (MAF)
Government of the Democratic Republic of Timor-Leste

Annex 2 of the Funding Proposal for GCF-SAP

Pre-Feasibility Study on the Proposed Project

Community-Based Landscape Management for Reduction of Deforestation and Strengthening of Climate Resilience of Local Livelihoods in Important Watersheds

1st Submission

June 2020

Japan International Cooperation Agency (JICA)

Table of Contents

page

Chapter 1 Introduction 1-1

1.1 Background 1-1

1.2 Objectives of the Pre-F/S 1-2

1.3 Scope of the Study 1-2

1.4 Composition of the Report 1-3

Chapter 2 Climate Change Conditions in Timor-Leste 2-1

2.1 Climate in Timor-Leste 2-1

2.1.1 Rainfall 2-1

2.1.2 Temperature 2-2

2.1.3 ENSO (El Nino and La Nina) 2-2

2.1.4 Climate-related Hazards 2-3

2.2 Future Prospects of Climate Change 2-5

2.2.1 Temperature 2-6

2.2.2 Rainfall 2-6

2.2.3 Extreme Events 2-7

2.3 Potential Risks associated with Climate Change 2-7

Chapter 3 Mitigation and Adaptation Needs in Forest and Agriculture Sectors 3-1

3.1 Estimated GHG Emissions from Land Use Change 3-1

3.2 Climate Change Vulnerability in Timor-Leste 3-2

3.3 Gender Sensitivity in Climate Change Vulnerability 3-4

3.4 Existing Policies, Legislation, and Plans relating to Climate Change 3-7

3.5 Current and Past Interventions for Climate Change Mitigation and Adaptation in the Forest and Agriculture Sectors 3-13

3.6 Adaptation and Mitigation Needs in the Sectors 3-16

Chapter 4 Key Stakeholders in Forest and Watershed Management in Timor-Leste 4-1

4.1 Government Institutions 4-1

4.1.1 Central Level 4-1

4.1.2 Municipal and Post-Administrative Levels 4-7

4.2 Non-government Institutions 4-8

4.2.1 Bilateral and Multilateral Donor Agencies 4-8
4.2.2 NGOs 4-8
4.3 Analysis of the Projects/ Programs implemented by MAF DPs 4-9
4.3.1 On-going Projects 4-9
4.3.2 Key Issues 4-10

Chapter 5 Community-Based Natural Resource Management (CBNRM) Approach..... 5-1
5.1 Background 5-1
5.2 CBNRM Mechanism developed and demonstrated in Timor-Leste 5-2
5.3 Efficacy of the CBNRM Mechanism in Addressing Climate Changes 5-5
5.4 Potential Impacts of the CBNRM Mechanism 5-8
5.5 Built-in Incentives of the CBNRM Mechanism for Sustainability 5-12
5.6 CBNRM Roadmap drafted by GDFCIP 5-14

Chapter 6 Present Conditions of the Target Watersheds 6-1
6.1 Selection of the Target Watersheds 6-1
6.2 Natural Conditions in the Target Watersheds 6-4
6.2.1 Climates in the Watersheds 6-4
6.2.2 Topographic Conditions of the Watersheds 6-9
6.2.3 Status of Forests and Trends in Deforestation and Forest Degradation in the Watersheds 6-10
6.2.4 Estimated GHG Emission from Deforestation and Forest Degradation in the Watersheds 6-11
6.3 Socio-economic Conditions in the Target Watersheds 6-12
6.3.1 Administrative Conditions and Demography 6-12
6.3.2 Local livelihoods in the Watersheds 6-13
6.3.3 Traditional Customs 6-18
6.3.4 Village Council 6-19
6.3.5 Gender 6-20
6.4 Perception on the Threats of Climate Change and Natural Disasters 6-22
6.5 Key Issues in Mitigation and Adaptation 6-25

Chapter 7 Justification and Rationale of the Proposed Project 7-1
7.1 Driver Analysis of Deforestation and Forest Degradation 7-1

7.2 Major Barriers to Mitigation 7-2
7.3 Future Potential Risks without Project Conditions 7-5
7.4 Mitigative Interventions to be Taken 7-7
7.5 Climate Rationale of the Proposed Project 7-8
7.6 Scalability and Replicability of the Proposed Project 7-9
7.6.1 Scalability of the Proposed Project based on the CBNRM Project Experiences . 7-9
7.6.2 Exist Strategy of the Proposed Project 7-10
7.7 Country Ownership of the Proposed Project 7-12
7.8 Knowledge Sharing and Potential for Private Sector Investment 7-13
7.8.1 Sharing of Knowledge and Lessons Learned 7-13
7.8.2 Creation of an Enabling Environment for Private Sector Investment 7-14

Chapter 8 Proposed Project 8-1
8.1 Objectives of the Proposed Project 8-1
8.2 Basic Concepts of the Proposed Project 8-1
8.3 Components of the Proposed Project 8-5
8.3.1 Overall Picture of the Components 8-5
8.3.2 Component 1: Establishment of People Driven Sustainable NRM System 8-6
8.3.3 Component 2: Reinforcement of Food Security and Livelihood Diversification through Implementation of Micro Programs/ FFSs on Sustainable and Climate Resilient Livelihoods Effective for Reducing CO_2 Emissions 8-9
8.3.4 Component 3: Institutional and Capacity Development for Scale-up of CBNRM/ CF beyond the Target Areas 8-18
8.3.5 Component 4: Impact Assessment 8-23
8.3.6 Project Management 8-26
8.3.7 Technical Assistant/ External Consultants 8-28

Chapter 9 Implementation Plan of the Proposed Project 9-1
9.1 Proposed Implementation Procedures 9-1
9.2 Institutional Framework for Implementation of the Project 9-2
9.2.1 Organizational Structure for Implementation 9-2
9.2.2 Roles and Responsibilities of the Main Actors 9-5
9.3 Procurement Plan 9-7
9.3.1 Implementation Methods 9-7

9.3.2 Procurement Plan 9-8
9.4 Operation and Maintenance Plan 9-10
9.5 Financial Management 9-10
9.6 Implementation Schedule 9-12

Chapter 10 Environmental and Social Considerations 10-1
10.1 Regulatory Frameworks and Systems referred and used for the Environmental and Social Screening 10-1
10.2 Outline of the Project Components and Activities 10-4
10.3 Environmental and Social Risk Screening 10-5
10.3.1 Present Environmental and Social Conditions of the Target Watersheds 10-5
10.3.2 Guidelines used for Environmental and Social Risk Screening 10-7
10.3.3 Results of Environmental and Social Risk Screening 10-7
10.3.4 Classification of the Project Risk 10-9
10.3.5 Results of the Initial Consultations with Stakeholders at Municipal Level 10-9
10.4 Environmental and Social Action Plan 10-9
10.5 Stakeholder Engagement Plan 10-11
10.6 Grievance Redress Mechanism 10-12
10.6.1 Grievance Redress Mechanism at the Project Level 10-12
10.6.2 Grievance Redress Mechanism of the Executing Entity 10-16
10.6.3 Grievance Redress Mechanism of AE/JICA 10-16
10.7 Draft Monitoring Plan 10-17

Chapter 11 Cost Estimate 11-1
11.1 Pre-conditions for Cost Estimates 11-1
11.1.1 Conditions and Assumptions 11-1
11.1.2 Cost Component 11-1
11.2 Results of Cost Estimation 11-2
11.3 Financial Plan (Sources of Project Funds) 11-3
11.3.1 Concepts of Cost Sharing 11-3
11.3.2 Cost Estimates by the Financing Parties 11-4
11.4 Annual Cost Disbursement Schedules 11-5

Chapter 12 Economic Assessment 12-1

12.1 Economic Benefit of the Project 12-1

12.1.1 Summary of the Results of Estimation of Economic Benefits 12-1

12.1.2 Benefit from Reduced CO_2 Emissions through Reduction of Forest Degradation 12-4

12.1.3 Benefit from Increased Maize Production in Trained Famers' Farms 12-8

12.1.4 Benefit from Carbon Sequestration by Reforestation/ Afforestation Activities ... 12-9

12.2 Economic Cost 12-11

12.3 Cost-Benefit Analysis 12-12

12.3.1 Cash Flow Analysis 12-12

12.3.2 Sensitivity Analysis 12-12

12.4 Potential Impact on CO_2 Emissions from Deforestation 12-13

12.5 Other Intangible Benefits/Impacts of the Project 12-14

12.6 Financial Impacts on Household Economy 12-15

Chapter 13 Risk Assessment 13-1

13.1 Potential Risks 13-1

13.2 Proposed Mitigation Measures against the Potential Risks 13-3

List of Tables

Table 1 Data and Information of International and National NGOs in Timor-Leste ..... T - 1

Table 2 Estimation of Annual Average CO_2 Emissions in the Watersheds ..... T - 6

Table 3 Evaluation of the Post-administratives concerned with the Target Watersheds ..... T - 7

Table 4 Checklist for Forestry Project (for Component 1 and Activity 2.1 of the proposed project) ..... T - 8

Table 5 Checklist for Agriculture Project (for Activity 2.1 of the proposed project) ..... T - 12

Table 6 Effect of CO_2 reducing forest degradation by implementation of PLUP ..... T - 16

Table 7 Areas of Dense Forests in the Target Watersheds under the With-Project and Without-Project Conditions ..... T - 16

Table 8 CO_2 Emission from forest degradation in the Target Watersheds under the without-project condition ..... T - 17

Table 9 Estimated CO_2 emission reductions to be credited ..... T - 18

Table 10 Annual and Total Benefits from CO_2 Reduction through Protection of Dense Forests ..... T - 18

Table 11 Results of the Cash Flow Analysis of the Proposed Project ..... T - 19

Table 12 Results of Sensitivity Analyses ..... T - 21

Table 1-1 Composition of the Pre-F/S Report 1-3

Table 2-1 Occurrence of ENSO Events in Timor-Leste (1950-2015)..... 2-3

Table 2-2 Occurrence of Climate-related Hazards in Timor-Leste (1950-2015) 2-3

Table 2-3 Historical Losses due to Floods by Municipality (1992-2013)..... 2-3

Table 2-4 Historical Losses due to Landslides by Municipality (1992-2013) ... 2-4

Table 2-5 Historical Losses due to Strong Winds by Municipality(1992-2013) 2-5

Table 2-6 Potential Impacts on Crop Production 2-7

Table 2-7 Potential Impacts on Water Resources..... 2-8

Table 3-1 Changes in Estimated GHG Emissions from 2005 to 2010..... 3-1

Table 3-2 Change of forest area and carbon stock between 2003 and 2012 3-2

Table 3-3 Carbon and CO_2 emission from deforestation and forest degradation between 2003 and 2012 3-2

Table 3-4 Five Categories used by the Vulnerability Assessment in the INC 2010 3-3

Table 3-5	Division of Labor between Women and Men in Crop Production in Five Municipalities in 2011	3-5
Table 3-6	Female Village Chiefs (VC) by Municipality	3-6
Table 3-7	Female OPS by Municipality	3-6
Table 3-8	Activities proposed for Food Security and Ecosystem Protection/ Restoration	3-8
Table 3-9	List of Major Projects relating to Climate Change in the Forest and Agriculture Sectors	3-13
Table 3-10	Priority Adaptation Measures proposed in NAPA	3-17
Table 4-1	Major Function of the National Directorates under DGFCIP	4-1
Table 4-2	Major Function of the Relevant National Directorates under MAF	4-3
Table 4-3	Major Function of the Relevant National Directorates under the Secretary of State for Environment	4-5
Table 4-4	Major Tasks given to Forest Guards and Extension Officers	4-7
Table 4-5	List of MAF DPs' Project in Forestry and Agriculture Sectors	4-8
Table 4-6	List of NGOs working in the Forest and Agriculture Sectors in Timor-Leste	4-9
Table 4-7	Key Interventions by the Development Partners at Suco Level	4-10
Table 5-1	Key Processes and Steps/Activities associated with the respective Processes	5-3
Table 5-2	Standard Timeframes for the establishment of the CBNRM mechanism	5-4
Table 5-3	Impacts of PLUP Key Activities on the Capacity Development of the Community	5-5
Table 5-4	Results of Impact Assessment Survey	5-9
Table 5-5	Changes in Incidence of Unsustainable NRM Practices by CBNRM	5-13
Table 5-6	Changes in Farming and Animal Raising Practices by CBNRM	5-13
Table 5-7	Impact on Local Livelihoods by CBNRM	5-13
Table 5-8	Outline of the Draft CBNRM Roadmap	5-14
Table 6-1	Evaluation Criteria for Assessment of the Watersheds	6-1
Table 6-2	Key Features of the High Priority Watersheds (including the highly degraded watersheds)	6-1
Table 6-3	Evaluation of the High Priority Watersheds for the Proposed Projects	6-3
Table 6-4	Summary of Possible Climate Risks and Potential Effect on GHG Emission	6-4

Table 6-5	Precipitations and Temperatures in Municipalities overlapped with the Target Watersheds	6-5
Table 6-6	Future Projections of Temperatures in Municipalities overlapping the Target Watersheds	6-8
Table 6-7	Possible Future Changes in Precipitation and Temperature under the Scenario 4.5	6-9
Table 6-8	Slope Conditions in the Watersheds	6-9
Table 6-9	Definition and Characteristics of Nine Types of Forest and Land Use	6-10
Table 6-10	Forest Covers and Land Use in the Four Watersheds in 2012	6-10
Table 6-11	Changes in Forests between 2003 and 2012	6-11
Table 6-12	Rates of Forest Degradation and Deforestation (2003-2012)	6-11
Table 6-13	Carbon and CO_2 emission from Forest Area each watershed between 2003 and 2012	6-11
Table 6-14	Average annual CO_2 Emission in the Watersheds between 2003 and 2012	6-12
Table 6-15	Administrative and Demographic Conditions of the Four Watersheds	6-12
Table 6-16	Population Growth in the Municipalities overlapping the Target Watersheds	6-13
Table 6-17	Major features of agriculture in the target watersheds	6-13
Table 6-18	Average Land Holding Size of the Farms in the Sampled Villages	6-14
Table 6-19	Average yields and cultivated area of major crops in the sampled villages	6-14
Table 6-20	Causes of Low Productivity with Climate Change Factors	6-14
Table 6-21	Average number of major animals per HH and Ha in the municipality	6-15
Table 6-22	Grazing Places of Major Animals in the Sampled Villages	6-15
Table 6-23	Source of Incomes of the HHs in the Sampled Villages	6-16
Table 6-24	Source of Drinking Water	6-17
Table 6-25	Source of Energy for lighting	6-17
Table 6-26	Source of Energy for Cooking	6-17
Table 6-27	Roofing Materials (Municipalities of Target Watersheds)	6-18
Table 6-28	Functions of Village Leaders and Council	6-19
Table 6-29	Division of Labour between Women and Men	6-20
Table 6-30	Process of Focus Group Discussion held by JICA CBNRM Project	6-22

Table 6-31	Threats prioritized by Women and Men Groups in the Sampled Villages	6-22
Table 6-32	Historical Trend of Climate Issues and Natural Disasters	6-23
Table 6-33	Some Comments by the Sampled Villagers on Major Climate Changes and Disasters	6-24
Table 6-34	Major Drivers of Deforestation and Forest Degradation	6-25
Table 6-35	Major Vulnerabilities at Community Level	6-26
Table 7-1	Expected Climate Variation and Potential Impact in the Target Watersheds	7-2
Table 7-2	Major Barriers to Mitigation and Proposed Activities for Improvement	7-3
Table 7-3	Expected Climate Variation and Potential Impacts on Local Livelihoods in the Watersheds	7-6
Table 7-4	Number of the Villages being/ will be Covered by Different Projects in the 14 watersheds	7-10
Table 7-5	List of recent examples of JICA-supported Natural Environment Conservation sector Projects in Asian and Pacific Island Countries	7-13
Table 8-1	Evaluation of the Post-administratives concerned with the Target Watersheds	8-3
Table 8-2	Target Villages and Post-administratives selected for the Project	8-4
Table 8-3	Total Forest Areas, Households, and Population in the Target Villages	8-5
Table 8-4	Proposed Components and Activities of the Proposed Project	8-5
Table 8-5	Targets of the Activities under Component 1	8-7
Table 8-6	Outline of the Major Sub-activities of Activities 1.1 to 1.3	8-7
Table 8-7	Annual Allocation of the Villages targeted by the Activities	8-9
Table 8-8	Targets of Activity 2.1	8-11
Table 8-9	Target MAF Municipal Office of Activity 2.4	8-11
Table 8-10	Outline of the Major Sub-activities of Activity2.1	8-11
Table 8-11	Key Techniques introduced in One batch of Hands-on Training	8-12
Table 8-12	Outline of the Major Sub-activities of Activity 2.3	8-14
Table 8-13	Outline of the Major Sub-activities of Activity 2.4	8-15
Table 8-14	Tools and Equipment to be Procured and Distributed in Activity 2.1	8-16
Table 8-15	Annual Allocation of the Villages targeted by the Activities	8-17
Table 8-16	Target Groups of the Activities	8-19
Table 8-17	Major Sub-activities of Activity 3.1	8-19

Table 8-18	Tentative Training Plans	8-21
Table 8-19	Tentative Plan of the National/International Seminars	8-22
Table 8-20	Implementation Period and Schedule	8-22
Table 8-21	Major Sub-activities of Activity 4.2	8-24
Table 8-22	Major Program Management (PM) Activities	8-26
Table 9-1	Proposed Implementation Procedures	9-1
Table 9-2	Prioritization of the Post-Administratives	9-2
Table 9-3	Results of Prioritization of the Post-Administratives	9-2
Table 9-4	Proposed Constitution of Central Steering Committee	9-4
Table 9-5	Proposed Constitution of Central Project Monitoring Team	9-5
Table 9-6	Proposed Constitution of Municipal Project Monitoring Team	9-5
Table 9-7	Roles and Responsibilities of the Relevant Organizations in the Structure	9-5
Table 9-8	Implementation Methods of the Components/Activities	9-7
Table 9-9	Procurement Items and Methods	9-8
Table 9-10	Procurement of International and National Consultants by JICA TL Office	9-10
Table 10-1	Legislation and Standards relating to ESM of the GoTL	10-1
Table 10-2	Environmental Risk Categories defined by Decree Law 5/2011	10-2
Table 10-3	Requirements to be fulfilled in the EIA Procedures	10-3
Table 10-4	Target Components and Applicable Screening Instruments	10-4
Table 10-5	Environmental and Social Baseline of the Target Watersheds	10-6
Table 10-6	Summary of the Results of the Environmental and Social Risk Screening	10-7
Table 10-7	Result of Risk Categorization	10-9
Table 10-8	Draft Environmental and Social Action Plan (Annex 12 to GCF funding proposal)	10-10
Table 10-9	Draft Local Stakeholder Engagement Plan	10-11
Table 10-10	Outline of Grievance Redress Mechanism proposed for the Project	10-12
Table 10-11	Proposed GRM at the Project Level	10-14
Table 10-12	Draft Environmental Monitoring Plan	10-17
Table 11-1	Cost Components of the Project	11-1
Table 11-2	Cost Breakdown of the Project Cost	11-2
Table 11-3	Financial Plan	11-4

Table 11-4	Financial Plan for each Financing Party	11-5
Table 11-5	Summary of Annual Cost Schedule for GCF fund	11-5
Table 11-6	Summary of Annual Cost Schedule for the GoTL	11-6
Table 11-7	Summary of Annual Cost Schedule for JICA	11-6
Table 11-8	Summary of Annual Cost Schedule for the Entire Project	11-7
Table 12-1	Overall Framework of Project Evaluation	12-1
Table 12-2	Summary of Methodologies for Estimation of the Project Benefits	12-2
Table 12-3	Summary of the Economic Benefits	12-4
Table 12-4	Results of Calculation of Benefit from Reduced CO_2 Emission	12-4
Table 12-5	Result of Calculation of Benefit from Increased Maize Production	12-8
Table 12-6	Result of Calculation of Benefit from Carbon Sequestration by Reforestation/ Afforestation Activities	12-10
Table 12-7	Summary of Methodologies for Estimation of the Project Benefits	12-11
Table 12-8	Result of Economic Analysis each watershed	12-12
Table 12-9	Result of Sensitivity Analysis of the Economic Analysis of the Project	12-13
Table 12-10	Estimated Changes in Forest Areas in the Watersheds	12-13
Table 12-11	Reduced CO_2 Emissions from Deforestation	12-14
Table 12-12	Summary of Intangible Benefits	12-14
Table 12-13	Household Budget Analysis of Case 1	12-15
Table 12-14	Household Budget Analysis of Case 2	12-16
Table 13-1	Potential Risks of the Project	13-1
Table 13-2	Proposed Mitigation Measures	13-3

List of Figures

Figure 1	Location Maps of the Target Watersheds, Post-Administratives, and Villages	F - 1
Figure 2-1	Average Rainfall Distribution in Timor-Leste	2-1
Figure 2-2	Annual Rainfall Variation from 1953 to 2009 at Dili Rain Gauge Station	2-2
Figure 2-3	Annual Temperature in Different Locations in Timor-Leste	2-2
Figure 2-4	Drought Hazard Potential Map of Timor-Leste	2-5

Figure 2-5	Projections of Monthly Mean Temperature Anomalies in Timor-Leste based on the Multi-Model Ensemble Mean under RCP Scenarios and SRES A1B Scenario	2-6
Figure 2-6	Projected Changes of Monthly Rainfall from 2011 to 2100 based on 4 RCP Scenarios	2-7
Figure 2-7	Impacts on Crop Production made by El Nino in 2015/2016	2-8
Figure 2-8	Impacts on Water Sources made by El Nino in 2015/2016	2-9
Figure 2-9	Results of the Study on Water Balance Projection in Soils (2011-2100)	2-9
Figure 2-10	Risk Level of Malaria and Dengue in 1990-2010	2-10
Figure 2-11	Level of Future Risk of Malaria under the Different Scenarios (2011-2100)	2-11
Figure 2-12	Level of Future Risk of Dengue Fever under the Different Scenarios (2011-2100)	2-11
Figure 3-1	Vulnerability Index Map in Timor-Leste	3-3
Figure 3-2	Livelihood Climate Resilience	3-4
Figure 3-3	Location Map of Major Climate Change-related Projects implemented by MAF DPs	3-16
Figure 4-1	Organizational Structures of DGFCIP and its National Directorates concerned	4-1
Figure 4-2	Typical Organizational Structures of MAF Municipal Office	4-7
Figure 4-3	Step Strategic Exit Strategy of the proposed project	4-12
Figure 5-1	Overall Process of Introduction and Establishment of the CBNRM Mechanism	5-3
Figure 5-2	Correspondence of training agenda under SUFP to CC risks/impacts	5-7
Figure 6-1	Priority Watersheds in the Country	6-2
Figure 6-2	Rainfalls in the Country	6-5
Figure 6-3	Projections of Annual Rainfall Changes in 2000 and 2050	6-6
Figure 6-4	Level of Probability of 20 CMIP5 GCM Models under the RCP Scenarios in Projecting Seasonal Rainfall Increases in Timor-Leste	6-7
Figure 6-5	Projections of Future Changes in Annual Rainfalls in the Target Watersheds	6-8
Figure 6-6	Projections of Future Changes in Mean Temperatures in the Target Watersheds	6-9
Figure 6-7	% loss in enterprise sale due to outage	6-17
Figure 6-8	Spousal Violence by Municipality	6-22

Figure 7-1	Results of the Analysis of Major Drivers of Deforestation and Forest Degradation	7-1
Figure 7-2	Major Barriers against the Government Interventions addressing Forest Degradation	7-3
Figure 7-3	Overall Picture of Possible Climate Variability and Potential Risks..	7-6
Figure 7-4	Proportions of Villages being/ will be Covered by Different Projects in the 14 watersheds	7-10
Figure 7-5	3-Step Strategic Approach to Future Expansion (As Exist Strategy).	7-11
Figure 8-1	Basic Concepts of the Proposed Project (Theory of Change under the Project)	8-2
Figure 8-2	Overall Picture of the Project Components and Activities	8-6
Figure 9-1	Proposed Organizational Structure for Implementation of the Roadmap	9-3
Figure 9-2	Proposed Overall Financial Management of the Project	9-11
Figure 9-3	Summary of Draft Implementation Schedule of the Project.....	9-12
Figure 10-1	Flow of EIA Procedure of GoTL.....	10-3
Figure 10-2	Outline of the Procedures in JICA's GRM	10-16
Figure 12-1	Cash Flow of Economic Costs and Benefits of the Project	12-12

List of Appendixes

Appendix 5-1 Draft CBNRM Roadmap submitted to DGFCIP

Appendix 5-2 Reports on the consultation meetings

Appendix 8-1 Operation Manual for Establishment of the CBNRM Mechanism at Suco Level

Appendix 8-2 Manual for Formation of the Watershed Management Council

1. Introduction

1.1 Background

Timor-Leste is one of the Least Developed Countries (LDCs) and Small Island Developing States (SIDS) in East Asia. It is a post-conflict society with a fast-growing population. Due to its geographical location, topography, and socio-economic conditions, the country is ranked 12th most vulnerable countries at risk of disaster in the world[1]. A majority of communities, particularly in rural areas, heavily rely on subsistence agriculture for their livelihoods. Increasing climatic variability and unpredictability, particularly in relation to rainfall and extreme weather events, presents a significant risk to the lives and livelihoods of rural people. Timor-Leste is prone to many climate-induced hazards including floods, landslides, and drought which have resulted in serious damage to local livelihoods.

The total greenhouse gas (GHG) emissions of Timor-Leste in 2010 were 1.48 million Mt CO_2 eq, which is less than 0.01% of global GHG emissions. Though its share is negligible in the global context, Timor-Leste expresses its commitments to contribute to the reduction of GHG emissions in the National Determined Contribution (NDC) submitted in 2016 to UNFCCC. Among others, the forestry-related interventions, such as rehabilitation of degraded land, customary forestry, REDD+, and reforestation, are one of the major potential mitigation options proposed by the Government of Timor-Leste (GoTL), as approximately 59% of the total area of the country is covered with forests and deforestation and forest degradation have rapidly progressed in the country over the decades[2].

Timor-Leste used to be fully covered with forests in the middle of the 19th century, but continuous burning and opening of forests for farming or plantation has resulted in the loss of the primary forests. At present, very few primary forests exist, and most of the existing forests are secondary with or without high canopy density (mix of dense and sparse forests). The recent survey made by Japan International Cooperation System (JICS) on forest resources in the country indicates that approximately 184,000 ha of forests had disappeared between 2013 and 2012 and around 171,000 ha of dense forests had been converted into sparse forests for the same period[3]. Forest Resource Assessment made by FAO (FRA 2015) also indicates a similar deforestation status that forest area has been decreased by 112,000 ha between 2005 and 2015. A rapid pace of deforestation and forest degradation is a critical issue that the GoTL, specifically the Directorate General of Forest, Coffee, and Industrial Plants (DGFCIP) of the Ministry of Agriculture and Fisheries (MAF) has addressed since independence.

Japan International Cooperation Agency (JICA) has assisted MAF, particularly the National Directorate of Forest and Watershed Management (NDFWM) under DGFCIP in the introduction and promotion of community-based sustainable forest and natural resource management (CBNRM) approach to reduce deforestation and forest degradation in Timor-Leste, particularly in the upper part of the national important watersheds, since 2005. A joint project named the Project for Community-Based Sustainable Natural Resource Management (hereinafter referred to as "the CBNRM Project") developed the methodology for establishment of an effective and operational village-level mechanism of community-based natural resource management (hereinafter referred to as "the CBNRM Mechanism") in 2015

[1] United Nations University-EHS, 2016, World Risk Report 2016
[2] The National Forest Conservation Plan drafted by the Consultant from JICS (2013)
[3] The National Forest Conservation Plan drafted by the Consultant from JICS (2013)

after field trials in several villages. Since then, the effectiveness of the CBNRM mechanism crowded-in other donor's interests, and has been introduced by several MAF development partners, such as FAO, GIZ, WB, etc., in more than 30 villages in the country as the main tool for sustainable forest management in the country.

Because of its effectiveness and applicability to the socio-economic and cultural context of Timor-Leste, DGFCIP has drafted a 10-year strategic plan for CBNRM promotion (CBNRM Roadmap) intending to mainstream the CBNRM mechanism as a national program to protect existing forests, especially dense forests, in the 14 priority watersheds in the country.

DGFCIP and JICA as well as other MAF development partners have realized that the CBNRM mechanism is effective in not only reducing CO_2 emissions from deforestation and forest degradation by protecting existing forests but also strengthening climate resilience of vulnerable rural communities who heavily rely on subsistence farming for their livelihoods. The mechanism encompasses the introduction of series of techniques/ skills for livelihood improvement, such as climate resilient agriculture, agroforestry, pomiculture, and small-scale enterprise development, which help vulnerable communities minimize potential climate risks on crop production, diversify crops and sources of income, and reduce further encroachment on existing forests for crop production. Experiences of the JICA Project also demonstrated sustainable natural resource and forest management can increase local resilience as forest products/ non-timber forest products are generally used for alternative sources of income as well as emergency food for local communities.

Consequently, DGFCIP decided to implement the CBNRM Roadmap in the context of climate change actions with financial assistance from Green Climate Fund (GCF), so that both the concepts could be mainstreamed as the government top priorities. DGFCIP and JICA as Accredit Entity submitted the concept note (C/N) of the proposed project to apply for he Simplified Approval Process (SAP) of GCF in March 2019. A pre-feasibility study (Pre-F/S) was conducted as part of the process of formulating a funding proposal of the proposed project after receiving GCF comments on the C/N. This is the Pre-F/S report developed as an annex of the funding proposal submitted to GCF.

1.2 Objectives of the Pre-F/S

The main objective of the pre-feasibility study is to assess the viability of the proposed project in terms of the soundness of its technical designs, costs and benefits, social and environmental impacts, rationale/ justification for the proposed interventions, legal and regulatory frameworks which back up the project, and institutional as well as financial aspects.

1.3 Scope of the Study

(1) Data used for the Study

The pre-feasibility study was mainly made by analyzing existing data and information collected from secondary sources, such as Timor-Leste's Initial National Communication, Timor-Leste's Nationally Determined Contribution, National Adaptation Program of Action, Forest Conservation Plan, and draft CBNRM Roadmap, to name a few. To supplement the secondary data, a field level interview survey was made in the selected villages in the target watersheds. Moreover, the results of the impact survey made by the JICACBNRM Project were fully used for estimation of the potential impacts of the project.

(2) Assessments made for the Pre-F/S

To assess the viability of the proposed project, the following assessments and analyses were conducted in the process of the Pre-F/S:

a. Assessment of the climate change conditions including the needs of climate change mitigation and adaptation measures in the country;
b. Analysis of major stakeholders, policy, and regulatory frameworks in the relevant sectors;
c. Analysis of current situations in target watersheds;
d. Assessment of climate risks and major barriers to be addressed for effective climate change mitigation and adaptation measures;
e. Clarification of rationale and justification for the project;
f. Formulation of sound designs of the project with a theory of change;
g. Development of an effective implementation plan including an institutional framework for implementation;
h. Assessment of economic viability of the project by conducting a cost-benefit analysis;
g. Assessment of potential environmental and social impacts caused by the project; and
h. Assessment of potential risks which may affect the project implementation.

(3) Period of the Pre-F/S

The Pre-F/S was conducted from May 2019 to May 2020.

1.4 Composition of the Report

The Pre-F/S report comprises 13 chapters. The outline of the Pre-F/S report is summarized in the table below.

Table 1-1 Composition of the Pre-F/S Report

Chapter	Title	Major topics discussed in the chapter
Chapter 1	Introduction	■ Background of the proposed project ■ Data used for Pre-F/S
Chapter 2	Climate Change Conditions in Timor-Leste	■ Climate change conditions in Timor-Leste including potential climate-related risks
Chapter 3	Mitigation and Adaptation Needs in Forest and Agriculture Sector	■ Estimated GHG emissions from LUCF ■ Climate change vulnerability, Gender sensitivity ■ Relevant national policy and regulatory frameworks ■ Past and on-going interventions for climate change mitigation and adaptation in forest and agriculture sectors
Chapter 4	Key Stakeholders in Forest and Watershed Management in Timor-Leste	■ Key stakeholders in forest and watershed management in Timor-Leste ■ Results of the stakeholder analysis
Chapter 5	Community-Based Natural Resource Management (CBNRM) Approach	■ Outline of the CBNRM mechanism/ approach adopted by the proposed project ■ Outline of the CBNRM Roadmap drafted by DGFCIP
Chapter 6	Present Conditions of the Target Watersheds	■ Results of the selection of the target watersheds in terms of climate-related risks ■ Climate conditions and potential risks in the target watersheds Natural and social conditions of the target watersheds ■ Key issues in mitigation and adaptation in the target watersheds
Chapter 7	Justification and Rationale of the Proposed Project	■ Future potential risks ■ Major barriers to adaptation and mitigation, Climate rationale of the project
Chapter 8	Proposed Project	■ Goal, objectives, and basic concepts of the project ■ Proposed components of the project
Chapter 9	Implementation Plan of the Proposed Project	■ Proposed implementation procedures ■ Institutional framework for implementation of the project with proposed roles and responsibilities of the stakeholders ■ Procurement plan ■ Financial management ■ Implementation schedule

Chapter	Title	Major topics discussed in the chapter
Chapter 10	Environmental and Social Considerations	■ Regulatory frameworks and systems for environmental and social screening ■ Results of environmental and social risk screening ■ Environmental and social action plan ■ Stakeholder engagement plan ■ Grievance Redress Mechanism
Chapter 11	Cost Estimate	■ Results of cost estimation ■ Disbursement schedule
Chapter 12	Economic Assessment	■ Economic benefit ■ Economic cost ■ Cost-benefit analysis
Chapter 13	Risk Assessment	■ Potential risks ■ Proposed mitigation measures against the potential risks

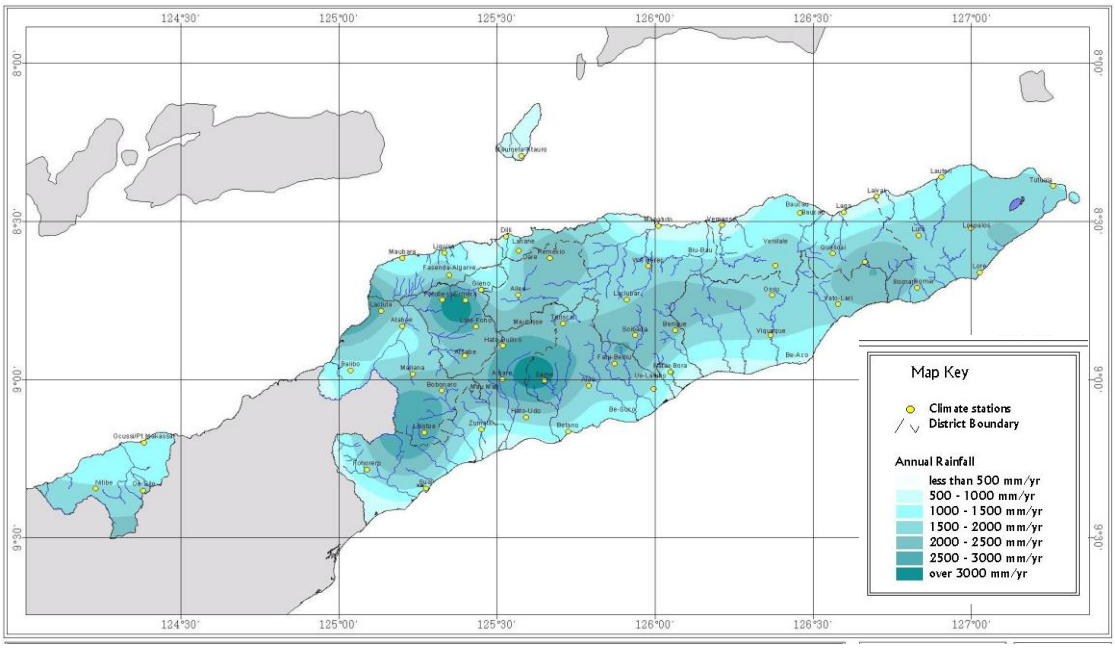
Source: JICA (2020)

2. Climate Change Conditions in Timor-Leste

2.1 Climate in Timor-Leste

2.1.1 Rainfall

The climate in Timor-Leste is significantly affected by the western pacific monsoon which brings a marked wet season from November/December to June followed by a dry season from June to November. The rainfall patterns vary with geographical locations between the north and south of the country. The northern part of the country is influenced by the Northern Monomodal Rainfall pattern, which has 4 to 6 months of the wet season from November/ December to April/May, while the southern part experiences the Southern Bimodal Rainfall pattern, of which the rainy season is prolonged for 7 to 9 months between November and June/July with two peak periods, namely December and May. Annual rainfall varies across the country from less than 1,000 mm in the north coast to more than 2,500 mm in the highlands in the central west. In general, the annual rainfall in the southern part of the country is higher than that in the northern part. The rainfall distribution map in the country is shown below.

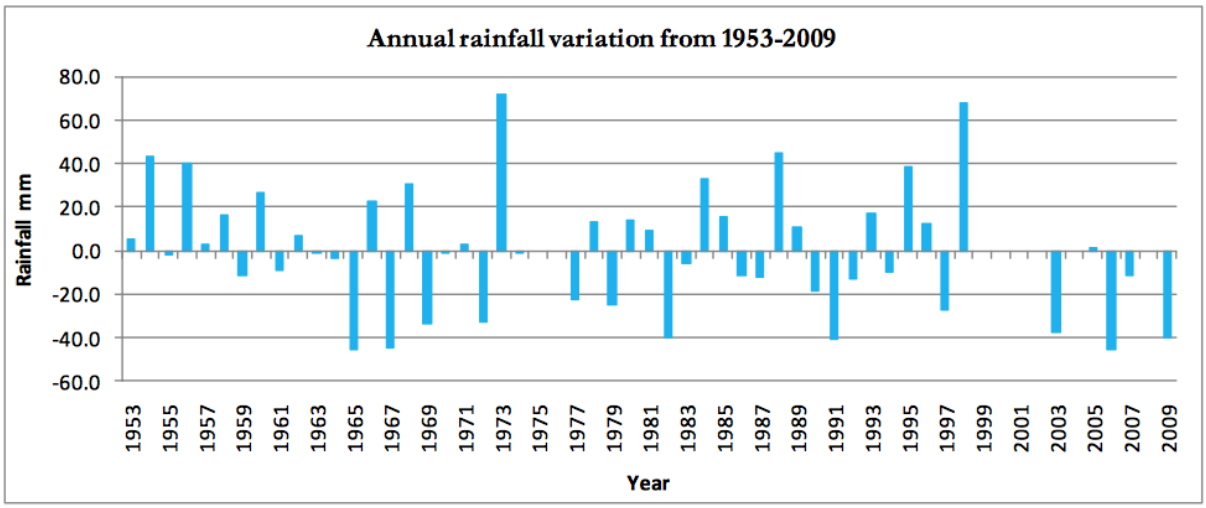


Source: Agriculture and Land-Use Geographic Information System Project, 2007

Figure 2-1 Average Rainfall Distribution in Timor-Leste

The inter-annual rainfall variability is highly dependent to the occurrence of El Nino and La Nina events. The variability has led to climate-related events, such as heavy rainfall and drought, which have often caused significant damage to agricultural crops and infrastructure particularly in rural areas of the country.

The figure below shows the annual rainfall variation from 1953 to 1998 at Dili rain gauge station. It suggests that year-to-year rainfall variability is significant, though data in some years are not available. In addition, rainfall is not equally distributed even in wet months and intensity varies considerably (Keefer, 2000).

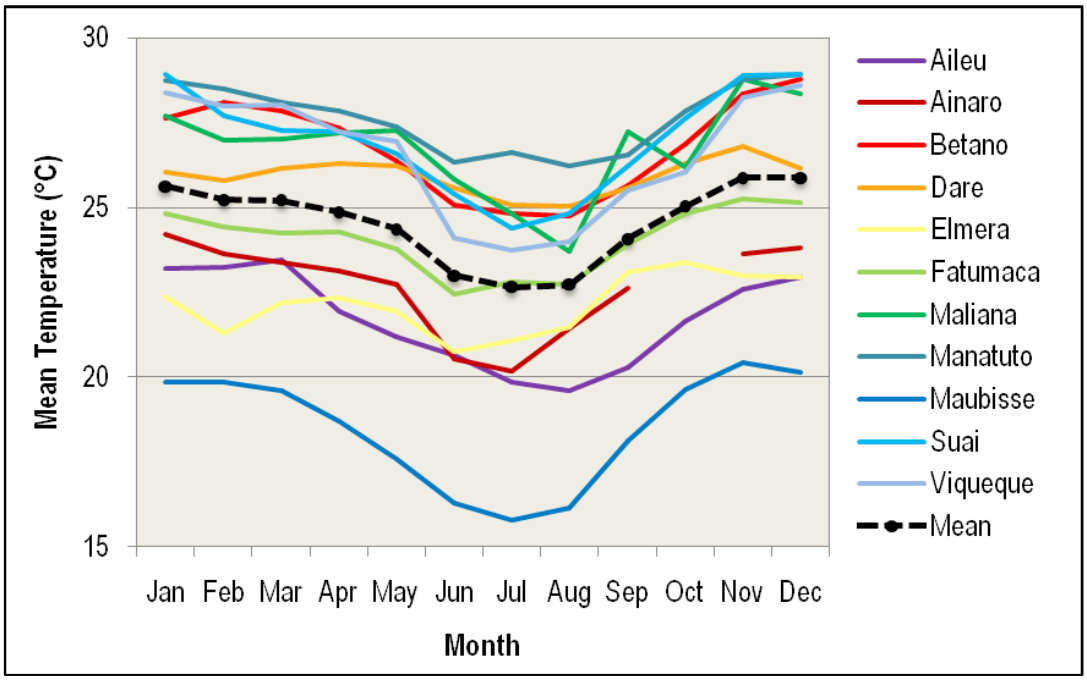


Source: NDMG, 2011

Figure 2-2 Annual Rainfall Variation from 1953 to 2009 at Dili Rain Gauge Station

2.1.2 Temperature

Timor-Leste is under the tropical climate which has less seasonal changes in temperature throughout a year. The annual mean temperature in the country vary with the altitude of the locations. It ranges from 27 C at sea level to 15 C in the mountains. As shown in the figure below, July is the coolest month, while October and November are the hottest months of the year.



Source: Timor-Leste's Initial National Communication under UNFCCC, State Secretary of Environment, GoTL, 2014

Figure 2-3 Annual Temperature in Different Locations in Timor-Leste

2.1.3 ENSO (El Nino and La Nina)

El Nino Southern Oscillation (ENSO) is a crucial factor influencing the rainfall patterns in the country. Timor-Leste has experienced both El Nino and La Nina event periodically over decades as shown below.

Table 2-1 Occurrence of ENSO Events in Timor-Leste (1950-2015)

Enso Event	Year of Occurrence
El Nino	1957, 1965, 1972, 1982, 1987, 1991, 1997, 2002, 2009, 2015
La Nina	1955, 1964, 1971, 1973, 1975, 1988, 1999, 2006, 2010

Source: Presentation (Country Report) by National Directorate of Meteorology and Geography, GoTL, 2017

The following are some key features of the ENSO's influence in Timor-Leste.[4]

- El Nino and La Nina events significantly cause climate variability, particularly the timing and amount of rainfall.
- In El Nino years, the rainy season starts late and ends earlier than the normal year, while the same is prolonged in La Nina years.
- The annual rainfall become less in El Nino years, while that in La Nina years is higher than the one in normal years.
- The rainfall pattern is also fluctuated by the ENSO events. High rainfalls are sometimes observed in February and March in El Nino years.

2.1.4 Climate-related Hazards

The country is exposed to several types of climate hazards, such as flood, landslide, drought, and strong wind, to name a few. The table below shows the number of major events happening in the country between 2002 and 2013.

Table 2-2 Occurrence of Climate-related Hazards in Timor-Leste (1950-2015)

Event	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Drought		1											1
Fire	2	8	4				1	40	20	29	55	22	181
Flood	1	10			1	7	4	7	88	36	25	75	254
Landslide		1						4	16	12	9	6	48
Strong Wind	3	3	5		3	3	12	32	93	47	74	33	308
Total	8	25	10	0	6	15	17	84	221	129	164	138	817

Source: Timor-Leste Disaster Management Reference Handbook, 2016

(1) Flood

Heavy rains during monsoon period have often caused floods in lowland areas in the country, particularly when cyclones hit the country. Floods have given severe damage to houses and infrastructure and led to the fatal cases in a worst-case situation. More than 14,000 people have been affected by floods for the last two decades in the country. Among the 13 municipalities, Covalima, Dili, Manufahi, and Manatuto are prone to flooding as shown below.

Table 2-3 Historical Losses due to Floods by Municipality (1992-2013)

Municipality	Houses destroyed (Units	Houses damaged (Units)	Victims (Persons)	People affected (Persons)
Aileu	2	8	11	10
Ainaro	5	310	312	906
Baucau		10	3	10
Bobonaro		15	38	8
Covalima	650	5,312	5,998	5,036
Dili	6	5,478	1,625	3,264
Ermera		168	162	162
Lautem		275	275	245
Liquica	1	56	75	140

[4] National Adaptation Programme of Action (NAPA) on Climate Change, Ministry for Economy and Development, GoTL,2010

Municipality	Houses destroyed (Units	Houses damaged (Units)	Victims (Persons)	People affected (Persons)
Manatuto		386	125	1,451
Manufahi	21	1,540	2,095	2,963
Oecusse		73	147	73
Viqueque	1	23	24	23
Total	686	13,654	10,890	14,291

Source: Timor-Leste Disaster Management Reference Handbook, 2016

(2) Landslide

Landslide is another crucial issue which rural communities in hilly and mountainous areas have faced. Due to steep terrain conditions and acute deforestation with improper land management of agricultural lands, the occurrence of such an event is commonly observed in almost all the upland villages. The events have caused damage to farms and infrastructure as well as houses in the severe cases. The table below shows the historical losses due to landslide by municipality between 1992 and 2013. As shown below, about 400 people have been adversely affected by landslides over the last two decades.

Table 2-4 Historical Losses due to Landslides by Municipality (1992-2013)

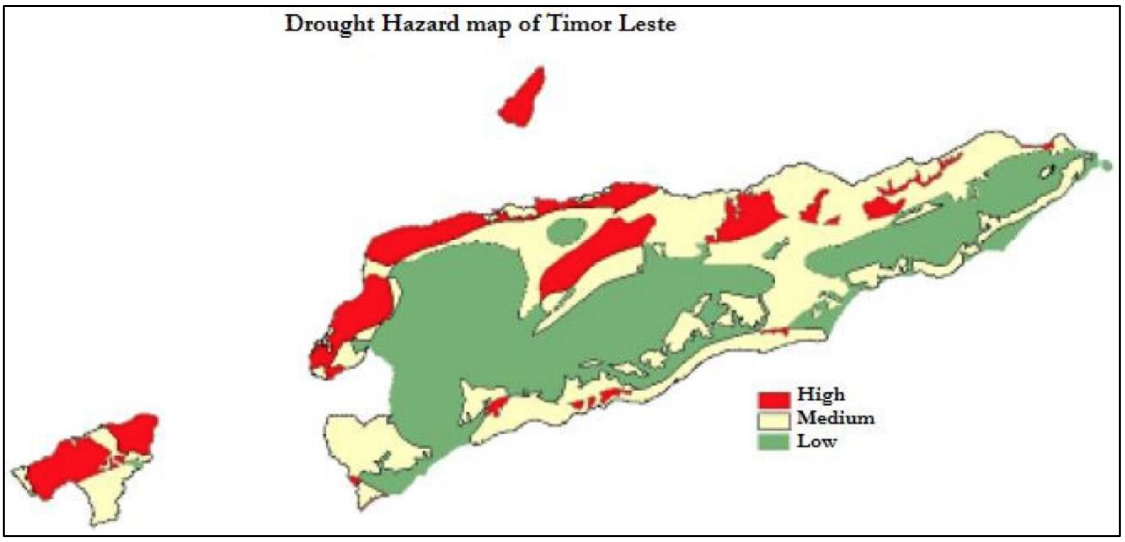
Municipality	Houses destroyed (Units	Houses damaged (Units)	Victims (Persons)	People affected (Persons)
Aileu	0	15	0	15
Ainaro	0	95	0	36
Baucau	25	19	44	44
Bobonaro	0	10	0	10
Covalima	0	54	54	41
Dili	8	41	116	135
Ermera	0	1	0	0
Lautem	0	2	2	2
Liquica	0	0	0	0
Manatuto	4	18	96	103
Manufahi	0	0	0	0
Oecusse	0	2	2	2
Viqueque	0	0	0	0
Total	37	257	314	388

Source: Timor-Leste Disaster Management Reference Handbook, 2016

(3) Drought

Drought is a recurring phenomenon in Timor-Leste, particularly the northern coast of the country and Oecusse. In general, drought and dry spells during the rainy season have often happened in El Nino years and cause significant crop failure in maize and cassava production, which led to severe food shortage in hilly and mountainous areas in the country. For example, the dry season in 2015 was exacerbated by El Nino affecting 400,000 people in Covalima, Oecusse, Baucau, Viqueque, and Lautem[5]. The drought hazard potential map of the country is shown below.

[5] Timor-Leste Disaster Management Reference Handbook, Center for Excellence in Disaster Management & Humanitarian Assistance 2019



Source: UNDP, 2010

Figure 2-4 Drought Hazard Potential Map of Timor-Leste

(4) Strong wind

Strong winds have often caused damage to crops and houses in hilly and mountainous areas and are mainly attributed to tropical cyclones often happening during the rainy season (October to May). From 2002 to 2011, the country experienced a total of 19 strong wind events, which adversely affected more than 2,000 individuals and damaged more than 1,800 houses[6]. Although strong winds have not directly caused death to human, it has severely affected vulnerable communities by damaging their houses, knocking down infrastructure (e.g., power lines and electricity poles), and damaging major crops (e.g., rice, maize, and coffee). As shown in the table below, over 6,000 people throughout the country have been adversely affected by strong winds between 1992 and 2013. Among others, Ainaro Municipality is subject to strong winds, as more than 70% of the total affected people live in Ainaro Municipality.

Table 2-5 Historical Losses due to Strong Winds by Municipality (1992-2013)

Municipality	Houses destroyed (Units	Houses damaged (Units)	Victims (Persons)	People affected (Persons)
Aileu	3	7	4	7
Ainaro	38	1,415	1,571	4,538
Baucau	1	65	54	100
Bobonaro	61	30	89	272
Covalima	0	110	0	78
Dili	3	86	267	99
Ermera	3	306	364	266
Lautem	0	57	82	59
Liquica	0	30	86	0
Manatuto	1	17	14	5
Manufahi	2	436	439	238
Oecusse	0	43	43	1
Viqueque	17	210	223	403
Total	129	2,812	3,236	6,066

Source: Timor-Leste Disaster Management Reference Handbook, 2016

2.2 Future Prospects of Climate Change

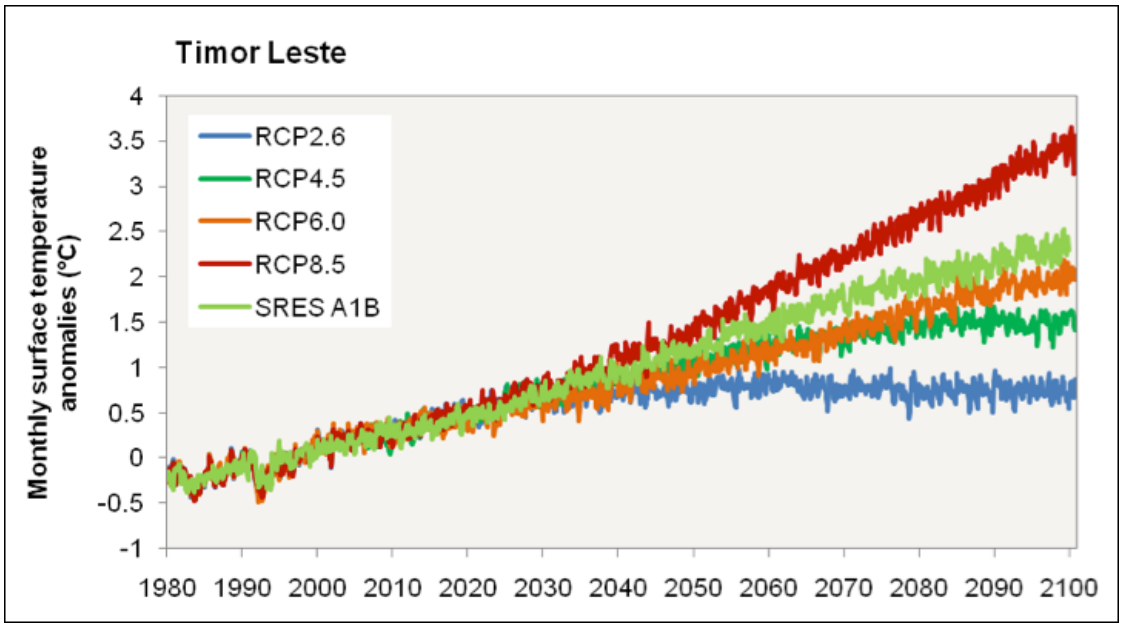
The initial national communication of Timor-Leste, which was submitted to UNFCCC in 2014, conducted the detailed studies on future projection of climate change in the country. One of the studies presented in the report made the projections by using Global Climate Models of the

[6] Country Report Climate Risk Management in Timor-Leste, UNDP, 2013

Climate Model Inter-comparison Project 5 (CMIP 5 GCM) based on the four types of emission scenarios: RCP 2.6 (490 ppm CO2e in 2100), RCP 4.5 (650 ppm CO2e in 2100), RCP 6.5 (850 ppm CO2e in 2100), and RCP 8.5 (1,370 ppm CO2e in 2100). Some highlights of the projections made by the study are summarized in the sections below.

2.2.1 Temperature

The annual mean temperature in Timor-Leste has increased consistently at a rate of about 0.016 C per annum and is likely to continue to increase at the same pace. The mean temperature increases up to 2035 is predicted not to exceed 1°C under all the scenarios. From 2035 to 2100, the projected temperature increase will range from 0.5°C to around 3.5°C depending on the emission scenarios. Under the worst scenario or high emission scenario, the temperature increase is predicted to reach 3~3.5°C by 2100. The following figure shows the projections of monthly mean temperature changes in Timor-Leste under four RCP scenarios.



Source: Timor Leste's Initial National Communication, State Secretariat for Environment, GoTL, 2014

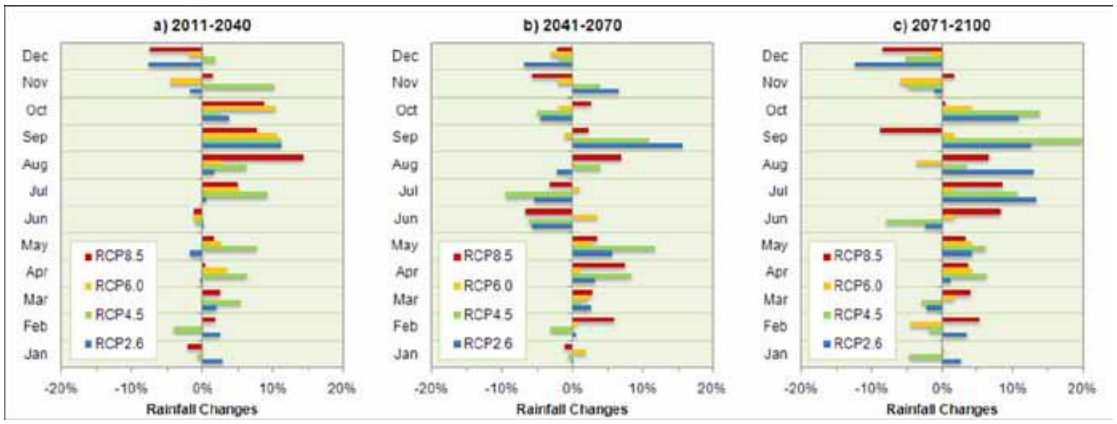
Figure 2-5 Projections of Monthly Mean Temperature Anomalies in Timor-Leste based on the Multi-Model Ensemble Mean under RCP Scenarios and SRES A1B Scenario

2.2.2 Rainfall

The spatial patterns of rainfall in the country are expected to change in the future. Under the least emission (RCP 2.6) scenario, the rainfall areas may be constantly reduced in the western and southern parts of the country from 2011 to 2100, while the same in the northern coast and central part of the country may increase. Similar trends are predicted in the projections under the RCP 6.0 scenario. Under the highest emission (RCP 8.5) scenario, the rainfall area may be expanded in the western part of the country, which has the highest rainfall during the rainy season, while the same in the northern coast may be reduced for the period from 2020 to 2100.

The projections also indicate that the rainfall pattern may be changed in the dry season and transition period, particularly from July to October in the periods from 2011 to 2040 and 2071-2100. The rainfall during the same months may increase by more than 10% as compared to the current situations. In the period from 2041-2070, rainfall is expected to increase during the transition periods (March-May and September), while the same is projected to become less in June and July. Under all the scenarios, rainfall in November and December, which are the initial

months of the rainy season, is expected to reduce between 2011 and 2100. The projected changes of monthly rainfall in Timor-Leste under the different scenarios are shown below.



Source: Timor Leste's Initial National Communication, State Secretariat for Environment, GoTL, 2014

Figure 2-6 Projected Changes of Monthly Rainfall from 2011 to 2100 based on 4 RCP Scenarios

Likewise, the onsets of the rainy and dry seasons are expected to be changed significantly in future. The projections indicate that the rainy season may shift from early to late November in most of the parts of the country, while the onset of the dry season may be changed from the beginning to the middle/end of April.

2.2.3 Extreme Events

The projections indicate that the frequency of extreme rainfall events is likely to be less, but the intensity of the events may be higher or severer. On the other hand, the frequency of extreme heat wave events is expected to increase and the length of the same could be prolonged.

2.3 Potential Risks associated with Climate Change

(1) Possible Impact on Crop Production

Agriculture is one of the important sectors in Timor-Leste, as more than 80% of the economically working population engage in the same sector. The increase of rainfall variability, such as the change in the onset of the rainy season and change of rainfall patterns in not only the rainy season but also the dry season, may cause significant impacts on crop production, especially in areas where there is no irrigation water supply system in place.

The situations may get worse in El Nino and La Nina years, as such events will reduce rainfall or prolong dry spells and bring long and heavy rains during the rainy season, respectively. It is also noted that crop production will be adversely affected by extreme climate events, which are often associated with ENSO events. Due to continuous heavy rains, the possibility of occurrence of flood and landslide is likely to increase in La Nina years. The following table shows potential impacts associated with climate change particularly on crop production.

Table 2-6 Potential Impacts on Crop Production

Factor	Possible Climate Risks	Potential Adverse Impacts on Crop Production
Temperature	■ Increase in minimum temperature in the growing period	■ Some crops may get damage due to high temperature in the growing season, while some may be able to increase the yields.
	■ Increase of temperature in the growing period.	■ The growth of crops may be affected due to a shortage of water. ■ The incident of pest infestation may increase; therefore, crop production may be adversely affected. ■ Livestock productivity may reduce due to high heat,

Factor	Possible Climate Risks	Potential Adverse Impacts on Crop Production
		particularly in the dry season.
Rainfall	■ Strong rains	■ The risk of land degradation or loss of soil fertility may be heightened due to the increase of surface soil erosion.
	■ Fluctuation or shortage of rainfall during the rainy season	■ It can significantly affect the growth of crops, particularly in the initial stage, and often cause crop failure.
	■ Long rains in the growing period and post-harvesting season	■ It can cause damage to root systems of crops and may cause crop failure. ■ It may prevent from maize being fully dried and cause a significant loss of maize grains during storage.
Winds	■ Strong winds	■ It can cause damage to maize growth and lower the productivity.

Source: Climate Risk Management in Timor-Leste, UNDP, 2013, partially adapted by the JICACBNRM Project (2019)

In fact, the country had significant negative impacts on crop production in the El Nino event in 2015/2016. The GoTL with assistance from UN-World Food Programme (WFP) conducted a rapid assessment of the impacts on crop production in the country. The figure below shows the crop impacts made in 2015/2016. Almost all the parts of the country except Dili had moderate to significant negative impacts owing to El Nino. Especially, the eastern and southern coastal parts of the country had severe damage to crop production.

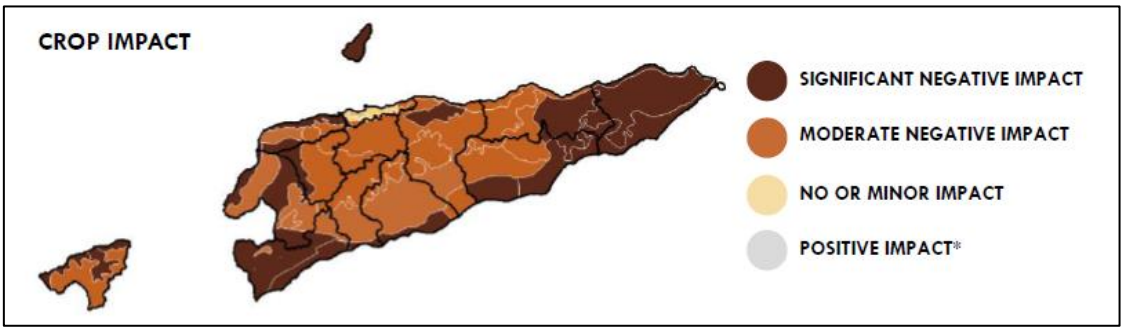


Figure 2-7 Impacts on Crop Production made by El Nino in 2015/2016

Source: Consolidated Livelihood Exercise for Analyzing Resilience, GoTL and WFP

(2) Possible Impact on Water Resources

Water resources, namely surface and ground water, are predicted to be influenced by climate change, due to increase of temperature and changes in rainfall patterns. Some potential impacts on water resources are summarized below.

Table 2-7 Potential Impacts on Water Resources

Factor	Possible Climate Risks	Potential Adverse Impacts on Water Resources
Temperature	■ Increase in temperatures	■ Water runoff and surface water in rivers/ stream and ponds may be reduced o due to increase in evaporation. ■ Water used for irrigation or livestock raising may be reduced; hence, the crop and livestock production may be adversely affected.
Rainfall	■ Shortage of rain	■ It can lead to a shortage of water at natural springs used as drinking water by rural communities, particularly in hilly and mountainous areas.
	■ Long rains	■ It can cause contamination in water sources due to landslide and soil erosion in hilly and mountainous areas, and floods and saltwater intrusion in lowland areas.

Source: Climate Risk Management in Timor-Leste, UNDP, 2013, partially adapted by the JICACBNRM Project (2019)

As shown above, the water supply in hilly and mountainous areas in the country will be significantly affected by climate change. Proper landscape management at watershed level is

requisite for reduction of potential negative impact on local livelihoods.

Likewise, the impacts of El Nino in 2015/2016 on water resources were assessed by the GoTL. The eastern and northern coastal parts in the country had significant impacts on water availability, while the mountainous areas in central and southern parts had moderately negative impacts on water sources as illustrated below.

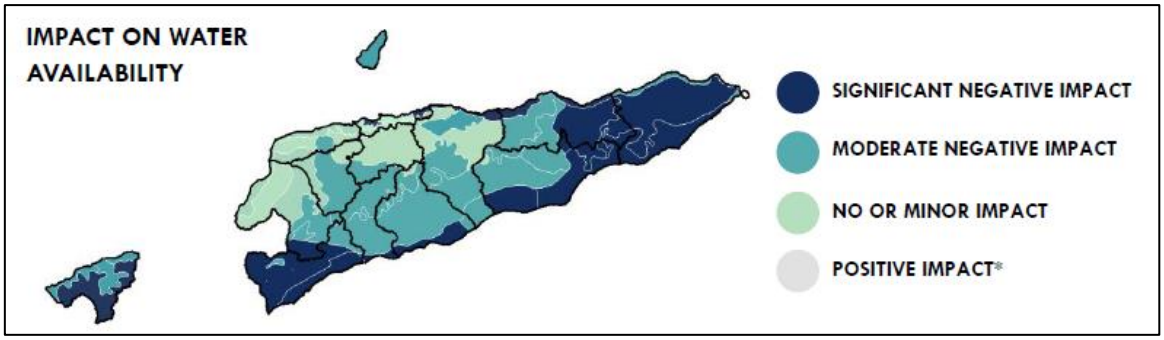
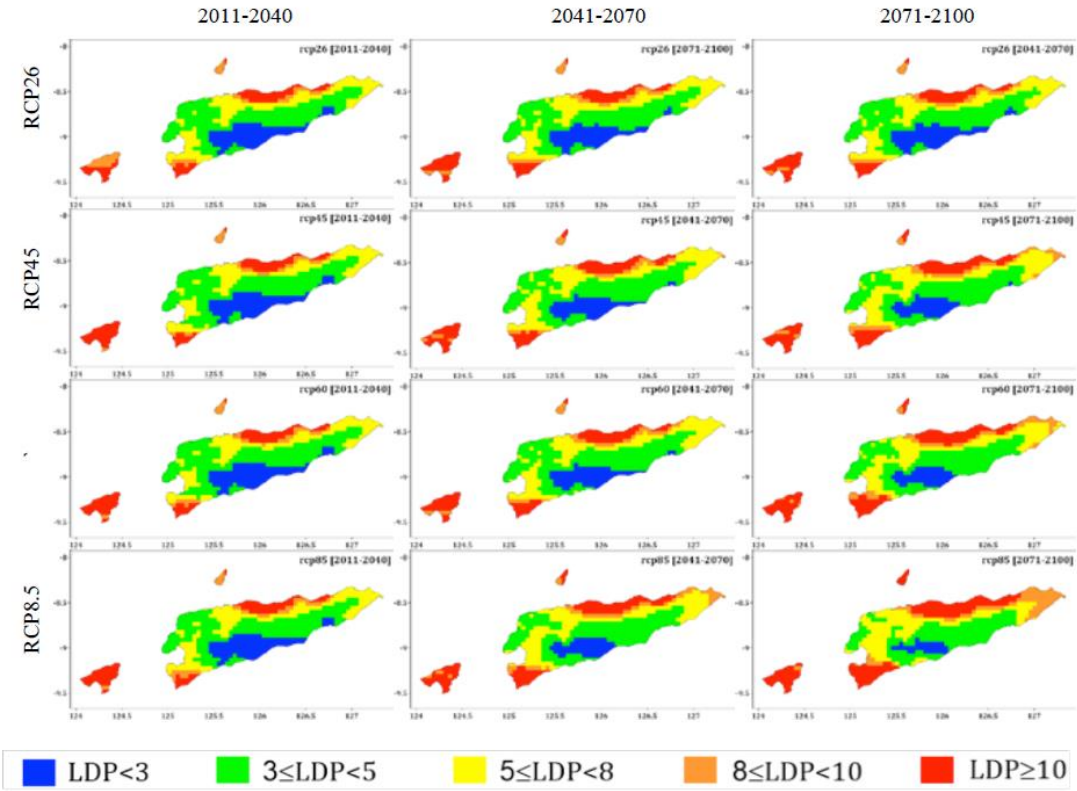


Figure 2-8 Impacts on Water Sources made by El Nino in 2015/2016

Source: Consolidated Livelihood Exercise for Analyzing Resilience, GoTL and WFP

(3) Possible Impact on Land Use

The water balance in soils in the country was also studied in the Initial National Communication (INC) to assess the climate change impacts on land use. The results suggest that the dry spells may increase throughout the country, and among others, the driest area (the area with more than 10 months of dry period: LPD>10) may expand in Manatuto, Covalima, and Baucau. The results of the study are shown below.



Source: Timor Leste's Initial National Communication, State Secretariat for Environment, GoTL, 2014

Note: LPD means the length of dry period, where "LPD<3" is the area with less than 3 months of dry period, while "LPD>10" is the area with more than 10 months of dry period.

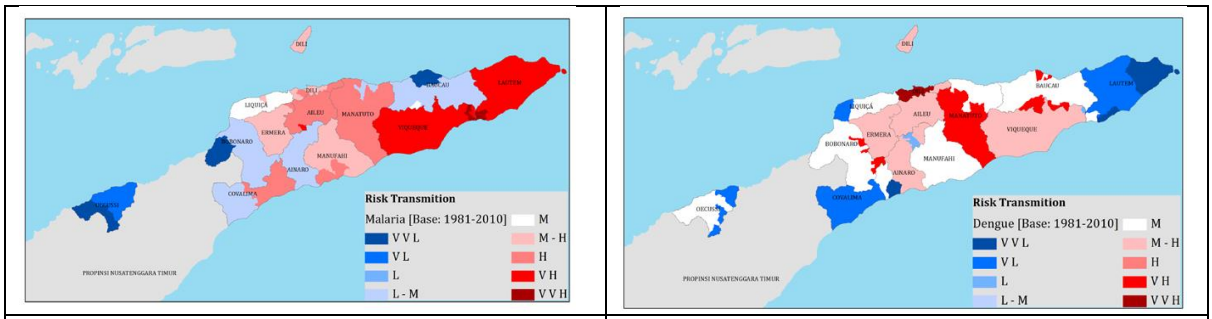
Figure 2-9 Results of the Study on Water Balance Projection in Soils (2011-2100)

The study indicates that the areas under UDP>10 may not be able to use for not only agricultural purposes but also reforestation. Furthermore, the potential risk of forest fire will significantly increase in almost all the municipalities, except the part of Manufahi and Ainaro which are under LDP<3 (areas with less than 3 months of dry period).

(4) Possible Impact on Health

Climate and weather variability will pose many risks to human health in the country. Households may suffer from displacement, water shortage, injury, and mortality due to floods and landslides, which intensity and frequency is predicted to increase in future. Floods and landslide often contaminate drinking water for local communities and cause outbreak of water borne diseases, such as diarrhea and typhoid. A shortage of water, crop failure, and livestock mortality, attributed to severe drought, will cause indirect but significant adverse impacts on human health.

Increase of incidence of vector-borne diseases, such as dengue and malaria, is another health concern due to the increase of temperature attributed to climate change. The municipalities of Viqueque and Lautem have the highest malaria rates and greatest risk of future increases, while Manatuto is most exposed to dengue[7]. The figures below show the municipality-wise risk level of malaria and dengue fever in 1990-2010.



Risk Level of Malaria	Risk Level of Dengue Fever

Figure 2-10 Risk Level of Malaria and Dengue in 1990-2010

Source: Timor Leste's Initial National Communication, State Secretariat for Environment, GoTL, 2014

The future risks of both the diseases are also evaluated based on the different emission scenarios as shown below.

[7] Climate Risk in Timor-Leste: County Profile, USAID, 2017

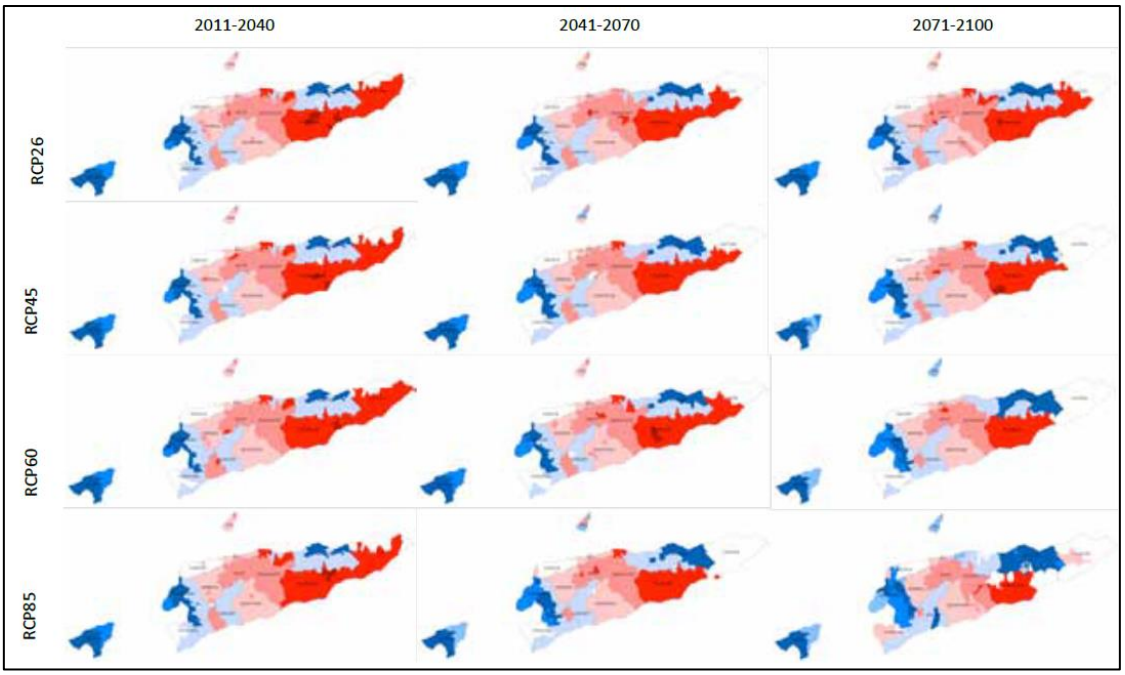


Figure 2-11 Level of Future Risk of Malaria under the Different Scenarios (2011-2100)
Source: Timor Leste's Initial National Communication, State Secretariat for Environment, GoTL, 2014

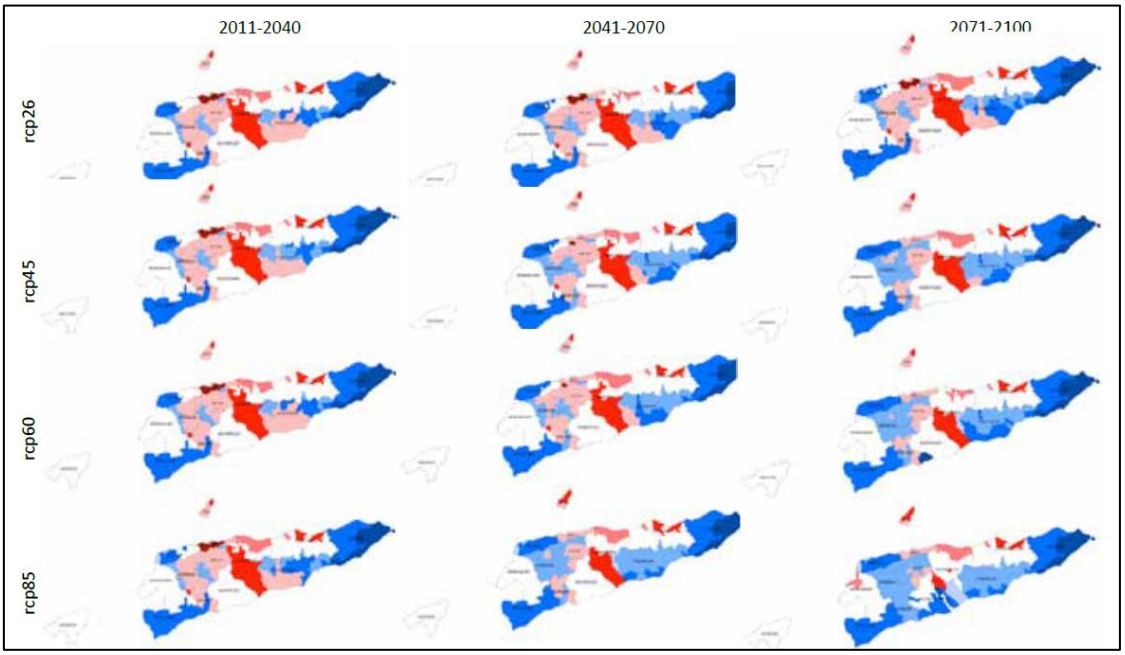


Figure 2-12 Level of Future Risk of Dengue Fever under the Different Scenarios (2011-2100)
Source: Timor Leste's Initial National Communication, State Secretariat for Environment, GoTL, 2014

As indicated above, the high-risk areas of both the diseases may be slightly expanded between 2011 and 2040, whereas the risks may decline from 2040 under all the scenarios.

3. Mitigation and Adaptation Needs in Forest and Agriculture Sectors

3.1 Estimated GHG Emissions from Land Use Change

(1) Estimated GHG Emissions from LUCF

A GHG inventory made in the INC submitted to UNFCCC in 2014 shows that the total GHG emission in 2010 is 1,482 Gg CO_2-eq, of which 65% is from agriculture sector, followed by energy (17%), land use change and forestry (LUCF) (14%), and waste (4%). The estimated emissions in the period from 2005 to 2010 varies from 1,245 to 2,196 Gg CO_2-eq, mainly attributed to the fluctuation of emission from LUCF, as shown below. The NDC stresses that 'emissions from agriculture, forests, and other land uses are the main sources of GHG emissions' in TL. Therefore, the forestry and agriculture sector can play a significant role in mitigating climate change in TL.

Table 3-1 Changes in Estimated GHG Emissions from 2005 to 2010

(Unit: Gg CO_2-eq)

Sources	2005	2006	2007	2008	2009	2010
Energy	200	207	313	262	222	251
Agriculture	883	901	957	997	933	966
LUCF	**115**	**1,037**	**734**	**441**	**225**	**206**
Waste	47	52	54	56	58	60
Total	**1,245**	**2,196**	**2,059**	**1,756**	**1,438**	**1,492**

Source: Timor-Leste's Initial National Communication under UNFCCC, State Secretary of Environment, GoTL, 2014

In the estimation of GHG emission from LUCF, deforestation (conversion of forest into grassland or non-forest lands) was considered as the main source of emission, while carbon uptake in forests and woodlots was considered as the major carbon offset. Hence, the figures of CO_2 emission in LUCF in the table above are the balance between the emission from land use change and absorption (uptake) by forest and grassland. In 2010, the emission from forest conversion was estimated 564 Gg CO_2-eq, while the estimated total uptake of the sector was 358 Gg CO_2-eq; therefore 100% of CO_2 emission in LUCF in 2010 was originated from deforestation[8].

The average annual deforestation rate used by the INC was 2.2%, which was slightly higher than the one in the National Forest Conservation Plan (2013)[9], where the average annual deforestation rate was estimated at 1.7%. In addition to deforestation, forest degradation should be considered as another major source of CO_2 emission.

The National Forest Conservation Plan (2013) is the sole assessment made for land and forest classification in Timor-Lest using the latest satellite imageries. The following definitions were adopted by the National Forest Conservation Plan for determination of forests and forest classification into dene and sparse forests, which are also used in this report since the National Forest Conservation Plan is the standardized guidelines for MAF/ DGFCIP.

Forests: Lands spanning more than 0.5 ha with trees higher than 5 m and a canopy cover of more than 10%, or trees able to reach these thresholds in situ

Dense forest: Forest with canopy cover of more than 60%

Sparse forest: Forest with canopy cover of 10 to 60%

[8] Timor-Leste's Initial National Communication, Timor-Leste's State Secretariat for Environment, GoTL, 2014

[9] Forest Conservation Plan issued by the National Directorate of Forest (NDF), MAF with technical assistance from JICS in 2012

The assessment made in the National Forest Conservation Plan indicates that around 171,000 ha of dense forests have been converted into sparse forests between 2003 and 2012, while around 184,000 ha of total forests have disappeared for the same period. Thus, the contribution of LUCF to GHG emission may be higher than the level estimated in the INC, if the emission from forest degradation was counted.

(2) Estimated GHG Emissions from Deforestation and Forest Degradation

In preparing the Forest Conservation Plan, the National Directorate of Forestry, which was the predecessor of NDFWM, conducted forest inventory surveys throughout the country with technical assistance from the Japan International Cooperation System (JICS) in 2011 and 2012 to estimate the carbon stock in the country and its historical changes. The table below show the calculated carbon stocks in forests in the country in 2003 and 2012.

Table 3-2 Change of forest area and carbon stock between 2003 and 2012

	Forest Area (ha)			Carbon-stock (t-C)		
	2003	2012	Difference	2003	2012	Difference
Dense forest	484,028	312,931	171,097	77,084,391	51,678,617	25,405,774
Sparse forest	568,990	556,200	12,790	42,294,607	40,056,587	2,238,020
Total	1,053,018	869,130	183,888	119,378,998	91,735,204	27,643,794

Source: Made by the JICA project team (2020) based on Forest Conservation Plan (2012)

As shown above, the total removal of carbon stock from forests between 2003 and 2012 is estimated at 27.6 million t-C. The average annual removal of carbon stock from forests for the same period is further estimated at around 3.1 million t-C, which is equivalent to about 11.3 million t-CO_2. Hence, the CO_2 emissions based on the Forest Conservation Plan (2012) are far higher than that of the INC. Counting CO_2 emission from forest degradation is considered as one of the reasons for the gap between the data of the two reports.

To confirm the effect of forest degradation in CO_2 emissions, the emissions from deforestation and forest degradation are estimated assuming that dense forests have been converted into sparse forest and the same area of sparse forests have been converted non-forestlands, such as farms or grasslands. The results of the estimation are showed below.

Table 3-3 Carbon and CO_2 emission from deforestation and forest degradation between 2003 and 2012

Degradation/Deforestation	Carbon emission (t-C)	CO_2 emission (t-CO_2)
Forest degradation	17,542,850	64,323,783
Deforestation	10,100,944	37,036,795
Total	27,643,794	101,360,578

Note: Ratio of carbon stock of dense forest and sparse forest was used for determining the proportion of carbon emissions from deforestation and forest degradation.
Source: Estimated by the JICA project team (2020) based on Forest Conservation Plan (2012)

As shown above, 27.6 million t-C, which is equivalent to about 101 million t-CO_2, have been removed from forest areas for 10 years, of which about 63% (or 17.5 million t-C) is estimated from forest degradation of dense forests into sparse forests.

3.2 Climate Change Vulnerability in Timor-Leste

Due to its geographical location, topography and socio-economic conditions, Timor-Leste is ranked 12th world most vulnerable country based on the assessment of disaster risks[10]. High vulnerability and susceptibility to climate change and limited capacities to cope with and adapt

[10] World Risk Report, 2016 (https://collections.unu.edu/eserv/UNU:5763/WorldRiskReport2016_small_meta.pdf)

to climate change are the major factors resulting in the high ranking in the risk impacts.

A vulnerability assessment was made in the INC at village level in 2010 by employing the IPCC Fourth Assessment (AR4) approach where three dimensions (i.e., level of exposure, level of sensitivity and adaptive capacity) were used for assessment of the vulnerability. In the assessment, villages in the country are classified into the following five categories:

Table 3-4 Five Categories used by the Vulnerability Assessment in the INC 2010

Categories	Level of exposure	Level of sensitivity	Adaptive capacity
Most vulnerable	High	High	Low
Quite vulnerable	Medium	Medium	Medium
Vulnerable	Low	Low	Low
Less vulnerable	High	High	High
Not vulnerable	Low	Low	High

Source: Timor-Leste's Initial National Communication under UNFCCC, State Secretary of Environment, GoTL, 2014

Almost half of the villages in the country were categorized as quite vulnerable, which is the 3rd ranks (middle level) of the 5-rating system, while a total of 61 villages (or 14.5 %) were classified as vulnerable to very vulnerable, which are the highest levels (4th and 5th level) of vulnerability.

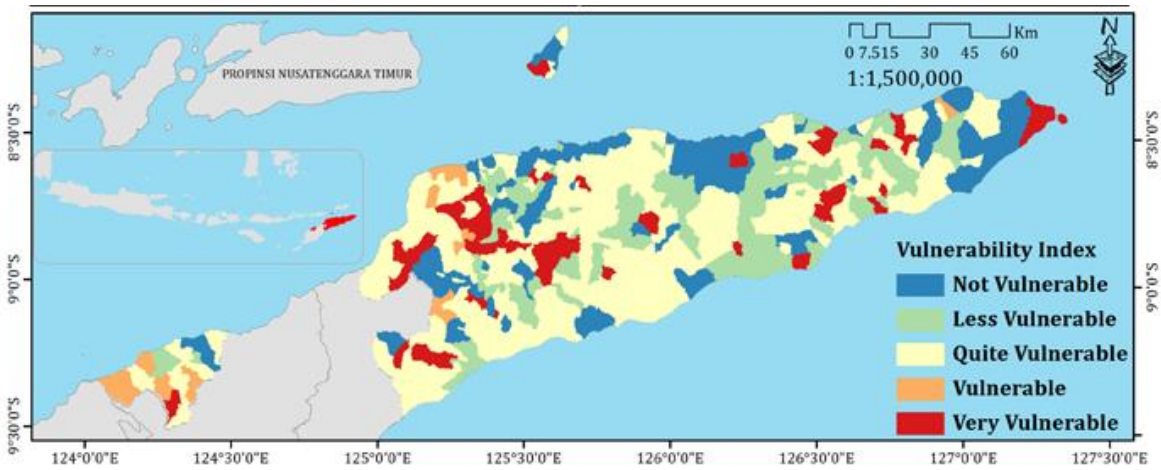


Figure 3-1 Vulnerability Index Map in Timor-Leste

Source: Timor-Leste's Initial National Communication under UNFCCC, State Secretary of Environment, GoTL, 2014

As the vulnerable villages have high potential to be exposed to climate change-related hazards, such as flood, landslide, heavy rains, and long drought, there is an urgent need to strengthen the adaptive capacity of local communities in such villages to minimize the potential risks of climate change. Particularly in El Nino and La Nina years, extreme climate events may often take place and result in severe damage and disasters affecting different socio-economic sectors of the country. Among others, the agriculture sector on which more than 80% of population has economically rely may be significantly affected by climate change, as their farming style is still in a subsistence way without or with application of limited amount of farm input. Particularly, local communities living in hilly and mountainous areas is highly vulnerable to not only hazardous events caused by climate change but also climate variability such as delay in the onset of the rainy season or fluctuation of rainfall pattern during the rainy season.

The figures below show the level of livelihood climate resilience assessed by the GoTL with assistance from WFP under the Consolidated Livelihood Exercise for Analyzing Resilience. In the assessment, wealth level, diversity of livelihood, and livelihood sensitivity were used as key factors for evaluation.

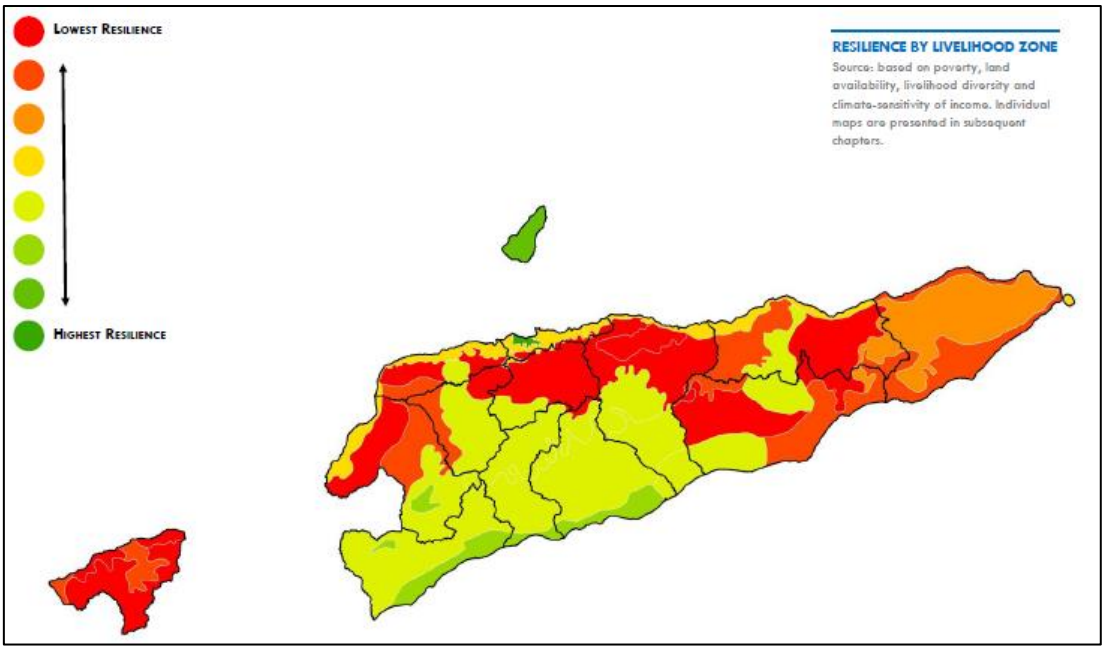


Figure 3-2 Livelihood Climate Resilience

Source: Consolidated Livelihood Exercise for Analyzing Resilience, GoTL

In general, the climate resilience in the northern parts of the country is low, particularly in hilly and mountainous areas, which demonstrated the necessity of climate interventions.

3.3 Gender Sensitivity in Climate Change Vulnerability

As shown in the previous section, rural communities in Timor-Leste are extremely vulnerable to the impacts of climate change in terms of the level of exposure to hazardous events, sensitivity to climate variability, and their adaptive capacity.[11] They significantly rely on subsistence agriculture for their survival with less application of sustainable farming practices, such as sloping agriculture techniques, and have weak community-level mechanisms/ initiatives for coping with climate variability as well as its-related environmental changes. Particularly, women in Timor-Leste, especially in rural and mountainous areas in the country, are highly vulnerable to climate change due to gender gaps in i) economic opportunities, ii) division of labor, iii) access to resources and information, and iv) decision making power[12].

(1) Economic Opportunities

Men are the main income providers in both urban and rural settings in Timor-Leste, while women are primarily responsible for producing for household consumption, childcare, and other unpaid domestic works.[13] Gender gaps in labor force participation are still significant as the proportion of women who engage in economic activities are still limited as compared to that of men. Inequal opportunity to earn cash income or heavy reliance on a husband's income makes women more vulnerable to climate variability or climate change-related hazardous events which adversely affect the household economy.

Particularly, a shortage of food in the lean period is one of the crucial issues in rural areas, especially remote mountainous areas in the country. Climate hazardous evens and variability would usually accelerate the food shortage and lead to food insecurity in rural households. The

[11] IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A.(eds.)]. IPCC, Geneva, Switzerland

[12] Based on the guiding questions for gender analysis shown in: The Green Climate Fund (GCF), Mainstreaming Gender in Green Climate Fund Projects (2017), p 28-29.

[13] ADB, 2014: Timor-Leste Country Gender Assessment

reduction of the frequency of meals or amount of food and use of foraging food (e.g., Kontas or tubers in forest) would be the main coping mechanism at household level in rural areas where alternative sources of income is limited. In food distribution at household level, children are first prioritized, followed by men, and women are generally least prioritized. In fact, the inadequate nourishment of women (or mothers) has often led to the increase of malnutrition and diseases among infants in rural areas.

(2) Division of Labor

Women bear a large burden of domestic works in the home, such as childcare, cooking, fetching of water, cleaning, and washing. Climate impacts, such a long drought and heavy rains, which may adversely affect the sources of water, would increase workload of women, as they may need to fetch and collect water at the sources far from their residential areas or take child to a clinic, which may not be located nearby, if any of their children gets water-borne diseases, such as diarrhea, due to the contamination of water.

Women also share the responsibility with men for farming and collection of firewood. The tasks given to women in farming are not necessarily minimal but rather time consuming and laborious. The table below shows the division of labor between women and men in production of upland crops (maize) and coffee.

Table 3-5 Division of Labor between Women and Men in Crop Production in Five Municipalities in 2011

Crop production	Works done by Women	Works done by Men
Upland crop production	■Selection and preparation of seeds ■Planting ■Harvesting ■Storage, processing, and marketing	■Tilling/Cultivation of land ■Irrigation (if necessary) ■Tending of crops
Coffee production	■Washing and drying	■Preparation of seeds ■Planting ■Pest control (if necessary) ■Grinding

Source: Secretary of State for the Promotion of Equality, Ministry of Agriculture and Fisheries and National University of Timor-Leste, 2011

Crop damage caused by climate changes, such as shift of onset of the rainy season or a long dry spell in the beginning of the rainy season often force rural communities to replant maize. Moreover, crop failure makes the food shortage in households and would often lead to malnutrition and diseases in children. Thus, women in communities would be doubly burdened with an increase in their works in reproductive and productive spheres, when climate change, particularly rainfall variability, affect crop production in rural areas. What has made things worse at household level is that women's works in both the spheres are generally underestimated by men,[14] though they undertake a fair load of productive and unproductive works.

(3) Access to Resources and Information

Although the rights to access to resources, such as farmlands, coffee plantations, and forest and non-timber forest products, are granted to women in general, the control over lands and resources is limited in many parts of the country, where the lands and property are inherited through patriarchal lineage. Even in some villages with the matrilineal system in Bobonaro, Manufahi, and Covalima, the decision making on resource use is generally made by their family heads, who are chiefly men.

[14] Field survey conducted in the communities of target watersheds for the proposed GCF-funded project.

In general, women's mobility in Timor-Leste has been improved and become higher than those in traditionally restrictive societies,[15] their mobility is still limited as compared to that of men. The means of transportation for women are generally the public transportation or motorbikes driven by men. Men are the ones who generally use and drive motorbikes, which are the main means of transportation in rural areas

Access to information is rather easy for men in most cases. Government services and information are first given to village leaders, who are generally men, and passed along to heads of households who are also generally men. Hence, more men attend community meetings and various types of training courses except for the ones specifically targeted to women, such as child health. It is also true in most cases that women are occupied with excessive domestic works in their households.

(4) Decision Making

As mentioned above, decision-making over the resources is limited for women in their households. It makes women more vulnerable to environmental changes as they cannot take necessary actions and measures to cope with such changes on a timely manner. Committee on the Elimination of All Forms of Discrimination against Women reported in "the 2009-10 Demographic and Health Survey" that women needed to consult with their husbands about expenses for expensive purchases and their own health care while most could make decisions on the purchase of daily needs[16.] This indicates that the decisions that women can make are still limited.

Likewise, women's representation in the local governance at village level is still limited. Village leaders (i.e., Chef de Suco and Chef de Aldeia) are predominantly men, and women representatives of village councils are highly limited. For instance, only 20 village chiefs are women out of all 452 villages in the country (4.4%) as shown below17. As a result, decision making at village level may be significantly affected by the single-sided view or biased by male members.

Table 3-6 Female Village Chiefs (VC) by Municipality

Munichipality	Aileu	Ainaro	Baucau	Bobonaro	Covalima	Dili	Ermera	Lautem	Liquica	Manatuto	Manufahi	Oecusse	Viqueque	Total
Number of Villages	33	21	59	50	30	36	52	34	23	31	29	18	36	452
Number of Female VC	4	1	4	0	1	3	0	0	1	3	2	0	1	20

Source: DNAAS, Ministry of State Administration (obtained on 12 December 2019).

Means of addressing women's rights and security are also limited in many rural communities in the country. Since the community police system is in place in the country, one officer (OPS: suco/village police officer) is assigned to each village. OPS is expected to resolve local disputes, including domestic violence, in coordination with village authorities. Yet the proportion of female OPS is rather low, and women are less likely to reach OPS for addressing their rights and security.

Table 3-7 Female OPS by Municipality

Munichipality	Aileu	Ainaro	Baucau	Bobonaro	Covalima	Dili	Ermera	Lautem	Liquica	Manatuto	Manufahi	Oecusse	Viqueque	Total
Number of OPS	29	21	59	50	30	31	52	34	23	31	29	18	35	442
Number of Female OPS	1	0	6	7	1	0	4	1	1	2	2	1	1	27

Source: Polícia Nacional de Timor-Leste (PNTL) (obtained on December 16, 2019).

[15] TOMAK, 2016: Gender Equality and Social Inclusion Analysis: Technical Report 8, p 20.
[16] Convention on the Elimination of All Forms of Discrimination against Women: Consideration of reports submitted by States parties under article 18 of the Convention: Second and third periodic reports of States parties due in 2013 Timor-Leste, 2014, p-36.
[17] DNAAS, Ministry of State Administration (obtained on 12/12/2019).

3.4 Existing Policies, Legislation, and Plans relating to Climate Change

The government of Timor-Leste is committed to responding to climate change. The GoTL has addressed climate change as one of the most crucial issues. The following documents are crucially relevant to the GoTL' s approaches to climate change, particularly relating to the forestry and land management sectors.

- Nationally Determined Contribution (2016)
- Draft National Climate Change Policy
- National Adaptation Program of Action (NAPA 2010)
- National Strategic Development Plan (2011-2030)
- National Forestry Policy (2008 and revised in 2018)
- Forest Conservation Plan (2012-2023)
- CBNRM Roadmap (Drafted in 2019)

In addition to the national policies and programs, the two legal documents listed below also clearly state that actions need to be taken by the GoTL to tackle the climate change issues.

- Environmental Basic Law (Environmental Framework Law) in 2012
- Law on the General Regime of Forests in 2018

(1) Nationally Determined Contribution

The Nationally Determined Contribution (NDC) indicates the first greenhouse gas target of Timor-Leste, submitted to UNFCCC when Timor-Leste ratified the Paris Agreement in 2016. In the NDC, Timor-Leste does not set a numeric target of emission reduction but vows to contribute to the reduction of emissions from the relevant sectors, such as transport, agriculture, forestry, and energy. In particular, the following are identified as potential mitigation actions in the agriculture and forestry sectors.

Agriculture Sector

- Introduction of sustainable agriculture practices, such as permaculture and climate-smart agriculture
- Promotion of biogas to reduce agricultural emissions

Forestry Sector

- Rehabilitation of degraded lands through sustainable forest management
- Promotion of community-based forest management using Tara Bandu
- Mangrove plantation and rehabilitation
- Introduction of REDD+ scheme
- Protected area management
- Afforestation and reforestation

Priority adaptation areas are also identified in the NDC. Food security, water resources, health, natural disasters, forestry, biodiversity and coastal ecosystem resilience, livestock production, and physical infrastructure are considered as priority areas for climate change adaptation in the country. The potential adaptation measures proposed for food security and forestry, biodiversity, and coastal ecosystem resilience in the NDC are listed below.

Agriculture Sector

- Development of integrated agroforestry and watershed management
- Promotion of integrated sustainable land management to replace shifting cultivation with permanent/ fixed agriculture

- Reforestation of degraded land to prevent landslide and provide a source of firewood
- Prevention of landslides through engineering works and natural vegetation methods
- Enhancement of awareness of the importance of sustainable agriculture and forest management

Forestry, Biodiversity and Coastal Ecosystem Resilience

- Ecosystem management in national planning
- Maintenance of mangrove plantations
- Rehabilitation and protection of mangrove plantations

Hence, sustainable forest and land management along with sustainable agricultural practices are the key prioritized climate interventions proposed by the GoTL for both climate change mitigation and adaptation.

(2) Draft National Climate Change Policy

The draft national climate change policy aims to provide guidance to the relevant sectors for mainstreaming climate change in the respective development plans to strengthen climate resilience in the country. The draft policy stresses the demand of i) better coordination between/among the government interventions for climate change adaptation and disaster risk management, ii) strengthening of climate resilience at the different levels of governance from central to village levels, and iii) promotion of climate change adaptation measures, particularly using the climate proofing approaches. The necessity of assessments of vulnerability and disaster risk is also emphasized in the policy to complement the existing information on potential damage caused by climate change.

(3) National Adaptation Program of Action (NAPA 2010)

The National Adaptation Plan of Actions (NAPA) was prepared and submitted to UNFCCC in 2010 with technical support from UNDP. It proposes a series of actions for reduction of the country's vulnerability to natural events and other consequences of climate change and variability. A total of nine priority adaptation projects/measures listed below are proposed in the plan.

a. Food security
b. Water resource management
c. Health improvement
d. Natural disaster management
e. Ecosystems protection and restoration
f. Livestock production
g. Infrastructure development
h. Poverty reduction
I. Development of institutional capacity for climate change

Among others, the activities proposed in food security and ecosystem protection and restoration are closely related to the forest sector as shown below.

Table 3-8 Activities proposed for Food Security and Ecosystem Protection/ Restoration

Priority projects	Activities
Food security	Development of integrated agroforestry and watershed management Implementation of integrated sustainable land management with promotion of fixed/permanent farming Development of famers' strategies for crop losses, conservation agriculture, and water

Priority projects	Activities
	harvesting Implementation of agroforestry and community forestry Enhancement of awareness of sustainable agriculture and forest management
Conservation of forest ecosystems	Reforestation in degraded lands with fuel wood plantations Demonstration of sustainable agriculture and forest management for enhancement of local awareness Building of capacity of local farmers for agroforestry and sustainable forest management

Source: National Adaptation Programme of Action (NAPA) on Climate Change, 2010

The report states that the following three cross-cutting strategic approaches will be embedded in all the priority projects for effective implementation of the priority measures.

- Capacity development and institutional strengthening for adaptation to climate change
- Demonstration of new ideas and techniques through field-based interventions
- Public awareness raising through information, education, and communication campaigns on climate change risks

(4) National Strategic Development Plan (2011-2030)

The National Strategic Development Plan was prepared in 2011 with an aim to provide a 20-year vision of the country, reflecting the aspirations of the Timorese people to create a prosperous and strong nation. The plan covers three key areas: i) social capital, ii) infrastructure development and iii) economic development, which further comprise a total of 16 sectors as listed below.

- Education and Training
- Health
- Social Inclusion
- Environment
- Culture and Heritage
- Roads and Bridges
- Water and Sanitation
- Electricity
- Seaports
- Airports
- Telecommunications
- Rural Development
- Agriculture
- Petroleum
- Tourism
- Private Sector Investment

The plan indicates the challenges, strategies, and actions to be taken for sustainable development of the country. Particularly, it focuses are specifically placed on infrastructure development to address the large infrastructure deficit and to lay the foundation for social and economic development of the country.

(5) National Forestry Policy (2008 and revised in 2018)

The National Forest Sector Policy was first issued in 2008 and has been reviewed and revised with technical assistance from FAO in 2018. The draft revised policy is being reviewed by

DGFCIP for finalization. Both the original and revised versions of the policy have the same goal and policy objectives, namely:

Goal: "Sustainable management of forest resources and watersheds to provide environmental, social, and economic benefits to people of Timor-Leste."

Policy objectives:
1) Protection and management of forest: Effective protection of the ecological integrity and biological composition of not less than 70% of the area of forests by 2030
2) Reforestation and land restoration: Reforestation and restoration of degraded land and forest to improve watershed and coastline protection, and maintain and expand wood resources
3) Watershed conservation: Long-term sustainable conservation of watersheds not later than 2035 to maintain and enhance natural water flows, to maintain high water quality and to minimize flooding and the erosion of rock and soils
4) Community and private participation in forestry: Harmonious and effective participation of forest communities and other private sector groups with the Government by the end of 2030
5) Private sector development: Development and maintenance of a private sector-based business environment for profitable forest ownership and the management, production, utilization, and marketing of forest products, especially for the alleviation of poverty among rural communities
6) Institutional Development: Development of managerial, technical, and administrative capacity and maintenance and development of forest sector institutions to effectively design, implement, manage, monitor, and adapt all the forest policy objectives and specific programs based on lessons learned from implementation.

Each policy objective has strategic activities to achieve the respective targets. Most of the activities are considered effective in the reduction of GHG emission or potential impacts caused by climate change-related events.

(6) MAF Strategic Plan (2014-2020)

The MAF Strategic Plan (2014-2020) was developed in 2012 to set its strategies and priorities consistent with the guidelines and targets given by the National Strategic Development Plan 2011-2030. The plan is considered as its roadmap to guide stakeholders in i) implementing development interventions to reduce poverty, ii) ensuring food and nutrition security, and iii) promoting employment and economic growth in the agriculture sector. The goals/development objectives of the strategic plan are:

a. to improve rural income and livelihoods, and reduce poverty;
b. to improve household food and nutrition security;
c. to support the transition from subsistence farming to commercial faming; and
d. to promote environmental sustainability and conservation of natural resources.

To achieve such goals, the strategic plan set five (5) strategic objectives, namely:

- Sustainable increase in production and productivity of selected crops, livestock species,

fisheries and forestry;

- Enhancement and improvement of market access and market value addition;
- Improvement of the enabling environment (legislation, policies, institutions, and infrastructure);
- Strengthening of MAF and related agencies to implement this Strategic Plan as well as the National Strategic Development Plan; and
- Enhancement of sustainable resource conservation, management, and utilization.

Each program is supported by several sub-programs. Those listed below are the sub-programs under the program for enhancement of sustainable resource conservation, management, and utilization. They are similar to those proposed in the priority programs for food security and ecosystem protection/restoration in NAPA 2010.

a. Sustainable natural resource management and utilization
b. Increase of knowledge, protection, and utilization of the biodiversity within Timor-Leste
c. Development and dissemination of environmentally friendly agricultural industry practices
d. Promotion of conservation of national and cultural heritages

(7) National Forest Conservation Plan

The National Forest Conservation Plan was developed under the Forest Preservation Program in 2013 to guide stakeholders in the forestry sector, especially the National Directorate of Forestry (predecessor of NDFWM and NDNC), toward the achievement of the goal of the forest sector policy, particularly the policy objectives of "forest protection," "community participation," and "watershed conservation" among the six (6) policy objectives.

Specifically, the forest conservation plan set the following goals:

a. About 73% of dense forests which have important forest functions (the important forests) will be protected in partnership with local communities living in the vicinity of the forests to ensure forest functions by 2023;

b. More than 53% of villages located in the important forests will introduce the community-based forest management by 2023; and

c. Major parts of the forests within the boundaries of at least five (5) critically degraded watersheds will be managed in a proper and sustainable manner by 2023.

In order to achieve such goals, the plan proposes seven (7) programs composed of 24 sub-programs. One of the programs, Forest Conservation Program, specifically aims to protect existing forests in collaboration with local communities through introduction and promotion of the community-based forest management approach.

(8) CBNRM Roadmap (drafted in 2019)

The CBNRM Roadmap has been drafted by the taskforce of DGFCIP with technical assistance from the JICA CBNRM Project in 2019 with an aim to protect and improve existing forests in the 14 high priority watersheds by promoting the CBNRM mechanism, which has been proven effective in forest protection in more than 30 villages in the country. The CBNRM Roadmap is a 10-year strategic plan for introduction of the CBNRM mechanism in more than 317 villages concerned with the 14 high priority watersheds to protect around 362,700 ha of forests in the

watersheds. DGFCIP aims to adopt the roadmap as a national program to mainstream CBNRM and CF as main tools for sustainable forest and watershed management in the country. More details of the draft CBNRM Roadmap is described in Section 5.4 of this report.

(9) Environmental Basic Law (Environmental Framework Law) in 2012

The Environmental Basic Law was enacted in 2012 to set out the framework for environmental policy and the guiding principle for conservation and protection of the environment and for the preservation and sustainable use of natural resources to promote the quality of life of the country's citizen. Its article, "Article 34 Climate Change," clearly stipulates that "the State shall implement the measures necessary for climate change adaptation and mitigation in terms of reducing greenhouse gas emissions into the atmosphere and/or their removal by sinks and minimizing the negative effects of the impacts of climate change on biophysical and socio-economic systems.

Moreover, the basic law stipulates that the State shall promote the protection, conservation, and sustainable use of environmental components (e.g., air, surface and ground water, soils, biodiversity, and ecosystems) for the benefits of national citizens.

(10) Law on the General Regime of Forest

The national forest policy law, composed of nine (9) chapters or 61 articles which cover roles and responsibilities of key stakeholders, policy instruments, reforestation, sustainable management and use of forest resources, forest extension, and monitoring and evaluation, was officially enacted in 2018. The main objective of the law is to achieve the goal and policy objectives of the forest sector policy; therefore, the law states that sustainable forest management, particularly sustainable community forest management, is the state's priority. The law also addresses the climate change issues in its article (Article 28) stating that the State should take necessary actions for climate change adaptation and mitigation through protection and restoration of forests as well as public awareness raising.

It is also noted that the law recognizes the customary rights of local communities over forest resources and classifies forests into three (3) categories: i) community forests (forests in community or state lands which shall be managed by communities under the agreement with the state), ii) private forests (forests in private lands which shall be managed by landowners), and iii) state forests (forests in state lands which shall be managed by the state.).

Specifically, the law clearly stipulates that the State shall:

i) develop a mechanism that ensures i) open access to information, ii) equal sharing of benefits from forest resources and watersheds, and iii) active participation of communities and private sector in forest management;

ii) develop a forest management plan and promote allocation of Community Forest Management Agreement (CFMA); and

iii) assist communities in the development of community rules on forest and watershed management in line with the existing laws and regulations.

The contents of CFMA are also specified in the law, such as the rights and obligations of the parties, rules on sustainable forest management, rules on benefit sharing, and forest management plan, but more details of the agreement will be determined in the subsequent decree/law to be elaborated in the future. The community-based approaches, namely

Community-Based Forest Management (CBFM) and Community-Based Natural Resource Management (CBNRM), are recognized by the policy law as the main instruments for sustainable forest management in Timor-Leste.

3.5 Current and Past Interventions for Climate Change Mitigation and Adaptation in the Forest and Agriculture Sectors

(1) Past and On-going Projects/ Interventions of the MAF Development Partners

A number of initiatives and interventions have been made by MAF development partners (MAF DPs) so far to tackle the climate change issues, particularly for strengthening of the capacity for adaptation to climate change. The table below shows the major projects which have been implemented since 2010.

Table 3-9 List of Major Projects relating to Climate Change in the Forest and Agriculture Sectors

Project	Implementing Organization	Counterpart Agency	Year	Outline
National Information and Early Warning System for Food Security	FAO	NDR, MAF	2012 - 2015	FAO assisted MAF in establishing the National Information and Early Warning System (NIEWS) with an aim to contribute to food security through more effective agriculture and rural development policies and programs based on relevant, reliable, and up-to-date food security data and information.
Conservation Agriculture Project (1. Enhancing Food and Nutrition Security and Reducing Disaster Risk through the Promotion of Conservation Agriculture, and 2. Conservation Agriculture, Permaculture and Sustainable Fisheries Management: Enhancing Food and Nutrition Security and Reducing Disaster Risk in Timor-Leste)	FAO	NDAH, NDFWM, ARGIS	2015-2018	FAO assisted MAF in the introduction of conservation agriculture techniques and practices to promote production intensification and diversification of smallholder farming systems.
Pro-resilient Agriculture Project	FAO	N.A.	N.A.	N.A.
Strengthening Community Resilience to Climate-Induced Disasters in the Dili to Ainaro Road Development Corridor (DARDC)	UNDP	MSS, MAF	2014-2019	The main aim of DARDC project is to protect critical economic infrastructure from climate induced natural hazards through improved policies, strengthened local DRM institutions and investments in risk reduction measures within the corridor. The major activities are: 1) community vulnerability assessment, 2) construction of resilient water supply and irrigation systems, 3) community-based reforestation 4) community-based water control infrastructure, 5) capacity development, 6) installation of early warning systems, etc.
Building Shoreline Resilience of Timor-Leste to Protect Local Communities and their Livelihoods	UNDP	MAF	2014-2019	The main objective of the project is to protect local communities and their livelihoods and to strengthen resilience of coastal communities by the introduction of nature-based approaches to coastal protection. The project comprises four components: 1) Policy formulation and institutional capacity strengthening for climate resilient coastal management; 2) Extensive mangroves and coastal wetlands ecosystem protection and restoration; 3)

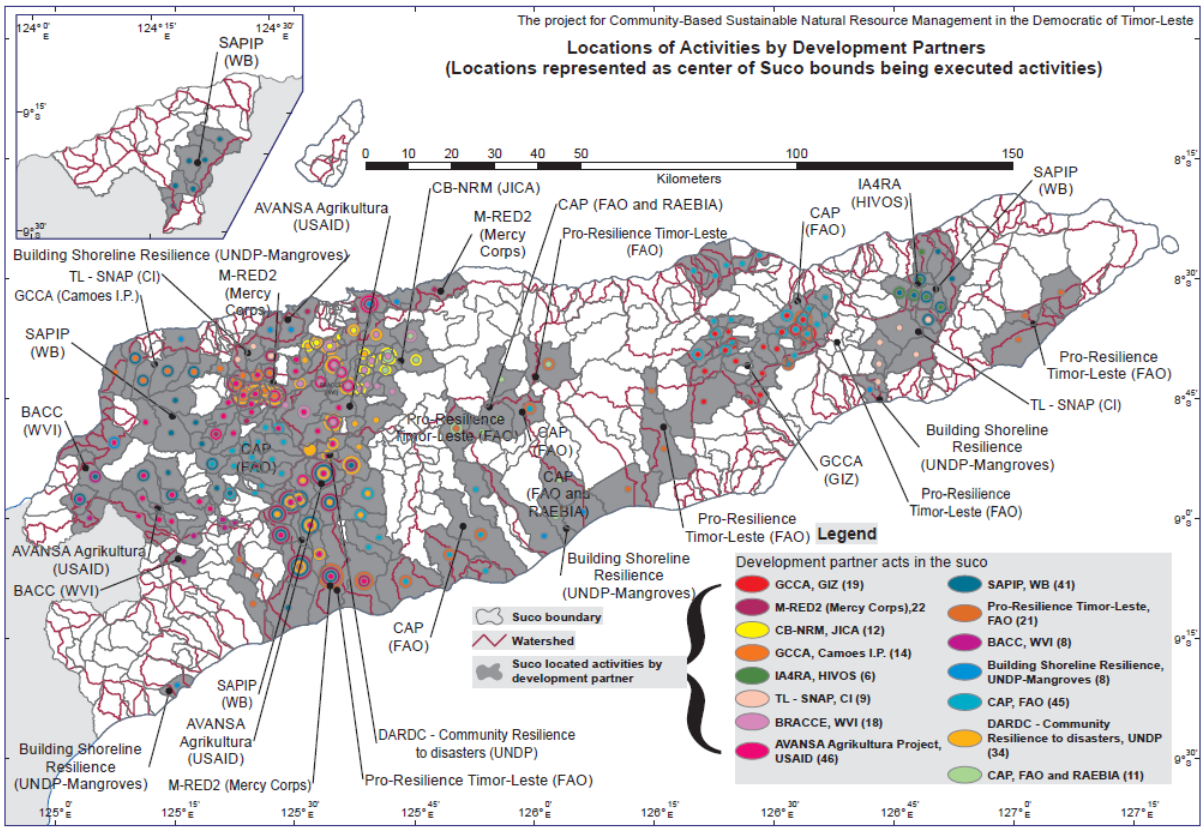
Project	Implementing Organization	Counterpart Agency	Year	Outline
				Alternative livelihood development with integrated coastal adaptation approaches; 4) Public awareness raising about the important role of coastal ecosystems; and 5) development of relevant ad credible multi-annual and costed agroforestry sector strategy.
Sustainable Agriculture Productivity Improvement Project (SAPIP)	World Bank	MAF	2017-2022	The main objective of the project is to increase crop productivity and marketed production of stallholder agriculture in the selected four watersheds, namely Loes, Belulik, Tono, and Raumoco, in the country. The project expects that a total of 85,000 marginal farmers will directly benefit from the project activities, such as training, agricultural development support, and development of post-harvesting and storage facilities for production of marketable products.
Global Climate Change Alliance Programme Timor-Leste (GCCA-TL)	GIZ and CAMOES - EU	MAF	2013-2018	The main objective of the program is to improve the capacity of vulnerable populations to cope with climate change effects through sustainable management of natural resources in the localities and improvement of potential livelihood options. Key components of the program are to: 1) enable MAF to collect reliable climatic data through weather monitoring; 2) enhance local communities' capacity to identify effective adaptive measures responding to climate challenges; and 3) enhance the resilience of local communities who are vulnerable to climate change risks through the restoration of their environment, the implementation of sustainable livelihood development activities and improved social dialogue.
To'os Ba Moris Diak (TOMAK)	DFID – Australian Aid	MAF	2017-2022	TOMAK has worked with the GoTL NGOs, private sectors to increase the capacity of local communities for engaging in profitable agricultural markets confidently and ably. The project also puts its focus on the establishment of a foundation of food security and good nutrition for agricultural households using a variety of approaches. Toward this end, the project has two key components: 1) development of sustainable and profitable partnership of local producers with agribusiness and service providers in selected agricultural value chains; and 2) promotion of appropriate nutrition for all age groups combined with improvement of productivity, crop diversity, and safe storage of food products.
Partnership for Sustainable Agroforestry (PSAP) Agroforestry Component	GIZ-EU	MAF	2017-2022	The specific objective of the agroforestry component of PSAP is to benefit marginalized community groups from better employment in agroforestry systems in rural areas in Timor-Leste. The component has four outputs: 1) increase of production and productivity of agroforestry system; 2) enhancement of capacity of actors in the agroforestry value chain; 3) improvement of market access for specific agroforestry value chain; and 4)

Project	Implementing Organization	Counterpart Agency	Year	Outline
				improvement of institutional and organizational frameworks for promotion of agroforestry.
Securing the long-term conservation of Timor-Leste's biodiversity and ecosystem services through the establishment of a functioning National Protected Area System and the improvement of natural resource management in priority catchment corridors (SNAP)	Conservation International funded by GEF	MAF	2018-2022	The main objective of the project is to establish Timor-Leste's National Protected Area System and improve the management of forest ecosystems in priority catchment corridors. The project has three components to achieve five outcomes as shown below. Component 1: Establishment of a National Protected Area System ➔Outcome 1.1: National PA system established and implementation initiated Component 2: Improvement of community-based natural resource management systems in priority catchment corridors ➔Outcome 2.1: Land degradation drivers halted in key catchment areas ➔Outcome 2.2: Capacity for communities to manage natural resources increased Component 3: Improvement of forest management and reforestation of degraded lands in priority catchment corridors ➔Outcome 3.1: Sustainable forest management in priority catchment corridors substantially improved ➔Outcome 3.2: Priority degraded areas reforested
Integrated Action for Resilience & Adaptation (IA4RA) under the EU-GIZ Adapting to Climate Change and Sustainable Energy (ACSE)	Hivos- EU-GIZ	MAF	2016-2019	IA4RA aims to contribute to the sustainable adoption and scaling out of sustainable food, water- and energy-efficient technologies for 500 vulnerable households in six villages in Raumoco watershed.
The Project for Community-Based Sustainable Natural Resource Management (Phase 1 and 2)	JICA	MAF	2010-2016 2016-2020	The project aims to develop, demonstrate, and scale up a community-based sustainable natural resource management mechanism (the CBNRM mechanism) in the target watersheds with capacity enhancement of relevant stakeholders at field and central levels for further expansion of the same throughout the country. Details of the project are described in Chapter 5 of this report.

Source: JICA (2020)

(2) Gaps in the Interventions

Although many donor-funded projects have been implemented in the country to enhance the capacity of local vulnerable communities who mainly rely on subsistent agriculture in hilly and mountainous areas, it is still insufficient to cover all the villages in the country as indicated the figure below. At the same time, there is a need to provide long-term and continuous support to enhance local capacity enough to sustainable respond to climate change risks without external assistance. In fact, the effects of many projects in the past did not remain in the field after the end of the projects. Sustainability of project impacts is one of the critical issues to be addressed for making the paradigm shift or making local communities adaptable to climate change in a self-reliant manner.



Source: JICA Project Team (2019)

Figure 3- 3 Location Map of Major Climate Change-related Projects implemented by MAF DPs

The drawing above, the location map of the on-going projects/programs implemented by MAF DPs as of the end of December 2019, indicates that the projects and interventions are concentrated in the western part of the country, such as Liquica, Ermera, Bobonaro, and Aileu, and more support should be given to Covalima, Manatuto, Ainaro, Manufahi, Viqueque, and Lautem.

3.6 Adaptation and Mitigation Needs in the Sectors

As indicated in the Nationally Determined Contribution of Timor-Leste (2016), the forest and agriculture sectors are considered as crucial sectors in terms of not only mitigation of climate change but also adaptation to climate change risks (Please refer to Section 3.4 of this report.). Local communities in the country, especially those living in rural hilly and mountainous areas, are still very vulnerable to climate change, as they heavily rely on subsistent agriculture for their livelihood. On the other hand, the LUCF and agriculture sectors are major sources of GHG emissions in Timor-Leste. The adaptation and mitigation capacity of the country should be further enhanced, particularly at community level, to strengthen livelihood resilience to climate change and reduce GHG emission through proper land and forest management.

(1) Priority Adaptation Measures

NAPA developed in 2010 identify the priority adaptation measures in the forest and agriculture sectors as tabulated below. Although the source of the data and information was rather outdated, the interventions/ activities proposed are still relevant to the site conditions in rural areas of the country, particularly in hilly and mountainous areas.

Table 3- 10 Priority Adaptation Measures proposed in NAPA

Objectives	Adaptation Activities
Reduce vulnerability of farmers and pastoralists to increased drought and flood events by improving their capacity to plan for and respond to future climatic conditions and improve national food production	■ Develop integrated agroforestry and watershed management including climate change dimensions. ■ Based on existing national action plans on sustainable land management, implement integrated, sustainable land management promoting fixed/permanent agriculture, reduced burning, reduced erosion, and increased soil fertility. ■ Reforestation of degraded land to prevent landslides and provide a sustainable fuel wood source in priority areas with high vulnerability to climate-related risks. ■ Improve physical infrastructure/civil engineering and natural vegetation methods to prevent landslides in hill sites, roads, and riverbanks. ■ Education and awareness and conduct a pilot demonstration on sustainable agriculture and forest management that increases resilience and reduces climate-related impacts of shifting cultivation and unsustainable upland farming practices.
Forests, Biodiversity and Coastal Ecosystems Resilience:	■ Maintain mangrove plantations and promote awareness raising to protect coastal ecosystems from impacts of sea level rise. ■ Include ecosystem management in national planning to develop sustainable, ongoing program, nurseries, and community awareness development - 1st year assessment, 2nd year plan, 3rd year implementation and maintenance.
Livestock Production:	■ Review existing laws, regulations, and standards to enhance CC-resilience of critical infrastructure. ■ Pass new legislation to strengthen and guarantee national development through improved regulation of the quality of materials, adapted building codes and practices and law enforcement.

Source: National Adaptation Programme of Action (NAPA) on Climate Change (2010)

(2) Priority Mitigation Measures

In the forest and agriculture sectors, the following actions could be considered as potential mitigation options.

- Conservation of existing forests, especially dense forests, to reduce GHG emission from deforestation and forest degradation
- Development of agroforestry and community forestry on degraded area to increase carbon sink
- Reduction of slash and burn practices particularly in hilly and mountainous areas by introduction of permanent and sloping agricultural techniques along with sustainable farming practices
- Introduction of biogas plants or improved cooking stove to substitute fossil fuel or reduce the use of firewood
- Introduction and promotion of composting to effectively use animal waste and reduce the emission of Nitrous oxide

Given the fact that the country has faced rapid and significant deforestation and forest degradation over decades, forest conservation and sustainable land management along with agroforestry and sloping agriculture practices are considered highly crucial to reduce GHG emission from deforestation and forest degradation in the country.

4. Key Stakeholders in Forest and Watershed Management in Timor-Leste

4.1 Government Institutions

4.1.1 Central Level

(1) Directorate General of Forest, Coffee, and Industrial Plant and Its National Directorates

The Ministry of Agriculture and Fisheries (MAF), particularly the Directorate General of Forest, Coffee, and Industrial Plant (DGFCIP) and its subordinate national directorates, namely the National Directorate of Forest and Watershed Management (NDFWM), National Directorate of Nature Conservation (NDNC), and National Directorate of Coffee and Industrial Plants (NDCIP) are the key government agencies for forest and watershed management in Timor-Leste. The organizational structures of DGFCIP and its subordinate national directorates in 2017 are shown below.

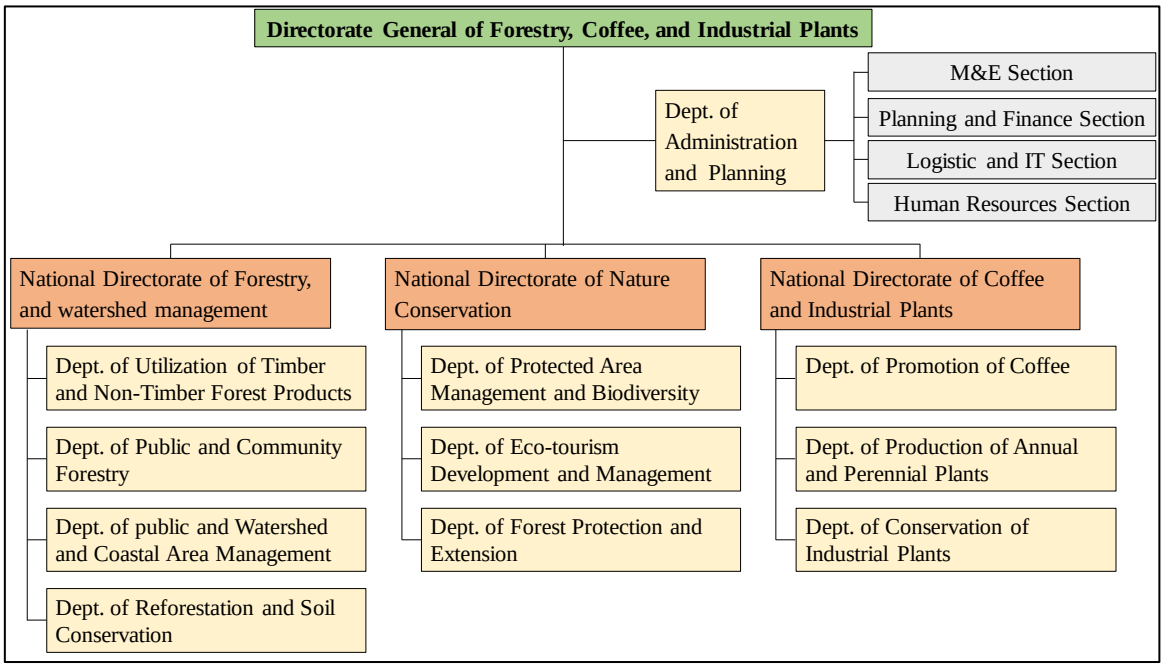


Figure 4-1 Organizational Structures of DGFCIP and its National Directorates concerned

Source: DGFCIP, 2017

The functions of the national directors under DGFCIP defined by the MAF Organic Law in 2016 are summarized below.

Table 4-1 Major Function of the National Directorates under DGFCIP

Organization	Major Functions
DGFCIP	a. Collaborate in the definition of policies, programs, and relevant plans in the area of forests, nature conservation, coffee, industrial plants, and biodiversity, namely in the definition of an integrated management plan of soil and subsoil management and in the definition and implementation of a biodiversity conservation strategy. b. Coordinate the execution, articulation, and monitoring of the implementation of policies and plans, programs, and strategies in the context of forest, nature conservation, coffee, and industrial plants. c. Contribute to the development of environmental standards, namely with regards to forest, hydrographic basins, soil, and subsoils d. Ensure the conservation of the country's biological diversity, in coordination with other services, and for a sustainable management of forests and its resources, the coffee plants and other industrial plants e. Promote the transversely and integration of environmental policy in the Forest sector, nature conservation, biodiversity, coffee and industrial plants. f. Coordinate the development and implementation mechanisms to combat deforestation and forest

Organization	Major Functions
	degradation which involves communities. g. Collaborate in the definition of an integrated soil and subsoil management plan, as well as in the definition and implementation of a biodiversity conservation and recovery strategy. h. Submit weekly, monthly, quarterly, and annual report to the Minister. i. Exercise any other competencies that are assigned by law, regulation, or higher determination.
NDFWM	a. Collaborate in the formulation of policies and strategies related to its competences, namely in the elaboration of the national plan for the management of forest and water resources. b. Implement, coordinate, and evaluate the implementation of forestry policy within the scope of the national forestry strategy and the national forest management plan. c. Combat deforestation and forest degradation. d. Collaborate in the conceptualization and definition of parks and forest reserves and promote the drafting of legislation on their management, in collaboration with the component services. e. Promote the Forestry industry. f. Implement the necessary measures to guarantee the rational and sustainable use of water resources. g. Ensure, in coordination with other relevant services, the quality of water resources. h. Prepare a hydrographic basin management manual and a manual on agroforestry, in coordination with other competent bodies. i. Implement an adequate organization of forest services and mangrove areas. j. Provide opinions on the import and export of forest resources in order to assist DNQB (Diresaun Nasional Quarantena e Biosseguransa/National Directorate of Quarantine and Biosafety) in carrying out its responsibilities. k. Authorize the commercial exploitation of forest resources. l. Prepare weekly, monthly, quarterly, and annual activity reports. m. Exercise any other competences that are attributed to him/her by law, regulation, or higher authority.
NDNC	a. Collaborate in the formulation and evaluation of policies and strategies related to nature conservation b. Collect relevant data and information on nature conservation for use in planning and decision making, in coordination with DNP (Diresaun Nasional Pecuaria/National Directorate of Livestock) c. Implement the necessary measures of the national plan for reforestation, conservation, sustainable use and recovery of soil and subsoil and protection of endangered or weakened forest species, with the objective of increasing the forest space and reduce its degradation d. Promote and implement an awareness campaign among populations, local communities, and general public about the need to conserve the nature of the biodiversity of the country's forest heritage e. Define and declare, in conjunction with the Ministry responsible for the area of the environment, parks, reserves and protected areas, as well as proceed with the implementation. f. To exercise other competencies conferred on it in the management of natural parks. g. Elaborate weekly, monthly, quarterly, and annual reports. h. Exercise any other competencies that are assigned by law, regulation, or higher determination
NDCIP	a. Collaborate in the formulation of policies and strategies related to its competencies. b. Propose the necessary measures to conserve coffee production, industrial crops and inspect their compliance. c. Promote the collaboration of legislation on the production of coffee and industrial cultures no monitor its compliance. d. To encourage, in cooperation with other competent services, the private sector of the economy and international or no n governmental organizations, increase sustainable in coffee production and quality, through the introduction of new plants of arabica type and sustainable cultivation, treatment techniques and harvest. e. To encourage, in cooperation with other competent services, the private sector of the economy and international or non-governmental organizations, the sustainable development of industrial plants and medical plants or similar, through the introduction of new plants and new and more productive species or crossing existing varieties. f. Promote the establishment and operate or company the entity that responsible for operating the nurseries for industrial plants, as a way to assist and support farmers in increasing and expanding the cultivation of such plants. g. To promote the training of farmers related to modern cultivation techniques and methods, in collaboration with other competent services. h. Provide an opinion on the import or export of coffee and industrial plants in order to assist DNQB in carrying out its responsibilities. i. Participate in licensing procedures for activities related to the skills. j. Prepare weekly, monthly, quarterly, and annual activity reports. k. Exercise any other powers that are attributed to him/her by law, regulation, or higher superior

Source: MAF Organic Law (2016)

(2) Other National Directorates of MAF

Almost all the technical national directorates of MAF, except for the National Directorate of Fisheries, are relevant to sustainable watershed management which is based on proper landscape management in a river basin. The relevant national directorates under MAF with their key roles are summarized below.

Table 4-2 Major Function of the Relevant National Directorates under MAF

Organization	Major Functions
National Directorate of Agriculture and Horticulture (NDAH)	a. Collaborate in the formulation of policies, programs and strategies related to its mission. b. Cooperate in the implementation of technical support programs for agricultural and rural development with relevant international and national organizations and institutions. c. Implement project aimed at increasing and improving the quality of agricultural and horticultural products. d. Ensure the development and execution of specific programs on the management and control of pests and diseases of agricultural and horticultural products. e. Implement and promote the use of new techniques and technologies related to methods of cultivation, harvesting and treatment of fruit trees. f. Promote the use of mechanized materials and equipment using post-harvest technologies. g. Promote and develop the diversification and sustainability of agricultural and horticultural food production. h. Provide technical opinions on the import or export of agricultural and horticultural products in order to assist DNQB in carrying out its responsibilities. i. Participate in the licensing procedures for commercial activities related to the legal competencies. j. Prepare weekly, monthly, quarterly, and annual activity reports. k. Exercise any other powers that are assigned to him/her by law, regulation, or higher superior.
National Directorate of Livestock (NDL)	a. To promote and develop the improvement of animal production and reproduction and the use of new technologies, with a view to increase animal production in a sustainable manner. b. To develop strategies that allow us to improve food and livestock nutrition and its distribution throughout the territory. c. Collect and analyze data and information related to the livestock sector for use in planning and decision making, in coordination with other relevant services. d. Create and keep updated a national registry containing the number of ruminants, non-ruminant and poultry animal. e. Promote the quality of slaughterhouse management. f. Collaborate in the defense and promotion of animal health. g. Assign and verify the maintenance conditions for health marks, identification marks and approval numbers for exports, establishment and operators of products of animal origin or intended for animal feed. h. Collaborate in defining and supervising the application of measures to promote animal health in slaughter and meat commercialization. i. Provide opinions on the import or export of animals in order to assist DNQB in carrying out its responsibilities. j. Prepare weekly, monthly, quarterly, and annual activity reports. k. Exercise any other competencies that attributed to it by law, regulation or higher superior.
National Directorate of Agribusiness (NDA)	a. Collaborate in the definition of the agribusiness policy. b. Identify, formulate, monitor, and evaluate programs and strategic project of interest to MAF related to its attributions and provide opinions on its technical and economic feasibility. c. Collaborate with relevant entities in the formulation of strategic guideline for action in the areas of rural credit. d. Ensure the collection and processing of information regarding agricultural market. e. Produce technical and economic information related to agricultural operations. f. Support the productive and industrial development of the agricultural sector. g. Implement appropriate measures for the development of the agri-food sector. h. Promote, in coordination with ministries with related duties, rural development, encouraging a cooperative system of production and commercialization of the demand for new markets. i. Identify and facilitate the promotion of agricultural, forestry and animal products of national origin, namely through the search for the new markets. j. Prepare weekly, monthly, quarterly, and annual activity reports. k. Exercise any other authorities that are assigned to him/her by law, regulation, or higher determination.
National Directorate of Policy, Planning, and	a. To assist the Minister in the formulation and definition of policies sector and strategies, as well as in the monitoring and implementation. b. To elaborate, in coordination with other MAF services, as well as studies and evaluation of national, regional, municipal, and sectorial scope, and to disseminate its results.

Organization	Major Functions
Monitoring (NDPPM)	c. Collaborate with relevant entities in the formulation of guidelines and action strategies related to rural credit and tax incentives. d. Ensuring the accompaniment and monitoring of the execution of the construction project of the MAF in an effective and efficient manner, namely through checking the compliance of the execution of the project with terms of the respective contracts, agreements, or construction plans. e. Propose the adoption of corrective measures whenever it is necessary to make changes to contracts, agreements or constructions plans and alert, in due time, the relevant MAF services for non-compliance or deficient length of the contracts, agreements or construction plans. f. Prepare weekly, monthly, quarterly, and annual activity reports g. Exercise any other powers that are assigned to him/her by law, regulation, or higher superior
National Directorate of Research and Statistics (NDRS)	a. Manage the geographic information system on land use for agricultural purposes. b. Collect, produce, analyze, organize and update agro-meteorological data, geographic information, maps statistical data and other relevant data for detection of MAF's task, namely in the field of land use, irrigation, agricultural production and resources forest, livestock and aquatic. c. Centralize all the geographic information, maps and data produced within the scope of MAF services and make this information available to them, in order to support all the tasks of planning and managing their activities, as well as the integration of important information from other ministries and their availability to the general public. d. Develop thematic mapping studies in order to understand and characterize the organization of space within the scope of MAF's tasks. e. Formulate research programs, in collaboration with relevant services. f. Promote the exchange of information and the transfer of knowledge regarding research techniques, veterinary techniques, fishing, and aquaculture techniques, agricultural and forest resources. g. Promote the necessary support for the execution of projects approved and carried out under the Community Development Fund related to agriculture, forest, fisheries, and livestock, in coordination with relevant authorities. h. Prepare weekly, monthly, quarterly, and annual activity reports. i. Exercise any other powers that attributed to him/her by law, by regulation or by higher superior.
National Directorate of Food Security (NDFS)	a. Ensure the coordination, monitoring and evaluation, as well as the continuous development and execution of projects with development partners, international organizations, and non-governmental organization in the context of food security. b. Implement in coordination with other relevant services, the necessary mechanism to ensure the creation of adequate food security conditions. c. Ensure the coordination and preparation of the plan and the scheduling of activities in the context of regional and municipal structural interventions related to food security, in collaboration with other MAF services. d. Ensure the functioning of the sovereignty of food security in Timor-Leste. e. Ensure the publication and dissemination of information related to food security, namely the publication of progress report. f. Prepare weekly, monthly, quarterly, and annual activity reports. g. Exercise any other competencies that are attributed to him/her by law, by regulation, by higher authorities.
National Directorate of Agricultural Technical Training (NDATT)	a. Participate in the formulation and updating of curricula of agricultural technical professional schools in collaboration with other competent bodies. b. Promote the proper functioning and management of agricultural technical-professional schools. c. Collaborate in the training of teachers and trainers in agricultural technical and vocational schools or a combination of courses within the scope of MAF's duties. d. Support and foster the development of courses and specialized training to increase the impregnability and develop additional skills or specific technical knowledge of their recipients, together with other government entities responsible for training and employment. e. Establish a close collaboration with National University Timor Lorosae and with other national institution's that work in the area of training, within the scope of the attributions in MAF. f. Promote the professional integration of participants in courses supported or promoted by MAF. g. Prepare weekly, monthly, quarterly, and annual activity reports. h. Exercise any other competencies that are assigned to him/her by law, regulation, or higher superior.
National Directorate of Agricultural Extension (NDAE)	a. Implement an agricultural strategy, namely by promoting the realization of this activity by other public or private entities. b. Participate in the training and implementation of training programs and information suitable for farmers and extension workers, together with the National Directorate of Agricultural Technical Training. c. Collaborate in the formulation of policies, programs and strategies related to their competencies. d. Cooperate in the implementation of technical support programs for agricultural and rural development with relevant international and national organizations and institutions.

Organization	Major Functions
	e. Ensure the implementation of the policies and strategy and the Agricultural Stability Manual at all levels. f. Promote the carrying out of agricultural extension activities by other public or private entities and non-governmental organizations. g. Disseminate information and transmit knowledge and techniques in the agricultural. h. Formulate and implement training programs suitable for extension workers and farmers. i. Promote organizations procedures through training and technical assistance. j. Accompany and monitor the implementation of the projects in the areas related to their competencies. k. Prepare weekly, monthly, quarterly, and annual activity reports. l. Exercise any other competencies that are assigned to him/her by law, regulation, or higher superior
National Directorate of Irrigation and Water Utilization Management (NDAIWUM)	a. Collaborate in the formulation and evaluation of the implementation of policies and strategies related to irrigation and water use. b. Establish measures that ensure effective and efficient irrigation schemes, in perspective of sustainability, as well as the rehabilitation of existing ones. c. Implement measures for the construction of water reservoirs for agriculture and rational and optimized use of water d. Promote the dissemination of information to farmers on the use, effective, efficient, and sustainable management of water. e. Exercise the competencies entrusted to it by law in matters of use of water in agriculture. f. Manage and keep updated an information system on irrigation and the hydro-agricultural infrastructure that support it. g. Ensure the maintenance and improvement of current rice irrigation system, as well as other crops, namely vegetables and legumes. h. Prepare weekly, monthly, quarterly, and annual activity reports i. Exercise any other powers that are assigned to him/her by law, regulation, or higher superior.

Source: MAF Organic Law (2016)

(3) Secretary of State for Environment and its National Directorates

The Secretary of State for Environment with its sub-ordinate national directorates are another important player in forest conservation, reduction of GHG emission through reduction of deforestation and forest degradation (REDD), and biodiversity conservation. The table below shows the major functions of the relevant national directorates under the Secretary of State for Environment

Table 4-3 Major Function of the Relevant National Directorates under the Secretary of State for Environment

Organization	Major Functions
National Directorate of Climate Change	■ Develop plans and carry out interventions related to the obligations arising from international treaties on environmental matters ratified by Timor-Leste. ■ Formulate and implement integrated actions to minimize the emission of chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) gases. ■ Develop standards and management measures to combat CFC and HCFC gases. ■ Conduct national studies and assessments regarding the level of emissions of CFC and HCFC gases and guide public intervention measures to minimize and combat CFC and HCFC gases. ■ Cooperate with relevant agents to minimize and combat CFC and HCFC gases. ■ Provide support, when requested, regarding the implementation of the national strategy for combating climate change, National Adaptation Action Programs (NAPA), National Adaptation Program (NAPs). ■ Develop materials and methods to minimize and combat CFC and HCFC gases. ■ Make recommendations on scares and beneficiaries of international conventions, protocols, and agreements on ozone. ■ Coordinate actions to mitigate the effects of climate change, namely in the context of National Appropriate Mitigation Actions (NAMA, in English), Contributions Determined at the National Level (NDC, in English) and the projects included in the Clean Development Mechanism (CDM, in English) and other programs financed by the Global Environment Facility (GEF), and by the Climatico Verde Fund (FCV). ■ Carry out public and educational awareness actions with a view to fostering university research and the development of strategies, methods and technologies for mitigating and adapting to climate change. ■ Formulate and implement integrated actions on adaptation to climate change in the context of NAPA and NAP.

Organization	Major Functions
	■ Develop the annual plan for data management and information on climate change. ■ Ensure the availability of support equipment for the collection, research and inventory of data related to greenhouse gases (GHG). ■ Coordinate with the focal points of the Centre for Climate Change and Biodiversity (CCCB, in English), the Working Group on Climate Change (WGCC, in English) and the relevant services of SEA and other relevant ministries for the collection of data and information on climate change, with a view to the development and management of an integrated database. ■ Collect and ensure the registration of implementation data from international conventions on matters related to the environment and from national or international agencies present in Timor-Leste. ■ Collect and ensure the registration of data on climate change and environmental resources. ■ Promote the good management of all data related to the implementation of international conventions on climate change and gas emissions. ■ Collect data from others to inventory in GEF. ■ Coordinate with CCCB, WGCC and academic institutions in Timor-Leste for the development of a data collection or scientific research guide in the area of climate change. ■ Promote the dissemination of information on climate change directed to the public, nationally and internationally, through the internet or other means of communication and information. ■ Promote and manage an information center on climate change, for other institutions to access information related to climate change. ■ Prepare and formulate the criteria for the establishment of a database on climate change. ■ Manage a database on climate change. ■ Coordinate with relevant services the collection of data on the impact of climate change on biodiversity. ■ Report the results of studies on the impact of climate change on biodiversity. ■ Ensure the management and updating of a website on the theme of climate change. ■ Produce periodic reports on the implementation of international conventions regularly ratified by the Timorese state and on the prospects of adhering to new conventions. ■ Present the national activities annual report. ■ Perform the other tasks that are assigned to you by law, regulation, or higher Superior.
National Directorate of Biodiversity Conservation	■ Formulate and implement integrated actions for the protection of the biodiversity of aquatic, marine and terrestrial ecosystems. ■ Take an action to protect biodiversity from aquatic, marine and terrestrial ecosystems. ■ Develop standards and management measures to protect the biodiversity of aquatic, marine and terrestrial ecosystems ■ Conduct studies on aquatic, marine and terrestrial biodiversity. ■ Cooperate with relevant agents to minimize the risks and threats to the biodiversity of aquatic, marine and terrestrial ecosystems. ■ Develop materials and methods for conserving and protecting biodiversity resources. ■ Make recommendations on the costs and benefits of international conventions, protocols and agreements signed in the area of biodiversity. ■ Produce periodic reports on the implementation of international conventions that have been ratified by the Timorese State and on prospects of adhering to new conventions. ■ Design and implement integrated actions for the collection of information and for the analysis, classification and management of the data collected in terms of biodiversity. ■ Promote a more effective form of coordination and among all general directorates, national directorates, departments, and service units whose activity is directly or indirectly related to the collection of data related to biodiversity. ■ Perform the necessary actions to ensure the management and updating of a database on biodiversity. ■ Cooperate with relevant stakeholders to improve the management of the biodiversity database. ■ Produce periodic report on biodiversity using the information contained in the database on biodiversity. ■ Present the national activities annual report. ■ Perform the other tasks assigned to him/her by law, regulation, or higher determination.

Source: to be confirmed

(4) Other National Directorates concerned

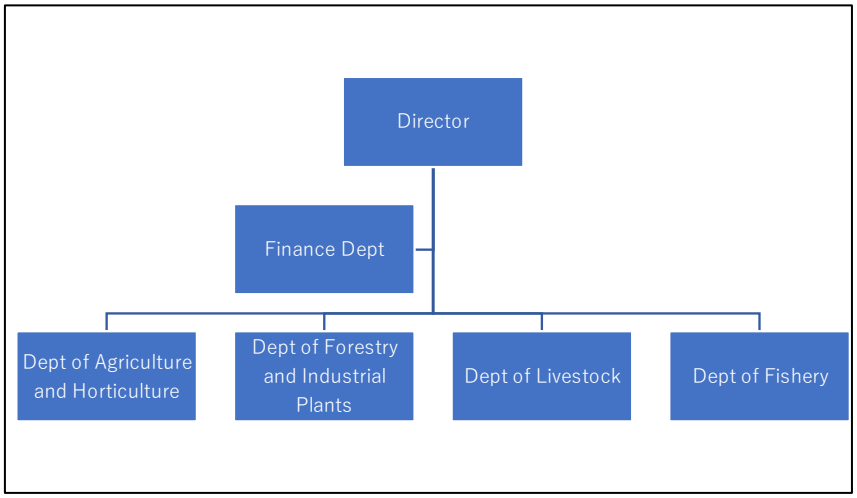
The National Directorate of Natural Disaster Management under the Secretary of State for Social Assistance and Natural Disasters and the National Directorate of Water Supply of the Ministry of Public Works are other government organizations relating to watershed management. The former organization is primarily responsible for reducing natural disaster risks in the country and coping with natural disaster events through provision of technical

support and coordination with the relevant government agencies and communities, while the latter has lead responsibility for rural and urban water supply.

4.1.2 Municipal and Post-Administrative Levels

(1) MAF Municipal Offices

At municipal and post-administrative levels, the MAF municipal offices concerned and their technical departments are the main actors in promotion and introduction of techniques relevant to sustainable land and forest management including sustainable farming practices to local communities in the respective jurisdictional areas. The typical organizational structure of MAF Municipal Office is illustrated below.



Source: MAF Municipal Office in Liquica

Figure 4-2 Typical Organizational Structures of MAF Municipal Office

The main tasks given to forest guards and extension officers are shown below. They are the front-line government officers who need to collaborate and cooperate with local communities for sustainable forest and land management in the respective localities.

Table 4-4 Major Tasks given to Forest Guards and Extension Officers

Organizations	Major Functions
Forest Guars	■ Protect forests and forest products. ■ Prevent forest fires. ■ Raise public awareness of forest functions in communities in and around forests. ■ Control illegal logging, transportation of woods, and sales of firewood. ■ Regulate the use/ exploitation of forest resources by communities. ■ Coordinate with relevant national directorates in MAF
Extension Officers	■ Promote development activities in the fields of agriculture, forestry, livestock, and fisheries in the assigned village/s. ■ Provide technical services relating to agriculture, forestry, livestock, and fisheries to local communities in the assigned village/s. ■ Provide guidance, orientation, and information to promote the improvement of production/ productivity in agriculture, forestry, livestock, and fisheries in the assigned village/s. ■ Coordinate with relevant national directorates in MAF

Source: MAF, 2008

(2) Local Government Units

The local government units at municipal and post-administrative levels, namely Municipal Administrative and Post-Administrative Offices, have the missions to 1) promote the coordinated actions by all the relevant state departments/services, 2) implement the administrative decentralization program of the government, and 3) provide technical support

to village level administrative and traditional leadership.

Since they bear principal responsibility for administration and management of the respective jurisdictional areas, they would also be important players in the implementation of any types of programs/projects. In fact, their involvement would be crucially important for implementation of those relating to land use and management as well as local adaptive capacity development, since such projects/ programs are highly relevant to local governance issues. Moreover, their continuous administrative support is also essential for ensuring the sustainability of the effects of project/ program interventions in the post-project period.

4.2 Non-government Institutions

4.2.1 Bilateral and Multilateral Donor Agencies

A number of projects/ programs have been implemented by bilateral and multilateral donor agencies in Timor-Leste since its independence. In the agriculture and forestry sectors, UN-related agencies (i.e., FAO and UNDP), EU, World bank, DFAT, USAID and JICA have the key partners (MAF Development Partners: MAF DPs) in collaboration with MAF. The table below shows the major MAF DPs and their-funded projects implemented in Timor-Leste.

Table 4-5 List of MAF DPs' Project in Forestry and Agriculture Sectors

Organizations	Supported Projects/ Program
UN-Agencies (UNDP and FAO)	■ Conservation Agriculture Program (Completed in 2018) ■ Pro-resilient Agriculture Project (On-going) ■ Strengthening Community Resilience to Climate-Induced Disasters in the Dili to Ainaro Road Development Corridor (Completed in 2019) ■ Building Shoreline Resilience of Timor-Leste to Protect Local Communities and their Livelihoods (On-going)
ADB	■ Innovative Partnerships for Coffee and Agroforestry Development (On-going)
World bank	■ Sustainable Agriculture Productivity Improvement Project (SAPIP) (On-going)
EU (GIZ and Camoes)	■ Global Climate Change Alliance Programme Timor-Leste (GCCA-TL) (Completed in 2019) ■ Partnership for Sustainable Agroforestry (PSAP) Agroforestry Component (On-going)
DFAT	■ Seed of Life (Completed in 2015) ■ To'os Ba Moris Diak (on-going)
USAID	■ AVANSA
JICA	■ The Project for Community-Based Sustainable Natural Resource Management (On-going)

Source: JICA (2020)

4.2.2 NGOs

Civil societies or Non-Government Organizations (NGOs) are another important player in the fields of rural development, forest protection and sustainable agriculture development, and climate change adaptation in the country. Both international and national NGOs have played an important role as part of development partners for the GoTL. International NGOs have raised capital for implementation of projects/ programs from international funding institutions, while local NGOs have worked as field implementers in partnership with international NGOs and donor agencies. Major NGOs working in the forest and agriculture sectors in Timor-Leste are listed below.

Table 4-6 List of NGOs working in the Forest and Agriculture Sectors in Timor-Leste

Type	Name of Organizations
International NGOs	Hivos, Conservation International, Mercy Corps, Care International, OXFAM TL, Plan International, Asian Foundation, PARCIC, Peace Wind Japan
National NGOs	SANTALUM, HALARAE Foundation, RAEBIA TL, HASATIL, Haburas Foundation, Konservasaun Flora Fauna, PERMATIL

Source: JICA (2020)

Likewise, the activities of some of the NGOs listed above are summarized and introduced in **Table 1.**

4.3 Analysis of the Projects/ Programs implemented by MAF DPs

4.3.1 On-going Projects

MAF development partners (MAF DPs) including the international NGOs have provided significant financial and human resources for implementation of projects/ programs relevant to forest protection, agricultural development, and climate change adaptation in the country. As of the end of 2018, it is estimated that about USD 120 million would be earmarked by MAF DPs for implementation of projects related to forestry, agroforestry, climate resilient agriculture, community-based disaster risk reduction, and value chain development (Please see **Box 1**). It is also estimated that the projects/ programs listed above would reach out to a total of 240 villages, of which 84 villages would have supports from multiple DP projects.

Box 1: Resource available with key DP Projects

DP	Project	Project period	Budget (million US$)	No of villages
USAID	Avansa	2015-20	19.2	50
EU/ GIZ	GCCA	2014-18	2	21
EU/Camoes I.P.	GCCA	2014-18	2	14
UNDP/GEF	DARDC	2014-18	5.25	25
UNDP/GEF	Mangroves	2016-19	7	19
Conservation International	SNAP Project	2018-21	3.34	9
European Union	PSAP	2017-21	32.47	40
HIVOS	IA4RA	2016-18	0.55	6
JICA/ CBNRM	CBNRM	2016-20	4	7
DFAT	TOMAK	2016-21	20	68
FAO	Pro-Resilience	2017-19	2.2	21
World Bank	SAPIP	2016-22	21	44
Total			119.01	324

Note: The table includes the project which ended in 2019.

In terms of village-wise geographical spread and coverage of the DPs support in the country, Baucau Municipality tops the list (**Box 2**). Many of the villages or 80% of the villages, where the DPs are and will be working, are located in six (6) municipalities, i.e., Baucau, Ainaro, Ermera, Bobonaro, Lautem and Aileu. TOMAK, SAPIP, AVANSA, UNDP-DARDC and GCCA are the important DP projects which share many villages in these Municipalities.

Box 2: Priority Municipalities by the DPs (top 6 Municipalities in terms of spread)*

Municipality	No. of villages	DPs
Baucau	41	TOMAK, GIZ-GCCA, FAO, CI, EU-PSAP
Ainaro	37	AVNSA, SAPIP, UNDP DARDC, FAO
Ermera	33	CAMOES – GCCA, AVNSA, SAPIP, UNDP DARDC, CI
Bobonaro	30	TOMAK, AVANSA, SAPIP, UNDP Mangroves
Lautem	26	TOMAK, AVANSA, SAPIP, HIVOS, CI
Aileu	25	AVANSA, JICA CBNRM, UNDP DARDC
Total	192	

Note: The villages to be targeted by EU Agroforestry have not been included, as it has yet to determine the target sucos.*

A further analysis was made to identify types of the activities undertaken by the DP projects in the respective villages. As shown in the table below, sustainable agriculture, nurseries/tree planting/ agroforestry,

livestock improvement and fisheries, value chain development are the major interventions made by the DP projects at the village level.

Table 4-7 Key Interventions by the Development Partners at Suco Level

Sl.	Key Project Interventions	No. of Suco	Percentage <1
1	Sustainable Agriculture	202	71
2	Nursery, Tree Planting, Agroforestry	146	51
3	Livestock and Fisheries	133	47
4	Water conservation/ resource management	123	43
5	CBDRM/CCVA	100	35
6	Sustainable Upland Management	94	33
7	Value Chain and Market Development	84	30
8	PLUP	74	26
9	Renewable/ Alternate Energy	41	14

Note: <1 The percentages are against 286 of the total number of villages targeted by DP-supported projects.
Source: Draft CBNRM Roadmap (2019)

Interventions relating to "sustainable agriculture," which have been and will be introduced in a total of 202 villages (71% of the total villages targeted by DPs), mainly focuses on the improvement of crop production/productivity and building of climate resilience in agricultural practices through training, demonstration, input supply and conducts of farmer field schools. Those relating to "nursery, tree planting, and agroforestry" undertaken in 146 villages (or about 51% of the total villages targeted by DPs) mainly aim to produce seedlings of timber, fruit, industrial plants, and leguminous species and plant them in the lands owned by local communities. There are also few cases of reforestation in community land and restoration of mangroves in coastal areas. Building community's linkages with market is another common intervention by DPs. The large projects, such as TOMAK, AVANSA and EU-PSAP, will give adequate emphasis on value chain development for agriculture, horticulture, and agroforestry products.

In addition to community development or agriculture development, DPs have also adopted or will adopt the field-tested participatory planning methods, namely Participatory Land Use Planning (PLUP) and Climate Change Vulnerability Analysis (CCVA). The data and information given by the DPs indicates that PLUP would be adopted in about 74 villages, whereas the DPs would go for Climate Change Vulnerability Analysis / Community Based Disaster Risk Management in 100 villages.

4.3.2 Key Issues

Some key issues are identified through the assessment of the results and processes of the past and on-going interventions made by the government organizations and the MAF development partners, as summarized below.

Overall

- The efforts made by the government organizations, particularly the national directorates under DGFCIP (i.e., NDFWM, NDNC, and NDCIP), are still limited.
- More than US$ 90 million is available with only four projects, namely USAID-Avansa, EU-PSAP, WB/GAFSP-SAPIP and DFAT-Tomak, which would reach out about 200 sucos (though there would be some overlaps in sucos). It is important to fully use the existing/on-going activities of the MAF DPs when implementing a new project/ program to minimize duplication and enhance the synergy effect.

Effective Implementation

- It is important to clarify the division of roles and responsibilities of the MAF national directorates and municipal offices for effective and efficient implementation of any projects/ programs in the field.
- Many of the MAF DPs projects have been implemented under direct management of MAF DPs, and few projects are under management of MAF. SAPIP supported by World Bank is one of the projects operated and managed by the Project Implementation Unit formed by MAF. The same project could give some lessons for others, particularly when considering the organizational framework and fund management of a project, for example:
  - It took one to two year/s to form the project implementation unit (PIU) prior to the commencement of the project activities;
  - It has also taken time for the PIU to process the billing documents submitted by the contractors; hence, the contractors have needed to wait for several months to receive the payment after submission of their invoice;
  - As many national NGOs are economically vulnerable, it may not be easy for national NGOs/ organizations to work for the project or maintain the quality of their works; and
  - It may need more time for MAF to adopt the PIU/PMU management style particularly for implementation of a large-scale project.

<u>Ensuring of Sustainability</u>

- Enhancement of the capacity of the national directorates under DGFCIP and the MAF municipal offices is one of the challenging issues for sustainable forest and watershed management.
- One of the important directions to be considered is to give influence on MAF's policy and regulatory frameworks to ensure the sustainability of project effects demonstrated by on-going and future projects/ programs implemented by the MAF DPs. It is, therefore, necessary to give due consideration to the support for development of the necessary policy and regulatory frameworks.
- It is also necessary to enhance the capacity and awareness of the stakeholders at the municipality level (e.g., MAF officers, NGOs, and local government units) for smooth introduction and implementation of projects/ programs in the field.
- In order to ensure the sustainability of the project effects after the end of projects/ programs in the field, a local-level coordinating platform should be formed and established at either municipal or post-administrative level. The relevant government organizations at municipal and post-administrative levels, such as MAF, national NGOs, Municipal and Post-Administrative Offices, other relevant offices, and local authorities at village level should participate in the platform, so that they could work together for improving local settings by maximizing the project effects.

5. Community-Based Natural Resource Management (CBNRM) Approach

5.1 Background

(1) Background

Community-based Natural Resource Management (CBNRM) is an approach to sustainable management of forest and other forest-related resources (e.g., lands and water) balancing with improvement of local livelihoods. One of the most remarkable features of CBNRM is to empower local communities to use and manage forests and other natural resources in the localities in a wise and sustainable manner. In Timor-Leste, CBNRM is a crucial concept for sustainable forest management as most of the existing forests in the country are under de facto management of local communities. The concept is supported by the current national policy and legislative frameworks, as it is highly consistent with the objectives of the National Forest Sector Policy (2018) and the Law on the General Regime of Forests in Timor-Leste (2017). In this connection, a model/ mechanism for establishment of CBNRM at village level ("the CBNRM mechanism") was developed and has been tested and demonstrated in the field to prove its effectiveness in sustainable forest management with technical assistance from JICA since 2010. Since then, the CBNRM mechanism has been introduced by several MAF DPs in more than 30 villages.

To further scale up the CBNRM mechanism on a large scale, DGFCIP with its taskforce composed of key officials from the national directorates under DGFCIP drafted a 10-year strategic plan for expansion of CBNRM ("the CBNRM Roadmap") along with the policy recommendations and ministerial order for implementation of the plan to achieve the goal of the National Forest Sector Policy.

(2) Forest Management in Timor-Leste

In the Portuguese era, forest resources had been controlled and protected by village leaders with authorization given by the colonial government. It can be said that forests and natural resources were managed by community leaders in the past, but in a compulsory way. As the system was tied to strong law enforcement, it was effective in protecting forests, regulating illegal exploitation, and reducing forest fires. The system was abandoned when the sovereignty of the country was replaced in 1975. Deforestation and forest degradation have widely started since then.

Although the Indonesian government had tried to reduce the pace of deforestation and forest degradation through controlling shifting cultivation, illegal cutting, and burning of forests for animal grazing, the degradation trend had progressed constantly. In fact, several studies reported that the significant part of natural forests, particularly valuable ones, in the country had been cleared over the period from 1975 to 1999. Deforestation was widely observed in the country during the Indonesian occupation times due to over exploitation of forest resources for exporting valuable trees (e.g., sandalwood, ebony, and redwood)[18] and burning of forests for combatting resistance army. It is estimated that the deforestation rate during this period was equivalent to 1.1% per year[19].

After independence in 2002, the government has banned commercial logging and regulated

[18] Sundland, et. al., 2001. Assessing Environmental Needs and Priorities in East Timor. Final Report – UNDP, Dili and Norwegian Institute for Nature Research, Throndeim.

[19] Timor-Leste National Action Programme to Combat Land Degradation, Revised Draft, November 2008

firewood collection on a commercial scale to reduce the deforestation rate in the country. The pace of deforestation and forest degradation may decline in the initial years from the independence as human pressure to forest resources was minimal. But forest degradation and deforestation seem to have progressed over the last decade as the demand of new farms has been heightened over the period due to rapid population increase. The recent assessment made by JICS indicates that the coverage of forest in the country has decline by 1.7 % p.a. from 2003 to 2012.

One of the important approaches taken by the GoTL is the community participation in forest protection and management as stipulated in the National Forest Sector Policy. Hence, the community-based management approaches, such as community-based forest management (CBFM), community-based natural resource management (CBNRM), and community forestry (CF), are stressed by the government as key interventions for sustainable forest management in collaboration with the relevant MAF DPs, such as FAO and JICA.

5.2 CBNRM Mechanism developed and demonstrated in Timor-Leste

A joint project, named "the Project for Community-Based Natural Resource Management," implemented by MAF and JICA, has developed an effective and operational mechanism of community-based forest and natural resource management, "the CBNRM mechanism," through field trials between 2011 and 2015. The mechanism is aimed at helping local communities manage and protect forests and other forests-related natural resources by using village rules that they have customarily observed since before. The effectiveness of the CBNRM mechanism has been proven in the field by the said project as well as other MAF DPs' projects through their field trials. It is also judged that the applicability of the mechanism would be high, especially in rural areas in the country. As of the end of December 2018, the mechanism has been introduced in more than 30 villages with the assistance from several MAF DPs. The outline of the CBNRM mechanism developed and demonstrated in the country is described in the sections below.

(1) Objectives of the CBNRM Mechanism

The principal objective of the CBNRM mechanism is to ensure that village leaders and local communities could properly protect and manage natural resources, such as forests, waters, and lands, in the locality in collaboration with MAF. Specifically, the mechanism aims to:

a. empower local communities, especially village leaders, to protect, manage and use forests and other natural resources in the locality;

b. enhance the capacity of local communities, especially village leaders, to properly manage forest and other natural resources in a wise and sustainable manner in accordance with the village regulations and future land use plan;

c. improve livelihoods of local communities through enhancement of local capacity for improvement of land productivity, increase of crop production, and introduction of high-value trees (industrial and fruit trees) in a village; and

d. establish a framework where MAF and local communities can work on sustainable forest and natural resource management balancing with livelihood development of local communities.

(2) Scope of the CBNRM Mechanism

The CBNRM mechanism shall deal with forest-related resources: namely i) forests including

non-timber forest products, ii) lands, and iii) water sources. In principle, the mechanism is applicable to villages located in hilly and mountainous areas, since it is aimed at the reduction of deforestation and forest degradation in the upper catchments in the country. Nevertheless, the mechanism can be likely adopted in the lowland as well as coastal areas to promote sustainable natural resource management though its detailed procedures may need to be fine-tuned/adapted to social and natural conditions in the respective areas.

(3) Overall Process of the Establishment of the CBNRM Mechanism

The overall process of the establishment of the CBNRM mechanism is illustrated below.

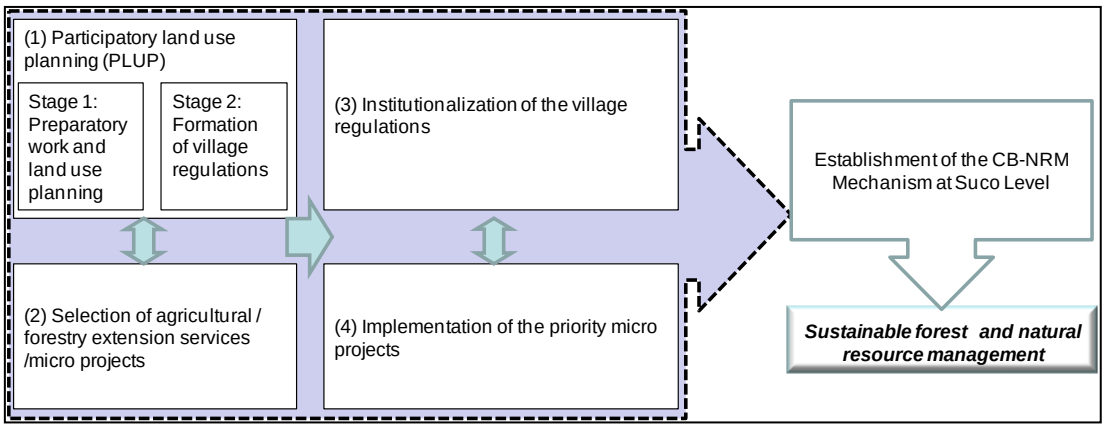


Figure 5-1 Overall Process of Introduction and Establishment of the CBNRM Mechanism

Source: Operation Manual for Establishment of the CBNRM Mechanism (2015)

Each process is composed of a series of workshops/meetings and community's collective activities as listed below.

Table 5-1 Key Processes and Steps/Activities associated with the respective Processes

Phase	Process	Stage/Steps
1. Assessment and planning	1.1 Participatory land use planning	<u>Stage 1: Preparatory works and land use planning</u> Step 1 Consultation with local leaders Step 2 Organization/Formation of the working group Step 3 Study tour to one of the JICA project villages Step 4 Present land use mapping Step 5 Future land use planning <u>Stage 2: Formulation of village regulations</u> Step 1 Review of the past and existing rules Step 2 Discussion of the draft village regulations Step 3 Review of the draft village regulations with future land use plan Step 4 Consultation with communities about the draft village regulations Step 5 Preparation for enforcement of the regulation in a traditional manner Step 6 Organization of Tar Bandu ceremony
	1.2 Selection of agriculture and forestry extension services/micro programs for achievement of a future land use plan	<u>Preparatory works</u> Step 1 Examination of possible extension services/micro programs for short-listing <u>Workshops/Meetings with local communities</u> Step 2 Evaluation of the short-listed extension services/micro programs for prioritization Step 3 Discussions of scope of the priority extension services/micro programs

Phase	Process	Stage/Steps
2. Implementation and monitoring	2.1 Institutionalization of the village regulations	Step 1 Monthly monitoring meeting at suco level Step 2 Bi-monthly or quarterly meeting at aldeia level Step 3 Annual evaluation meeting at suco level
	2.2 Implementation of the priority extension services / micro programs	Step 1 Organization of farmers' / beneficiaries' groups Step 2 Preparation of a work plan in a participatory manner Step 3 Conducts of a series of hands-on training courses / farmers' field schools (FFSs) on topics related to the priority extension services Step 4 Annual evaluation and planning of the work plan

Source: Operation Manual for Establishment of the CBNRM Mechanism (2015)

(4) Implementation Procedures for the Establishment of the CBNRM Mechanism

The implementation procedures for introduction/establishment of the CBNRM mechanism are detailed in the manual developed by the JICA CBNRM Project in 2015[20].

(5) Time Frame of the Processes

Participatory Land Use Planning (PLUP) should be the first step to be carried out as an entry point activity of the entire process. It is followed by the selection of agriculture and forestry extension services as the key output from PLUP, namely a future land use plan, can provide useful insights into potential agriculture and forestry extension services in the respective localities. After PLUP and selection of the extension services/micro programs, the institutionalization of the village regulations and the implementation of the priority micro programs will start, respectively. The standard time frames of the respective activities for the establishment of the CBNRM mechanism are shown below.

Table 5-2 Standard Timeframe for Establishment of the CBNRM Mechanism

Phase	Process	Stage	Timeframe	Remarks
1. Assessment and planning	**1.1 Participatory land use planning**	Stage 1	1~2 months	The process should begin in May or June so that the whole process of PLUP can be completed before September when communities start the land preparation.
		Stage 2	2~3 months	Likewise, the activities of stage 2 of PLUP should be completed before September to reduce the incidence of wildfires caused by communities' burning practices during land preparation.
	1.2 Selection of extension services/micro programs	-	1~2 months	The selection of extension services/micro programs can begin after the end of stage 1 of PLUP, as long as a field facilitator is capable to conduct the sessions of stage 2 of PLUP simultaneously with those for selection of extension services/micro programs. In case that the selection of extension services/micro programs starts is carried out after PLUP (stage 2 of PLUP), it could be completed before January/February so that the extension services/micro programs can begin in March/April.
2. Implementation and monitoring	**2.1 Institutionalization of the village regulations**	-	2 ~ 3 years	The monthly monitoring meeting should start from one month after the Tara Bandu ceremony.
	2.2 Implementation of the priority extension services/micro programs	-	2 ~ 3 years	A series of hands-on training courses/FFSs on techniques for sloping agriculture, sustainable upland farming, nursery establishment and operation, planting of fruit and industrial plans, and livelihood improvement, will start in March/April and be continued for at least 2 years.

Source: Operation Manual for Establishment of the CBNRM Mechanism (2015)

[20] Operation Manual for Establishment of the CB-NRM Mechanism at Suco Level (2015)

5.3 Efficacy of the CBNRM Mechanism in Addressing Climate Changes

As described in the previous sections (Sections 5.1 and 5.2), the CBNRM mechanism was originally developed for sustainable forest and natural resource management in line with the National Forest Sector Policy. It has been confirmed that the CBNRM mechanism could be an effective tool for addressing climate changes in both spheres of mitigation and adaptation. The rationales for adopting this mechanism in the climate change context are highlighted in the sections below with a particular focus on its key processes, namely PLUP and Micro Program/ hands-on training.

(1) PLUP

PLUP is an essential activity to motivate local communities to take initiatives of natural resource management (NRM) and climate change (CC) responses. Through participatory assessments of both present and future land uses in the localities, the communities become aware of the issues on NRM and CC, including their wishes on how the village should look like for future generations. With the formulation and enforcement of the village regulations, they can gain their adaptive management capacities including those for fact-finding, assessment, conflict solving between/ among community members and action-taking for solution (See the table below). Issues that they encounter during the implementation of the village regulations are diverse: illegal tree cutting, free-grazing animals damaging crops, forest fires, and land slide are the major topics in relation to NRM/ CC, while those related to social aspects are domestic violence and land disputes, which are also often raised and dealt with by local communities with the regulations. A variety of solutions and actions are taken by the communities as summarized in Box 3.

Box 3: Actions taken by the Community with PLUP

For Mitigation

- Preventing forest fire with the village regulations that stipulates how to minimize the risk of wildfires, particularly when preparing farmlands (if wildfire happens due to negligence, the sanction is given to a violator)
- Preventing illegal tree cutting with the village regulations (if found, the sanction is given to a violator)
- Prohibiting free-gazing animals causing damage of crops and seedlings (if found, the sanction is given to a violator)
- Establishing community patrol teams to prevent the above incidents (e.g., forest fire and illegal cutting)

For Adaptation

- Joint/ individual planting trees to prevent landslides, protect water sources, and establish wind break
- Coordinating with the neighborhood village to restore a broken water supply system

For social issues

- Brining the case of domestic violence to the police
- Regulating the number of animals to be killed for traditional ceremony.

Table 5-3 Impacts of PLUP Key Activities on the Capacity Development of the Community

Key Activity	Function of Key Activity	Capacity developed
Present Land Use Mapping	■ Assess the current situation of natural resources with an aerial photo while identifying vulnerable areas to climate change/ disasters.	■ Become aware of the current situations of natural resources and climate change impacts in the village.
Future Land Use Planning	■ Formulate a blueprint of their village in terms of land use and identify necessary actions for realization.	■ Share the goal/ future blueprint among the community members. ■ Make decisions over actions for NRM and CC.
Formulation of Village regulations	■ Officialize necessary actions to be taken and rules of behavior/ code of conduct to be followed by the community members	■ Develop and determine the village rules for sustainable NRM by themselves. ■ Share the common rules that people need to observe and follow for taking collective actions.
Monthly monitoring of enforcing the village regulations	■ Find i) how the people follow what they have agreed and ii) solution if any problems and the violation against the regulations	■ Be equipped with the tool (the regulations) and capacities for solving village-level issues and taking collective actions.

Source: JICA (2020)

(2) Micro programs/ Hands-on Training Courses

The Micro program/ Hands-on training is another tool, in addition to the village regulations, for the CBNRM mechanism to accelerate the community's implementation of the future land use plan. Participating in a micro program, they can obtain techniques/ skills effective in improving their livelihood options, be it of farming, forestry, or other small-scale business. The distinct feature of Micro program/ Hands-on training provided by the CBNRM mechanism from those provided by other programs is that the support extended to community members is not only for training, but also for actual application or replication of techniques that they have learned from hands-on training in their own farms/ plots. It thus assures tangible impacts on their farming, land management, and economic activities, which creates, by its nature, incentives for local communities to continue the activities. Particularly, the Micro program/ Hands-on training could directly address the climate change risks which would bring about negative impacts on local livelihoods; therefore, the CBNRM villages (the villages where the CBNRM mechanism is in place) could reduce local climate vulnerability once the community members are capacitated enough to replicate key techniques introduced in the training courses. The major topics handled as the Micro programs/ Hands-on training are described below.

Micro Program: Seedling Production and Tree Planting Promotion

Under this program, community members are trained how to establish a community nursery and produce seedlings through nursery operations. Working in the nursery, from finding the location for the nursery to hardening the seedlings before planting, they can gain all the processes and techniques of producing seedlings, e.g., seed collection, seedbed making, seedling pot preparation, and transplanting. They obtain knowledge on the selection of tree species based on the natural conditions of their localities (e.g., moisture and temperature, soil types). After growing seedling at the nursery, they can also learn how to plant seedlings on sloping lands with key skills to ensure and encourage seedling growth, such as contour line planting, hole digging and compost application.

Seedling production (training on sowing seeds)

Training on compost making

Nursery operation, seedling distribution and hole digging, which are rather laborious and time consuming, are undertaken by community members in a cooperative fashion using the traditional co-working system/ mutual support system, so-called "Harosan."

Seedlings are planted in their own farms or plots where the members choose for planting. They are guided to consider the future functionality of the respective types of trees. For example, fast growing and wind tolerant trees, such as casuarina, are planted as wind break or shade trees for coffee, while fruit and valuable timber species, such as Rambutan, Citrus, and Sandalwood, are planted in permanent/ backyard farms as part of cash crops. Because of nature of the

program, community members are substantially motivated to take care of "their" seedlings planted in their plots as they are expected to benefit from those in the future. As such, this program enables the community to restore and/or rehabilitate forest resources, which will contribute to the reduced GHG emission in their localities.

Micro Program: Sustainable Upland Farming Promotion

This program has a variety of agenda, which could help community members, especially those who live in hilly and mountainous areas and use sloping farmlands for crop production, to be equipped with sloping agriculture techniques with permaculture elements, which are also effective in adaptation to climate variability in many cases. As further discussed in Chapter 7, community members could reduce and minimize the extent of damage on crop production caused by climate variability through the application of the different techniques and technologies provided by this program (See the figure below).

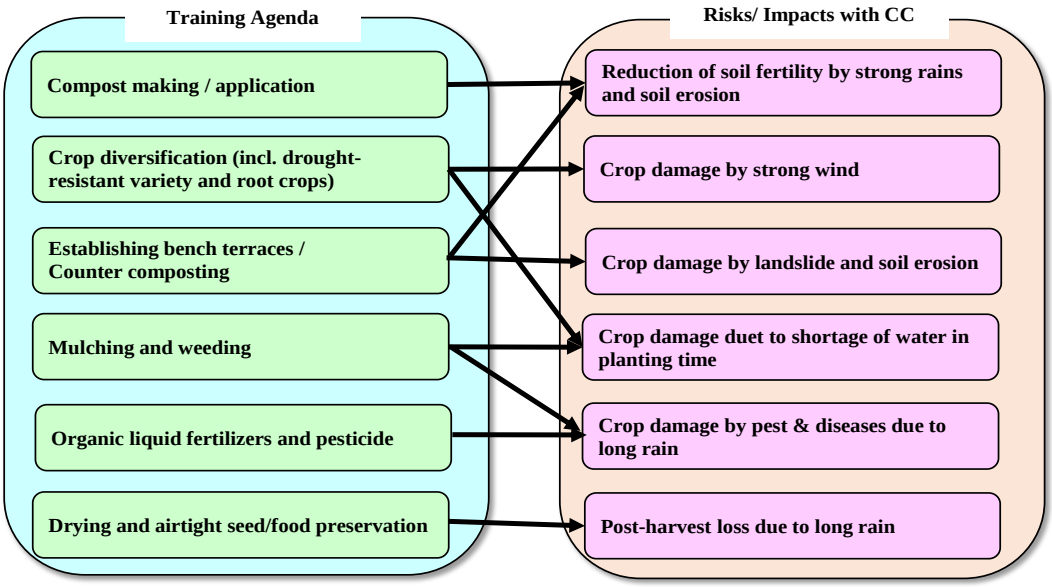


Figure 5-2 Correspondence of Training Agenda under SUFP to CC Risks/Impacts

Like in the case of Seeding Production and Tree Planting, techniques, and knowledge that the community members have learned from training courses at the demonstration plot are actually applied to the members individual farms with mutual supports of the members. In the 1st year, they focus on learning and seeing efficacy of new/ improved techniques at the demo plot, while in the 2nd year they replicate their learnings in their own land. For example, bench terraces are built in all members' farms during micro program implementation period. As the farms can produce substantial crop production, they maintain the farm with such structures to enjoy benefits from crop production even in the post-project period.

P Demo plot with bench terraces

Harvesting maize together

Livelihood Development/ Income Generation

This program first undertakes the assessment of available local resources, including crops and fruits grown by local communities as well as NTFP (e.g., honey, bamboo, mushroom, and wild herbs), and explore the possibility of food preservation or processing, artificial cultivation and handy-crafting with the resources identified. Under the JICA CBNRM projects, the beneficiaries' groups produced herbal teas, dried sweet potatoes, salted/ pickled vegetables, fruit jam, cassava chip, and fresh/ dried mushroom, and generated cash income from the sales of those products. Once the beneficiaries' groups learned to produce the product and could earn cash income, they can operate a small-scale business with limited support from external organizations to gain additional cash income.

With the application of expertise gained into their daily activities, these kinds of techniques also help them preserve the produce in a long term to secure food security. Special focus of this program is placed on women, who tend to be limited to take part in business and training opportunities, as cooking, and taking care of daily family food are under women's responsibility in rural areas in Timor-Leste. Thus, this program could enhance not only local community resilience to climate change but also local women's capacity for income generation, which would further contribute to the empowerment of women in the society.

Training on fruit jam making

Training on mushroom cultivation

5.4 Potential Impacts of the CBNRM Mechanism

Significant positive changes have been observed in the villages where the CBNRM mechanism is in place. The end-of-project evaluation of the JICA CBNRM Project (Phase I) jointly made by the GoTL and JICA in 2015 reported the following positive impacts of the CBNRM mechanism[21].

[21] Report of the Joint Terminal Evaluation on the Project for Community-Based Sustainable Natural Resource

- The number of forest fire, illegal cutting, and free grazing practices, which have often happened in the villages, is reduced after introduction of the CBNRM mechanism.
- About 30~100 % of the total households in the villages have applied the techniques introduced by the micro programs, such as sloping agriculture land techniques/ sustainable upland farming techniques, to their own farms, and continued the practices even in the post project period.
- Interventions and approaches adopted in the CBNRM mechanism are effective and contribute to forest conservation and livelihood development at village level.
- The situation is likely to continue to prevail even after the completion of the project since communities in the villages have found it economically beneficial to maintain the CBNRM mechanism.
- Many local communities who participated in the project activities continue to apply the techniques that they learned as such techniques have help them improve land productivity and increase crop production.
- The impacts generated in the project villages seem to be maintained even without any support from the project as the elements of the CBNRM mechanism, namely village regulations and micro program techniques (e.g., sustainable upland farming techniques) can sustain in the localities.

In addition to the results of the end-of-project evaluation, the following comments are also given by local communities in the project villages.

- Communities can use unproductive or less productive lands for production purposes, such as farmlands, production of fruit trees, and production of timber and fodder trees.
- Communities can grow crops in their farms without fence and fear of crop damage caused by free grazing animals.
- Some water sources, which were dried up before, have been restored after the CBNRM mechanism was in place as the incidence of forest fires and illegal cutting was drastically reduced in the village.

Furthermore, the ongoing JICA Project, namely the Project for Community-Based Sustainable Natural Resource Management in Timor-Leste, Phase II (JICA CBNRM Project Phase II), has recently conducted an assessment survey to assess the impacts of the CBNRM mechanism in terms of the following viewpoints on adaptation and mitigation of climate change.

a. Reduction of the pace of deforestation or forest degradation
b. Improvement of food security and livelihood opportunities

The results of the assessment survey are summarized below.

Table 5-4 Results of Impact Assessment Survey

a. Reduction of the pace of deforestation or forest degradation

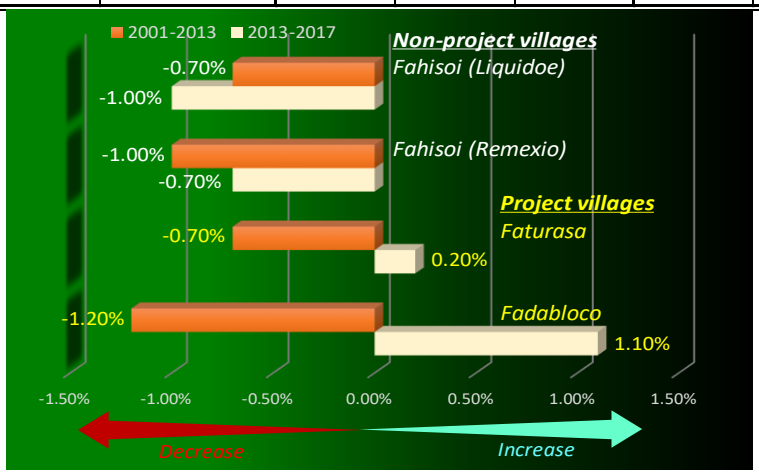
Items	Descriptions
Points of evaluation	■ Changes in forest covers in the project villages as compared to non-project villages ■ Reduction of forest degradation rates in the project villages after introduction of the CBNRM mechanism as compared to non-project villages

Management in the Democratic Republic of Timor-Leste, July 2015, JICA and MAF

Items	Descriptions
Methodology	■ 2 project villages, where JICA CBNRM Project Phase 1 had worked between 2010 and 2015, and 2 non-project villages were selected for the survey. All of them are from Noru Sub-watershed in Laclo Watershed. ■ Focus of the assessment was placed on the assessment of CO_2 emission from degradation of dense forest since the major source of CO_2 emission in the country was the conversion of dense forest into sparse forest. Particularly such a tendency was remarkable in Laclo watershed. (See Section 6.2.4 for details) ■ A satellite image analysis with visual interpretation using aerial photos and SPOT imageries taken in 2001, 2013, and 2017 was conducted to assess the changes in areas of dense forest in each village in the respective years.
Results	■ The areas of dense forest increased in the project villages from 2013 to 2017, where the CBNRM mechanism was in place in 2010/2011, while dense forests continuously reduced in the non-project villages throughout the assessment period from 2001 to 2017 (See the table below, especially for data on the size of dense forests). ■ While the project villages were able to halt the process of deforestation/degradation of dense forests, the decrease rate in the non-project villages was kept high (-1.0% to -0.7% per year) throughout the assessment period (See the table and figure below, especially for data on decreasing/ increasing rates of dense forests). ■ The comments given by local communities in the project villages, namely "the village has become greenish" and "the greenery has increased in the villages," support the above-mentioned results. ■ It can be concluded that the CBNRM Mechanism has brought positive impacts on the conservation and even restoration of degraded forests. Since CO_2 emission from conversion of dense forests into sparse forests is considered significant, the CBNRM mechanism has been proven as an effective measure to mitigate the emission, at least, from forest degradation. ■ Although the impact assessment survey did not clarify the efficacy of reduction of deforestation due to time and budget limitations, there is no denying that the mechanism could be effective in reduction of deforestation, since the communities have applied, under the CBNRM mechanism, their NRM regulations wherever necessary for protection, regardless of dense/ sparse forests.

Changes in Dense Forest Areas in the Sampled Villages

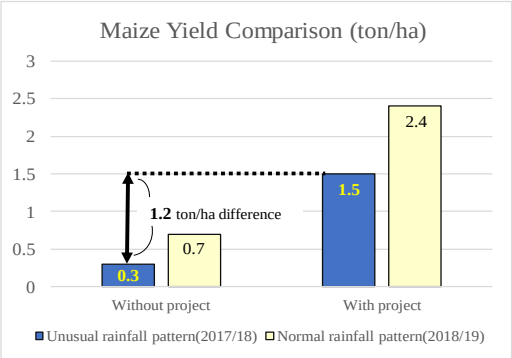
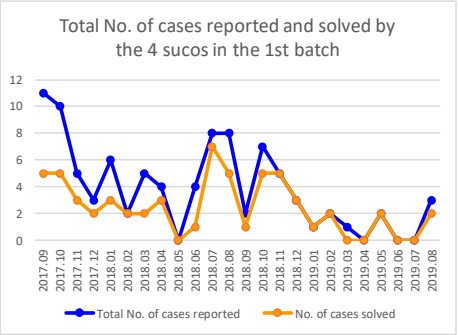
Project/ Non-project	Village	Size of Dense Forests (ha)			Decreasing/ Increasing Rate (%/year)	
		2001	2013	2017	2001-2013	2013-2017
Non-porject village	Fahisoi (Remexio)	434.9	385.6	374.3	-1.00%	-0.70%
	Fahisoi (Liquidoe)	175.2	160.7	154.5	-0.70%	-1.00%
Project village	Fadabloco	443.3	384.2	401.3	-1.20%	1.10%
	Faturasa	837.6	773	778.5	-0.70%	0.20%



Changes in Rates of Increase/Decrease in Dense Forest Areas

Source: JICACBNRM Project (2020)

b. Improvement of food security and livelihood opportunities

Items	Descriptions
Points of evaluation	■ Changes (Increase) in crop production with introduction of sustainable upland farming practices which are similar in nature to those of climate resilient agriculture ■ Livelihood resilience to climate changes among communities in terms of crop diversification, potential impacts caused by climate variability, and reduction of potential risks of climate-related natural disasters.
Methodology	■ Interviews to communities in the project and non-project villages ■ Sample survey of crop production in the demonstration plots and other plots
Results	■ The average yield of maize has increased with introduction of sustainable upland farming/ conservation agriculture techniques, which are quite similar to those of climate resilient agriculture, such as the use of improved seeds and varieties, compost application, terracing/ contour ditching, mix planting, and introduction of cover crops. This helps communities gain more production, particularly when facing irregularity in rainfalls (See the figure at right side for yield comparison).  ■ The number of tree and fruit crops, such as Dorian, Rambutan, Clove, Cacao, and Pepper planted in the private lands with assistance of the project have provided additional sources of income for local communities. ■ Processed food products produced by communities after a series of hands-on training on livelihood development have generated substantial cash income for women members, and reduce climate vulnerability of communities, particularly women. ■ Many of wastelands or abandoned areas have been used and developed for farming or plantation of industrial trees or fuelwood plantations. ■ The locations of lands vulnerable to natural disasters e.g., strong wind, landslide, and forest fires have been identified in the process of land use planning. Collective actions to reduce future risks in such vulnerable areas have been undertaken by communities, e.g., planting trees in areas damaged by forest fire or landslides.
	■ The incidence of illegal cutting, crop damage by free-grazing animals, and forest fire caused by human behaviors have reduced while the capacities of the communities for solving illegal cases are enhanced (See the figure at right and table below as sample performance of the CBNRM villages).  **Numbers of the Illegal Cases on NRM reported and solved by Communities in the target 4 sucos (1st target batch of the JICACBNRM Project Phase II)** Monitoring period (Semi-annual interval) / No. of cases reported / No. of cases solved / % of the solved Sept.2017 - Feb.2018 / 37 / 20 / 54% Mar.2018 - Aug.2018 / 29 / 18 / 62% Sept.2018 - Feb.2019 / 20 / 17 / 85% Mar.2019 - Aug.2019 / 6 / 4 / 67%

Source: JICACBNRM Project (2020)

The results of the JICACBNRM Project also indicate that the CBNRM mechanism could effectively address the non-climate related drivers of deforestation and forest degradation, namely 1) low crop production which often cause new opening of forests for farming and 2)

animal free grazing which often leads to burning of forests for new grasses.

5.5 Built-in Incentives of the CBNRM Mechanism for Sustainability

With the positive impacts stated above, the CBNRM mechanism entails built-in incentives for local communities to adopt its systems and techniques. First, it is established based on traditional customs that have been engaged by rural communities over years, which assures institutional readiness and incentives for operations. For example, the village regulations developed by PLUP are inaugurated with a customary ceremony named "Tara-Bandu," a traditional system reminding community members of prohibiting acts that cause any problems disturbing a peaceful life, which are not necessarily limited to NRM / climate change issues. It has no legal enforcement but could function often more, especially in rural areas where the government regulatory system is not strongly enforced. Tara-Bandu, by its nature, has driving forces for enforcement of rules and mobilizing people for collective actions on accounts of the respects of community members to their traditional wisdom and peer monitoring pressures.

Secondly, Micro programs/FFSs/ Hands-on training, which last over 2 years, is designed not only for participants to learn skills and knowledge at demonstration plots or training workshops, but also to put into practice what they have learned in their own plots or as part of their livelihood activities. For instance, community members, who understand the effects of sustainable upland farming at demonstration plots in the 1st year, will practice it in their respective farms in the 2nd year. Behind this application process two factors are built in the training courses. The first factor is based on the philosophy of "Seeing is Believing": they observe better results of the 1st year trial in the demo plots, and then have interest in the application of such techniques to their own farms. The second is the facilitation of helping each other particularly for replication of the labor- intensive practices (e.g., bench terracing and compost making), using traditional mutual support system (so-called "Harosan"). In general, shifting cultivation is not easy to embark on, as it requires more energy, times for commuting to farms and human resources for land preparation and weeding. Sustainable upland farming also requires significant amount of labor force for initial set-ups, such as digging of compost pit and application of soil conservation measures (e.g., bench terraces), but running and operation costs at later stage are lower than those of shifting cultivation, as the practice requires less labor force for weeding and land preparation in the consecutive years. The second factor of Harosan facilitation could eradicate the disadvantage of sustainable upland farming, offering an enabling environment for each member to apply techniques. Once the permanent farm is established, they have incentives to maintain it, as they can enjoy more production in a stable manner. The same principle be applied to the seedling production and tree planting program, in which local communities decide types of trees and plant selected trees in their own lands with the traditional mutual support system (Harosan). The communities take good care of seedlings as they consider seedlings as important assets for the communities to generate additional income in future. This mind set has also motivated local communities not to graze animals freely or put a light to his/her farm, so as to protect such valuable trees planted in their own plots.

The last incentives for the community to sustain the CBNRM mechanism is that it can keep public order and prevent social conflicts in the communities. Without the CBNRM mechanism, there is no strong rules on regulating and controlling community acts. Hence, forest fires, illegal exploitation, grazing animal and even theft of properties (e.g., animals, crops, fruits, and other properties) used to prevail within a village. There is a well-known bitter experience of

reforestation projects that seeding planted by community members were eaten by animals owned by other members in the same village. After/ With the establishment of the CBNRM mechanism, however, these chaotic cases have not been observed.

Evidence for sustainability

The post-project impact assessment conducted by MAF and JICA for the CBNRM Project Phase 1 confirmed that the CBNRM mechanism was effective even in the post-project period and a majority of local communities were continuing the techniques (e.g., of sustainable upland farming techniques) in their farms. The following are major findings of the assessment, which are supported by the tables showing the differences in communities' recognitions on NRM issues and livelihood status between the project villages (CBNRM villages) and non-project village (Non-CBNRM villages). It can be clearly seen that the results below illustrate the suitability and sustainability of the CBNRM mechanism in the context of Timor-Leste.

- The incidence of unsustainable NRM practices (e.g., forest fire, illegal exploitation of forest resources, and free grazing) has been reduced after the CBNRM mechanism was in place. Presence of village-level NRM regulations with continuous governance capacity enhancement helps to reduce conflicts over NRM as indicated in the table below.

Table 5-5 Changes in Incidence of Unsustainable NRM Practices by CBNRM

Village Type	Illegal cutting		Forest fire		Free grazing animals	
	Increased/ No change	Decreased	Increased/ No change	Decreased	Increased/ No change	Decreased
CBNRM Villages	0%	100%	0%	100%	1%	99%
Non-CBNRM Villages	74%	26%	68%	32%	60%	40%

Note: % represents the proportion of the sampled interviewees (20 people/ village) responding "Yes" to a question given.

- The number of households who have changed their conventional farming and animal-husbandry practices (i.e., shifting cultivation and free grazing animals) is higher in the CBNRM villages as compared those in Non-CBNRM villages.

Table 5-6 Changes in Farming and Animal Raising Practices by CBNRM

	Shifting cultivation		Keeping animals with pens/ropes	
	Yes doing	Not doing	Yes doing	Not doing
CBNRM Villages	6%	94%	95%	5%
Non-CBNRM Villages	50%	50%	59%	41%

Note: % represents the proportion of the sampled interviewees (20 people/ village) responding "Yes/ No" to a question given.

- Local livelihoods in the CBNRM villages have been improved after introduction of the CBNRM mechanism, as the communities could increase crop production, diversify income sources, and restore forest ecosystem services in the localities. This implies that the communities in the CBNRM villages have realized economic benefits to sustain the CBNRM mechanism (See the table below for comparison with Non-CBNRM villages).

Table 5-7 Impact on Local Livelihoods by CBNRM

	Income levels			Food production			Availability of timbers/ fuel wood		
	Increase	Decrease	No change	Increase	Decrease	No change	Increase	Decrease	No change
CBNRM Villages	100%	0%	0%	87%	13%	0%	93%	7%	0%

	Income levels			Food production			Availability of timbers/ fuel wood		
	Increase	Decrease	No change	Increase	Decrease	No change	Increase	Decrease	No change
Non-CBNRM Villages	0%	85%	15%	0%	76%	14%	16%	15%	69%

Note: % represents the proportion of the sampled interviewees (20 people/ village) responding "Yes" to a question given.

5.6 CBNRM Roadmap drafted by DGFCIP

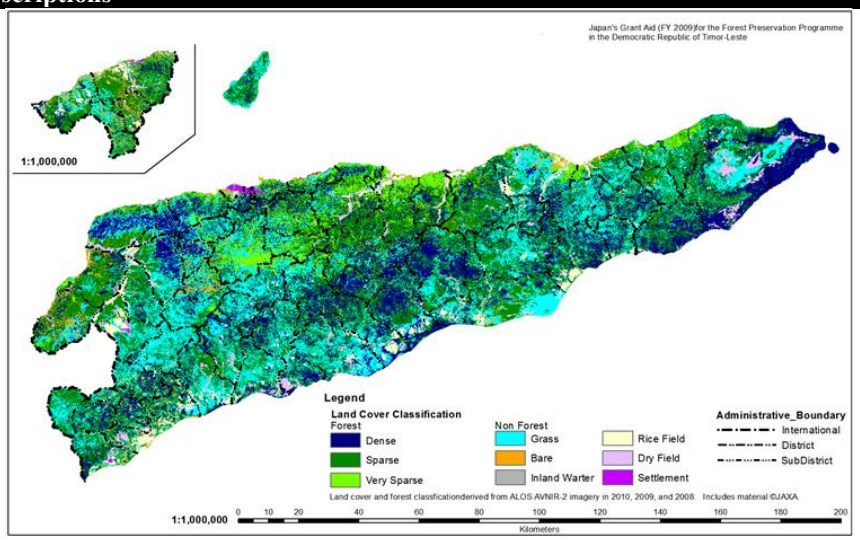
The CBNRM Roadmap, a 10-year strategic plan for expansion of the CBNRM mechanism in the 14 priority watershed, was drafted in October 2019 by the DGFCIP taskforce with technical assistance from the JICA CBNRM Project Phase II. **Appendix 5-1** shows the draft roadmap submitted to DGFCIP, and its outline is summarized below.

Table 5-8 Outline of the Draft CBNRM Roadmap

Items	Descriptions
1. Structure of the roadmap	The draft roadmap is composed of xx chapters as listed below. Chapter 1: Introduction Chapter 2: Present Conditions in the Forest Sector Chapter 3: Evaluation of the Watersheds Chapter 4: Overall Framework of the CBNRM Mechanism Chapter 5: Goal, Objectives, and Strategies of the Roadmap Chapter 6: Action Plan of the Roadmap Chapter 7: Mechanism and Institutional Framework for Implementation of the Roadmap Chapter 8: Estimation of Indicative Cost Chapter 9: Proposed Monitoring Indicators/Milestones
2. Present Conditions of the forest sector in Timor-Leste	(1) Status of Forests in the Country The results of the study made by the Forest Preservation Program22 in 2012/2013 is fully referred for the assessment of the current forest status in Timor-Leste. The table below shows the forest status in the country in 2012/2013. **Land Use** / **Area (ha)** / **Ratio (%)** 1.1 Dense Forest (including coffee plantations) / 312,930 / 21.0 1.2 Sparse Forest / 556,200 / 37.3 **Sub-total** / **869,130** / **58.3** 2.1 Very Sparse Forest / 63,173 / 4.2 2.2 Grass land / 403,247 / 27.0 2.3 Dry farm / 22,153 / 1.5 2.4 Paddy field / 41,387 / 2.8 2.5 Bare land / 48,717 / 3.3 2.6 Water body / 22,877 / 1.5 **Sub-total** / **604,543** / **4.2** 3. No data / 18,213 / 1.2 **4. Grand Total** / **1,491,887** / **100.0** Moreover, the present land use and forest cover map is also shown below.

[22] The Forest Preservation Program in the Democratic Republic of Timor-Leste implemented by Japan International Cooperation System (JICS) in 2012/2013

Items	Descriptions



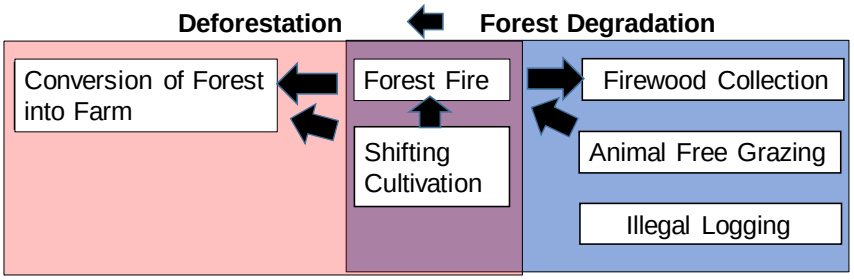
(2) Changes in Forest Covers

The Forest Conservation Program also analyzed the changes in the forest covers in the country between 2003 and 2012. The results of the analysis suggest that:

- Total forest area has decreased by 183,837 ha (17.5% of total forest area) between 2003 and 2012;
- A total of 171,097 ha of dense forests have been converted into sparse forests or other forms of land use (such as grassland) for the same period; and
- A large scale of forests may have been used for shifting cultivation and converted into farms and grasslands /bushes/sparse forests (which are fallow lands after farming) since independence.

(3) Major Drivers of Deforestation and Forest Degradation

Conversion into farmlands including shifting cultivation is conserved as the main cause of deforestation, while forest fires, collection of firewood, illegal cutting, and animal grazing are considered as major drivers of forest degradation as illustrated below.



(4) Socio-economic Conditions in the Country

The socio-economic settings in the country are summarized below.

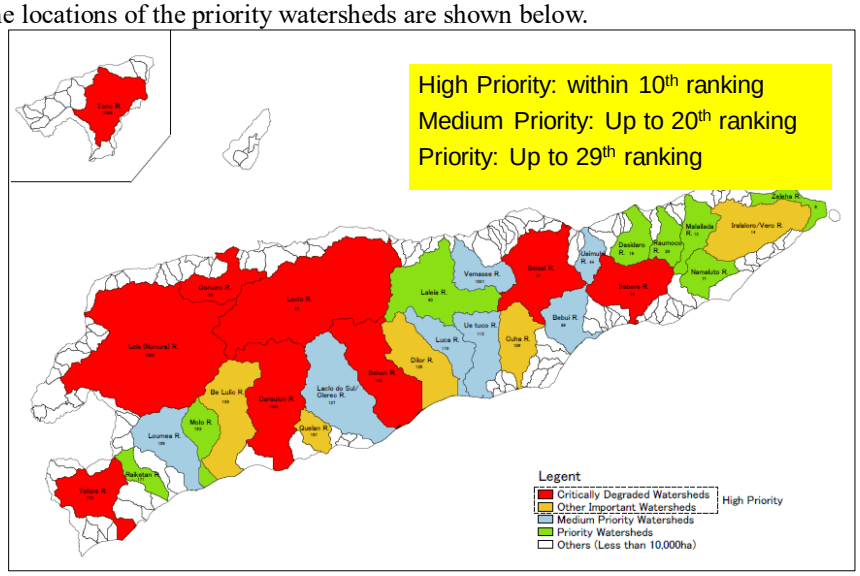
- Main economic activities: Agriculture, Livestock raising, Collection of non-timber forest products and firewood, and employment.
- Major crops produced: Maize, Cassava, Sweet potato, Rice, Coffee, and Vegetables
- Farming practices: Conventional farming practices under rainfed conditions
- Livestock: About 87% of the total households in the country rear/raise animals, mainly pigs (about 419,000 heads), cattle (222,000 heads), goats (199,000 heads), buffalo (128,000 heads), and chicken (929,000 heads).
- Poverty: The poverty ratio on the country remains high although it has declined from 50% to 42% between 2007 and 2014.
- Gender: Timor-lest is one of the high gender inequality country as evaluated and ranked by UNDP (118 rank out 149 countries). High gender inequality index is attributed to high maternal mortality and the large gender gap in labor force participation rates.

(5) Key Legislation, Policies, and Plans in the Forest Sector

Items	Descriptions
	The following are the exiting legislation, policies, strategies, and plans relating to forest and watershed management in the country. ■ Forest Sector Policy (revised in 2018) ■ Land Law (2017) ■ Law on the General Regime of Forests in Timor-Leste (or Forest Policy Law) (2017) ■ National Strategic Plan (2011) ■ MAF Strategic Plan (2012) ■ National Conservation Plan (2013)
3. Priority watersheds for expansion of the CBNRM mechanism	(1) Evaluation of the Existing Watersheds in the County In order to develop an effective and realistic plan and implement the same in a strategic manner, all the 191 watersheds existing in the country are evaluated and prioritized in terms of forest ecosystem functions and urgency of forest rehabilitation. Specifically, the following criteria are used for evaluation. 1) Size of watershed: > 10,000 ha of the area 2) Function to protect water sources: Existence of large-scale rice field in the downstream area and/or a water supply system for major cities/towns) in the catchment 3) Function to prevent soil erosion: Proportion of steep sloping areas (over 26 degree) 4) Function of conserve biodiversity: Areas overlapped with the protected areas 5) Provision of forest resources: Forest cover rate and ratio of dense forest in total forests 6) Urgency/necessity of intervention: Deforestation rate (2003-2012) (2) Results of the Evaluation and priority Watersheds As a result of the evaluation, a total of 29 watersheds are selected as priority ones. Among others, 14 watersheds are selected as high priority areas as shown below.

Priority	No. of watersheds	Total Area / Ratio	Total Forest Area / Ratio
High Priority	14	6,641 km^2 / 44.5%	3,627 km^2 / 41.8%
Medium Priority	7	2,915 km^2 / 19.5%	1,742 km^2 / 20.1%
Priority	8	1,602 km^2 / 10.7%	1,140 km^2 / 13.1%
Sub-total	29	11,158 km^2 / 74.8%	6,509 km^2 / 75.0%
Less Priority	162	3,753 km^2 / 25.2%	2,166 km^2 / 25.0%
Total	192	14,911 km^2 / 100.0%	8,676 km^2 / 100.0%

The locations of the priority watersheds are shown below.



Those selected as high priority ones are listed below.

Watershed	Catchment Area	No. of Sucos related

Items	Descriptions

1. Loes	1,609 km^2	111
2. Caraulun	648 km^2	36
3. Be Lulic	461 km^2	21
4. Seisal	505 km^2	39
5. Tafara	317 km^2	18
5. Laclo	1,359 km^2	65
5. Cuha	252 km^2	13
5. Comoro	232 km^2	27
9. Sahen	541 km^2	17
9. Irabere	374 km^2	31
9. Tono	344 km^2	16
9. Dilor	374 km^2	10
9. Quelan	108 km^2	4
9. Iralaloro	453 km^2	13

4. Goal and Strategies of the roadmap

(1) Goal and Objectives of the Roadmap

The goal and objectives of the roadmap are set as follows:

<u>Goal of the Roadmap</u>

Forests and other natural resources, e.g., lands and water in the 14 high priority watersheds are protected and managed in collaboration with local communities in a proper and sustainable manner.

<u>Objective of the Roadmap</u>

All the sucos geographically related to the 14 high priority watersheds will introduce and establish the CBNRM mechanism by the end of 2030.

(2) Key Strategies of the Roadmap

Key strategies to achieve the objective of the roadmap are mapped out in three different phases: short-term (2021-2023), medium-term (2024-2026), and long-term (2027-2030). Those proposed as the short-term strategies are listed below.

- Issue and enact the new policy documents to adopt the CBNRM mechanism as one of the mainstream measures not only for sustainable forest management but also for adaptation to adverse effects of climate changes.
- Promote the integration of PLUP into on-going and pipelined MAF and DPs projects, especially those targeting any part of the 14 high priority watersheds.
- Encourage MAF and DPs projects which include any activities relating to the CBNRM mechanism to implement their activities in the sucos located in the 14 priority watersheds.
- Strengthen the capacity of local facilitators (e.g., NGO facilitators, forest guards, extension officers, and other technical staff) who will play a leading role in introducing the CBNRM mechanism, especially PLUP, in sucos geographically relating to the 14 high priority watersheds.
- Seek additional financial assistance from the potential funding schemes and institutions, such as GCF and GEF, and secure additional budgets to expand the CBNRM mechanism in the 14 high priority watersheds.
- Restructure and strengthen the institutional framework of the GoTL, particularly MAF and DGFCIP, to take a major initiative in promoting the CBNRM mechanism in a systematic manner.
- Introduce the CBNRM mechanism in sucos geographically relating to the 14 high priority watersheds using additional budgets secured from the potential funding schemes/institutions.
- Establish the watershed management councils at the watershed/sub-watershed level in the 14 high priority watersheds depending on their size and terrain and enhance the capacity of local leaders for natural resource management through operations of the councils.

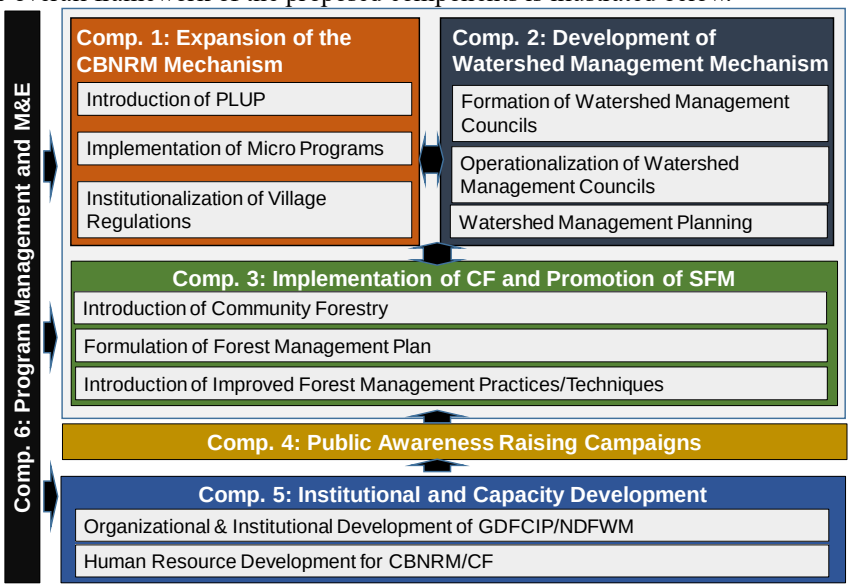
5. Action plan of the roadmap with implementation procedures for the programs/ sub-programs

(1) Proposed Components of the Action Plan

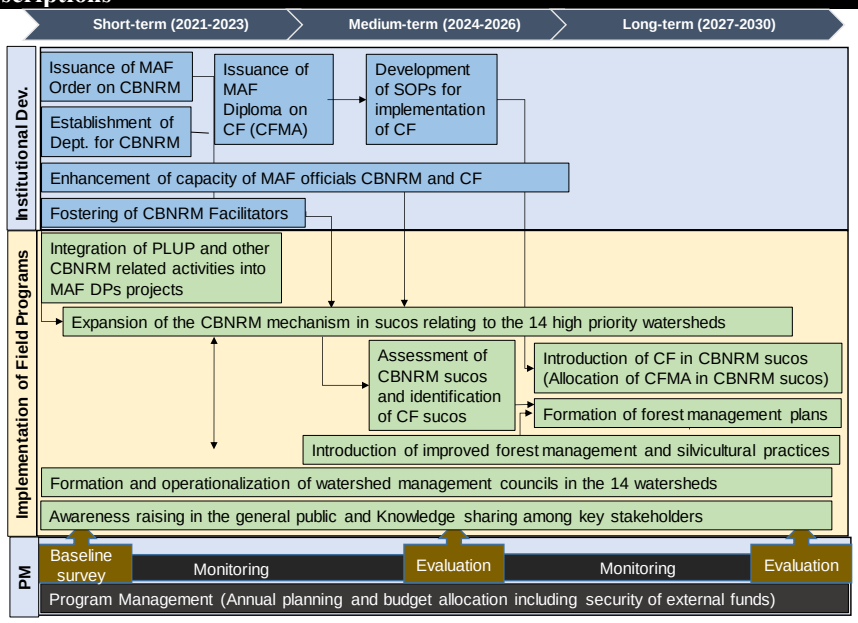
A 10-year plan to scale up the CBNRM mechanism in the 14 high priority watersheds are developed as an action plan of the roadmap. A total of six (6) components or 13 sub-components listed below are proposed in the action plan.

Comp. 1: Expansion of the CBNRM Mechanism

1.1 Introduction of PLUP
1.2 Implementation of Micro Programs
1.3 Governance Capacity Enhancement

Items	Descriptions
	Comp. 2: Development of Watershed Management Mechanism 2.1 Watershed Management Council Formation 2.2 Watershed Management Council Operationalization 2.3 Watershed Management Planning Comp. 3: Implementation of CF and Promotion of SFM 3.1 Introduction of Community Forestry 3.2 Formulation of Forest Management Planning 3.3 Introduction of Improved Forest Management/ Silvicultural Practices Comp. 4: Public Awareness Raising Campaigns 4.1 Public Awareness Raising 4.2 Knowledge Sharing with Key Stakeholders Comp. 5: Institutional and Capacity Development 5.1 Organizational & Institutional Development 5.2 Human Resource Development Comp. 6: Program Management and M&E 6.1 Program Management 6.2 M&E The overall framework of the proposed components is illustrated below.  (2) Structure of the Action Plan The components and the associated sub-components shall be implemented in a strategic manner to bring about synergetic effects through implementation and efficiently achieve the objectives and targets of the roadmap within a given period. The structure of the action plan is illustrated below.

Items	Descriptions



(3) Target Areas

A total of 317 villages in 58 posts-administrative in 13 municipalities will be targeted by the action plan.

(4) Timeframe of the Action Plan

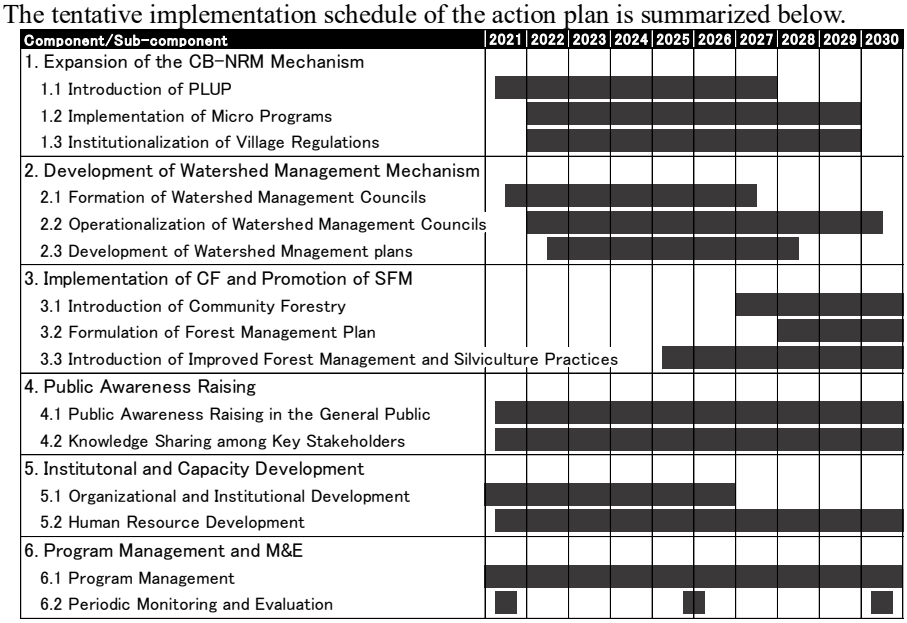
The action plan shall be implemented for 10 years from 2021 to 2030.

(5) Detailed Process of Implementation of Sub-Components

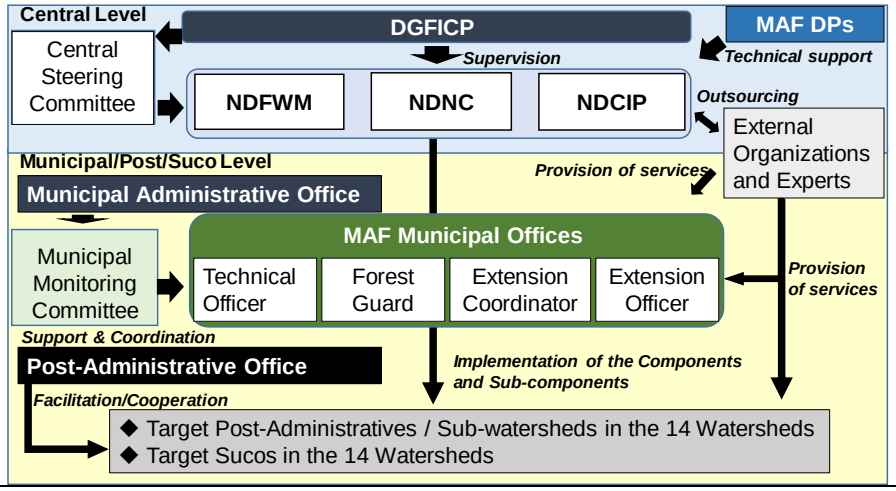
Details of the process of implementing the respective components and sub-components are described in Chapter 5 of the Draft Roadmap attached in Appendix 5-1.

6. Implementation plan

The 58 posts-administrative (P.As.) are further evaluated and prioritized for strategical implementation of the action plan. Out of 58 P.As., 22 P.As. are selected as high priority areas, while 18 P.As. are considered low priority. It is proposed that the proposed components and sub-components should be implemented in the priority P.As. first. The tentative implementation schedule of the action plan is summarized below.



The organizational structure for implementation of the action plan is illustrated below.

Items	Descriptions
	

Source: Draft CBNRM Roadmap (2019)

DGFCIP will adopt the CBNRM roadmap as a national program to mainstream the CBNRM mechanism as a key approach to sustainable forest management. Prior to the official endorsement, DGFCIP and its national directorates have introduced and presented the draft roadmap to relevant stakeholders at municipal level, i.e., MAF municipal officers, municipal administrative officers, and those from the municipal offices relating to environment and natural disaster management, through consultation meetings held at the strategic locations in the country. The reports on the consultation meetings, which were submitted to DGFCIP, are attached in **Appendix 5-2** of this report as references.

DGFCIP was supposed to have another consultation meeting at central level inviting the relevant national and international organizations, such as MF DPs, the national directorates under MAF and other ministries concerned, and national NGOs, in March/April 2020. It was cancelled and postponed due to the expansion of COVID-19 infection around world. It will be arranged and organized by DGFCIP taskforce with technical assistance from the JICA CBNRM Project Phase II once gathering of people is allowed in the country to have comments from those at central level and finalize the CBNRM Roadmap.

6. Present Conditions of the Target Watersheds

6.1 Selection of the Target Watersheds

In Timor-Leste, there are a total of 191 watersheds including minor-/small-scale watersheds of short-distance streams flowing from hills along the coastline. In the CBNRM roadmap drafted by DGFCIP, which is currently under consultations with relevant stakeholders in the country for finalization, 29 watersheds whose basin area is more than 10,000 ha are selected as priority watersheds. Furthermore, 29 priority watersheds are evaluated according to its ecosystem services, and 14 watersheds are selected as high priority watersheds for the targets of the CBNRM roadmap, which is currently being finalized by DGFCIP and its subordinate national directorates. The following criteria closely relating to climate change impacts are used for the assessment of the priority watersheds.

Table 6-1 Evaluation Criteria for Assessment of the Watersheds

Criteria	Descriptions
i) Protection of water sources	Watersheds which have water sources for a large-scale rice field or a water supply system to populated areas (e.g., town and city) in the boundaries are considered highly important for security of regional food and water supply. Protection and proper management of forest resources in the catchment areas in such watersheds is crucial for reduction of climate risks to human life in the downstream areas.
ii) Soil conservation	Watersheds which have high risks of soil erosion and slope failure due to topographic conditions in the areas are given high priority as existing forests in such watersheds play an important role in prevention of soil erosion and slope failure. Sustainable forest and land management is essential to the minimization of potential landslide or soil erosion due to heavy or strong rains in future.
iii) Biodiversity conservation	Watersheds which overlap their areas with the protected area are considered important for conservation of ecosystems as they contain habitats of precious species in the country. Existing forests play an important role in protection of wildlife from extreme heats in the dry season.
iv) Provision of forest resources	Watersheds which have high forest coverage rates and high proportion of dense forest in existing forests are prioritized as dense forests are important carbon sinks in the country. In fact, degradation of dense forest into sparse forest is considered as one of the major sources of GHG emissions in the forest sector. On the other hand, existing forests have generated natural resources crucial for local livelihoods, such as firewood, wild plants for food, mushroom, and medicinal plants, which are important alternative food and sources of income for local communities particularly when crops are damaged by climate variability and its related events.
v) Urgency and necessity of interventions	Watersheds in which deforestation and forest degradations have progressed at high rates are given priority as the areas urgently require interventions to reduce the GHG emission from deforestation and forest degradation and to protect local livelihoods from severe damage by climate viability.

Source: Draft CBNRM Roadmap (2019)

The table and figure below show key features of the 14 high priority watersheds and their locations, respectively.

Table 6-2 Key Features of the High Priority Watersheds (including the highly degraded watersheds)

Watershed	Socio-economic				Natural condition					
	Municipality	No. of Villages (No.)	HHs (No.)	Population (persons)	Total area (km2)	Dense forest (km2)	Sparse forest (km2)	Very sparse (km2)	Farms (km2)	Others (km2)
Lois (Nunura) River	Aileu, Ainaro, Bobonaro, Ermera, Liquica	111	47,242	280,267	1,608.71	275.10	539.20	21.00	84.90	688.51
Caraulun River	Aileu, Ainaro, Manufahi	36	14,853	88,840	647.80	128.40	205.50	2.40	16.80	294.70
Be Lulic River	Ainaro, Covalima, Ermera, Manufahi	21	11,496	66,569	460.92	72.90	141.50	3.00	26.00	217.52
Seisal River	Baucau, Viqueque	39	17,668	93,771	505.30	111.70	164.90	8.20	40.70	179.80

Watershed	Socio-economic				Natural condition					
	Municipality	No. of Villages (No.)	HHs (No.)	Population (persons)	Total area (km2)	Dense forest (km2)	Sparse forest (km2)	Very sparse (km2)	Farms (km2)	Others (km2)
Tafara River	**Covalima**	18	7,045	36,043	317.18	59.60	139.10	0.00	2.60	115.88
Laclo River	**Aileu, Ainaro, Dili, Ermera, Manatuto, Manufahi**	65	19,020	120,562	1,358.58	172.70	532.70	316.90	24.40	311.88
Cuha River	**Viqueque**	13	5,949	30,025	251.84	31.50	112.10	0.00	5.90	102.34
Comoro River	**Aileu, Dili, Ermera, Liquica**	27	27,423	174,082	231.82	53.00	57.70	13.80	1.90	105.42
Sahen River	**Manatuto, Manufahi**	17	3,373	21,881	540.80	199.40	183.20	4.10	34.00	120.10
Irabere River	**Baucau, Lautem, Viqueque**	31	8,647	43,385	373.62	103.50	139.50	0.00	6.00	124.62
Tono River	**Oeccuse**	16	13,317	64,295	344.33	16.60	186.80	0.00	16.80	124.13
Dilor River	**Manatuto, Viqueque**	10	2,662	16,283	374.47	129.30	117.90	0.00	13.10	114.17
Quelan River	**Manufahi**	4	2,445	13,992	107.50	22.40	35.10	0.00	0.30	49.70
Iralaloro/Vero River	**Lautem**	13	7,185	39,751	453.25	123.00	94.50	0.00	63.70	172.05

Note: River basins with shade are those categorized as the critically degraded but important watersheds in the forest sector policy.
Source: Draft CBNRM Roadmap (2019)

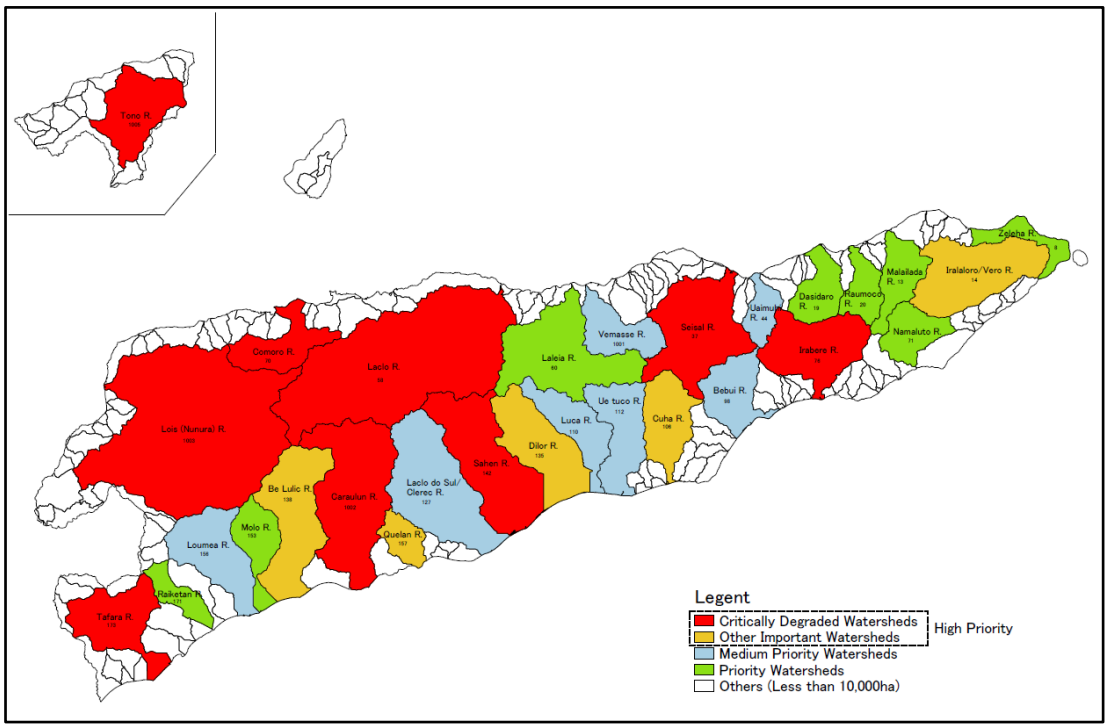


Figure 6-1 Priority Watersheds in the Country

Source: Draft CBNRM Roadmap (2019)

All the 14 high priority watersheds are selected as target areas for the CBNRM roadmap, where the CBNRM mechanism should be rolled out for sustainable protection and management of forests and natural resources and strengthening of local climate resilience through improvement of local livelihoods in the watersheds.

For the selection of the target watersheds of the proposed project, DGFCIP further evaluated the 14 high priority watersheds in terms of i) potential climate risks, such as floods, landslide, drought, and strong winds, ii) potential of reduction of GHG emission from deforestation and forest degradation, iii) overlap with existing MAF development partners' interventions, and iv) consistency with the National Forest Sector Policy. The points of evaluation are outlined below.

a. Potential climate risks: Watersheds with high potentials of floods, landslide, drought, and strong winds are prioritized.

b. Potential of GHG emission reduction: Watersheds with a large area of existing forest and high deforestation/forest degradation rates are considered highly potential to reduce GHG emission through sustainable forest management.

c. Overlap with existing MAF development partners' interventions: Watersheds with less existing interventions of MAF development partners' projects should be first selected.

d. Consistency with National Forest Sector Policy: Watersheds designated as critically degraded watersheds by the National Forest Sector Policy are prioritized.

The table below shows the results of the evaluation of the high priority watersheds in terms of the points given above.

Table 6-3 Evaluation of the High Priority Watersheds for the Proposed Projects

Watershed	Potential Climate Risks				Mitigation Potentials	Existing DPs Coverage	Consistency with National Policy
	Floods	Landslide	Drought	Storng Winds			
Lois (Nunura) River	Low-Medium	**Medium-High**	Meidum	**Medium-High**	**High**	High (WB and others)	**High (Degraded watershd)**
Caraulun River	**Medium-High**	**Medium-High**	Meidum	**Medium-High**	**High**	**Low (USAID)**	**High (Degraded watershd)**
Be Lulic River	Medium	**Medium-High**	**Meidum-High**	**Medium-High**	Medium	High (WB, USAID, wtc.))	
Seisal River	Low	MEDIUM	**Meidum-High**	**Medium-High**	**High**	High (EU, DFAT, etc.)	**High (Degraded watershd)**
Tafara River	**High**	**Medium-High**	**High**	Medium	Medium	**None**	**High (Degraded watershd)**
Laclo River	**Medium-High**	**Medium-High**	**Medium-High**	**Medium-High**	**Medium-High**	Meidum (JICA, USAID)	**High (Degraded watershd)**
Cuha River	Low	Low	Low-Medium	**Medium-High**	Low	**Low (USAID)**	
Comoro River	**Medium-High**	**Medium-High**	**Meidum-High**	Medium	**Medium-High**	Medium (JICA and CI)	**High (Degraded watershd)**
Sahen River	**Medium-High**	Medium	Medium	**Medium-High**	**Medium-High**	Medium	**High (Degraded watershd)**
Irabere River	Low	Low-Medium	Medium	Medium	**High**	Medium (UNDP,, DFAT, CI)	**High (Degraded watershd)**
Tono River	Low	Low	**High**	**High**	Low	High (WB)	**High (Degraded watershd)**
Dilor River	Medium	Medium	**Meidum-High**	Medium	**High**	**Low (UNDP)**	
Quelan River	**High**	Low	Low	Low	Low	**Low (FAO)**	
Iralaloro/Vero River	Low-Medium	Low	**Meidum-High**	**Medium-High**	**High**	**Low (FAO)**	

Source: JICA and DGFCIP (2020)

Among the 14 high priority watersheds, DGFCIP selected the following four watersheds as the target areas for the proposed project.

- Caraulun watershed:
- Tafara watershed:
- Laclo watershed:
- Comoro watershed:

The possible climate risks and potential positive effect on GHG emission in the selected target watersheds are preliminarily assessed to confirm the validity of the evaluation results.

Table 6-4 Summary of Possible Climate Risks and Potential Effect on GHG Emission

Watershed	Potential risks of climate change	Potential of GHG emission reduction
Caraulun	The lower part of the watershed, which is located in Manufahi Municipality, is prone to flooding, while the upper part of the same has a high risk of landslide. The extent of the events may get severer as the intensity of rainfalls is expected to be higher though the frequency of flood/landslide events may reduce.	About 52% (or 333 km2) of the watershed is covered with forest, of which 38% (or 128 km2) is dense forest. The area has a high potential of reducing GHG emission and stabilizing carbon uptake and stock by protection and regeneration of the existing forest and halting deforestation and degradation.
Tafara	Flood is the major climate-related hazard, which have affected people living in the watershed, particularly in the downstream area of the watershed. The extent of damage caused by floods may increase due to increase of the intensity of strong rains. Furthermore, the area, particularly the middle or upper part of the watershed may often have severe damage of long drought in the future as the area is expected to have more than 10 months of dry period based on the future projection.	The potential of GHG reduction in the watershed is rather lower than the ones in the other target watersheds, due to the limitation of remaining dense forests in the watershed (4th lowest of the 14 watersheds). However, the watershed has a high potential for carbon uptake from community rehabilitation and regeneration of degraded forests, which widely exist at various stages of regeneration in the watershed. Besides, the watershed may face a risk of increase of forest fires, because of the predicted increase in dry months.
Laclo	Drought and rainfall variability are the major causes of crop failure in the watershed, particularly in the hilly and mountainous areas where maize is the predominantly planted. The upper part of the watershed has a high likelihood of an increase of damage by landslide and strong winds, while the extent of flood damage in the downstream areas may increase in the future. Furthermore, the paddy production in the Laclo irrigation system, one of the largest irrigation systems in the country, may decline when a severe drought hits the area.	This watershed has about 705 km2 of forests, of which 173 km2 is dense forest. Though its deforestation rate is rather lower than the ones in other watersheds, the pace of forest degradation (or conversion of dense forest into sparse forest) is as high as 3.5% p.a. Due to unfavorable climate conditions and frequent forest fires, the situations are expected to get worse. It is crucially important to protect existing dense forests from degradation by forest fires to reduce GHG emission in the watershed.
Comoro	The watershed has a catchment of the main source of water for Dili city. Hence, a long dry spell in the watershed would result in serious impacts on people's life in Dili city due to a shortage of water. At the same time, the crop production in the upper watershed would be significantly affected by drought and rainfall variability. On the other hand, a short-term but strong rain has sometime caused severe flood damage to Dili city. In the upper part of the watershed, landslide in sloping lands is the major climate-related hazard affecting local people's life.	Although the total forest cover in the watershed is lower than other watersheds, the annual rates of deforestation and forest degradation are both high, 4.9% and 5.9%, respectively. Shifting cultivation and conversion of forests into farmlands are considered as major causes of deforestation and forest degradation. It is, therefore, critically important to protect existing forests, particularly dense forests, in the watershed not only for protection of the important water source but also for reduction of GHG emission in the watershed. There is also an increasing number of community-based forest regeneration initiatives in the watershed, particularly in areas with Eucalyptus rootstock, which would contribute to the increased carbon uptake.

Source: JICA Project Team (2020)

Current conditions including climate change projections in the target watershed are further analyzed in the sections below.

6.2 Natural Conditions in the Target Watersheds

6.2.1 Climates in the Watersheds

(1) Rainfalls and Temperatures

As shown below, the annual rainfalls vary with the locations in the country.

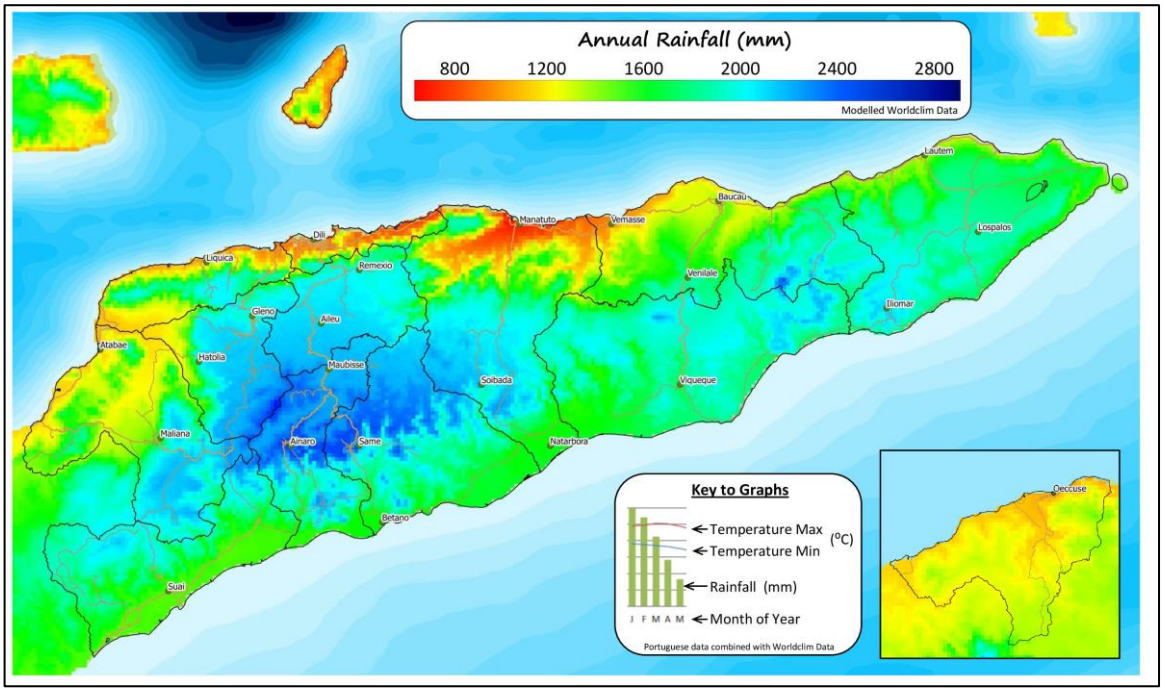


Figure 6-2 Rainfalls in the Country

Source: Map of Annual Rainfall and Temperature in Timor-Leste, Seed of Life (2013)

Laclo watershed, particularly its northern coastal part and those along Laclo river, shows drier characteristics. The annual rainfalls in the drier parts range from 600 mm/year (at Manatuto) to less than 1,200 mm/year (at Laclo), while the highest peaks of the same watershed (e.g., Aileu and Laclubar) have about 2,000 mm/year of annual rainfalls. Caraulun watershed stretching from the central mountain peaks to the southern coast has the wet monsoon characteristic with rather longer rainy months. The annual rainfalls in the watershed range from approximately 1,200 mm/year (at Betano) to more than 2,000 mm/year (at Ainaro). Comoro and Tafara watersheds have the intermediate character whose average annual rainfalls are from approximately 1,000 mm/year to less than 2,000 mm/year. The table below shows climate data (i.e., temperatures and annual rainfalls) in the municipalities geographically related to the target watersheds. Below figure shows the rainfall patterns.

Table 6-5 Precipitations and Temperatures in Municipalities overlapped with the Target Watersheds

Municipality	Watershed related*			Temperature (℃)**			Precipitation (mm)**			Remark
				Range of Daily Ave. Temp			Ave. Temp.	Min. / month	Max./ month	Total / year	
Aileu	Cr	L	Cm	19.9	-	22.6	21.6	18	360	2,080	
Ainaro	Cr	L		20	-	23.2	21.9	27	421	2,465	at Suai
Manufahi***	Cr			22	-	31	-	-	-	1,128	at Betano
Covalima		T		25	-	27.9	26.5	14	266	1,511	
Dili			Cm	26.2	-	28.4	27.5	11	136	847	
Ermera		L	Cm	21.4	-	24.2	23	18	323	1,918	at Gleno
Liquica			Cm	26.5	-	28.5	27.5	10	175	1,007	at Maubara
Manatuto		L		26.1	-	27.9	27.3	3	115	650	
Manufahi	Cr			22.3	-	25.5	24.2	22	331	2,328	at Same

Note: * Cr=Caraulun T=Tafara, L= Laclo, Cm= Comoro. ** Data was collected between 1982 and 2012 where/when available.
*** Data source is different from others.

Source: ** : https://en.climate-data.org/info/sources/
*** : Climate Change Research in Timor Leste, Seed of Life, 2013

(2) Preliminary projections of climate changes

In Timor-Leste, the availability of climate data is rather sporadic especially at local level. It is also statistically difficult to make sound presentations on historical trends as well as projections of site-specific future climate change. Limited existing assessments are reviewed to make preliminary projections on future precipitations and temperatures in the watershed as described below.

Projections on precipitation

An assessment made by Nicholas Molyneux et al. in 2012[1] indicates a slight increase of annual rainfalls especially in the central parts of the country during the period of 2000-2050. The assessment predicts that the monthly rainfalls in January and February may increase while those in March and April may reduce. As shown below, the precipitations are expected to increase in the upper parts of the target watersheds, particularly Laclo and Caraulun watersheds.

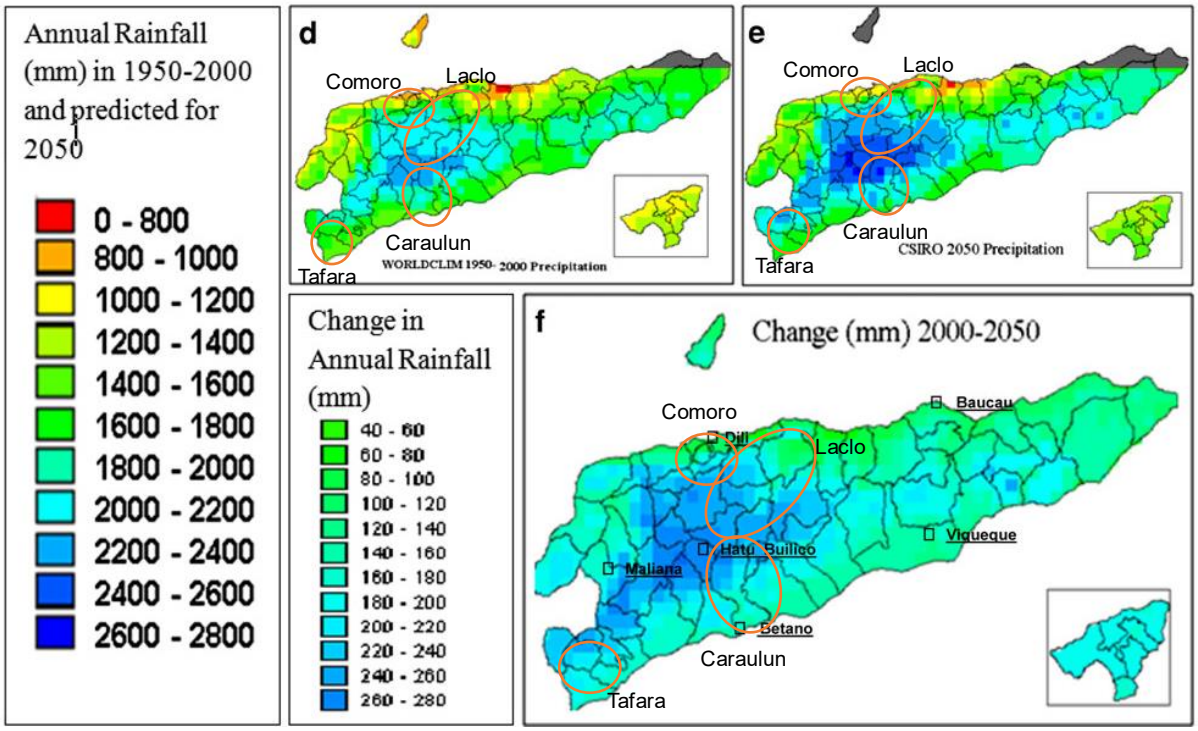


Figure 6-3 Projections of Annual Rainfall Changes in 2000 and 2050

Source: Climate Change and Population Growth in Timor Leste: Implications for Food Security (2012)

On the other hand, the Initial National Communication of Timor-Leste in 2014 indicates somewhat different trends, namely an increase of rainfall in the onset of the dry season (March to May) and possible reduction of rainfall during the rainy season (from December to February). The following figures show the probability of seasonal rainfall increases in Timor-Leste under the four RCP scenarios based on the 20 CMIP5 GCM models.

[1] Climate Change and Population Growth in Timor Leste: Implications for Food Security, Nicholas Molyneux et al., 2012

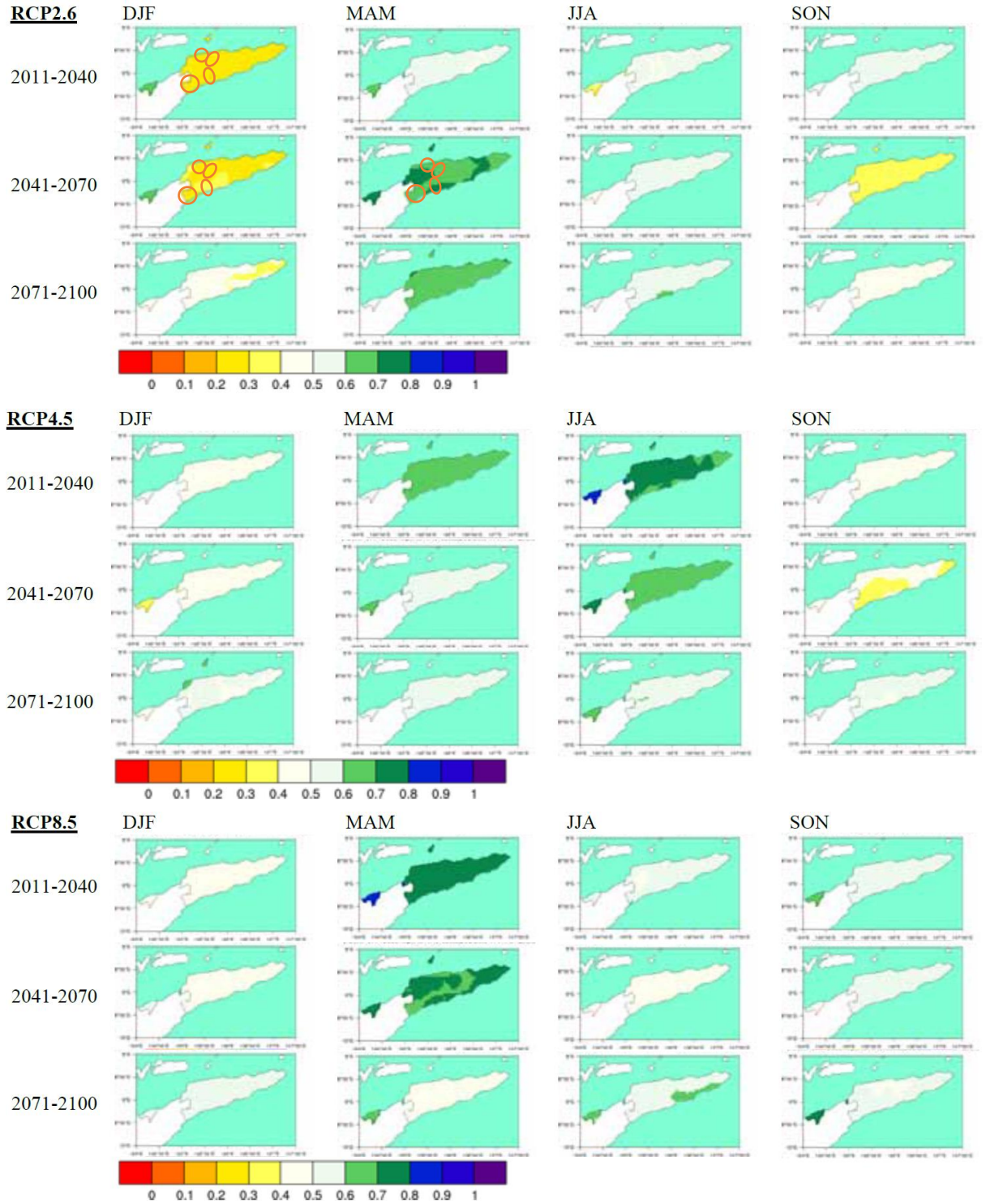


Figure 6-4 Level of Probability of 20 CMIP5 GCM Models under the RCP Scenarios in Projecting Seasonal Rainfall Increases in Timor-Leste

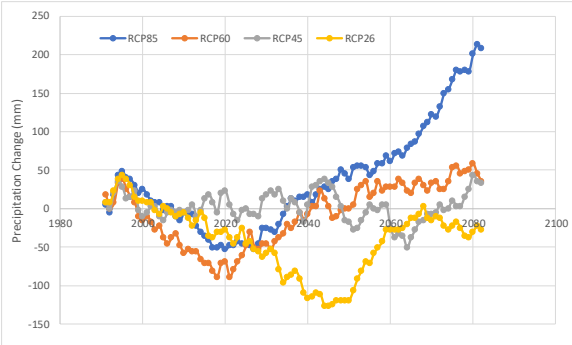
Note : DJF : Dec, Jan, and Feb, MAM : Mar, Apr, and May, JJA : Jun, Jul, and Aug, and SON : Sep, Oct, and Nov.
Source: Timor-Leste Initial National Communiation (2012)

In the above figures, the areas with greenish colors have a high probability of rainfall increases in the respective seasons. Hence, all the four watersheds are expected to increase the monthly rainfalls in March, April and May, while the precipitations in the rainy season may decrease during the period of 2011-2070, particularly under the RCP 2.6 scenario.

In order to supplement the existing data, the climate change projection data of the National

Center for Atmospheric Research (NCAR), USA, "Climate Inspectors[2]," were collected and analysed. As shown below, the projections for Calaurun and coastal parts of Laclo come to the same results, while those for Tafara, Comoro, and mountainous area of Laclo indicate the same predictions.

Projections of Future Changes in Annual Rainfalls (Calaurun Watershed and Coastal Part of Laclo Watershed)



Projections of Future Changes in Annual Rainfalls (Tafara and Comoro Watersheds and Mountain Part of Laclo Watershed)

Figure 6-5 Projections of Future Changes in Annual Rainfalls in the Target Watersheds
Source: Climate Inspectors of the National Center for Atmospheric Research (NCAR), USA

In the projections, all the watersheds commonly indicate the following trends.

- Under the scenarios of RCP 6.5 and 8.5, annual rainfalls in all the areas may increase constantly until 2080, while the same under the scenario of RCP 2.6 indicates the constant decline by 2050.
- The annual rainfall of RCP 4.5 might fluctuate yearly, though it may slightly decline in the next decade and increase the decade after.

<u>Projections on temperatures</u>

With respect to temperatures, all the existing assessments predict the same trend toward increased temperature in the future. As shown in Chapter 2 of this report, the projections based on all the RCP scenarios in the INC indicate the constant increase from 0.5 to 3.5 C by 2100. Local specific data available at post-administrative level also supports such predictions. The table below shows the annual mean temperatures recorded in the municipalities concerned with the target watersheds in 2000 as well as those of the future projections for 2050.

Table 6-6 Future Projections of Temperatures in Municipalities overlapping the Target Watersheds

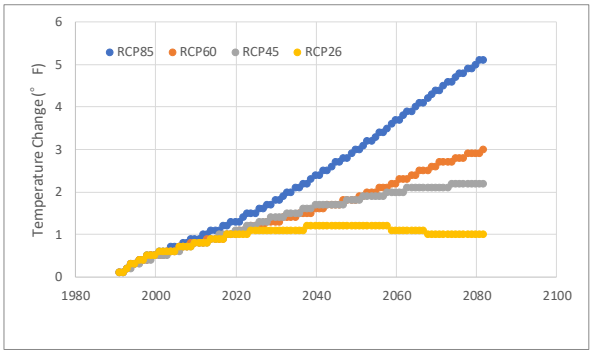
(Unit: degrees Celsius)

Municipality	Watershed related*	1) Ave. Temp (2000)	2) Ave. Temp (2050)	Difference =2)-1)	Data from (Post. admi)
Aileu	Cr L Cm	20.3	21.4	1.1	Aileu Vila
Ainaro	Cr L	22.5	23.5	1.0	Ainaro
Covalima	T	26.3	27.5	1.2	Suai
Dili	Cm	26.8	28.2	1.4	Dome Aleixo
Ermera	L Cm	20.6	21.5	0.9	Ermera
Liquica	Cm	24.1	25.1	1.0	Liquica
Manatuto	L	25.6	26.8	1.2	Manatuto
Manufahi	Cr	24.5	25.9	1.4	Same

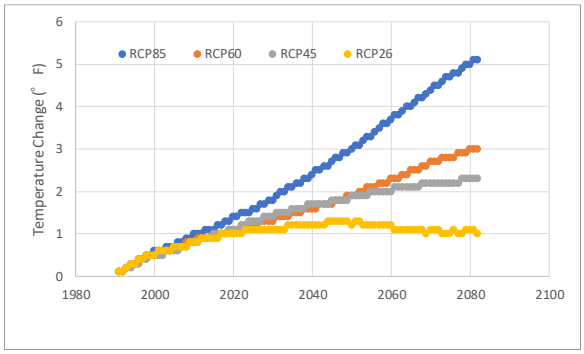
Source: Average figures based on Sub-district temperature maps created by Seeds of Life

[2] http://gisclimatechange.ucar.edu/inspector

Likewise, the data of Climate Inspectors of NCAR are used and analysed for confirmation of the future trends in temperatures in the target watersheds as shown below.



Projections of Future Changes in Mean Temperatures (Calaurun Watershed and Coastal Part of Laclo Watershed)



Projections of Future Changes in Mean Temperatures (Tafara and Comoro Watersheds and Mountain Part of Laclo Watershed)

Figure 6-6 Projections of Future Changes in Mean Temperatures in the Target Watersheds

Source: Climate Inspectors of the National Center for Atmospheric Research (NCAR), USA

As observed in the respective data above, it is predicted that the annual mean temperature would increase in all the watersheds by 2050. However, the areas may have a downward trend from 2050 under the scenario of RCP 2.6.

The perception of local communities in the villages visited by JICA CBNRM Project is significantly coincided with the projections for the next decade. Many of them recognize that they have often encountered dry spells and high heats during the rainy and dry seasons, respectively, in the last decade.

Future Climate Changes in the Target Watersheds

The table below shows the possible future changes in precipitation and temperature under the scenario 4.5 in the target watersheds based on the projections described above.

Table 6-7 Possible Changes in Precipitation and Temperature under Scenario 4.5

Watersheds (Location)	Precipitation	Temperature	Seasonal trends
Caraulun (South-central TL)	- Bumpy tendency up to 2045 (starting with decrease by 2030) - Decrease substantial from 2045 to 65 - Increase substantial from 2065 to 80	Steady increase, especially in lowland area	Rainfall reduction especially in SON, affecting maize planting Rainfall increase especially in MAM and JJA, intensifying the latter part of the rainy season (incl. prolonging it)
Tafara (South-western TL)	- Ditto	Steady increase	Ditto
Laclo (North-central TL)	- Ditto	Steady increase, especially in lowland area	Rainfall increase especially in MAM and JJA, intensifying the latter part of the rainy season (incl. prolonging it)
Comoro (Northern TL)	- Ditto	Ditto	Ditto

Source: JICA

6.2.2 Topographic Conditions of the Watersheds

The topographic conditions of the four watersheds are summarized below.

Table 6-8 Slope Conditions in the Watersheds

(unit: ha)

Watersheds	More than 36 degrees	31-35 degrees	26-30 degrees	21-25 degrees	16-20 degrees	0-15 degrees	Total
Caraulun	1,928	3,007	4,938	7,088	9,176	38,643	64,780
Tafara	409	407	1,015	2,458	5,508	21,921	31,718
Laclo	778	2,379	6,538	15,588	30,716	79,859	135,858

Watersheds	More than 36 degrees	31-35 degrees	26-30 degrees	21-25 degrees	16-20 degrees	0-15 degrees	Total
Comoro	144	375	1,464	4,250	6,465	10,484	23,182
Total	3,259	6,168	13,955	29,384	51,865	150,907	255,538

Source: Based on the data from the Forest Conservation Plan (2012)

There is no district difference in the slope conditions among the four watersheds as shown above. More than 30 % of the lands in the watersheds have more than 15 degrees (or 27%) of slopes.

6.2.3 Status of Forests and Trends in Deforestation and Forest Degradation in the Watersheds

The assessment study conducted by the Forest Preservation Program[3] in 2012/2013 is the sole study to be referred for grasping the current status of forests in the country. The study analyzed the satellite images taken in the different years, namely 1990, 2003, and 2012 and developed the national forest status maps in 2003 and 2012 with verification by interpretation of aerial photos taken in 2001 and ground truth surveys in the field. The forest and vegetation cover in the country was classified into nine types of forest and land use as tabulated below.

Table 6-9 Definition and Characteristics of Nine Types of Forest and Land Use

Forest/land use		Descriptions
Forest	Dense Forest	Forest with clown cover of more than 60% is classified as Dense forest. This class includes various types of combination of tree species, which vary with regions and locations where forests stand. Coffee plantations with matured shade trees, such as Falcataria spp. and Albizia spp., are also included in this class.
	Sparse Forest	Forest with clown cover of 10-60% is classified as Sparse Forest. Although it uses the term of "Sparse," this class also includes forests with medium clown density. A wide range of types of forest are included in the class.
Non-forest	Very Sparse Forest	Grasslands with sporadic Eucalyptus Alba stands and Eucalyptus Alba scrub whose basal diameter is less than 10 cm are classified as "Very Sparse Forest." As its clown density is below 10%, this class is categorized as one of the non-forest classes.
	Paddy Field	Bare lands confirmed as rice fields through ground truth surveys and aerial photo interpretation are classified as Paddy Field.
	Dry Field	Bare lands confirmed as upland crops farms such as permanent farms and shifting cultivation farms through ground truth surveys and aerial photo interpretation are classified as Dry Field.
	Grassland	Grasslands or pasture lands without any trees are classified as Grassland.
	Settlements	The populated areas, such as cities and towns, are classified as Settlements. This class does not include the areas where houses are built.
	Inland Water	The water bodies, such as lakes, marshes, and rivers, are classified as Inland water. Dry riverbeds are included in this class.
	Bare Land	Bare lands which are not classified into those described above are classified as Bare land. Slope failures are also included in this class.

Source: Revised by JICA Project Team (2017) based on Forest Conservation Plan in Timor-Leste (Draft)

The table below shows the areas of the respective forest and land use types in the four watersheds in 2012.

Table 6-10 Forest Covers and Land Use in the Four Watersheds in 2012

(unit: ha)

Watersheds	Dense Forest	Sparse Forest	V. Sparse Forest	Paddy & dry field	Glass land	Bareland	Others	Total
Caraulun	12,840	20,550	240	1,680	26,010	270	3,190	64,780
Tafara	5,960	13,910	0	260	8,950	1,430	1,208	31,718
Laclo	17,270	53,270	31,690	2,440	25,230	840	5,118	135,858

[3] The Forest Preservation Program in the Democratic Republic of Timor-Leste implemented by Japan International Cooperation System (JICS) in 2012/2013

Watersheds	Dense Forest	Sparse Forest	V. Sparse Forest	Paddy & dry field	Glass land	Bareland	Others	Total
Comoro	5,300	5,770	1,380	190	8,120	1,230	1,192	23,182
Total	41,370	93,500	33,310	4,570	68,310	3,770	10,708	255,538

Source: Forest Conservation Plan (2012)

More than 50% of the total area of the four watersheds are covered with forests, of which one third (about 30% of the existing forests or 41,370 ha) are still in dense conditions. The Forest Preservation Program also assess the historical changes in forest covers between 2003 and 2012. The changes in forest cover in the four watersheds are summarized below.

Table 6-11 Changes in Forests between 2003 and 2012

Municipality	2003			2012			Difference		
	Dense Forest (ha)	Sparse Forest (ha)	Total (ha)	Dense Forest (ha)	Sparse Forest (ha)	Total (ha)	Dense Forest (ha)	Sparse Forest (ha)	Total (ha)
Caraulun	24,720	23,180	47,900	12,840	20,550	33,390	-11,880	-2,630	-14,510
Tafara	13,410	13,310	26,720	5,960	13,910	19,870	-7,450	+600	-6,850
Laclo	23,740	51,280	75,020	17,270	53,270	70,540	-6,470	+1,990	-4,480
Comoro	9,170	8,180	17,350	5,300	5,770	11,070	-3,870	-2,410	-6,280
Total	71,040	95,950	166,990	41,370	93,500	134,870	29,670	-2,450	-32,120

Source: Revised by JICA Project Team (2017) based on Forest Transition of 1990, 2003 and 2010 in Timor-Leste

As shown above, about 32,120 ha of forests had been converted into non-forest lands from 2003 to 2012. Particularly, about 29,670 ha of dense forests were degraded or converted into either sparse forests or non-forest land uses, such as grasslands and dry fields, for the same period. The results suggested that the extensive deforestation and forest degradation had occurred after the independence in 2002. As shown in the table below. the rates of forest degradation (reduction rate of dense forest) and deforestation (reduction of sparse forest) between 2003 and 2012 are quite high in the respective watersheds. On average,

Table 6-12 Rates of Forest Degradation and Deforestation (2003-2012)

Municipality	Degradation rate	Deforestation rate
Caraulun	- 7.02%	- 3.93%
Tafara	-8.62%	- 3.24%
Laclo	-3.47%	- 0.68%
Comoro	-5.91%	- 4.87%
Average <1	-5.83%	-1.69%

Note: geometric mean
Source: JICA (2020)

6.2.4 Estimated GHG Emission from Deforestation and Forest Degradation in the Watersheds

Carbon dioxide emission from deforestation and forest degradation in the four watersheds were estimated by using data on historical changes in areas of dense and sparse forests shown in Section 6.2.3. Consequently, CO_2 emission from both forest degradation and deforestation were estimated under the assumption that i) dense forests were changed into sparse forest while sparse forests were converted into non-forest areas; and ii) forestry biomass removed from dense and sparse forests were released as carbon dioxide in the atmosphere. The results of the estimation of carbon and CO_2 emission from forest areas in the target watersheds between 2003 and 2012 are shown in **Table 2,** and summarized below.

Table 6-13 Carbon and CO_2 emission in the Watersheds between 2003 and 2012

Watershed	Carbon emission (t-C)			CO_2 emission (t-CO_2)		
	Forest Degradation	Deforestation	Total	Forest Degradation	Deforestation	Total
Caraulun	2,246,983	1,383,674	3,630,657	8,238,938	5,073,471	13,312,409
Tafara	1,109,827	843,852	1,953,679	4,069,366	3,094,124	7,163,490
Laclo	1,074,020	319,245	1,393,265	3,938,073	1,170,565	5,108,638
Comoro	747,529	525,950	1,273,479	2,740,940	1,928,483	4,669,423
Total	5,178,359	3,072,721	8,251,080	18,987,317	11,266,643	30,253,960

Source: Revised by JICA Project Team (2020) based on Forest Conservation Plan in Timor-Leste (Draft)

The annual averages of CO_2 emission in the target watersheds were also estimated as shown in the table below.

Table 6-14 Average annual CO_2 Emission in the Watersheds between 2003 and 2012

Watershed	Annual CO_2 emissions (t-CO_2/year)		
	Forest Degradation	Deforestation	Total
Caraulun	915,438	563,719	1,479,157
Tafara	452,152	343,792	795,944
Laclo	437,564	130,063	567,627
Comoro	304,549	214,276	518,825
Total	2,109,703	1,251,850	3,361,553

Source: Revised by JICA Project Team (2020) based on Forest Conservation Plan in Timor Leste (Draft)

The emission in Caraulun watershed is the largest among those of the four watersheds, which is almost twice as large as that of Tafara watershed. The one in Tafara watershed is the second largest, followed by Laclo and Comoro watersheds, whose annual CO_2 emission levels are almost the same. In all the watersheds, the estimated emissions from forest degradation are higher than those from deforestation. Particularly, about 80% of the emission in Laclo watershed is originated from forest degradation. Details of the estimation of the average annual CO_2 emissions in the target watersheds are presented in **Table 2.**

6.3 Socio-economic Conditions in the Target Watersheds

6.3.1 Administrative Conditions and Demography

The four watersheds extend over nine municipalities or 28 post-administratives (P.As). A total of 126 villages, where 61,159 households reside are fully or partially overlapped with the watersheds. The administrative and demographic conditions of the respective watersheds are summarized below.

Table 6-15 Administrative and Demographic Conditions of the Four Watersheds

Watershed	Municipality	No. of P.As	No. of Villages	HHs	Population (Persons)
Caraulun	Aileu, Ainaro, Manufahi	8	36	14,853	88,840
Tafara	Covalima	6	18	7,045	36,043
Laclo	Aileu, Ainaro, Dili, Ermera, Manatuto, Manufahi	13	65	19,020	120,562
Comoro	Aileu, Dili, Ermera, Liquica	8	27	27,423	174,082
Total <1	9 municipalities	28	126	61,159	373,772

Note: There are overlaps in the geographically related municipalities as well as villages between/ among the four watersheds. Hence the numbers of municipalities and villages in total are not sums of the numbers of the respective watersheds.

Source: Draft CBNRM Roadmap (2019), Timor-Leste Population and Housing Census 2015

As well as other parts of the country, in the target watersheds, there is steady increase in population, as shown in the table below. Undoubtedly, the growth of the population is providing

impetus for greater utilization of natural resources, including forest and water. This is one of the underlying causes of the occurrence of various risks led by climate change in the future.

Table 6-16 Population Growth in the Municipalities overlapping the Target Watersheds

Municipality	Watershed related*				2004 (persons)	2015 (persons)	Growth rate per year (%)
Aileu	Cr		L	Cm	38,427	48,837	2%
Ainaro	Cr		L		52,476	63,136	2%
Covalima		T			52,986	65,301	2%
Dili			L	Cm	175,294	277,279	4%
Ermera			L	Cm	103,249	125,702	2%
Liquica				Cm	54,834	71,927	2%
Manatuto			L		36,736	46,619	2%
Manufahi	Cr				44,950	53,691	2%

Note: * Cr=Caraulun T=Tafara, L= Laclo, Cm= Comoro.
Source: http://www.statistics.gov.tl/category/publications/census-publications/

6.3.2 Local livelihoods in the Watersheds

(1) Agriculture

In Timor-Leste, approximately, 70% of the households (HHs) live in rural areas and almost all of them (97% of the rural HHs) are engaged in agriculture including livestock husbandry as a major economic activity. In the target watersheds, while there are a few irrigation schemes in lowland areas, the most common farming system is upland, rain-fed, and subsistence agriculture, including slash and burn shifting cultivation. With such a system, they produce maize and other crops (such as cassava and sweet potato) as staple crops. The table below shows the proportion of households who is engaged in agriculture in the municipalities, which implies that the subsistent upland agriculture is the major production system in the municipalities.

Table 6-17 Major Features of Agriculture in the Target Watersheds

Municipality	% of HHs engaged in agriculture among the total HHs	% of non-commercial farms* among the total agri. HHs	% of HHs producing maize among the total agri. HHs
Aileu	99%	98%	94%
Ainaro	98%	96%	91%
Covalima	98%	98%	84%
Dili	61%	97%	31%
Ermera	97%	98%	86%
Liquica	98%	96%	88%
Manatuto	95%	95%	65%
Manufahi	99%	97%	90%

Source: Timor-Leste Population and Housing Census 2015 modified by JICA CBNRM Project Team
Note: * Non-commercial farms = HHs engaged in only minor agriculture (backyard) + HHs producing mainly for home consumption with some sales

The sample survey conducted by the JICA CBNRM project revealed the average land holding and use sizes per HH in some villages in the watersheds (See the table below). In general, a farming HH owns a small piece of land as a backyard garden and relatively larger areas for fixed upland farming and/or shifting cultivation, in addition to coffee plantation, forest and grazing areas if any. The HHs engaged in shifting cultivation use their own lands (2 or 3 pieces). Under the current practice of shifting cultivation, they farm a certain piece of land for 2 or 3 years in row, and then shift to another land, while keeping the used land fallow for future use. As a part of the practices, they put fire for land preparation just prior to the onset of rainy season (November in many places). This act often causes the spread of fire beyond their farm and cause damage to a vast area of the existing forests, especially when burning the farm under windy conditions.

Table 6-18 Average Land Holding Size of the Farms in the Sampled Villages

Watershed	Laclo		Comoro		Caraulun		Tafara	
Village	Fahisoi (Remexio)*		Bocolelo*		Babulo**		Lactos**	
	Area/ HH	Own rate*[1]	Area/ HH	Own rate*[1]	Area/ HH	Own rate*[1]	Area/ HH	Own rate*[1]
Backyard garden	0.5 ha	92.8%	0.4 ha	100.0%	0.3 ha	81.8%	0.6 ha	60.0%
Fixed Upland	0.6 ha	64.0%	0.6 ha	35.7%	1.0 ha	72.7%	1.0 ha	70.0%
Coffee Plantation	0.7 ha	92.8%	0.3 ha	33.3%	0.5 ha	27.3%	0.9 ha	83.3%
Shifting Cultivation	0.3 ha	36.0%	1.0 ha	50.0%	0.6 ha	36.4%	0.5 ha	30.0%
Fallow area for shifting	0.3 ha	36.0%	0.5 ha	50.0%	0.4 ha	36.4%	0.3 ha	30.0%
Forest	0.9 ha	57.1%	0.5 ha	66.7%	0.9 ha	72.2%	0.9 ha	61.5%
Grazing area	0.6 ha	64.3%	0.5 ha	46.7%	0.3 ha	36.4%	0.3 ha	71.4%

Note*: 1: Own rate indicates the proportion of the households who own the land of relevant land use.
Source: *JICA CBNRM Project Team (2017) and ** JICA CBNRM Project Team (2020)

A majority of the HHs plant maize, cassava, sweet potato, and beans in the same farm in a mixed planting manner. The following table indicates the average cropped areas and yields of the major crops grown based on the results of the sample survey. As can be seen in the table, productivity is arguably low in Laclo and Comoro watersheds, while the data in Caraulun and Tafara watersheds demonstrate somehow better results, though they are still subsistent level of production. This could be attributed to difference in the length of rainy season in northern and southern parts of the country as discussed in Section 6.2.2: maize can be planted twice in a season in some parts in Caraulun and Tafara watersheds. In general, however, be it fixed or shifting cultivation, most of the HHs rely on a conventional way of farming without applying soil conservation measures and useful inputs (e.g. organic compost).

Table 6-19 Average Yields and Cultivated Area of Major Crops in the Sampled Villages

Watershed	Laclo*		Comoro*		Caraulun		Tafara	
Village	Fahisoi (Remexio)		Bocolelo		Babulo**		Lactos**	
Crops	Yield	Ave. area	Yield	Ave. area	Yield	Ave. area	Yield	Ave. area
Maize	0.3 ton/ha	0.6 ha	0.3 ton/ha	0.8 ha	1.3 ton/ha	0.5 ha	2.0 ton/ha	0.6 ha
Cassava	0.2 ton/ha	0.3 ha	0.3 ton/ha	0.7 ha	0.4 ton/ha	0.2 ha	1.3 ton/ha	0.3 ha
Sweet potato	0.1 ton/ha	0.2 ha	0.1 ton/ha	0.9 ha	1.5 ton/ha	0.1 ha	0 ton/ha	-
Beans	0.1 ton/ha	0.5 ha	0 ton/ha	-	0.6 ton/ha	0.1 ha	0.4 ton/ha	0.5 ha
Coffee	0.2 ton/ha	0.7 ha	0,1 ton/ha	0.4 ha	0.1 ton/ha	0.5 ha	0.4 ton/ha	0.8 ha

Source: *JICA CBNRM Project Team (2017) and ** JICA CBNRM Project Team (2020)

Major factors causing low productivity in the target watersheds are listed below. Many of them will be further affected by future climate variability.

Table 6-20 Causes of Low Productivity with Climate Change Factors

Direct factor	Underlying cause	Climate change factors
Low soil fertility	■ Lack of knowledge on soil conservation and sustainable farming	Heavy and strong rains will progress soil erosion and further lower soil fertility in sloping farms.
Quality of seeds	■ Limited extension support ■ Limited stock of seeds	Climate variability in the onset of the rainy season, particularly dry spell in the beginning of the rainy season, will cause significant damage on crop production. Some communities who have less own seeds may not be able to produce crops, particularly maize, in such season.
No irrigation system	■ Limited government support ■ Less potential to develop an irrigation system	As described above, climate variability in the onset of the rainy season, particularly dry spell in the beginning of the rainy season, will cause significant damage on crop production.
Less farm input	■ Limited source of income ■ Lack of knowledge on sustainable farming techniques	None

Source: JICA (2020)

(2) Livestock

Major animals kept by the rural HHs include chickens, pigs, goats, cattle/cows and buffaloes. In terms of the number of HHs owning and that of animal heads owned, chickens and pigs are most common, followed by cattle/ cow and goats (See the data on "Heads/hh" in the table below). From the table below, one can also see that the communities in Covalima, Manatuto and Manufahi have a relatively larger number of animals than other municipalities, while the pressures of livestock against available land is higher in Dili and Liquica, both of which have a relatively smaller size of land to sustain their livestock (See especially yellow-highlighted data in the table). Similarly, even among villages, such differentiation can be observed: some have mainly small animals (e.g. pigs and goats) while other own a greater number of big livestock e.g. cattle/cows and buffaloes than others.

Table 6-21 Average Number of Major Animals per HH and Ha in the Municipality

Municipality	Land size (ha)	Chickens		Pigs		Goats		Cattle/Cows		Buffaloes	
		Heads/ hh	Heads/ ha	Heads/ hh	Heads/ ha	Heads/ hh	Heads/ ha	Heads/ hh	Heads/ ha	Heads/ hh	Heads/ ha
Aileu	73,731	4.0	0.4	1.9	0.2	0.9	0.1	0.9	0.1	0.3	0.0
Ainaro	80,398	4.0	0.5	2.1	0.3	0.6	0.1	0.9	0.1	0.6	0.1
Covalima	120,254	5.2	0.5	3.2	0.3	0.7	0.1	2.7	0.3	0.4	0.0
Dili	36,705	2.3	2.7	1.0	1.2	0.4	0.4	0.1	0.1	0.0	0.0
Ermera	76,833	4.0	1.1	1.5	0.4	0.4	0.1	0.7	0.2	0.2	0.0
Liquica	54,909	5.5	1.2	2.2	0.5	1.3	0.3	0.9	0.2	0.1	0.0
Manatuto	178,134	4.7	0.2	2.5	0.1	1.2	0.1	1.5	0.1	1.7	0.1
Manufahi	132,315	7.5	0.5	2.8	0.2	0.7	0.0	1.6	0.1	1.0	0.1

Source: JICA CBNRM Project Team (2020) based on Timor-Leste Population and Housing Census 2015 and District maps prepared by Seeds of Life (2013)

The sample survey conducted by the JICA CBNRM project found that pigs are generally left in a stall, while goats and especially cows/ buffaloes are taken to forests and grassland for grazing (See the table below). And through interviews with the community members, around 30% of them stated that the lands they used for grazing were not necessarily their own lands, but may be the property of the government, community and/or other community members. In fact, the experience of the JICA CBNRM project has shown that crop or tree damages caused by animals grazed is one of the major conflicts happening in villages: free-grazing also could be considered as one of the critical issues causing forest/land degradation.

Table 6-22 Grazing Places of Major Animals in the Sampled Villages

Grazing Place	Sample villages in Laclo and Comoro WSs*			Sample villages in Caraulun and Tafara WSs**		
	Pigs	Goats	Cows/ Buffaloes	Pigs	Goats	Cows/ Buffaloes
Forest/grassland	12%	39%	60%	5%	75%	72%
In a stall	76%	42%	36%	95%	25%	24%
Others (incl. NA)	12%	19%	4%	0%	0%	4%***

Source: *JICA CBNRM Project Team (2017) and **JICA CBNRM Project Team (2020)
Note: * Data are the sum of 4 villages sampled (Fatisi, Bocolelo, Fahisoi R and Fahisoi L). ** Data are the sum of 4 villages sampled (Babulo, Manumera, Lactos and Maudemo), excluding NA (not answered). *** Fallow paddy field

(3) Source of Income

In Timor-Leste, the gross national income per capita was USD 7,527 in 2018, which ranked 128th in the world[4]. Poverty rate of total population in 2015 was as high as 41.8%, which

[4] 2011 PPP $. (UNDP, Human Development Report 2019).

means about 495,000 people lived below the national poverty line in the same year[5] As the household economy data in the target watersheds are seldom available, the results of the sample survey were fully used to articulate site-specific data on household income in the target watersheds as shown below.

Table 6-23 Source of Incomes of the HHs in the Sampled Villages

Watershed	Laclo		Comoro		Caraulun		Tafara	
Village Sample	Fahisoi-R **		Bokolelo**		Babulo***		Lactos***	
Item	USD/Year	%	USD/Year	%	USD/Year	%	USD/Year	%
Crop (Own consumption) *	910.8	72%	910.8	41%	984.7	43%	984.7	74%
Crop (Sale)	815.5		495.1		133.6		423.9	
Livestock	55	2%	34.3	1%	349.3	14%	350	19%
Firewood & timber	0	0%	197.7	6%	27.3	1%	0	0%
NTFP	3.6	0%	6	0%	43.2	2%	0	0%
Others	614.9	26%	1762.6	52%	1,040.9	40%	128.1	7%
Total	2399.8	100%	3406.5	100%	2579.0	100.0%	1886.7	100.0%

Source: *The data in Ministry of Finance (2011) Timor-Leste Household Income and Expenditure Survey adjusted to 2017 price Project Team, based on the inflation rate at https://www.statista.com/statistics/728789/inflation-rate-in-timor-leste/.
** JICA CBNRM Project Team (2017) *** JICA CBNRM Project Team (2020)

The household economy generally relies on subsistence agriculture, which also produces and secures food crops for their own consumption. Hence, the monetary values of food crops produced for own consumption are also estimated in the table above to clarify the importance of agriculture in the household economy. The data indicate that crop production accounts for more than 70% of household income of rural households in Laclo and Tafara watersheds, while the household economic structure in Comoro and Caraulun watersheds is more diverse as there are some alternative sources of income, though the total amount is far below the national average.

(4) Water Access

In rural settings in the target watersheds, a majority of HHs need to fetch water to/from public-shared water sources such as public tap points and tube wells, outside of their premises: this view is particularly applied to Covalima, which solely consists of Tafara watershed (See the table below). The dependence of the HHs on public water sources poses the issue of workload and time management. During the dry season when water becomes less available, people, especially women, are forced to spend i) more time to collect water, as the water volume coming out from a tap become less, or ii) more time and physical energy to move to other water sources if they could not get enough water from their usual collection points. As such, water access and availability can be considered as a crucial factor in sustaining their daily life.

A public water point used for collecting water for home and washing clothes

[5] Ditto.

Table 6-24 Source of Drinking Water

Municipality	Pipe or pump extend to a house (indoor/outdoor)	Public-shared water sources*	Others**
Aileu	14.5%	84.5%	1.0%
Ainaro	15.1%	83.0%	1.9%
Covalima	5.8%	92.8%	1.4%
Dili	36.4%	54.1%	9.6%
Ermera	17.8%	78.9%	3.4%
Liquica	33.1%	63.3%	3.6%
Manatuto	14.7%	82.8%	2.5%
Manufahi	16.2%	82.9%	0.9%

Note: *includes Public Pipe/Tap, Tube well/Borehole, Well or Spring, River, Lake, Stream or Irrigation channel. ** includes Rainwater collection, Bottle water, Water vendors/tank.
Source: Timor-Leste Population and Housing Census 2015 modified by JICA CBNRM Project Team

(5) Energy (Lighting and Cooking)

With respect to the source of energy for lighting, the national statistics indicate that more than half of the HHs in the target watersheds have access to the electricity, which is followed by solar panel (See the table below). The proportion of the HHs using electricity ranges from around 45% to more than 90%: the figure tends to be rather higher in urban areas such as Covalima, Dili, Manatuto. Notwithstanding these data, the reliability of such power sources is another issue. Frequency of power outage and instability of voltage are widely recognized in Timor-Leste. According to the existing survey[6], the values lost due to electric outage could be equivalent to 3.6% of the sale volumes generated by the private sector in the country, which is much higher than the average figure of East Asia and Pacific Countries (0.2 %) (See the figure below). Not only enterprises, but also HHs have suffered from the unreliability of the electricity, which is particularly true of rural HHs, as they do not own or have access to a generator and a stabilizer.

Table 6-25 Source of Energy for lighting

Municipality	Electricity	Solar panel	Others
Aileu	63.2%	21.7%	15.1%
Ainaro	49.6%	31.2%	19.2%
Covalima	75.7%	11.5%	12.7%
Dili	93.5%	2.5%	4.0%
Liquica	58.6%	21.7%	19.7%
Ermera	44.9%	33.6%	21.5%
Manatuto	70.9%	13.0%	16.1%
Manufahi	50.1%	36.8%	13.1%

Source: Timor-Leste Population and Housing Census 2015

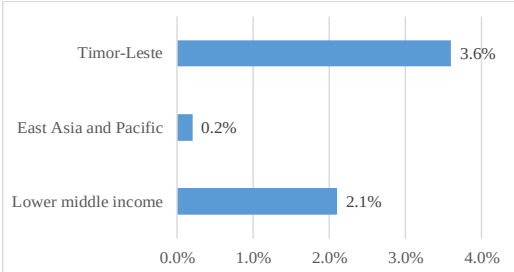


Figure 6-7 % Loss in Enterprise Sale due to Power Outage
Source: World bank (2015) TL country Profile

As regards energy source for cooking, more than 80% of the HHs rely on firewood for cooking, except in Dili that shows a relatively dependency of 47% (See the table below). Owing to the government efforts to regulate firewood collection, the current common practice of the people is to cut branches of a tree, not its trunk, and to obtain a business licence if they intend to sell firewood to others. Based on these situations, it is recognized that harvesting firewood may not be the major driver of deforestation in rural areas, especially where human pressures are balanced with natural regenerating capacity of existing forests. Rather, careful consideration should be given to the suburbs of urban areas, where communities may undertake intensive collection of firewood to supply energy source to urban people.

[6] World Bank (2015): Enterprise Survey Timor-Leste Country Profile

Table 6-26 Source of Energy for Cooking

Municipality	Wood	Electricity	Cooking gas	Biogas	Kerosene	Coal	Others
Aileu	93.8%	2.7%	0.8%	0.8%	1.4%	0.4%	0.2%
Ainaro	93.1%	3.5%	0.7%	0.5%	1.5%	0.5%	0.3%
Covalima	86.1%	10.7%	0.9%	0.4%	1.2%	0.4%	0.3%
Dili	47.0%	25.5%	9.5%	1.4%	15.9%	0.4%	0.3%
Ermera	93.9%	2.9%	0.4%	0.7%	1.3%	0.6%	0.2%
Liquica	93.9%	3.2%	0.8%	0.4%	1.1%	0.4%	0.2%
Manatuto	88.7%	8.1%	1.1%	0.5%	1.1%	0.3%	0.2%
Manufahi	95.1%	2.7%	0.6%	0.3%	0.9%	0.2%	0.1%

Source: 2015 Timor-Leste Population and Housing Census

(6) Housing

In Timor-Leste, a typical rural house is constructed with wooden frames, a clay soil foundation, bamboo or palm-trunk walls and corrugated iron/ zinc roof (See the table on the data of roofing materials). As compared to a concreted/ brick-made house, this type of the house is vulnerable to natural disasters such as strong wing and easily damaged by fires. This brings about critical risks on rural HHs who will face climate changes in the future. High demand for timbers for house construction is another concern relating to housing. This is one of the drivers of forest degradation in rural communities. People tend to cut trees standing in someone's or community lands when collect poles for house construction.

A typical rural house in Timor-Leste
(Source: https://cwsglobal.org/lucia/)

Table 6-27 Roofing Materials (Municipalities of Target Watersheds)

Municipality	Corrugated iron/ Zinc	Palm leaves/ thatch/	Tiles	Asbestos	Concrete	Bamboo	Other
Aileu	85.1%	2.6%	1.0%	0.6%	1.1%	9.4%	0.2%
Ainaro	70.2%	2.8%	0.9%	0.8%	2.0%	23.0%	0.3%
Covalima	67.1%	3.4%	0.6%	0.7%	0.4%	27.5%	0.2%
Dili	87.9%	8.7%	0.9%	0.6%	0.1%	1.5%	0.2%
Ermera	83.4%	3.3%	1.1%	0.7%	2.0%	9.1%	0.3%
Liquica	86.1%	2.7%	0.7%	0.4%	1.9%	7.9%	0.1%
Manatuto	70.8%	3.5%	0.7%	3.2%	2.0%	19.2%	0.5%
Manufahi	68.6%	2.3%	0.6%	2.5%	2.7%	22.8%	0.5%

Source: Timor-Leste Population and Housing Census 2015

6.3.3 Traditional Customs

The rural society of Timor-Leste is rich with tradition customs and cultures as highlighted below.

<u>Lulic or sacred places</u>

Connection with ancestors and spirits is a crucial aspect of daily lives especially in rural areas. Most villages have sacred (*lulic* in Tetun) sites, such as sacred clan houses (*uma lulic*) and other particular locations and objects (e.g. hilltop, trees, springs and rivers). These places are believed to connect them with spiritual forces; hence often used as the centre of reverence with ritual ceremonies.

<u>Inheritance System</u>

Individual inheritance rights are normally passed through the male line with some exceptions in particular areas of the target watersheds (e.g. some communities in Manufahi and Covalima Municipalities). In patrilineal system, women usually cannot hold any property rights other than usufruct acquired through male property rights.

Tara Bandu

Tara Baudu can be translated as the act of displaying a set of rules that define particular behaviour in the community. *Tara Bandu* often sets the rules on agricultural practice, tree cutting hunting, fishing and other use of natural resources. Formalization and undertaking of *Tara Bandu* require a public ceremony as well as specific settings of sanctions for misconducts such as unauthorized tree cutting, theft and other offenses. The set rules and sanctions are announced in a public meeting as communal consent. While the idea of *Tara Bandu* is widely shared in the county, its formalization and implementation are rather weak in many communities.

6.3.4 Village Council

Village (*suco*) is the smallest administrative unit which has a council in Timor-Leste. Each village consists of sub-villages (*aldaia*), which can be further divided into kinship groups (*lisan*). Decree Law No.5/2004 sets the roles and functions of village/suco council. The council functions as a governing and decision-making body and is composed of one suco chief, aldeia chiefs, two young representatives (male and female) and one elderly. In recent years, two delegates from each aldeia (one female and one male) are added to the membership of suco council for assisting aldeia chiefs in decision making. However, the opinions of elderly or *lianain* are well respected and integrated into community decision making.

Table 6-28 Functions of Village Leaders and Council

Actor	Roles and Functions
Chef de Suco	■ To lead activities of the community ■ To carry out activities related to welfare of inhabitants, environment of suco, and other public affairs. ■ To coordinate the implementation of decisions made by the suco council ■ To establish mechanisms of coordination and articulation between the suco and competent authorities at all levels of the government ■ To provide for the creation of grassroots structure for the resolution and settlement of minor disputes among sub-villages (aldeia)
Chef de Aldeia	■ To implement those decisions approved by the village/suco council ■ To provide the suco chief with elements necessary for articulation with ministries and local administration ■ To provide for the creation of grassroots structures for the settlement and resolution of minor disputes that may emerge in the village ■ To promote respect for the law ■ To ensure the creation of mechanisms for the protection of domestic-violence victims ■ To promote consultations and discussions among the village inhabitants on all issues related to community life and development ■ To conduct any other business related to its functions
Suco Council	■ To hold ordinary meetings on a monthly basis or special meetings whenever requested by the Chief ■ To make decisions by consensus or majority rule ■ To invite one or more members of the katuas council in the meetings to share and exchange opinions

Source: Decree Law No.5/2004 on community authorities.

In a village where the CBNRM mechanism is in place, the village council holds monthly meetings to monitor and regulate any illegal acts including illegal cutting, crop/tree damage by free-grazing animals, even physical fights and domestic violence, on a regular basis. In the meeting, sub-village chiefs report any incidents happening in the preceding month and how they have solved or would solve the issues according to the village regulations developed

through the PLUP workshops. At the initial stage of the implementation of the regulations, the village council members, particularly village chief and sub-village chiefs, are fully guided and assisted by NGOs or government officials in the discussion of the issues and decision-making/ solution-finding using the village regulations. However, as they gain experiences through the meetings, they could take greater parts in discussions, and finally become capable to effectively use the village regulations to solve and settle village issues. Strengthening of the governance capacity of the village council is the key to ensuring the sustainability of the CBNRM mechanism.

6.3.5 Gender

(1) Division of Labor

Based on the results of the sample survey in the target watersheds[7], the division of labour between women and men can be summarized as shown in the table below.

Table 6-29 Division of Labour between Women and Men

Role taker	Division of Labour
Women	• Most of domestic and reproductive works such as cooking, washing, cleaning house, taking care of children and elders are done by women • Fetching water is mainly done by women and children. However, men pointed out that they help women when the location of a water source is far from the house, the volume of water is heavy, or women are sick. • Buying foods and daily things are mainly done by women
Men	• Cutting and collecting timbers are mostly done by men because it is heavy and tough work and difficult for women.
Both women and men	• Productive sphere (farming, grazing, harvesting coffee and fruits, selling products) is shared by both women and men. However, men tend to think that farming is mainly done by men, because men engage in whole process of farming (women: mainly sowing, weeding, harvesting, men: land preparation, taking care of livestock, sowing, weeding, harvesting) • Collecting and fetching the firewood to home is done both women and men. • Selling things such as vegetables, crops are mainly done by women. On the other hand, men generally sell animals such as cow, pig and goat.

Source: Group discussions in the field survey conducted by JICA CBNRM Project Team (2019) and (2020)

As can be seen in the table above, women are engaged in both productive (mainly farming) and reproductive works such as fetching water, cooking, cleaning and caring of kids, while men tend to concentrate on farming and other productive works. Although men could help women with house works, the range of women's roles in their livelihood tend to be broader than that of men.

(2) Assets and Access

Property such as land and house area usually owned by men, unless the village is a matrilineal society[8]. In addition, it is found that men have more opportunities to earn income than women because they could work in agriculture as well as in business or public works. If men earn income from business or public work, they tend to have a bank account with their own name.

[7] The survey was conducted in Suco Fahisoi-Lequidoe (Laclo Watershed), Suco Fatisi (Comoro Watershed), Suco Babulo and Suco Manumera (Caraulun Watershed), Suco Lactos and Suco Maudemo (Tafara Watershed)

[8] Suco Lactos and Suco Maudemo are matrilineal society. According to the interview with Village Chief of Suco Casabauc, the villages in Tafara watershed are generally maternal society except for Fatumean PA.

However, women do not have their account. They have an account only for receiving children education fund from the government.

Regarding household finance, women mainly control the expenses for daily use and education for children. Women can make decision on how to use money for small expenditure; however, when spending a significant amount, the wife and husband need to discuss for joint decision.

Generally, female farmers are engaged in agriculture and other income generations such as sewing, handicraft, making bread and cakes to improve their livelihood. In addition, women need to do household chores (unpaid work). However, women's contribution tends to be overlooked and less recognized by men. It sometimes causes a gender issue such as women to have less voice than men in their family and decision making.

Regarding access to information, both women and men have mobile phones. If they do not have their own, they share the same unit to use. Also, according to the group discussions, village/community meetings are equally represented by women and men. Participation in any training is also basically awarded to women and men. Therefore, it can be said that there is no significant gap between women and men to access information. However, sometimes women cannot attend such meetings due to household chores and taking care of children.

Probably the largest gap between women and men could be observed in access to transportation. In general, motorbikes and bicycles are used by men. This fact results in less mobility of women beyond walking distance. Although women need to go to markets for selling things, their transportation is limited, and typically, women use a microbus. There are possibilities that men could help women to go to markets by a motorbike, or sometimes men could sell things instead of women so that women can reduce their workload. Besides, women's limited movement also impacts their access to other services including access to health services, information and their ability to participate in social networks other than the family.

(3) Women's Participation

Based on the government regulation, a village council consists of a village chief, chiefs of sub-village (aldeia), two representatives, delegation, (one woman and one man) from each sub-village, and youth representatives (one woman and one man). The participation of both women and men are assured in the council. However, the position of the village chief is dominated by men; only 20 village chiefs are women out of all 452 villages in the country.

In the sampled villages, there are three female village chiefs. Two of them had working experiences as a leader e.g. sub-village chief, before being elected village chief. Through such processes, the community people had recognized her performance and characteristics, finding out her potential to be a village chief. Their histories suggest that more women could play more significant roles in the governance and management, once "entry points" of becoming leaders are given.

(4) Gender Based Violence (GBV)

According to Demographic and Health Survey 2016, GBV is prevalent in the county, including communities in the target watersheds. In the sampled villages of Tafara and Caraulun Watersheds, however, the sample survey as well as the follow-up interviews with village leaders did not find any evidence and clue that they recognized and dealt with GBV cases.

Seemingly there is no incident of GBV, nor is the issue discussed in village council meetings. On the other hand, in the target villages of the CBNRM project in Laclo and Comoro Watersheds, the cases of domestic violence are often reported and discussed in the monthly monitoring meetings. GBV is a sensitive issue, sometimes difficult to discuss in open areas, but our experience shows that the formalization of the village regulations and regular monitoring on their implementation could help the issue to be identified and handled by communities themselves, at least to some extent.

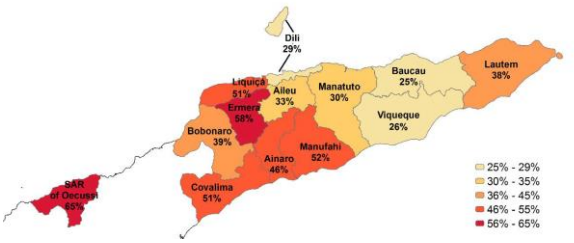


Figure 6-8 Spousal Violence by Municipality
Source: Timor-Leste Demographic and Health Surrey 2016

6.4 Perception on the Threats of Climate Change and Natural Disasters

In order to identify communities' perceptions of climate change and climate-related disasters as well as the perception gap between men and women in the target watersheds, the JICA CBNRM Project had focus group discussions in selected villages in the watersheds.

The discussions were made either in i) PLUP/CCVA workshops for introduction of the CBNRM mechanism under the JICA CBNRM Project II or ii) group discussions of the additional sample survey made by JICA CBNRM Project for the preparation of the GCF funding proposal. In both cases, local NGO facilitators were hired for facilitation of the discussions of local people. The following table shows the processes of the discussions, including the names of the villages visited, the dates of visit, the number of the participants from the communities as well as modality of work.

Table 6-30 Process of Focus Group Discussion held by JICA CBNRM Project

Area	Watershed	Village	Date	Participants	Discussion modality
Northern	Comoro	Cotolau	17 Aug. 2017	23 (F:6 M:17)	As part of PLUP/CCVA
		Fatisi	04 Dec. 2019	8 (F:4 M:4))	Additional sample survey
	Laclo	Maumeta	06 July 2017	34 (F:10 M:24)	As part of PLUP/CCVA
		Fahisoi	16 Oct. 2019	12 (F:4 M:8)	Additional sample survey
Southern	Caraulun	Babulo	16 Jan. 2020	11 (F:6 M:5)	Additional sample survey
		Manumera	28 Jan. 2020	8 (F:4 M:4)	Additional sample survey
	Tafara	Lactos	21 Jan. 2020	10 (F:5 M:5)	Additional sample survey
		Maudemo	23 Jan. 2020	10 (F:5 M:5)	Additional sample survey

Source: JICA CBNRM Project

Most serious threats identified by the female and males

The JICA CBNRM Project with facilitators assisted female and male groups in the villages separately in identifying the most serious threats of climate change and natural disasters in maintaining their daily life. The table below summarizes the results of their ranking. As seen in the table, almost all the women groups (7/8 sampled groups) pointed out Little Rain/Drought as the most or second most serious threat, while men's perception was more diverse. This tendency indicates the strong anxiety of the female on the shortage of water, which affects their daily works, including fetching water, cooking and washing clothes and dishes. Another observation must be noted is that Strong Wind was commonly raised by both groups as a hazard affecting houses and farms. Interestingly, neither of the groups prioritized wildfire in Caraulun and Tafara watersheds, which was one of the concerned issues in Laclo and Comoro watersheds.

Table 6-31 Threats prioritized by Women and Men Groups in the Sampled Villages

Affected group	Southern/ Northern	WS	Village	Threat 1 (Most serious)	Threat 2 (Second serious)	Threats 3 (Third serious)
Women	Southern	Caraulun	Manumera	Heavy Rain	Little Rain/Drought	Strong Winds
			Babulo	Little Rain/Drought	Strong Winds	Heavy Rain
		Tafara	Lactos	Little Rain/Drought	Heavy Rain	High Temperature
			Maudemo	Little Rain/Drought	High Temperature	Strong Winds
	Northern	Comoro	Fatisi	Wildfire	Little Rain/Drought	Heavy rain
			Cotolau	Little Rain/Drought		Strong Winds
				Wildfire		Strong Winds
		Laclo	Fahisoi	Little Rain/Drought	Strong Winds	Wildfire
			Maumeta	Heavy Rain	Strong Winds	Land Slide
Men	Southern	Caraulun	Manumera	Little Rain/Drought	Strong Winds	Heavy Rain
			Babulo	Strong Winds	Little Rain/Drought	Heavy Rain
		Tafara	Lactos	Strong Winds	Heavy Rain	Little Rain/Drought
			Maudemo	Strong Winds	Little Rain/Drought	Heavy Rain
	Northern	Comoro	Fatisi	Heavy Rain	High Temperature	Wildfire
			Cotolau	Little Rain/Drought		Strong Winds
				Wildfire		Strong Winds
		Laclo	Fahisoi	Wildfire	Strong Winds	Heavy Rain
			Maumeta	Heavy Rain	Strong Winds	Land Slide

Source: Group discussions under JICA CBNRM Project Team (2017, 2019 and 2020)

Historical trends of climate changes and natural disasters

In addition to ranking of the serious threats, the sample survey revealed communities' recognition on the historical trends in climate change and natural disasters in the last decade. The results of the survey were tabulated below.

Table 6-32 Historical Trend of Climate Issues and Natural Disasters

Respondents	Area (Watersheds)	Trend	Strong Wind	Little Rain /Drought	High Temperature	Heavy Rain	Landslide	Wildfire
Women	Southern (Caraulun and Tafara)	Increased	50%	75%	100%	30%	45%	30%
		No Change	25%	25%	0%	45%	0%	20%
		Decreased	25%	0%	0%	25%	25%	25%
		No experience	0%	0%	0%	0%	25%	25%
	Northern (Laclo and Comoro)	Increased	50%	50%	100%	0%	0%	50%
		No Change	0%	50%	0%	50%	50%	0%
		Decreased	50%	0%	0%	50%	50%	50%
		No experience	0%	0%	0%	0%	0%	0%
Men	Southern (Caraulun and Tafara)	Increased	21%	100%	74%	0%	26%	0%
		No Change	79%	0%	26%	26%	26%	26%
		Decreased	0%	0%	0%	74%	22%	53%
		No experience	0%	0%	0%	0%	26%	21%
	Northern (Laclo and Comoro)	Increased	100%	100%	100%	100%	67%	0%
		No Change	0%	0%	0%	0%	33%	0%
		Decreased	0%	0%	0%	0%	0%	100%
		No experience	0%	0%	0%	0%	0%	0%

Source: Group discussions in the sample survey conducted by JICA CBNRM Project Team (2019 and 2020)

Some key observations based on the above discussions are highlighted below. Further deliberation is made in light of the insights gained through the implementation of JICA

CBNRM project working with communities in Laclo and Comoro watersheds since 2005, to complement the interview survey with anecdotal experiences from the Portuguese colonial era (before 1975, which is more than 50 years ago) through groups discussions with local communities including elderly people in the project target villages.

- More than 50% of both women and men in the sampled villages, regardless of the location of the watersheds (or southern/northern areas), consider that the incidences of "Little Rain/Drought" and "High Temperature" have increased during the last decade. In Laclo watershed, it was told by local communities that they had faced prolonged rains damaging agricultural crops between 2009 and 2011.
- More than 50% of the respondents, except for men sampled in the southern watersheds, also perceive that Strong Wind has occurred more frequently than before. According to the elderly persons in Laclo watershed, there used to be strong winds causing sever damages on maize production in the area even in the Indonesian occupation (between 1975 and 2000).
- All female respondents recognize an increase of frequency of High Temperature, while all men consider the same tendency of Little Rain/Drought in their respective communities.
- Around 20% of both women and men sampled in the southern watersheds state that they have never experienced Landslide and Wildfire. This is arguably consistent with their perceptions on the most serious threats, as they did not prioritize these incidents during the ranking session.
- The discussions with the elders in Comoro and Laclo watersheds suggest that frequent wildfires/ forest fires took place during the Indonesian occupation, which were mainly caused by military operations of the Indonesian army. Arguably this story may be true of the southern watersheds, namely Caraulun and Tafara.

Conclusion: Communities' perceptions on their climate vulnerabilities

It can be concluded from the ranking method that the communities in the selected villages in the target watersheds tend to consider Little Rain/Drought and Strong Wind as the most serious threats to their daily life. From a gender point of view, it should also be noted that the former phenomenon (Little Rain/Drought) is the major concern of the female respondents, while the latter (Strong Wind) is the common threat by both the male and female respondents. Their historical view on climate change and natural disasters also suggests the recent increase of these threats along with High Temperature as compared to the past trend. The following are comments provided by the respondents on their vulnerabilities to Strong Wind, Little Rain/Drought and High Temperature.

Table 6-33 Some Comments by the Sampled Villagers on Major Climate Changes and Disasters

Climate Issues	Experience
Strong Wind	◆ It usually happens in January and February and causes serious damage to many farms and houses in the village. Sometimes, the electric lines are cut off. (Babulo village) ◆ Strong winds often fell trees, which sometimes kill animals. (Lactos village) ◆ It often damages houses and crops (e.g., maize, coffee, banana and other crops) in farms, and eventually, causes a food shortage, which forces farmers buy food at shops/markets. (Fahisoi village)
Little Rain/Drought	◆ The volume of water at the sources become less during the drought period, and a shortage of water often causes social conflict in the community. (Fahisoi village) ◆ Due to the water shortage, villagers dig wells to take water from the ground. In the past, the well was 3-5 meters deep. However, it is necessary to dig more than 10 meters deep to get

Climate Issues	Experience
	water these days. (Maudemo village) ◆ Water becomes less at the sources, and therefore, villagers always use one particular water source which have more water than others during the dry season. Villagers are worried that the water source will eventually run out. (Manumera Village)
High Temperature	◆ Many fruit trees e.g., rambutan, durian and mangos, are damaged by high heats. (Fatisi village) ◆ It creates much dust in the village, which often affects the health conditions of communities. People suffer from throat infection and a cough. It also kills pigs and chicken and changes the taste of watermelon (It becomes not sweet). (Maudemo village) ◆ It is difficult to work outside; therefore, the time for farming decreases when it happens. (Lactos village)

Source: Group discussions in the sample survey conducted by JICA CBNRM Project Team (2019 and 2020)

6.5 Key Issues in Mitigation and Adaptation

This sub-section summarizes key issues derived from discussions in the previous sub-sections, which should be addressed in consideration of mitigation and adaptation, respectively.

(1) Key Issues in Mitigation

The causes of deforestation and forest degradation may vary with the watersheds as their socio-economic and climatic conditions vary with the locations of the watersheds. However, the following are considered as common drivers of deforestation and forest degradation in the watersheds based on literature reviews of the existing documents[9], interviews to local households in the areas, and discussions with key officials of NDFWM.

Table 6-34 Major Drivers of Deforestation and Forest Degradation

Major Drivers	Descriptions
1. Conversion of Forest into Farm	The conversion of forests into farmlands is considered as the main and direct driver of deforestation. It is particularly observed that deforestation or conversion of forests has occurred in gentle and medium level sloping lands in hilly and mountainous areas since independence, when local communities were allowed to use the areas where they used to cultivate for crop production in the Portuguese colonial era. At present, the majority of the existing dense forests are located in either steep sloping lands or remote areas far from communities, which are not suitable for farming. The pace of deforestation may have become slower than that for a few years after independence as communities may have already opened enough farms to secure food for their families. Nevertheless, deforestation has still progressed along with shifting cultivation, and if anything, the situations might get worse in the future as the number of households increases with population increase.
2. Shifting Cultivation	Shifting cultivation is still a common farming practice in Timor-Leste, particularly in the western and southern parts of the country. In general, a family uses a few to several plots for shifting cultivation on a rotation basis. As the fallow period is more or less 3 to 5 years on average, the areas used for shifting cultivation seem like bushes or grasslands in many cases. Those who do not have enough farms may further slash and burn forests for opening a new farm. Currently the direct impact of shifting cultivation may not be as high as that in the early 2000s as described above, but this practice is also considered as a major cause of forest fires in addition to the conversion of forests.
3. Forest Fire	Frequent forest fire is considered as one of the main causes of forest degradation in Timor-Leste, although there is no statistical or cumulative data of forest fires in the county. High incidence of forest fires in the dry season, especially before the onset of the rainy season, is the common issue to be addressed for forest protection in the country. Shifting cultivation, bush fires for generation of new grasses, and hunting of wild animals are considered as major causes of forest fires.
4. Firewood Collection	Firewood is the most prevailing source of energy in Timor-Leste. In fact, the majority of families, even those in Dili, use firewood for cooking. Intensive firewood collection to supply fuel wood to the populated cities and towns has caused forest degradation in the suburbs, such as Post-Administrative Laulara and Metinaro. Nevertheless, the impact caused by firewood collection in the remote areas may not necessarily be significant, as human pressures may be balanced with natural regenerating capacity of existing forests.
5. Illegal Logging	Illegal logging has been commonly found in Timor-Leste. Although it may not lead to large-scale deforestation, it is one of the causes of forest degradation throughout the country. Such an illegal act is conducted by not only communities but also groups organized by people from outsides.

[9] For example, Timor-Leste Strategic Development Plan 2011-2030, National Forest Policy, Timor-Leste, December 2005

Major Drivers	Descriptions
6. Animal Free Grazing	Free animal grazing is a practice commonly found in Timor-Leste. In many areas of the country, communities graze their large animals (cow, buffalo, and horse) in dense and sparse forests in and around their villages. Such a practice does not directly cause deforestation, but it significantly affects natural regeneration of existing trees, particularly the growth of the understory vegetation. Furthermore, communities who used forests for animal grazing have often burned the areas to promote regeneration of new grasses for securing animal feed.

Source: Draft CBNRM Roadmap (2019) Timor-Leste Strategic Development Plan 2011-2030, and National Forest Policy, Timor-Leste, December 2005

A further analysis of the major drivers of deforestation and forest degradations is made in Section 7.1 of this report.

(2) Key Issues in Adaptation

In addition to the issues in mitigation, some key issues affecting the sensitivity and adaptive capacity of local communities are also highlighted in the table below based on the discussions in the previous sections.

Table 6-35 Major Vulnerabilities at Community Level

Major Vulnerabilities	Descriptions	Reference
1. Limited Sources of Stable Income	As farming is the major economic activity in the target watersheds, the livelihoods of the communities heavily depend on agricultural outputs. The values of farm products occupy large portion of their monetary income. Yet the dependence on agriculture as sole income source makes the community susceptible to the negative impact of climate change.	6.2.5 (3)
2. Lack of Knowledge and Inputs on Sloping and Climate Resilient Agriculture	Farming as major source of income, the communities need to adopt farming methods that are resilient to the hazards of climate change. However, most of the farmlands are located in sloping areas, which are susceptible to soil runoff, and the farmers lack proper skills and inputs on sloping and climate resilient agriculture, resulting in low production of crops. Besides, shifting cultivation is still practiced and poses a risk of forest degradation.	6.2.5 (1)
3.Tradtional way of animal raising (Animal Free Grazing)	Most of the communities in the target watersheds are still maintaining free-grazing style of livestock keeping (especially goats and cows/ buffaloes). As this way of animal raising fully depends on natural generation of grass and trees, it poses easy and sensitive status of being influenced by climate changes. With a less availability of feeds, they will be subject to loss of animal weight and life, more time to search for greens, and more incidence of creating conflicts among themselves.	6.2.5 (2)
4. Limited Rural Infrastructure	Electric system has yet to be developed properly. This is especially true for the hilly and mountainous areas of the target watersheds. Poor power condition prevents communities from developing small-scale industries. In addition, most households do not have direct water supply to their houses. The workload of fetching water will increase if prolonged drought occurs (See Item 6 below).	6.2.5 (4) and (5)
5. Poor Housing Conditions	As most of the houses in the watersheds are built with fragile materials on weak foundations, they are prone to the damages in the occurrence of intensified wind and rainfall.	6.2.5 (6)
6.Greater exposure of women against shortage of water and other threats	Women are more involved in water-related house works, including fetching water, cooking and washing. They are thus more sensitive and vulnerable against shortage of water than men. In addition, mothers have a greater responsibility of taking care of children and equal or often greater roles of selling and buying goods at market. But the availability of their transportation means is limited. Hence, women's ability to respond to their needs (e.g. taking a child, who gets hurt by strong wind, to a hospital) is also limited against any climate changes causing women to move, In addition, women's representation in decision making is low at community level. As a result, their priorities or perceived threats are often not properly addressed in the community.	6.2.5 (4) 6.2.6 (1), (2) and (5)
7. Inadequate Capacity for NRM at Village Level	As demonstrated by the CBNRM villages, village regulations based on Tara Bandu can function as a set of rules on natural resource management and regulate illegal cutting, uncontrolled burning and animal free grazing. Yet formalization and enforcement of such regulations are not undertaken in most of the communities in the target watersheds. It is often the case that issues of natural resource management are not discussed or addressed in village council meetings.	6.2.5 (7) and (8)
8. Lack of a concrete plan for climate change adaptation	In general, there is no plan or idea on how to adapt to climate variability or climate-related hazardous events in the villages in not only target watersheds but also others. Many rural households follow their traditional ways of living, including farming	Based on 6.2.5 and 6.2.6 with

Major Vulnerabilities	Descriptions	Reference
	practices; hence, their living conditions are generally vulnerable to the recent climate change. It is essential for local communities to learn the potential risks of climate change and necessary actions to be taken, so that they could chose "better" options to moderate future risks with less additional cost. If a village can develop a community-based plan for climate change adaptation or community-based adaptation plan, the same would be used as the basis of the extension services of MAF and/or its development partners' project.	reference to Draft CBNRM Roadmap (2019)

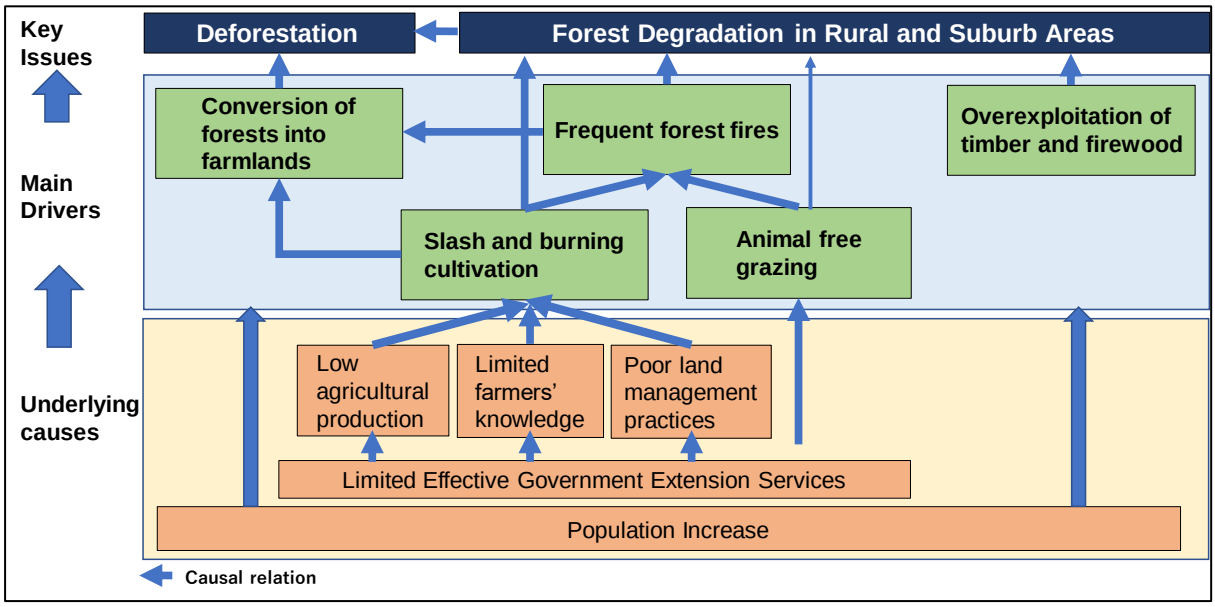
Source: JICA CBNRM Project (2020) and Draft CBNRM Roadmap (2019)

7. Justification and Rationale of the Proposed Project

7.1 Driver Analysis of Deforestation and Forest Degradation

As described in Section 6.5, forest fires, conversion of forests into farmlands/ expansion of farmlands, shifting cultivation/ slash and burning cultivation, firewood collection, illegal logging, and animal free grazing are considered as direct and indirect causes of deforestation and forest degradation. Many existing reports indicate the same drivers as the major factors. Among other things, the conversion of forests into farmlands is considered as the main and direct driver of deforestation, which has been often led by shifting cultivation and forest fires. Forest degradation, particularly degradation of dense forests into sparse forests, which is one of the salient trends in forests in Timor-Leste, has been caused by shifting cultivation, frequent forest fires, and overexploitation of fuelwood particularly in the suburb areas (See the figure below).

Low agriculture production, limited farmers' knowledge, and poor land management practices are considered as key underlying causes along with limited government effective extension services. Overall, the acute population increase after the independence in 2002 has been another underlying factor accelerating deforestation and forest degradation. The following figure shows the causal relationship between major drivers and deforestation and forest degradation in the target watersheds.



Source: JICA (2020)

Figure 7-1 Results of the Analysis of Major Drivers of Deforestation and Forest Degradation

Since degradation of dense forests is also one of the major sources of CO_2 emission in the LUCF sector in Timor-Leste as described in Section 3.1, it is, therefore, essential to address both deforestation and forest degradation, especially in rural areas for climate change mitigation purposes. In particular, the conventional farming and animal raising practice (i.e., shifting cultivation and free grazing animals) and frequent forest fires are the key drivers to be tackled as they are not only the direct causes of forest degradation but also the leading causes of deforestation. What makes the matters worse is that they have often caused land degradation, which has further accelerated the opening of forests for new farms by local communities. Unless such issues are properly addressed, CO_2 emissions from deforestation and forest degradation would increase at the current or higher paces as the population increases.

The situations of deforestation and forest degradation with the main drivers in the target watersheds are also analyzed as follows.

Table 7-1 Driver Analysis by Watershed (Degrees of impacts relative to other target watersheds)

Target watershed		Deliberation on the drivers for DF/DG
Caraulun (South-central TL)	DF: Medium (-3.93% p.a) DG: High (-7.02% p.a)	The high rate of forest degradation may be attributed mainly to the prevailing traditional farming (slash & burn cultivation), as upland farmers in the watersheds may rely on such practices on crop production due to the limited agriculture/forestry-development supports from DPs. The impact of forest fire is considered less, since the sampled communities indicate no threat of forest fire in their life (See Sec 6.4).
Tafara (South-western TL)	DF: Medium (-3.24% p.a) DG: High (-8.62% p.a)	
Laclo (North-central TL)	DF: Low (-0.68% p.a) DG: Medium (-3.47% p.a)	Forest fire is considered as the main cause of forest degradation in the watershed. In fact, a number of cases of wild/ forest fires had been reported by local communities in the monthly monitoring undertaken in the CBNRM project villages. The number of cases in Laclo was far beyond the one in Comoro watershed. Strong winds were also reported as major threats in the sampled communities in Laclo watershed, which often cause wildfire and make uncontrollable, when local communities burn their farms for clearing.
Comoro (Northern TL)	DF: Medium (-4.87% p.a) DG: High (-5.91% p.a)	The high rate of forest degradation can be considered as overexploitation of timber and firewood due to high demands along with population growth and urbanization in the suburbs of Dili town. Despite the boost of the population, Deforestation is of medium impact. This may be attributed to the occupational structure in villages in the watershed, where some of the population are not engaged in farming.

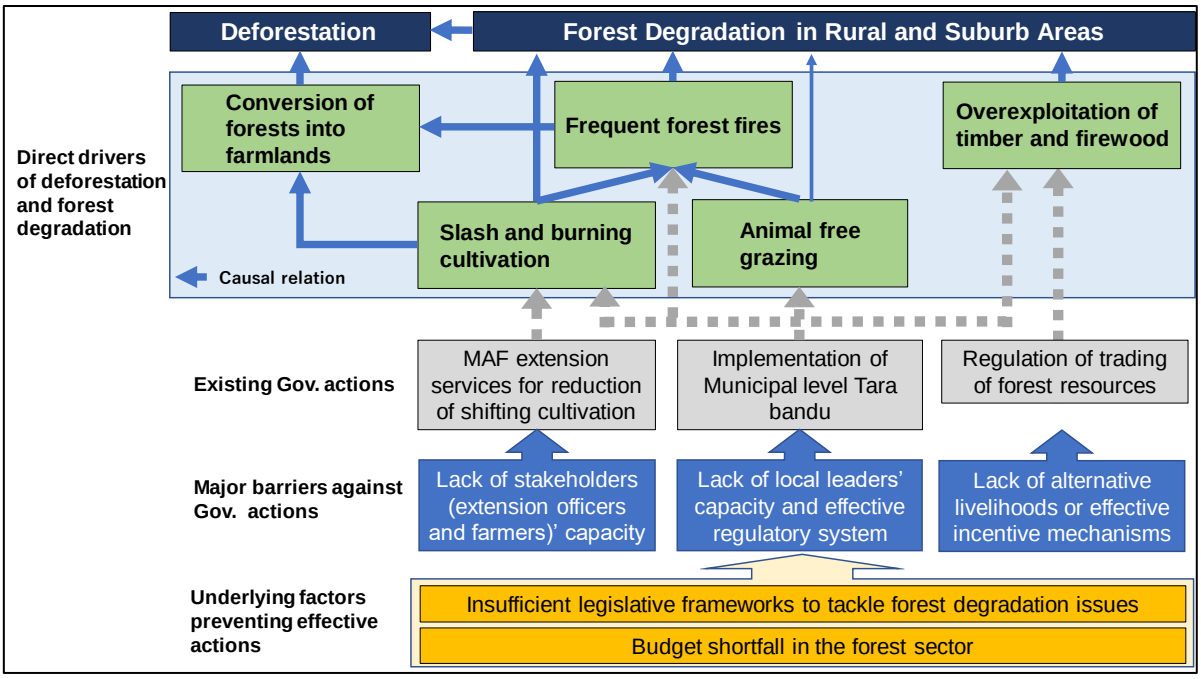
Note: High > - 5.0 % p.a > Medium > - 3.0 % > Low
Source: JICA (2020)

7.2 Major Barriers to Mitigation

The GoTL, particularly MAF/DGFCIP and municipal administrative offices, have put their efforts to reduce the pace of deforestation and forest degradation caused by shifting cultivation, forest fire and overexploitation over years through i) provision of agricultural extension services, ii) enforcement of municipal-level Tara Bandu regulations, and iii) introduction of regulatory measures to control trading of forest resources, and iv) provision of agricultural extension services. Nevertheless, such interventions have not necessarily brought about significant changes as the GoTL expected mainly due to the existence of the following barriers against the government actions.

- Lack of local capacity for transformation of conventional farming into sustainable ones
- Lack of local leaders' capacity and effective regulatory system for sustainable NRM
- Lack of alternative livelihoods and effective incentive mechanisms to enable local communities to protect forests

There are also underlying factors preventing the implementation of effective government measures, namely i) limited legislative framework to tackle deforestation and forest degradation issues and ii) budget shortfall for MAF extension services, in addition to the major barriers directly affecting the government actions. The figure below illustrates how the major direct and underlying barriers affect the government activities.



Source: JICA (2020)

Figure 7-2 Major Barriers against the Government Interventions addressing Forest Degradation

The major and underlying barriers to emission reduction are further examined with the proposed activities to address these barriers as tabulated below.

Table 7-2 Major Barriers to Mitigation and Proposed Activities for Improvement

Major Barriers	Elements of the Barriers	Descriptions	Proposed Activities
Lack of local capacity for transformation of conventional farming into sustainable ones	Lack of MAF field officials' and NGO staff's capacity to provide effective extension services	In general, the government officials have less experience in village-level participatory assessments and planning, such as; participatory rural appraisal; participatory land use planning, and climate change vulnerability assessment. As a result, the governmental services provided to local communities are rather stereotyped than site-specific; therefore, they do not well respond to the complexities of social and natural contexts in rural areas. At the same time, many extension officers have less knowledge on: i) sloping agriculture, ii) climate resilient agriculture, iii) agroforestry, and iv) permaculture or sustainable upland farming. Limited knowledge hinders them from providing comprehensive agricultural extension support which is more effective for solving problems that farmers face as the issues are generally complex and difficult to resolve with single technique.	Provision of training and guidance to field level government officials
	Lack of local farmers' capacity to transform their conventional way of farming	Due to a lack of knowledge or support from MAF field officials, it is not easy for local communities to transform their conventional way of farming into sustainable and climate resilient ones. The current farming practices, such as shifting cultivation, are the main causes of land and forest degradation in rural areas, and to make matters worse, have kept local farmers living conditions at subsistent level, which is highly vulnerable to climate variables.	■Participatory assessment of their farming and land use practices Introduction and implementation of sustainable and climate resilient livelihood options and sustainable forest management
Lack of local leaders' capacity and effective regulatory system for	Lack of village leaders' capacity for sustainable NRM	In general, local leaders are eager to minimize the occurrence of forest fire and any illegal acts which disturb the peace and order situations in their villages. Nevertheless, their conflict solving ability is generally low and not sufficient to address such	Enhancement of local governance capacity through i) formulation and implementation of village-level NRM

Major Barriers	Elements of the Barriers	Descriptions	Proposed Activities
sustainable NRM		issues in a proper manner. Based on the experiences of JICA CBNRM Projects, local leaders had no idea of what to do except the customary ceremony for reducing forest fires, animal grazing, and any other environmentally destructive activities.	regulations, and ii) formation and operations of sub-watershed level coordinating platforms
	Lack of effective regulatory systems for NRM	A lack of effective regulatory systems is another issue on sustainable village-level NRM. Local communities in Timor-Leste have traditionally relied on the customary governance system, which is based on the verbal instructions with the traditional ritual (Tara bandu). Generally, such a system does not last for a few years along with the lack of village leaders' governance capacity. This is the reason why many government and non-government interventions with Tara bandu were not necessarily effective for forest protection particularly in the post-project period.	■Formulation of effective village-level regulatory systems in a participatory manner with full use of traditional knowledge and customary norms Enhancement of local leaders' capacity for implementation of the village-level regulation systems
Lack of alternative livelihoods and effective incentive mechanisms to enable local communities to protect forests	Limited alternative livelihood options	In general, economic conditions of local communities living in hills and mountains in the country are still at subsistent level. They have heavily relied on shifting cultivation and forest resources for their livelihoods with less alternative sources of income. Hence, it is not easy for local communities to change their practices (for crop production as well as other livelihood purposes) though such practices are banned by the government/ municipal regulations.	■Enhancement of local livelihoods through diversification of livelihood options
	Lack of incentive mechanism for forest protection	At this moment, there is no tangible incentive for local communities to protect natural forests except their ecosystem services; hence, it is difficult for local communities, particularly in the suburb areas, to forgo the commercial exploitation of natural forest resources as a source of cash income. A certain incentive mechanism should be designed and introduced along with legalization of sustainable operations and management of village level production forests.	■Introduction of an incentive mechanism for reforestation and forest protection and legalization of community-level management of production forests
Insufficient legislative framework to address deforestation and forest degradation	-	This is raised as another issue to be addressed for effective implementation of the government laws and policies. In the forest sector in Timor-Leste, National Forestry Policy and Law on the General Regime of Forest are in place; however, their subordinate instructions for implementation have not been issued yet. CBNRM and CF, which are key approaches employed for the proposed project, do not have specific legislative and regulatory frameworks for supporting their implementation at this moment, though they are defined as key instruments for implementation of the National Forestry Policy and Law on the General Regime of Forest. The limited budget allocation is often attributed to the insufficient policy and legislative supports; hence, legislative frameworks for CBNRM and CF should be developed for sustainable and	■Development of new government legislative and technical documents for mainstreaming CBNRM/ CF, climate resilient agriculture, seedling production/ reforestation, etc.
Budget shortfall for government interventions	-	A shortage of government budget allocated to the forest sector is a chronic issue that MAF/ DGFCIP as well as MAF DPs have faced when considering the sustainability and scalability of their interventions. A lack of lawmakers' understanding of the importance of forest protection or watershed conservation is one of the reasons for less government financial support for the forest sector. It is also important to consider the	■Institutionalization of the sub-watershed level coordinating platforms as the government official organizations ■Enhancement of lawmakers and decision makers'

Major Barriers	Elements of the Barriers	Descriptions	Proposed Activities
		integration or institutionalization of conservation measures into economic development works or government regular activities to ensure their sustainability.	understanding of the importance of sustainable NRM through knowledge sharing

Source: JICA (2020)

7.3 Future Potential Risks without Project Conditions

7.3.1 Possible Scenario of Deforestation and Forest Degradation

As indicated in the previous section, deforestation and forest degradation may progress at the current or higher pace, unless any effective measures addressing the major drivers as well as their underlying causes are taken. The Forest Conservation Plan (2013) predicts that the forest degradation, conversion of dense forest into sparse forest, and deforestation may progress at 3~4% p.a. and 0.25% p.a., respectively, indicating about 40,000 ha of dense forests might be converted into sparse forests for the next decade. LUCF might remain as the major contributor to the national GHG emissions without the project conditions.

7.3.2 Pontential Impacts on Livelihoods caused by Climate Variability

As described in Chapter 2, the climate variability may be obvious and prevalent in the country based on RCP scenarios as some changes have been already found in the watersheds. The adverse impacts on local livelihoods by climate variability are expected to accelerate forest degradation and deforestation as local subsistent communities need to open new farms for ensuring their food security.

The major climate variables and hazards which may affect the local livelihoods in the watersheds are as follows:

- Reduction and fluctuation of rainfalls during the rainy season, particularly in the onset of the rainy season, November and December;
- Occurrence of heavy and strong rains in the middle of the rainy season, particularly January and February;
- Occurrence of long rains in April and May, which is the post-harvesting season of Maize;
- Increase of rainfalls during the dry season;
- Increase of temperature in both the rainy and dry season; and
- Frequent occurrence of strong winds.

Potential climate risks caused by the possible climate variability, which will be further accelerated by the vulnerabilities at national and community levels, are illustrated below.

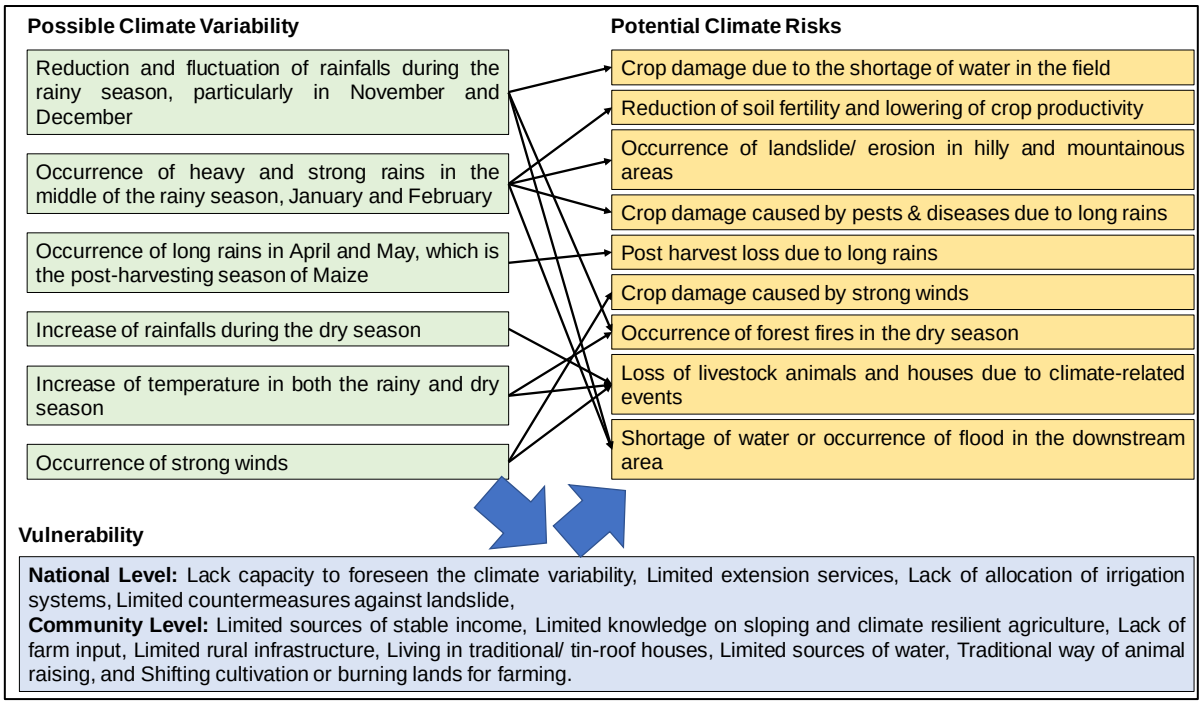


Figure 7-3 Overall Picture of Possible Climate Variability and Potential Risks

Source: JICA (2020)

Potential climate risks, such as crop damage, loss of produced crops and animals, reduction of soil fertility, and progress of soil erosion will directly and indirectly affect local livelihoods of communities in the watersheds, particularly those living in hilly and mountainous areas, and will result in the expansion of shifting cultivation in existing forests.

The shortage of water in the downstream areas may trigger the social unrest as it directly causes the food shortage or water scarcity in the region, while the occurrence of floods may cause severe damage to social infrastructure, houses, and other household property in many cases. The table below shows the expected climate variability and potential climate impacts on local livelihoods in the respective target watersheds.

Table 7-3 Expected Climate Variation and Potential Impacts on Local Livelihoods in the Watersheds

Target watershed	Important Factors affecting local livelihoods	Potential impacts on crop production	Potential impacts on other livelihood aspects
Caraulun (South-central TL)	Long-term national projection - Decrease of rainfall amount by 2030 - Delayed/ short rain in the onset of rainy season - Intensified/ prolonged rainy season - Temperature increase Community perspective* - Little rain/ drought	Crop/ seedling damages due to: - shortage of water in planting season - more occurrence of pest & diseases associated with prolonged rains - post-harvest loss	- Shortage of water for daily use (short-term) - Difficult to work outside under high temperature - Animal damages under high temperature
Tafara (South-western TL)	Long-term national projection - Decrease of rainfall amount by 2030 - Delayed/ short rain in the onset of rainy season - Intensified/ prolonged rainy season - Temperature increase Community perspective* - High temperature	Crop / seedling damages due to - shortage of water in planting season - more occurrence of pest & diseases associated with prolonged rains - post-harvest loss	- Shortage of water for daily use (short-term) - Difficult to work outside under high temperature - Animal damages under high temperature
Laclo (North-	Long-term national projection - Decrease of rainfall amount by 2030 - Intensified/ prolonged rainy season	Crop / seedling damages due to - shortage of water in planting season	- Shortage of water for daily use (short-term) - Difficult to work

Target watershed	Important Factors affecting local livelihoods	Potential impacts on crop production	Potential impacts on other livelihood aspects
central TL)	- Temperature increase Community perspective* - Strong wind	- more occurrence of pest & diseases associated with prolonged rains - post-harvest loss - Strong wind	outside under high temperature - Animal damages under high temperature - House damages by strong winds
Comoro (Northern TL)	Long-term national projection - Decrease of rainfall amount by 2030 - Intensified/ prolonged rainy season - Temperature increase Community perspective* - Little rain/ drought	Crop / seedling damages due to - shortage of water in planting season - more occurrence of pest & diseases associated with prolonged rains - post-harvest loss	- Shortage of water for daily use (short-term) - Difficult to work outside under high temperature - Animal damages under high temperature

Note: * It is the historically increasing trend pointed out by all of the community members interviewed for the sample survey.
Source: JICA (2020)

7.4 Mitigative Interventions to be Taken

In order to reduce CO_2 emissions from further progress of deforestation and forest degradation and reduce the potential climate risks on local livelihoods, strategic actions should be taken to: i) effectively address the major drivers of deforestation and forest degradation considering key barriers, ii) reduce local vulnerability to climate variability, iii) enhance local resources and functions for sustainable forest protection, and iv) strengthen the government institutions as well as human resource capacity for long-term scale-up.

The following potential actions could be considered:

- Building of capacity of local communities, particularly leaders of villages, to i) assess a the current farming and land management practices with their consequences, ii) protect and manage natural resources (e.g., land, water, and forest resources) in the localities in a sustainable manner, iii) solve conflict over natural resources fully using the village regulations and the inter-village level coordinating platforms, and iv) transform their conventional livelihood activities into sustainable and improved practices;
- Formulation of village-level NRM regulations in a participatory manner with full use of traditional knowledge and customary norms/ systems;
- Enhancement of local communities' capacity for sustainable and climate resilient livelihoods, such as climate resilient agriculture with proper land management, planting and management of horticulture trees, reforestation/ afforestation, and introduction of alternative livelihoods;
- Introduction and designing of an effective incentive mechanism for reforestation and forest protection and legalization of community-level management of production forests so that local communities could benefit from sustainable forest management;
- Enhancement of the capacity of MAF extension officers, forest guards, and other service providers at the field level (e.g., NGOs) to enable MAF to assist local communities in sustainable natural resource management and transition to sustainable and climate resilient livelihoods for reduced CO_2 emissions;
- Development of new government legislative documents and technical tools for mainstreaming CBNRM/ CF and smooth implementation of the CBNRM/ CF-related activities in the field;

- Institutionalization of the project interventions, particularly inter-village level collaboration for sustainable NRM, as the government official organizations; and
- Enhancement of lawmakers and decision makers' understanding of the importance of sustainable NRM through knowledge sharing.

7.5 Climate Rationale of the Proposed Project

Local communities in the watersheds, specifically those in hilly and mountainous areas, have played a critical role in deforestation and forest degradation causing the GHG emissions in the country. The situations are expected to get worse under the future scenarios of climate change as described in the previous sections. The proposed project is conceptualized with the premise that:

a. The experiences of the CBNRM project could be fully used for reduction of deforestation and forest degradation in the priority watersheds, particularly hills and mountains in the watershed areas, as the CBNRM-related activities directly address the major drivers of deforestation and forest degradation and barriers hindering the government interventions;

b. Community engagement and participation in sustainable forest protection and management could overcome the current institutional weakness of MAF/ DGFCIP, which is one of the key barriers to mitigation, and ensure the sustainability of the project activities at field level;

c. CBNRM could contribute to preventing forest degradation and deforestation, which could further contribute to the reduction of CO_2 emissions and enhancement of forest ecosystem services including CO2 absorption; and

d. At the same time, hands-on training and implementation for community-based sustainable livelihood options could encourage local communities to transform their shifting cultivation practices towards more productive, sustainable and climate resilient ones, which will reduce food insufficiency and enhance climate resilience of local livelihoods.

The CBNRM approach is the proven method which could help local communities develop a mechanism for enhancement of forest ecosystem services and improvement of land productivity using customary rules and natural resources locally available. More importantly, the approach puts its focus on the enhancement of local capacity for sustainable natural resource management, sustainable agriculture, restoration of forests, and adaptation to climate change through several types of participatory activities, such as participatory assessment and planning, hands-on training, and formation and operations of a coordinated platform at local level. They are highly consistent with the mitigative solutions proposed as the project activities at community level. Specifically, the CBNRM approach can i) tackle the major drivers of deforestation and forest degradation together with key barriers and ii) minimize the potential climate impacts on crop production and local livelihoods as explained in Section 5 of this report

In fact, the project based on the CBNRM approach can satisfy not only the mitigation needs but also the adaptation needs in Timor-Leste, as its objectives and major activities are coincident with those proposed in the relevant government strategic documents in the climate change sector, such as NDC (2016), Draft Climate Change Policy, NAPA (2010), National Strategic Development Plan (2011-2030), and National Forest Sector Policy (2008/2018).

Furthermore, the proposed approach is expected to generate synergy effects in mitigation and adaptation between forest and agriculture sectors as well as local governance. For instance,

- Once the governance capacity of local leaders is enhanced, the incidence of illegal acts, not only related to forest protection but also to other aspects of life (e.g. farming and animal husbandry), are drastically reduced.
- Sustainable forest and land management introduced by the CBNRM mechanism contribute to the reduction of deforestation and rehabilitation of degraded areas, which further lead to the restoration of dried water sources, effective utilization of unused lands for production, and increase of vegetable production by using available water. All of them contribute to the improvement of local vulnerability to climate change.
- Alternative livelihood improvement support which are namely based on natural resources and agricultural production can strengthen the sustainable NRM mechanism as communities tend to consider the resources as important assets for their livelihoods. At the same time, the support enhances the capacity as well as status of women members in the communities, as the support mainly target women groups in communities.
- The proposed project could also address the non-climate drivers of deforestation and forest degradation, namely 1) expansion of farmlands, 2) increase of firewood consumption, and 3) animal free grazing, through introduction of the village-level NRM mechanism and capacity building of local communities on climate change adaptation measures.

It is concluded that the implementation of the proposed project is judged as highly rational in terms of its relevance to climate change adaptation and mitigation, its main approach taken, effectiveness, and efficiency.

7.6 Scalability and Replicability of the Proposed Project

7.6.1 Scalability of the Proposed Project based on the CBNRM Project Experiences

As described in Section 4.2, several international organizations and donor agencies working in Timor-Leste (MAF Development Partners: MAF DPs) have already adopted the CBNRM-related techniques, particularly PLUP and CCVA, as part of their project activities, because of the efficacy of the CBNRM approach in community empowerment, forest conservation, sustainable land management, and increase of agricultural production. Likewise, sustainable livelihood options to be proposed by the project, namely sustainable land management, reforestation, and livelihood improvement have also been widely demonstrated by MAF DPs-supported projects, as they have been proven effective in reducing climate vulnerability of local communities in Timor-Leste.

Forest sector donor coordination platform initiated and led by DGFCIP has contributed to the replication of the CBNRM approach by MAF DPs in the sector, as it has functioned as the place where MAF DPs have learn about the CBNRM approach and the approach itself has been evolved and improved in collaboration with DPs who used the approach. The same mechanism can continue during and after the proposed project. It is, therefore, highly expected that the CBNRM approach with climate resilient elements (e.g., climate resilient agriculture) could be adopted by future MAP DPs-initiated project and integrated into their project interventions. Lessons learned through the implementation of the proposed project will also be shared and effectively used for other MAF DP-supported projects through the coordinating platform.

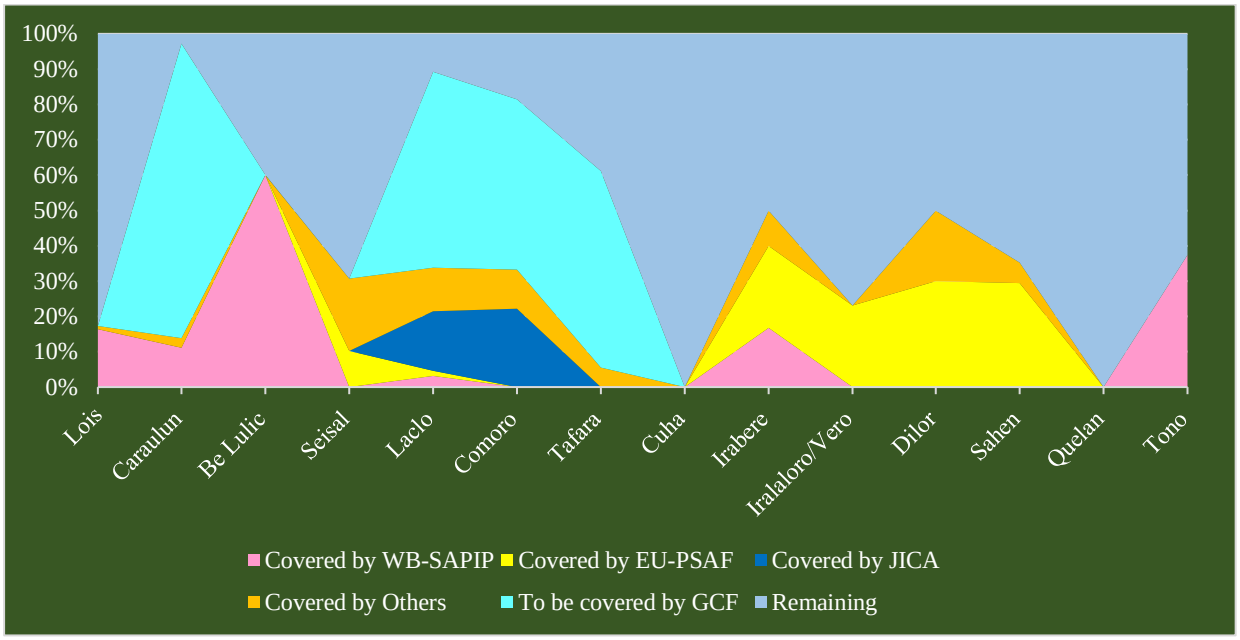
As of the end of April 2020, PLUP and/or CCVA have been introduced by MAF DPs in more

than 30 villages, and around 100 villages are in the process of implementation to be completed by 2022. As shown in the table below, there are on-going initiatives supported by several DPs in addition to JICA, such as, World Bank-SAPIP, EU-PSAF, CI-SNAP, in almost all the 14 priority watersheds.

Table 7-4 Number of the Villages being/ will be Covered by Different Projects in the 14 watersheds

No.	Watershed	Number of Villages	WB-SAPIP	EU-PSAF	JICA	Others	GCF	Remaining
1	Lois	110	18	0	0	1	0	91
2	Caraulun	36	4	0	0	1	30	1
3	Be Lulic	20	12	0	0	0	0	8
4	Seisal	39	0	4	0	8	0	27
5	Laclo	65	2	1	11	8	36	7
6	Comoro	27	0	0	6	3	13	5
7	Tafara	18	0	0	0	1	10	7
8	Cuha	13	0	0	0	0	0	13
9	Irabere	30	5	7	0	3	0	15
10	Iralaloro/Vero	13	0	3	0	0	0	10
11	Dilor	10	0	3	0	2	0	5
12	Sahen	17	0	5	0	1	0	11
13	Quelan	4	0	0	0	0	0	4
14	Tono	16	6	0	0	0	0	10

Note: There are villages overlapping more than one watershed
Source: JICA (2020)



Source: JICA (2020)

Figure 7-4 Proportions of Villages being/ will be Covered by Different Projects in the 14 watersheds

7.6.2 Exist Strategy of the Proposed Project

Post-project sustainability will be sustained by the 3-step strategic approach enhanced by JICA's co-financing project of Technical Expert Team (TET) as an exit strategy:

i) Strengthening of the government's own initiatives;
ii) Mobilization of MAF DPs' resources; and
iii) Mobilization of private investments by introduction and designing of carbon offsetting schemes as an incentive mechanism for farmers

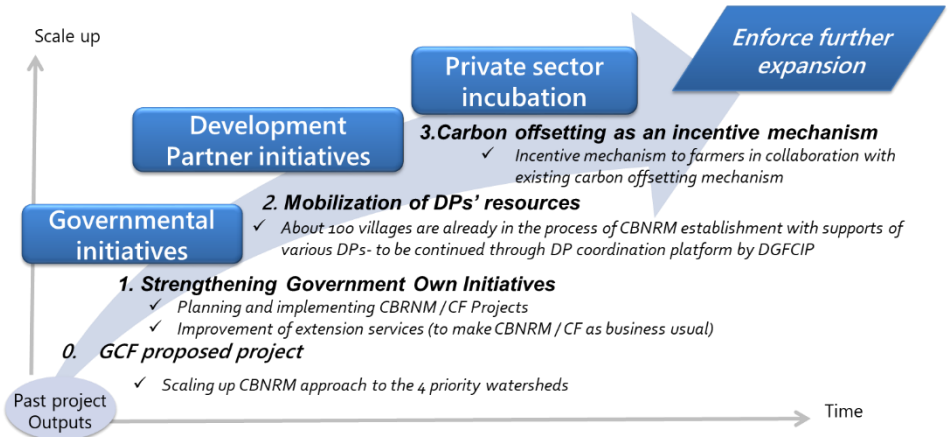


Figure 7-5 3-Step Strategic Approach to Future Expansion (As Exist Strategy)

Step 1: Strengthening of government's own initiatives:

JICA TET will provide technical assistance in the institutionalization of the CBNRM approach through development of policy and legislative frameworks necessary for mainstreaming CBNRM/ CF in MAF's extension activities, so that MAF/ DGFCIP will be able to plan and implement the CBNRM roadmap as business as usual. Institutionalization does not limit to national level legislative development, but moreover, it will enhance the capacity of the field level extension service providers, both MAF field officers and NGO technical staff. MAF field officers, extension officers and forest guards, are expected to play an leading role in implementation and operation of the micro programs/ FFSs in the field, while local NGOs who will be involved as field level operators, will have enough capacity to undertake CBNRM-related activities even after the end of this project, so that they could be hired by any government-initiated or MAF DP-supported projects.

Step 2: Mobilization of Development Partners' resources:

The second step is the enhancement of Development Partners' (DP) resource mobilization. Widespread recognition and adoption of CBNRM approach by the DPs (e.g. World Bank, EU and FAO) have led the CBNRM scaling up to more than 30 villages so far, and around 100 villages are in the process of implementation which will be completed by 2022. This demonstrates not only the effectiveness of the CBNRM approach, but also the high potential of replicability. The forest sector donor coordination platform led by DGFCIP has proven to be effective in CBNRM replication by mobilizing other MAF DPs in the sector, functioning as the place where MAF DPs learn about the CBNRM approach and the approach itself has been evolved and improved in collaboration with DPs. Efforts for DP resource mobilization through the coordination platform will be continued during and after the proposed project. It is, therefore, highly expected that the CBNRM mechanism could be adopted by future MAP DPs-initiated projects and integrated into their project interventions.

Step 3: Mobilization of private investments by introduction and designing of carbon offsetting schemes as an incentive mechanism for farmers

Lastly, JICA TET project will promote the private sector investments by introducing and designing a carbon offsetting scheme as an incentive mechanism to continuously support local communities in their reforestation and forest management activities. In the carbon offsetting scheme, local communities will be paid for their continuous maintenance and protection of

planted trees, which would act as an alternative income and improve their climate resilience. By activity, PLUP will identify degraded lands in villages and motivate local communities in restoration of such lands through reforestation/ afforestation micro program. Forest plantations to be developed by reforestation/ afforestation micro program could be used for carbon offset projects. Existing experiences gained by the national and Australian NGOs working in Timor-Leste will be fully used for designing and formulation of carbon offset projects in the project villages where reforestation/ afforestation micro program is implemented. As both the NGOs have their carbon offset projects which have been already validated and certified by the internationally well recognized voluntary carbon offsetting schemes (i.e., Gold Standard and Plan Pivo), JICA TET project will closely communicate and collaborate with the NGOs for learning and using their rich experiences in project formulation and registration as well as lessons learned. JICATET project will support the development of linkages with potential buyers or carbon offsetting market access in Timor-Leste and other EU/Asian carbon markets.

7.7 Country Ownership of the Proposed Project

The proposed project is highly consistent with the 1st NDC and National Adaptation Programmes of Action (NAPAs) of Timor-Leste and will contribute to the achievement of the targets of NDC. It is also in line with the GoTL's priorities identified in the National Climate Change Policy, National Forest Sector Policy, MAF Strategic Plan, and the Law on General Forest Regime.

At the same time, the proposed project is the part of the national program (i.e. the CBNRM roadmap) being currently developed by DGFCIP; therefore, DGFCIP shows its commitment to take a leading role in the preparation and implementation of the proposed project. The following are major actions that have been or being taken by DGFCIP in pursing the implementation of the CBNRM roadmap.

- MAF/ DGFCIP enacted the Law on the General Forest Regime (2017), which endorses CF and CBNRM as the main instruments for sustainable forest management in Timor-Leste.
- As stated in Section 7.6, DGFCIP has embarked on DP coordination in the forestry sector since 2017 including the establishment of the platform and enhancement of key stakeholders' coordination and collaboration in project formulation. The platform has function to mobilize various DPs (other than JICA) for expansion of the CBNRM mechanism, especially PLUP/CCVA, over the country.
- MAF/DGFCIP established Inter-ministerial Technical Commission for Watershed Management (so-called National Watershed Management council) in 2017, involving the relevant ministries such as Secretary of State for Environment, Ministry of Public Works, and Ministry of State Administration. Similar efforts for establishing Watershed Management Councils (WMCs) have been made at field level in collaboration with MAF DPs, such as Loes, Belulik, and Tono WMCs with World Bank- SAPIP, Raumoco WMC with Hivos, and Noru and Bemos WMCs with JICA.
- MAF/DGFCIP has assisted the WMCs established by the JICA CBNRM project and other community-based organizations in rehabilitating degraded lands by planting seedlings. As far as JICA CBNRM Project is concerned, more than 55,000 seedlings have been provided by MAF/ DGFCIP for rehabilitation of degraded areas.
- DGFCIP has recently established a new national directorate specialized for CBNRM and

CF, which may start its services in the end of 2020 for technical guidance for CBNRM/ CF for further expansion.

In addition, DGFCIP with its national directorates has implemented several climate change-related projects supported by GEF/UNDP, EU/GIZ/CAMOES, ADB, and JICA. They have direct connections with the MAF Municipal Offices, as they deploy their staff, such as technical officers and forest guards, to the respective offices; hence, they could easily form the field-level monitoring teams in collaboration with the MAF Municipal Offices concerned.

Last but not least, the concept note and this funding proposal have been developed in collaboration with the relevant ministries of the GoTL under the initiative of DGFCIP. Key officials from the relevant national directorates under DGFCIP have been involved in the planning process. Hitherto, three consultation workshops have been organized by DGFCIP in collaboration with JICA CBNRM Project in 2019 to introduce the initial ideas on the proposed project and have feedback from the relevant regional stakeholders, such as Municipal Administrative Officers, MAF Municipal officers, and local NGOs concerned. The feedbacks were incorporated in this funding proposal.

7.8 Knowledge Sharing and Potential for Private Sector Investment

7.8.1 Sharing of Knowledge and Lessons Learned

JICA has implemented many projects in the forest and climate change-related sectors all over the world over decades. Particularly, community-based forest and natural resource management is one of the priority areas in the forest sector in JICA; hence, a number of community-based projects similar in nature to the proposed one have been implemented in other countries, particularly Asian and Pacific Island counties as listed below.

Table 7-5 List of Recent Examples of JICA-supported Natural Environment Conservation sector Projects in Asian and Pacific Island Countries

Name of Project	Country	Period
Community-based integrated watershed management in Laclo and Comoro river basins	Timor-Leste	2005-2010
The Project for Community-Based Sustainable Natural Resource Management（CBNRM）Phase1	Timor-Leste	2010-2015
The Project for Community-Based Sustainable Natural Resource Management (CBNRM) Phase 2	Timor-Leste	2016-2021
Sustainable Natural Resource Management Project	Viet Nam	2015-2020
Sustainable Forest Management and REDD+ Support Project (F-REDD)	Lao PDR	2014-2020
Indonesia-Japan Project for Development of REDD+ Implementation Mechanism	Indonesia	2013-2018
Project for Community Movement Program on Forest and Land Fire Prevention	Indonesia	2018-2022
Project for Development of Rural Business with Forest Products in the Kyrgyz Republic	Kyrgyz Republic	2015-2019
Capacity Development Project for Operationalization of PNG Forest Resource Information Management System for Addressing Climate Change	Papua New Guinea	2014-2019
The Project for Biodiversity Conservation through Implementation of the PNG Policy on Protected Areas	Papua New Guinea	2015-2020
The Project on Capacity Development for Sustainable Forest Resource Management in Solomon Islands	Solomon Islands	2017-2022

Source: JICA (2020)

Any lessons learned and good practices gained from the proposed project could be used for other projects in other countries and vice versa. To this end, JICA has its own knowledge sharing mechanism for exchanging experiences of the respective projects with each other on a timely manner.

7.8.2 Creation of an Enabling Environment for Private Sector Investment

Furthermore, the CBNRM/CF approach could lay the foundation for private sector's investment in their carbon offset programs, as described in Section 7.6. As there are existing successful cases of carbon offset programs initiated by the national and Australian NGOs in Timor-Leste, the proposed project could also incorporate the same arrangements in the project design so that the project or the beneficial communities can have additional investment from the private sector which has interested in carbon offsetting in Timor-Leste and Asian countries. The inclusion of the carbon offset programs provides the CBNRM mechanism with an additional measure of brining sustainable incentives to local communities, leading their behavior change more for conservation and restoration of forest resources.

The government will also gain additional significant values from this attempt, as it could deepen the understanding of the importance of credibility, traceability, and non-regression of forest restoration through formulation and implementation of a carbon offset project. Building the government capacity on these elements will also contribute to future development of credible national GHG registry.

8. Proposed Project

8.1 Objectives of the Proposed Project

The ultimate goal of the proposed project is to reduce CO_2 emissions from deforestation and forest degradation in the country, particularly the 14 priority watersheds through improvement of landscape ecosystem services in the watersheds with effective use of the CBNRM/ CF approach demonstrated by the proposed project.

Thus, the main objective of the project is to reduce CO_2 emissions from deforestation and forest degradation in the target four watersheds through enhancement of local capacity for sustainable NRM and sustainable, productive, and climate resilient livelihoods by introducing the CBNRM/ CF approach in the target villages in the watersheds. Particularly, the project aims to:

- Enhance local capacity for sustainable forest and natural resource management to improve landscape (and forest) ecosystem services, including carbon sequestration and reducing GHG emissions from deforestation and forest degradation in the target watersheds;
- Replace the conventional farming and land management practices with more sustainable and climate resilient ones through introduction and promotion of the CBNRM approach including climate resilient agriculture with sloping agriculture techniques, forest restoration/ rehabilitation and livelihood diversification in the four target watersheds;
- Enhance the capacity of key stakeholders, particularly MAF field officials (i.e., extension officers, forest guards, and other officials) and NGO technical staff, to provide training, technical assistance and extension services to local communities on field-level climate adaptive measures (e.g., climate resilient agriculture, diversification of livelihoods, horticulture development, and implementation and monitoring of community forestry management plans); and
- Develop an enabling environment for MAF/ DGFCIP to expand the project beyond the target four watersheds through development of new legislative documents (e.g., ministerial orders or circulars) as well as technical guidelines/manuals and provision of training for MAF officials and NGOs working in other priority watersheds (Institutional support).
- Develop an enabling environment to improve local access to climate finance and private sector investments by incorporating small-scale carbon offsetting programmes in reforestation/afforestation activities.

8.2 Basic Concepts of the Proposed Project

(1) Logical Framework of the Proposed Project

The logical framework of the proposed project to achieve its goal is summarized below.

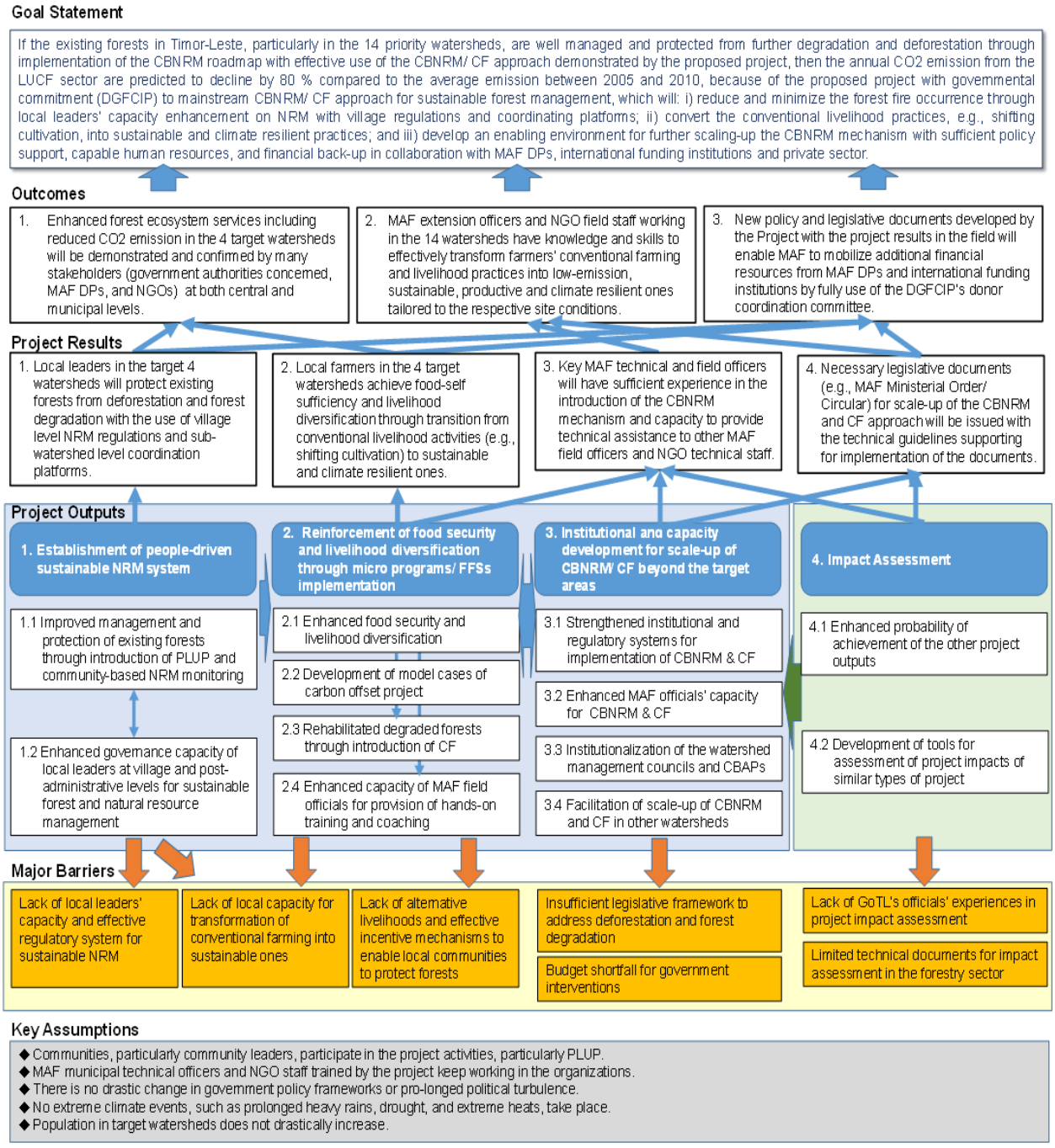


Figure 8-1 Basic Concepts of the Proposed Project (Theory of Change under the Project)

Source: JICA CBNRM Project (2020)

The goal statement of the proposed project is as follows.

"If the existing forests in Timor-Leste, particularly in the 14 priority watersheds, are well managed and protected from further degradation and deforestation through promoting the proven CBNRM (Community Based Natural Resource Management) /CF (Community Forestry) approach, developed through JICA's 15 years of experience,

then the annual GHG emissions from LULUCF sector will decline by approximately 80 % compared to the average between 2005 and 2010, and enable the implementation of the national CBNRM roadmap,

because the proposed project with the DGFCIP commitment to mainstream the CBNRM/ CF approach for sustainable forest management in Timor-Leste can: i) reduce forest fire and forest overexploitation through inclusive and participatory natural resource management and regulatory frameworks and coordinating platforms to run the approach as an everyday practice, which will ii) enhance sustainable livelihood practices, instead of conventional ones e.g., shifting cultivation to realize the effective climate mitigation action in the country, with stable institutionalization by iii) developing an enabling environment to further scale up the CBNRM/CF mechanism with adequate policy support, capable human resources, and financial back-up in collaboration with MAF development partners, international funding institutions, and private sector."

(2) Target Area in the Target Watersheds

There are 125 villages whose jurisdictional areas are partially or fully overlapped with the target watersheds. However, due to the budget limitation, the proposed project will not be able to cover all the 125 villages. Considering the nature of the proposed project, which is to enhance local resilience against climate variability and reduce GHG emission from deforestation and forest degradation, the proposed project should prioritize villages vulnerable to climate variability and those with existing forests, particularly dense forests, within their jurisdiction.

The target villages for the proposed project were tentatively selected according to the following procedures. In the selection, the post-administratives (or sub-municipalities) concerned with the 125 villages were evaluated since "Cluster Implementation" (as further explained in Section 9.2) is one of the key approaches to the implementation of the proposed project. The final selection of the post-administrative as well as target villages will be made by DGFCIP and JICA in close consultation with the relevant stakeholders at municipal levels prior to the implementation of the project.

1st step: The post-administratives (or sub-municipalities) whose geographical overlaps are less than 10% of the jurisdictional area were excluded from target areas;

2nd step: The remaining post-administratives were evaluated in terms of the points given above, namely i) climate vulnerability and ii) existence of forest carbon sink in the area.

Since the site-specific climate data as well as the related risk data are not available, the slope conditions of the post-administratives are substituted for the climate vulnerabilities of the respective areas. The thought behind this is that sources of water and livelihoods are generally limited in hilly and mountainous areas and their agricultural practices (i.e., upland farming and livestock management) are highly vulnerable to climate variability and natural hazardous events. On the other hand, existing forests in the respective post-administratives are used for evaluation of the mitigation potential in the areas. The results of the evaluation are shown in **Table 3** and table below.

Table 8-1 Evaluation of the Post-administratives concerned with the Target Watersheds

Watersheds	Municipality	Post-administratives (PAs)	No. of Villages related	Vulnerability (Slope condition)	Mitigation potential (dense forest)
Tafara	Covalima	Fatululic	2	Medium	Low
		Fatumean	3	Medium	Low
		Forohem	4	High	Medium
		Maukatar	3	Low	Medium
		Tilomar	4	Low	Low

Watersheds	Municipality	Post-administratives (PAs)	No. of Villages related	Vulnerability (Slope condition)	Mitigation potential (dense forest)
Calaurun	Ainaro	Hatu-Udo	2	Low	Low
	Manufahi	Same	8	Low	Medium
Laclo	Aileu	Liquidoe	7	High	Low
	Manatuto	Laclo	4	Medium	Low
		Laclubar	7	Medium	Medium
		Manatuto	5	Low	Low
Comoro	Dili	Dom Aleixo	3	Low	Low
		Vera Cruz	1	High	High
	Ermera	Railaco	9	High	Medium
	Liquica	Bazartete	4	Medium	Medium
Caraulun/Laclo	Ainaro	Maubisse	9	High	Low
	Manufahi	Turiscai	11	High	Low
Laclo/Comoro	Aileu	Laulara	6	High	High
		Remexio	8	High	Low
Calaurun/Laclo/Comoro	Aileu	Aileu vila	10	High	Low

Note: The evaluation of the vulnerability and mitigation potential was made in accordance with the criteria shown below.
Vulnerability (Proportion of steep slopes with over 26 degree): High: > 80%, Medium: 40%~80%, Low: below 40
Potential of mitigation (Dense forest coverage): High: more than 30 %, Medium: 20%~30%, Low: below 20%
Source: JICA (2020)

A total of 16 post-administratives with 96 villages in total, were evaluated as priority ones in terms of the vulnerability to climate change and mitigation potential. Among 96 villages, villages whose geographical overlap with the target watersheds is very limited and those supported by MAF DPs including the JICA CBNRM Project were excluded from the list of the target villages. Consequently, the target villages were tentatively selected in terms of i) GHG emission reduction potential, ii) potential risks of climate change to local communities, iii) less overlap with MAF DPs support, and iv) geographical occupancy in the target watersheds.

Finally, 74 villages were tentatively selected as target villages of the proposed projects. The table below shows the list of the target villages of the project. **Figure 1** shows the locations of the target villages as well as the post-administratives in the respective watersheds.

Table 8-2 Target Villages and Post-administratives selected for the Project

Watershed	Municipality	Post Administratives	Villages related *	No. of villages
Caraulun	Aileu	Aileu Vila	Fatubosa, Lahae, Lausi	1.5
	Ainaro	Maubisse	Aitutu, Edi, Fatu-Besi, Horai-Quic, Manelobas, Manetu, Maulau, Maubisse, Suco Liurai	5.5
	Manufahi	Same	Babulu, Betano, Daisua, Grotu, Letefoho, Holarua, Rotuto, Tutuluro	7
	Manufahi	Turiscai	Aitemua, Beremana, Caimauc, Foholau, Liurai, Manumera, Mindelo, Orana	6
Tafara	Covalima	Fatululic	Taroman	1
	Covalima	Fatumean	Belulik Leten, Fatumea, Nanu	3
	Covalima	Forohem	Dato Rua, Dato Tolu, Fohoren, Lactos	4
	Covalima	Maukatar	Holpilat, Ogues	2
Laclo	Aileu	Aileu vila	Aisirimou, Bandudato, Fahiria, Fatubosa, Lahae, Lausi, Saboria, Seloi Malere, Seloi Craic, Suco Liurai	7
	Aileu	Liquidoe	Acubilitoho, Bereleu, Betulau, Faturilau, Namoleso	4
	Aileu	Remexio	Acumau, Tulataqueo, Suco-Liurai	2.5
	Ainaro	Maubisse	Edi, Fatu-Besi, Horai-Quic, Manelobas, Maubisse, Maulau, Suco Liurai	3.5
	Manatuto	Laclo	Hohorai, Lacumesac, Umacaduac, Uma Naruc	4
	Manatuto	Laclubar	Batara, Fatumaquerec, Funar, Orlalan, Sanana'In	5
	Manufahi	Turiscai	Beremana, Caimauc, Fatucalo, Lesuata, Liurai, Manumera	4
Comoro	Aileu	Aileu vila	Aisirimou, Saboria, Seloi Craic	1.5
	Aileu	Remexio	Acumau	0.5

	Ermera	Railaco	Deleco, Fatuquero, Lihu, Railaco Craic, Railaco Leten, Samalete, Taraco, Tocoluli	8
	Liquica	Bazartete	Fahilebo, Leorema, Tibar, Ulmera	4

Note: * The villages highlighted in red are overlapped more than two watersheds. These villages are counted as 0.5 villages for avoiding double counting.
Source: JICA CBNRM Project (2020)

Out of 74 villages, six villages have already put the village regulations in place with assistance from MAF Development Partners, and another six villages are expected to have agricultural development support from MAF development partners projects, namely SNAP and TOMAK.

The following table shows the total forest areas and number of households as well as populations belonging to the 74 villages.

Table 8-3 Total Forest Areas, Households, and Population in the Target Villages

Watersheds	Forest areas			Households	Population <1		
	Dense	Sparse	Total	<1	Female	Male	Total
Laclo	14,201	40,585	54,786	11,860	34,466	36,611	71,077
Comoro	3,238	3,273	6,511	5,505	16,595	17,758	34,353
Tafara	5,244	10,027	15,271	5,969	16,700	17,487	34,187
Caraulun	9,985	14,401	24,386	10,475	31,188	33,069	64,257
Total	32,668	68,287	100,955	25,152	72,518	76,473	148,991

Note: The numbers of households and populations in the watersheds are estimated by summing those of the villages geographically related to the respective watersheds. Since some villages overlap its jurisdictional areas with more than one watershed, their households and populations are counted twice or trice in the estimation. Thus, the total numbers of households and populations in the table above are not equal to the sums of the figures of the respective watersheds.
Source: JICA CBNRM Project (2020)

8.3 Components of the Proposed Project

8.3.1 Overall Picture of the Components

The proposed project comprises of four (4) Components, which are further composed of 12 Outputs and then14 Activities as shown below.

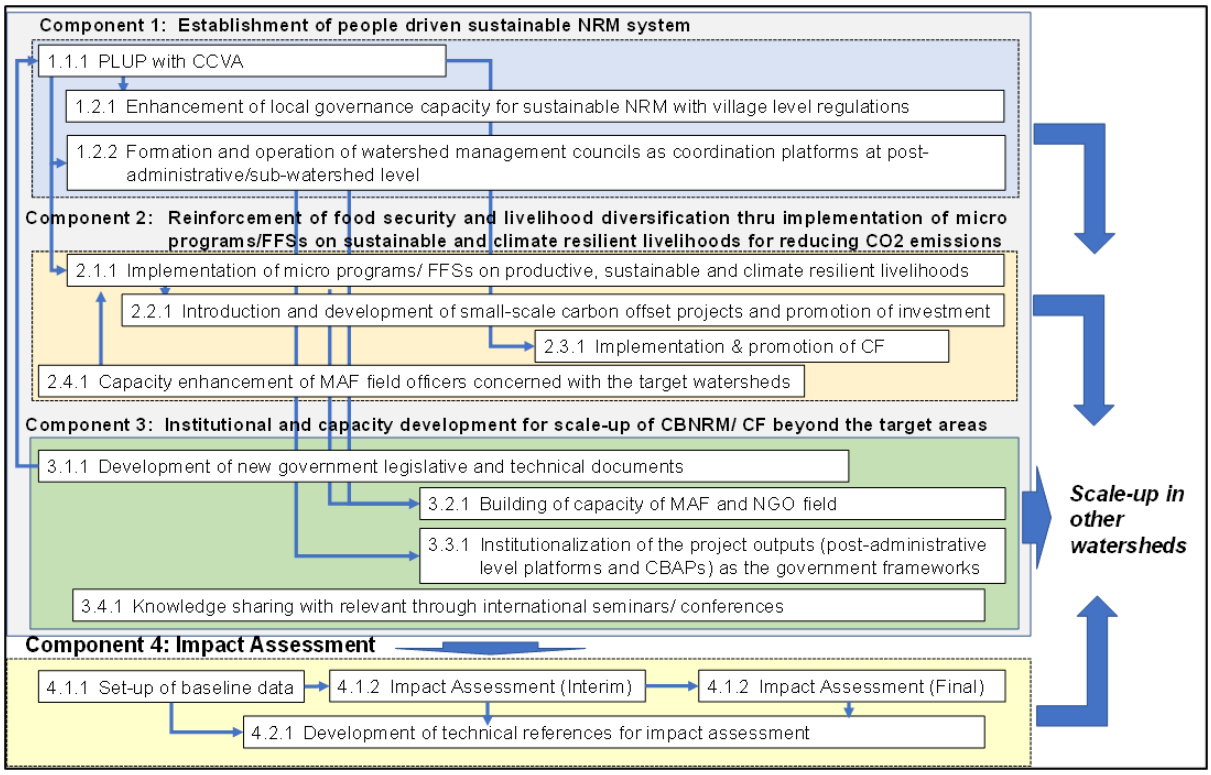
Table 8-4 Proposed Components, Outputs, and Activities of the Proposed Project

Component	Outputs and Activities
Component 1: Establishment of people driven sustainable NRM system	Output 1.1: Improved management and protection of existing forests through introduction of PLUP and community-based NRM monitoring 1.1.1 Conduct participatory land use planning (PLUP) with climate change vulnerability assessment (CCVA) to assist local communities in the watersheds in formulation and adoption of village natural resource management (NRM) regulations and community-based adaptation plans (CBAPs) at village level. Output 1.2: Enhanced governance capacity of local leaders at village and post-administrative levels for sustainable forest and natural resource management 1.2.1 Assist local communities in the enforcement of village NRM regulations and monitoring of CBAP-related activities through regular meetings at village level. 1.2.2 Formulate and strengthen the sub-watershed level coordinating platforms for enhancement of the local capacity for adaptive management of forest and natural resources in the target watersheds.
Component 2: Reinforcement of food security and livelihood diversification through implementation of micro programs/ FFSs on sustainable and climate resilient livelihoods effective for reducing CO_2 emissions	Output 2.1 Enhanced food security and livelihood diversification of vulnerable living in hills and mountains in the target watersheds through implementation of micro programs/ FFSs on sustainable and climate resilient livelihoods 2.1.1 Conduct a series of hands-on training or field farmers schools on climate resilient agriculture, sustainable forest management, reforestation/ afforestation, horticulture development, and livelihood improvement at village level to enhance villagers' capacity to take adaptive measures using resources locally available. Output 2.2 Development and demonstration of model cases of incentive mechanism based on the carbon offsetting scheme in selected villages 2.2.1 Develop and design an incentive mechanism based on the carbon offset scheme using the results of the forestry-related interventions, namely reforestation/ afforestation undertaken in Activity 2.1.1, so that local communities involved in Activity 2.1.1 could continue the project activities even after the end of the project.

Component	Outputs and Activities
	Output 2.3 Rehabilitated degraded forests and lands through reforestation and sustainable forest management with introduction of CF 2.3.1 Implement and promote community forestry (CF) with community forestry management agreement in selected villages to empower forest management mechanism at village level. Output 2.4 Enhanced capacity of MAF field officials for provision of hands-on training and coaching on relevant sustainable and climate resilient livelihoods 2.4.1 Arrange and conduct on-the-job and off-the-job training courses for MAF field officials (such as extension officers, forest guards, municipal technical officers) working in the target watersheds prior to and during the hands-on training courses for local communities.
Component 3: Institutional and capacity development for scale-up of CBNRM/ CF beyond the target areas	Output 3.1: Strengthened institutional and regulatory systems for implementation of the CBNRM and CF approaches in other watersheds 3.1.1 Develop new government legislative and technical documents for effective implementation and promotion of the project activities in and beyond the target watersheds. Output 3.2: Enhanced MAF technical officials' capacity for implementation of the CBNRM and CF approaches, particularly PLUP, CCVA, enhancement of local governance capacity, CF, and climate change adaptation measures 3.2.1 Arrange and conduct training courses on PLUP with CCVA and climate change adaptive measures for MAF field officers and NGO technical staff working in other priority watersheds. Output 3.3: Institutionalization of the watershed management councils and community-based adaptation plans (CBAPs) as part of the formal institutional set-ups at municipal/post-administrative and village levels 3.3.1 Collaborate and consult with MAF and Municipal Administrative Offices about institutionalization of the sub-watershed level platforms organized by the proposed project as the municipal level mechanism. Output 3.4: Facilitation of scale-up of the CBNRM and CF approaches in other watersheds 3.4.1 Knowledge sharing with key stakeholders through international seminars/ conferences.
Component 4: Impact Assessment	Output 4.1: Enhanced probability of achievement of the other project outputs through improvement of the project approaches, structures, and systems by i) evaluating the effectiveness and efficiency of the proposed project, ii) assessing the project impacts, and iii) drawing lessons from the project implementation 4.1.1 Establish baseline conditions for impact assessment. 4.1.2 Evaluate the project impacts with established methodologies for impact assessment. Output 4.2: Development of tools for assessment of project impacts of similar types of project 4.2.1 Develop technical references for impact assessment in similar projects in future.

Source: JICA (2020)

The overall picture of the proposed Components and Activities of the proposed project is illustrated below.



Source: JICA (2020)

Figure 8-2 Overall Picture of the Project Components and Activities

As illustrated above, the three Components or 11 Activities are interrelated with each other. Hence, they should be implemented in an integrated manner.

8.3.2 Component 1: Establishment of People Driven Sustainable NRM System

(1) Objectives

This Component aims to enhance the capacity of local stakeholders, particularly village leaders and post-administrative officers in the watersheds, for sustainable management of forest and natural resources at village and post-administrative levels through participatory assessment, planning, and management of natural resources in the localities.

The methodologies and processes proven by several MAF development partners will be fully used for capacity enhancement of local leaders under the component. Some national NGOs have experienced in the methodologies in the field. There are also the written manuals and standard operating procedures, which can be used as technical references for field facilitators to do the same.

(2) Proposed Activities

This Component comprises of the following Activities.

1.1.1 Participatory land use planning (PLUP) with climate change vulnerability assessment (CCVA)

1.2.1 Enhancement of local governance capacity for sustainable NRM with village level regulations

1.2.2 Formation and operation of watershed management councils as coordination platforms at post-administrative/sub-watershed level

(3) Target Areas

In principle, Activity 1.1.1 will target the villages where the CBNRM mechanism has yet to be in place (68 villages), while Activity 1.2.1 will cover all the villages (74 villages) including those with the CBNRM mechanism to ensure that it could take firm root in the localities. As of the end of April 2020, six villages have been supported by other MAF DPs (e.g., FAO) in the development of the future land use plan and village regulations. Activity 1.3 will target all the post-administratives concerned with 74 villages selected for the project (14 P.As). The table below shows the targets of the respective Activities under Component 1.

Table 8-5 Targets of the Activities under Component 1

Watersheds	Total Target Villages <1	PLUP with CCVA	Enforcement of local capacity	Formation of WMC
Caraulun	20	19	20	2
Tafara	10	10	10	4
Laclo	30	28	30	5
Comoro	14	11	14	3
Total	74	68	74	14

Note: Target watersheds share some villages as the watershed boundaries run through within the villages.
Source: JICA (2020)

(4) Major Sub-activities

All the Activities will be implemented in accordance with the methodologies and procedures described in the existing technical references[1] and its revised edition[2] developed by the JICA CBNRM Project Phase 1 and Phase II, respectively. Those technical references, which describe the detailed procedures for implementation of Activities 1.1.1 ~1.2.2 are attached to this report in **Appendixes 8-1 and 8-2.**

The outline of the methodologies of Activities 1.1.1 to 1.2.2 are summarized below.

Table 8-6 Outline of the Major Sub-activities of Activities 1.1.1 to 1.2.2

Activities	Procedures/Major Sub-activities	Duration
PLUP with CCVA	The following activities will be carried out for the formulation of village regulations with a future land use plan and a community-based adaptation plan in each village. 1. Consultation with local leaders & communities 2. Formation of a PLUP working team 3. Study tour to a village where PLUP has been introduced 4. Present land use mapping with vulnerability assessment 5. Future land use planning with identification of adaptation options 6. Review of past and on-going village rules 7. Development of draft village regulations 8. Review of the draft village regulations 9. Consultation with local communities about the draft regulations 10. Preparation of the customary (*tara bandu*) ceremony 11. Announcement of the village regulations in the customary (*Tara bandu*) ceremony	3~4 months per village
Enhancement of local governance capacity	1. Holding of meetings with village leaders (including women members) to discuss i) any problems occurring in a village; ii) how such problems could be settled/solved using the village regulations; and iii) any action related to CBPA (including Activity 2.1.1) taken in the village so far. 2. Holding of a quarterly sub-village (*aldeia*) meeting with local communities in the sub-village to share the results of the monthly village meetings with those at sub-village level and discuss any	3 years

[1] Operation Manual for Establishment of the CB-NRM Mechanism at the Village Level, 2016
Manual for Formation of the Watershed Management Council, 2016

[2] The JICA CBNRM Project revised the procedures for PLUP in the operation manual by adding the sessions of CCVA in collaboration with GIZ-GCCF Project in 2017 and 2018.

Activities	Procedures/Major Sub-activities	Duration
	issues concerned in the sub-village.	
Formation and operations of watershed management councils	The following activities will be carried out for the formation of a watershed management council at post-administrative level. 1. Consultations with local leaders concerned with a watershed 2. Study tour to the existing watershed management council 3. Stakeholder analysis and selection of members 4. Situation analysis and determination of vision and missions 5. Development of by-laws of the council 6. Development of a resolution on vision, missions, and by-laws	2~3 months
	After the formation of the watershed management council, the Activity will further help the watershed management councils to have council meetings on a quarterly basis so that the members could discuss any issues on natural resource management (e.g., forest fire, illegal logging, and landslide) happening in the sub-watershed/post-administrative and take necessary actions to solve any issues between/ among the member villages.	3 years

Source: JICA (2020)

(5) Implementation Period

Activity 1.1.1, PLUP with CCVA or CCVA, will start in the 1st year and end in the 4th year, while Activity 1.2.1, the enhancement of the local governance capacity, will be commenced one year after the start of Activity 1.1.1 and implemented for six years until the last year of the project. The formation of the watershed management councils in the target watersheds, Activity 1.3, will start in the 2nd year and be continued until the 5th year of the project. Each watershed management council formed will be assisted by the Activity in its operations for three years after the formation.

The following table shows the proposed allocation of the target villages and post-administratives during the implementation period.

Table 8-7 Annual Allocation of the Villages targeted by the Activities

Activities	2021	2022	2023	2024	2025	2026	2027
PLUP with CCVA	10%	30%	30%	30%			
Enhancement of local governance capacity	-	10%	40%	70%	90%	60%	30%
Formation of watershed management councils	-	10%	30%	30%	30%		
Operation of watershed management councils		10%	40%	70%	90%	60%	30%

Source: JICA (2020)

(6) Implementation Agencies (Organizations responsible for Implementation)

Since there are several national NGOs involved PLUP and CCVA activities initiated by several MAF development partners' projects, such as GCCA-GIZ, SAPIP, FAO-Conservation Agriculture, and JICA CBNRM, such expertise should be fully used for implementation of Component 1. The main implementers at field level will be procured in the 1st year of the project.

In principle. NDFWM and NDNC with the MAF municipal offices concerned will be responsible for supervision and monitoring of the performance of hired organizations together with the technical assistance team employed by JICA (TET). If NDFWM and NDNC can form a special working team in collaboration with the MAF municipal offices concerned for implementation of Activity 1.1.1, such a team will take a leading role in the conduct of PLUP and CCVA in several villages with technical assistance from the hired organizations and TET.

In the implementation of Activity 1.2.2, the Municipal Administrative Offices (MAOs) and Post-Administrative Offices (PAOs) will be involved in the process as key stakeholders of the watershed management councils. Among others, the Post-Administrative officers of the PAOs concerned will be assigned to the position of chairpersons or vice chairpersons to lead the watershed management councils.

(7) Necessary Arrangements

In all the processes of Activities, particularly Activities 1.1.1 and 1.2.1, due consideration should be given to the improvement of women. At least 30% of the participants in the meetings or activities arranged should be women members. Likewise, gender-related issues, such as use and management of water sources, mobility, and any special concerns on gender in climate-related disaster, should be carefully discussed in the meetings organized in Activities 1.1.1 and 1.2.1.

As proposed in Activity 3.3.1 in Section 8.3.4, the future land use plans and community-based adaptation plans (CBAPs) developed through the process of PLUP in Activity 1.1.1 should be integrated into the village development plans so that activities and interventions proposed in the land use plans or CBAPs could be financed by the government and other MAF- DPs programs, such as the National Program for Development of Suco (PNDS) under the Ministry of State Administration & Territorial Management (ESTATAL). It is, therefore, important to communicate and collaborate with the Municipal Administrative Offices concerned as well as ESTATAL when implementing Activity 1.1.1 before starting Activity 3.3.1.

8.3.3 Component 2: Reinforcement of Food Security and Livelihood Diversification through Implementation of Micro Programs/ FFSs on Sustainable and Climate Resilient Livelihoods Effective for Reducing CO_2 Emissions

(1) Objectives

This Component aims to enable local communities to transition away from traditional shifting cultivation practices by mainstreaming more productive, sustainable and climate resilient ones, which will reduce food insecurity and allow farmers to forgo forest degradation for cropping. The transition will be enabled by strengthening the capacity of local communities on sustainable land management and climate resilient agriculture, planting and management of horticultural plants (fruits and industrial plants), reforestation/ afforestation, and introduction of alternative livelihood options, through implementation of micro programs/ FFS/ a series of hands-on training on the relevant topics.

An additional incentive mechanism based on the results of local communities' performance involved in hands-on training courses should be considered and developed to ensure the sustainability of the demonstrated activities under Component 2, particularly reforestation/ afforestation activities, which may not provide direct and short-term benefits to local communities. Hence, the introduction of the carbon offset scheme will be examined as a potential incentive mechanism under this component. Another incentive mechanism through introduction of community-based operation and management of production forests should be promoted by implementing community forestry (CF) under Activity 2.3.1.

Capacity building of MAF field-level officers (e.g., MAF extension officers, forest guards, and technical officers of the MAF municipal offices concerned) is also essential to the effective

training for local communities. They will be given On-JT and Off-JT training opportunities on the relevant topics so that they could continuously provide technical support services to local communities in the target villages during the project as well as in the post-project period.

(2) Proposed Activities

This component is composed of four Activities listed below.

2.1.1 Implementation of micro programs/ Field Farmers Schools (FFSs) on productive, sustainable and climate resilient livelihoods (e.g., climate resilient agriculture, horticulture/ agroforestry, CB nurseries and reforestation, coffee rehabilitation, alternative income generation)

2.2.1 Introduction and development of small-scale carbon offset projects and promotion of private investment

2.3.1 Implementation and promotion of community forestry (CF) in the selected areas in the watersheds

2.4.1 Capacity enhancement of MAF field officers (Extension officers, Forest Guards, and Municipal technical officers) concerned with the target watersheds

(3) Target Areas and Groups

a. Activity 2.1.1

Activity 2.1.1 will basically target all the villages where Activity 1.1.1 is implemented. The villages which have had similar assistance and support from MAF DPs' ongoing projects, such as TOMAK, SNAP, and SAPIP, are excluded from the targets of the Activity. Currently 6 villages have received or will receive similar assistance; therefore, 68 villages in the watersheds are selected as target villages of the Activity as shown below.

Table 8-8 Targets of Activity 2.1.1

Watersheds	Total Villages	Villages supported by CBNRM Projects	Target Villages
Tafara	20	1	19
Caraulun	10	0	10
Laclo <1	30	2	28
Comoro <1	14	3	11
Total	74	6	68

Note: Laclo and Comoro watersheds share one village as it is located in between.
Source: JICA (2020)

Assuming that the average number of households in the villages in the watersheds ranges from 300 to 400 HHs per village, the target of the hands-on training courses in one village is set at 120 HHs to enable 30 to 40% of the total households to be directly benefited by the proposed project. The rest of the households in the villages are expected to be assisted by the trained MAF field officers concerned with the watersheds.

b. Activity 2.2.1

Activity 2.2.1 will target the villages where the reforestation activities and training courses are introduced. All the households involved in such activities under Activity 2.1.1 will be the potential beneficiaries of this Activity. In addition to those participating in Activity 2.1.1, other villagers who will plant and maintain seedlings in accordance with technical guidelines prepared by the project could also be benefited in the future.

c. Activity 2.3.1

Community forestry should be introduced in the villages where local communities have used existing forest resources as an important source of income. Activity 2.3.1 will select 20 villages, or 5 each from the target watersheds, based on the results of Activity 1.1.1.

d. Activity 2.4.1

Activity 2.4.1 will target the field level officials in the MAF municipalities concerned with the watersheds, particularly the upper and middle parts of the watersheds. Hence, the field officials, such as extension officers, forest guards, and technical officials in forestry, crop and agriculture, and coffee and industrial plants, in the following municipalities will be targeted by the Activity.

Table 8-9 Target MAF Municipal Office of Activity 2.4.1

Watersheds	Target Municipality
Tafara	Covalima
Caraulun	Aileu, Ainaro, Manifahi
Laclo	Aileu, Manatuto
Comoro	Aileu, Liquica, Ermera

Source: JICA (2020)

The total number of MAF field officials to be targeted by Activity 2.4.1 has yet to be clarified by the time when this report is prepared, as there is a need to clarify who are responsible for which villages in the beginning of the proposed project. Hence, it is assumed in this report that 10 officials each from the municipalities will be targeted by the Activity.

(4) Major Sub-activities

a. Activity 2.1.1

Activity 2.1.1 will be implemented in accordance with the proven process demonstrated by the JICA CBNRM Project and other MAF development partners in the field. The technical references[3] will be fully referred for implementation of the Activity. Major Sub-activities to be carried out in the Activity are outlined below.

Table 8-10 Outline of the Major Sub-activities of Activity 2.1.1

Activity	Procedures/Major Sub-activities	Duration
Implementation of micro programs/ Field Farmers Schools (FFSs) on productive, sustainable and climate resilient livelihoods	The standard process of implementation of the Activity is shown below. 1. Selection and prioritization of potential adaptation measures based on the CBAP in a participatory manner 2. Assistance in the selection of beneficiaries or households participating in hands-on training on the selected adaptation measures 3. Study tour to a/ village/s where similar activities have been carried out 4. Identification of a demonstration plot at each sub-village as a training venue of hands-on training 5. Conduct of the 1st year of hands-on training on key techniques of the selected adaptation measures in the demonstration plot at each sub-village 6. Evaluation of the results of the 1st year of hands-on training at the end of the course 7. Conduct of the 2nd year of hands-on training on key techniques/skills including development of sub-demonstration plots at hamlet level as part of training 8. Encourage members to help each other apply key techniques demonstrated in the training courses to their own farms/ plots using the traditional collected working system or mutual support system.	2 years for 2 batches of hands-on training including individual application of techniques

[3] Training materials used in the CBNRM Project, GCCF-TL, AVANSA, and Seed of Life

Source: JICA (2020)

As discussed in Sub-section 6.2.6 of this report, the existing agricultural practice prevalent in the watersheds is quite vulnerable to climate variability, and at the same time, is considered as one of the main drivers of deforestation and forest degradation in the areas. Moreover, limited source of stable income is another issue which makes local livelihoods in the watershed vulnerable to external changes, particularly climate variability.

The effectiveness of the following adaptation measures has been proven by several MAF DP-supported projects including the JICA CBNRM project over decades. Although the final selection will be made with local communities in the target villages, the communities should be guided to select the adaptation measures among those listed below. It has been confirmed in the JICA CBNRM project that any of the measures would not be associated with infrastructure development which might cause potential environmental and social negative impact.

- Climate resilient agriculture with sloping land agriculture techniques
- Community nursery and reforestation with mechanisms to generate additional sources of income
- Rehabilitation and improvement of aged coffee plantations
- Development of alternative sources of income using resources available in localities

Key techniques to be covered by one batch of hands-on training for the respective adaptation measures are listed in the table below.

Table 8-11 Key Techniques introduced in One batch of Hands-on Training

Adaptation Measures	Key Techniques to be introduced in Hands-on Training
Climate resilient agriculture with sloping land agriculture techniques	1. Production of compost using materials locally available (preparation, piling, and maintenance of compost) 2. Clearing of farmland 3. Delineation of contour lines with A-frame (making an A-frame and delineation of contour lines with A-frame) 4. Application of soil conservation measures, such as bench terrace and contour ditch/band 5. Land preparation 6. Designing of farm and seed selection (procurement of improved seeds) 7. Sowing seeds of crops (maize, beans, sweet potato, cassava, and pumpkin) 8. Preparation of liquid fertilizer using materials locally available 9. Maintenance of farm (weeding, mulching, application of liquid fertilizer, planting of hedgerows along contours, and planting of wind break trees) 10.Planting of cover crops 11.Post-harvesting of maize and beans (measurement and storing of grains/beans) 12.Maintenance of soil conservation measures applied in the farm
Community nursery and reforestation with mechanisms to generate additional sources of income	1. Selection of location for a nursery and a source of water to be used for watering 2. Development of a simple water supply system from the source to the nursery (if necessary) 3. Collection of materials (bamboo and others) for building a nursery 4. Building of a community nursery 5. Production of compost using materials locally available (preparation, piling, and maintenance of compost) 6. Making of a seedbed 7. Collection of soils and sands (procurement of compost or animal manure, if necessary) 8. Procurement of seeds of trees (for timber and firewood production), fruits and industrial plants (for cash crops production) 9. Sowing of seeds/planting materials in seedbed 10.Mixing of soils, sands, and compost and filling mixed soils into poly bags 11.Transplanting of sprouts in seedbed into poly bags

Adaptation Measures	Key Techniques to be introduced in Hands-on Training
	12.Maintenance of seedlings transplanted in ploy bags 13.Hardening of seedlings 14.Designing of plantation 15.Land preparation for planting (staking, hole digging, application of compost, refilling) 14.Planting of seedlings 15.Tending of seedlings (weeding, cultivation, and mulching)
Improvement of aged coffee plantations	1. Selection of aged coffee plantation 2. Rejuvenation of aged coffee trees 3. Procurement of new seedlings of coffee and other trees used for shade trees 4. Designing of plantation 5. Land preparation for planting (staking, hole digging, application of compost, refilling) 6. Planting of seedlings 7. Preparation of liquid fertilizer 8. Tending of seedlings (weeding, cultivation, fertilization and mulching) 9. Harvesting of coffee 10.Pruning of branches of coffee trees
Development of alternative sources of income using resources available in localities	1. Assessment of resources available in the localities 2. Identification of potential livelihood options using resources available 3. Assessment of marketing needs and potential value chains 4. Designing of hands-on training courses on the potential livelihood options, such as production of food processing products, mushroom production, and other cottage industry activities 5. Procurement of tools and materials used for livelihood options 6. Conduct of hands-on training on the livelihood options 7. Trial production of products and communication with potential buyers 8. Improvement of quality of products through trial production 9. Marketing of products 10.Preparation and management of a book of account (if necessary) 11.Cash management (if necessary)

Source: JICA (2020)

Technical references listed below can be used as guiding documents for the conducts of hands-on training on the techniques of the above-mentioned adaptation measures.

- Climate resilient agriculture: CBNRM Technical Manual Vol. 1: Sustainable Upland Farming Promotion (Including Community-Based Seed Extension and Sustainable Use of Backyard/Permanent Farms)
- Community nursery and reforestation: CBNRM Technical Manual Vol. 2: Seedling Production and Tree Planting Promotion
- Improvement of coffee plantation: Technical Manuals/ Handbooks prepared by GCCF-TL
- Alternative sources of income: CBNRM Technical Manual Vol. 3: Income Generating/Livelihood Development

b. Activity 2.2.1

Introduction of an incentive mechanism based on the carbon offset scheme is the major activity of Activity 2.2.1. Since the formation of community groups and establishment of plantations are basically carried out in the course of Activity 2.1.1, this Activity mainly aims to: i) develop the guidelines and manuals, which the community group as well as the implementer of Activity 2.1.1 should follow, ii) develop MRV methodologies and PDDs for the carbon offset scheme

in partnership with external organizations, such as NGOs which have experiences in development of PDDs for carbon offset projects, iii) assist the partner organizations and local communities in monitoring the plantations, and iv) develop a benefit sharing mechanism of community groups, which can be adopted by all the groups involved in reforestation/ afforestation activities of Activity 2.1.1.

c. Activity 2.3.1

For smooth implementation of Activity 2.3.1, the results of the upcoming FAO-TCP on CF, which is scheduled to be implemented in 2021, will be fully used, as the FAO's intervention is expected to put CF to trial in the field and develop some deliverables (e.g., technical guidelines and so on) for further scale-up of the trail results. Technical references, such as standard operating procedures (SOPs) and/or technical manuals for implementation of CF-related activities will be developed in Activity 3.1.1 based on the results of FAO-TCP (More details are described in Sub-section 8.3.4 in this report.). Hence, the Activity is expected to be commenced after the issuance of the SOPs or technical manuals as a result of Activity 3.1.1, likely in the 3rd or 4th year of the proposed project.

Although detailed procedures for implementation of the Activity will be stipulated in the technical references to be developed, draft ideas on the key Sub-activities of the Activity, namely i) Introduction of community forestry with an agreement on sustainable forest management an ii) Formulation and implementation of a forest management plan, are outlined below.

Table 8-12 Major Sub-activities of Activity 2.3.1

Major Sub-activities	Descriptions	Duration/suco
Introduction of community forestry with an agreement on sustainable forest management	The following activities will be carried out together with local communities in target villages. 1. Review the future land use map and village regulations developed by local communities through Activity1.1.1. 2. Identify the important forests to be targeted and managed under the community forest management agreement on the future land use map. 3. Demarcate the boundaries of the important forests on the ground and collect geographical coordinates of the boundaries. 4. Discuss with communities the community forestry management agreement, i.e., - Rules on protection and management of the important forests based on the village regulations; - A resource use/harvest plan of the important forests and the surrounding forests; - Benefit sharing mechanism on harvested products in the important forests; and - Roles and responsibilities of local communities and MAF. 5. Finalize and exchange the community forest management agreement between local communities and MAF/NDFWM.	2~3 months
	The following activities will be carried out for monitoring of CF communities and management of CF contracts. 1. File the signed agreements and convert the geographical coordinates of the important forests into GIS data and overlay them on the base map of the watershed or municipality. 2. Periodically visit the suco and monitor the management of the important forests. 3. Assess and evaluate the performance of local communities	5 year for every contract period

Major Sub-activities	Descriptions	Duration/suco
	once a year. 4. Renew the community forest management agreement every 5 years based on the results of the assessment.	
Formulation and implementation of a forest management plan	The following activities will be carried out together with local communities in target villages. 1. Confirm the rules on management of the important forests and the resource use/harvesting plan of the community forest management agreement. 2. Identify the areas to be used for harvesting and those to be protected from any disturbance in the important forests. 3. Identify silvicultural practices useful for sustainable harvesting of forest products while maintaining the quality of forests. 4. Develop an annual plan for forest management with application of the silvicultural practices. 5. Select the persons/groups responsible for implementation of the annual plan 6. Conduct the silvicultural practices in the important forests used for harvesting according to the annual plan. 7. Periodically monitor and evaluate the conditions of forest used for harvesting.	3 months for planning 5 year for implementation of a forest management plan

Source: JICA (2020)

c. Activity 2.4.1

Activity 2.4.1, aimed at the enhancement of the capacity of MAF field officials, such as extension officers, forest guards, and municipal technical officers, in the MAF municipal offices concerned with the watersheds, is composed of the following Sub-activities.

- Training of MAF field officers (Extension officers, Forest Guards, and Municipal technical officers) concerned with the target watersheds on participatory planning and facilitation for strengthening community resilience
- Coaching and mentoring for enhancement of MA field officers' capacity for facilitation and resilient livelihood

Sub-activities planned in the Activity are summarized below.

Table 8-13 Outline of the Major Sub-activities of Activity 2.4.1

Sub-activities	Procedures	Duration
Training of MAF field officers concerned with the target watersheds on participatory planning and facilitation for strengthening community resilience	The standard process of implementation of the training is shown below. 1. Review of the existing training curriculum and programs relevant to potential adaptation measures 2. Selection of MAF field officials concerned with the target villages 3. Assessment of training needs or capacity gaps of the MAF field officials concerned with the target villages 3. Collection of the existing training modules and materials relating to potential adaptation measures 4. Development of training programs and materials on hands-on training and potential adaptation measures, namely, i) process of hands-on training, ii) facilitation skills, iii) gender issues/ nutrient improvement/ food security, iv) climate resilient agriculture and sloping agricultural land management, v) community nursery and reforestation with fruits and industrial plants, vi) rehabilitation and improvement of coffee plantation, and vi) livelihood development. 5. Conduct of a 3-day training course at Dili for the respective watersheds including a study tour to a sample village - 2-day seminar on the above-mentioned topics - 1-day study tour to a village where some adaptation measures have been introduced	2 years

Sub-activities	Procedures	Duration
	6. Evaluation of the results of the training activities and review/revise the training programs and develop a refresher program 7. Conduct of the refresher course at Dili for the respective watersheds	
Coaching and mentoring for enhancement of MA field officers' capacity for facilitation and resilient livelihood	The standard process of implementation of the training is shown below. 1. Organization of MAF field assistant teams composed of MAF field officers concerned to assist NGOs/ contractors in the implementation of Activity 2.1.1 in the field 2. Collaboration with NGOs/ contractors responsible for implementation of Activity 2.1.1 in the field and sharing of the tasks and responsibilities in hands-on training or technical assistance to local communities 3. Evaluation of the results of the assistant works with technical assistance from TET 5. Conducts of follow-up hands-on training on the techniques that they have learned for local communities who are not supported by the proposed project in the target villages	2 years for OJT in one village 1~4 years for follow-up extension services in one village

Source: JICA (2020)

(5) Materials required

In order to heighten the effectiveness of hands-on training and facilitate the replication of techniques introduced in the training on their own initiatives, the following tools and equipment will be procured and distributed to local communities who participate in the training courses of Activity 2.1.1.

Table 8-14 Tools and Equipment to be Procured and Distributed in Activity 2.1.1

Adaptation Measures	Tools and Equipment
Climate resilient agriculture with sloping land agriculture techniques	1. Farm tools 2. Animal manure (1st year) 3. Improved seeds 4. Seeds or planting materials of hedgerow, windbreak trees and cover crops 4. Materials for liquid fertilizer making
Community nursery and reforestation with mechanisms to generate additional sources of income	1. Materials for nurseries 2. Materials for construction of water supply system 3. Animal manure (1st year) 4. Seeds and planting materials of trees, fruits, and industrial plants 5. Farm tools for land preparation 6. Materials for liquid fertilizer making
Improvement of aged coffee plantations	1. Knives and handy saws 2. Seedlings of coffee, fruits and shade trees 3. Materials for liquid fertilizer making 4. Pruning scissors
Development of alternative sources of income using resources available in localities	1. Utensils for food processing 2. Facilities for mushroom production 3. Other tools required for specific livelihood options 4. Calculators and stationaries for bookkeeping

Source: JICA (2020)

No specific equipment except projector and stationaries is required in Activities 2.3.1 and 2.4.1, while Activity 2.2.1 might require some devices to measure the forest biomass of seedlings planted by local communities.

(6) Implementation Period

Activity 2.1.1 will be implemented for five years starting from the 2nd year of the project. year simultaneously with On-JT of Activity 2.4.1 as they are closely linked to each other. The Off-JT of Activity 2.4.1 will be conducted in the 1st year and 3rd year of the project period.

Activity 2.2.1 will start its activities one year after the commencement of Activity 2.1.1 (in the 3rd year of the project), while Activity 2.3.1 will be commenced in the 3rd or 4th year of the project and implemented for three years.

The following table shows the proposed allocation of the target villages and groups during the implementation period.

Table 8-15 Annual Allocation of the Villages targeted by the Activities

Activities	2021	2022	2023	2024	2025	2026	2027
Implementation of micro programs/ Field Farmers Schools (FFSs) (Activity 2.1.1)	-	10%	40%	60%	60%	30%	-
Introduction and development of small-scale carbon offset projects (Activity 2.2.1)	-	-	10%	30%	30%	30%	-
Implementation of CF (Activity 2.3.1)				20%	30%	30%	20%
Capacity enhancement of MAF field officers concerned with the target watersheds (Activity 2.4.1)							
- Training of MAF field officers (Off-the-job training)	-	10%	40%	60%	60%	30%	-
- Coaching and mentoring (On-the-job training)	100%	-	100%	-	-	-	-

Source: JICA (2020)

(6) Implementation Agencies (Organizations responsible for Implementation)

Like in the case of PLUP, international/ national NGOs will be hired for implementation of Activities 2.1.1 and 2.3.1, as some of national NGOs with expertise have experiences in doing similar activities, namely hands-on training and FFSs in several MAF development partners' projects, such as GCCA-GIZ, SAPIP, FAO-Conservation Agriculture, and JICA CBNRM.

Activities 2.2.1 and 2.4.1 will be implemented by TET with some national experts hire by JICA TL office.

(7) Necessary Arrangements

In the implementation of Activity 2.1.1, the beneficiaries should be organized into small groups according to the locations where they live in the second year of the training courses. They will be encouraged by hired NGOs to help each other replicate the techniques that they have learned in the training courses in their own farms/ plots. The traditional mutual support system or collective working system named "Harosan" in Tetun (or "Gotong Yorong" in Indonesian) will be fully used for replication of the techniques in the individual farms/ plots as some techniques are time consuming and laborious when being applied.

Activity 2.2.1 is considered critical to the sustainability of reforestation/ afforestation activities carried out in Activity 2.1.1, since such activities will generate less short-term cash income for local communities. Coordination and collaboration with partner national and international NGOs which have experiences in the formulation of a carbon offset project in Timor-Leste is essential to the effective designing and implementation of the carbon offset project.

Additionally, due consideration should be given to the exploration of potential buyers of carbon credit. As the proposed project may develop a number of plantations to be financed by the carbon offset scheme, it is therefore advisable to find out potential buyers particularly in the private sector even in the early stage of the proposed project.

Like in the case of Component 1, gender issues should be fully considered in the implementation of the component except Activity 2.2.1. More than 30% of the participants in the activities of Activities 2.1.1 and 2.3.1 should be women members in communities. Likewise, food security-related topics may be included in the training courses to be provided in the Activity, whenever needed.

8.3.4 Component 3: Institutional and Capacity Development for Scale-up of CBNRM/ CF beyond the Target Areas

(1) Objectives

The main aim of the component is to develop an enabling environment for i) promotion of the same approaches taken by the proposed project in other watersheds and ii) enhancement of sustainable effects of the CBNRM mechanism at village and post-administrative levels. Specifically, the component aims to: i) develop necessary legislative and technical documents for implementation of the project activities,, ii) enhance field-level human capacity for PLUP with CCVA and climate change adaptation measures, iii) ensure the sustainability of the institutional mechanism for natural resource management at post-administrative and village levels; iv) enhance the awareness of the effects of the project-related activities, particularly CBNRM and CF, among key government officials and decision makers as well as international communities.

(2) Proposed Activities

This component is composed of four Activities listed below.

3.1.1 Development of new government legislative and technical documents for effective implementation and promotion of the project activities in and beyond the target watersheds;

3.2.1 Arrangement and conduct of training courses on PLUP with CCVA and climate change adaptation measures (e.g., climate resilient agriculture) for MAF field officers and NGO technical staff working in other priority watersheds;

3.3.1 Collaboration and consultation with MAF, Municipal Administrative Offices, and other relevant national directorates about i) institutionalization of the sub-watershed level platforms organized by the proposed project into the municipal level organizations and ii) integration of the community-based adaptation plans developed under Activity 1.1.1 with the village-level development plans supported by the GoTL under the PNDS scheme; and

3.4.1 Sharing of knowledge gained and lessons learned through the implementation of the proposed project with key stakeholders, such as key government officials, decision makers and legislators in the GoTL, through international/ national seminar and conferences.

(3) Target Groups

Each Activity has different target groups as tabulated below.

Table 8-16 Target Groups of the Activities

Activity	Target Groups
Activity 3.1.1 Development of new government legislative and technical documents for effective implementation and promotion of the project activities in and beyond the target watersheds.	Directors, heads of departments, and key technical officers of the national directors under DGFCIP
Activity 3.2.1 Building of capacity of MAF and NGO field officers working in other priority watersheds	MAF field officials (extension officers, forest guards, municipal technical officials, and NDFWM/NDNC's technical officials) and NGOs' technical staff working in other priority watersheds
Activity 3.3.1 Institutionalization of the project outputs (sub-watershed/ post-administrative level platforms and CBAPs) as the government frameworks	Director of NDFWM, head and technical staff of Department of Watershed and Coastal Management of NDFWM,

Activity	Target Groups
	Relevant national directorates under the Ministry of State Administration and Territorial Planning (ESTATAL), Municipal Administrative Officers and their staff, Post-Administrative Officers in Baucau, Viqueque, Lauteun, Manatuto, Ermera, and Liquica.
Activity 3.4.1 Knowledge sharing with relevant stakeholders (e.g., key government officials, decision makers and legislators in the GoTL) through international seminars/ conferences	Minister of MAF, State Secretary of Environment, DGs of MAF, National Directors of MAF, MAF Municipal Officers, and Municipal Administrative Officers, NDA, National Directorate of Climate Change

Source: JICA (2020)

(4) Major Sub-activities

Activity 3.1.1

The key role of Activity 3.1.1 is to assist MAF/ DGFCIP in the development and issuance of new government legislative documents, such as ministerial order and circular for implementation and expansion of key project activities, namely CBNRM and CF, in not only the target watersheds but also other priority ones. Specifically, the documents listed below are considered essential for smooth implementation of the project activities.

- MAF Ministerial Order on Expansion of the CBNRM Mechanism
- MAF Ministerial Order on Implementation of CF (CFMA)
- MAF Circular on Standard Operating Procedures (SOPs) for CF

The 1st document, the ministerial order on expansion of the CBNRM mechanism has been drafted by the on-going JICA CBNRM project; hence, the proposed project would mainly focus on the preparation of the remaining two documents as well as others. The following table shows the major activities to be carried out for finalization and issuance of the respective documents.

Table 8-17 Major Sub-activities of Activity 3.1.1

Document	Major Sub-activities	Period
MAF Ministerial Order on Expansion of CBNRM	■ Review the draft MAF Ministerial Order on Expansion of the CBNRM Mechanism, which was developed by the JICA CBNRM Project and NDFWM before. ■ Update and revise the same order to make it effective and functional under the latest situations in the country. ■ Have a series of consultation meetings with relevant stakeholders at the central and municipal levels. ■ Finalize the Ministerial Order and submit the same to H.E. Minister for approval.	2 years
MAF Ministerial Order on Implementation of CF and Ministerial Circular on SOPs for CF	■ Review the Forest Basic Law and Revised Forest Sector Policy. ■ Review the draft Forest Management Decree developed with assistance from FAO in 2008. ■ Review and study the existing CF activities including the pilot cases of FAO-TCP on CF, which will be implemented in 2021, as well as those in other Asian countries. ■ In case that the results of FAO-TCP are not available, implement pilot CF projects including introduction of the community forest management agreement in strategic locations in the country as part of Activity 2.3.1 and monitor and evaluate the implementation of the pilot CF projects. ■ Draft the MAF Ministerial Order on Implementation of CF and Ministerial Circular on SOPs for CF. ■ Have a series of consultation meetings with relevant stakeholders about the documents at the central and municipal levels.	4 years including CF pilot activities

Document	Major Sub-activities	Period
	■ Finalize the Ministerial Order and Circular and submit the same to H.E. Minister for approval.	

Source: JICA (2020)

The proposed legislation or ministerial orders will function as the main driving force for further scale up of the CBNRM/CF approaches in not only the target four watersheds but also other priority watersheds. As the documents can mainstream CBNRM/CF in the government interventions in the forestry sector, DGFCIP could secure adequate budget and human resources to implement the orders and achieve their goals.

Activity 3.2.1

Activity 3.2.1 will conduct lecture, guidance/workshop, and field training for development of field-level capacity of MAF and NGOs working in other priority watersheds. The key activities to be carried out for Activity 3.2.1 are listed below.

- Review the existing training curriculum and programs (including those provided by MAF DP projects) relevant to CBNRM/CF-related practices/techniques
- Assess the training needs or the capacity gaps of the existing field facilitators of NGOs and MAF field officers.
- Collect the existing training modules and materials on CBNRM/CF-related practices
- Identify experts and organizations which can be used as resource persons in training.
- Develop training programs/plans for the following topics: i) facilitation skills, ii) PLUP with CCVA, iii) gender issues including nutrient and food security, iv) climate resilient agriculture, v) forest management planning and improved silvicultural practices (e.g., FMNR and community nurseries), vi) coffee cultivation and processing, vii) fruit and industrial plant development, and vii) potential livelihood development.
- Arrange and conduct lecture type and on-farm training courses on the topics listed above in accordance with the training programs/plans. Tentative training plans of the topics are summarized below.

Table 8-18 Tentative Training Plans

Training type	Topics	Duration	Venue	Participants	Year
Lecture type	1) Facilitation skills ii) PLUP with CCVA iii) Gender issues iv) Climate resilient agriculture v) Forest management planning and improved silvicultural practices vi) Coffee cultivation and processing, vii) Fruit and industrial plant development viii) Potential livelihood development	2 days	Dili, Each Municipality	20 persons/ course (technical officials and NGO staff)	2nd year
On-farm Type	PLUP with CCVA	3 days	Dili, Each Municipality	Ditto	3rd and 4th year
Study tour	Climate resilient agriculture	1 day	Project villages in the target watersheds	Ditto	3rd year
	Forest management planning	1 day	Ditto	Ditto	4th year
	Coffee cultivation and processing,	1 day	Ditto	Ditto	4th year
	Fruit and industrial plant development	1 day	Ditto	Ditto	4th year
	Potential livelihood development	1 day	Ditto	Ditto	4th year

Source: JICA (2020)

- Evaluate the results of the training activities and review/revise the training programs and plans annually.

This Activity is expected to reactivate MAF extension officers and forest guards as effective agents for scale-up of the CBNRM/CF approaches. Through the continuous training including on-farm practices, they could be aware of their roles and responsibilities for the expansion of CBNRM/CF in addition to the enhancement of their technical skills. It is, therefore, essential to implement this Activity in parallel with Activity 3.1.1.

Activity 3.3.1

Main activities of Activity 3.3.1 are consultations and meetings with MAF, Municipal Administrative Offices concerned, and relevant national directorates under relevant national directorates under the Ministry of State Administration and Territorial Planning (ESTATAL) about the possibility of i) institutionalization of the watershed management councils formed at post-administrative level as part of the governmental mechanism of Municipal Administrative Offices and ii) integration of CBAPs developed by local communities through PLUP with CCVA into the village development plans developed through the National Program for Development of Sucos (PNDS). The former is aimed at the formal recognition of the watershed management councils/ post-administrative platforms as the government-led organizations which could have the budget allocation for its activities regularly, while the latter aims to help the target villages access to the additional funding source, namely PNDS, to continuously implement the activities of the CBAPs in the post-project period.

A series of consultation meetings will be held with MAF, Municipal Administrative Offices, and relevant national directorates to this end. In case a new government regulatory document is required to support the institutionalization of the watershed management councils, Activity 3.1.1 will help this Activity develop a new document.

Activity 3.4.1

Under the Activity, national or international conferences or seminars will be arranged and organized in collaboration with DGFCIP and NDA/National Directorate of Climate Change in the 2nd and 7th years of the project. As mentioned in the section of "Target Groups," H.E. Minister of MAF and Secretary of State of Environment will be invited to the conference/ seminars in addition to high ranking government officials (DGs and NDs) of the relevant government organizations, to deepen key decision makers' understanding of the proposed project. A tentative plan of the national/ international seminars is outlined below.

Table 8-19 Tentative Plan of the National/International Seminars

Theme of the seminar	Topics	Duration	Venue	Participants	Year
Climate change and Necessary Actions	i) Possible climate change and risks ii) Actions for climate change (Introduction of on-going climate-related projects implemented by MAF DPs) iii) Actions of the GoTL (MAF and Secretary of State of Environment)	1 day	Dili	100 persons	2nd year
Results of the GCF Project and Way forward	i) Results and accomplishments made by the proposed project ii) Lessons learned iii) Future plan of MAF	1 day	Dili	100 persons	7th year

Source: JICA (2020)

It is also important to introduce the GoTL's efforts on climate change mitigation to the international communities at the international conferences, such as COP meetings of UNFCCC, when the situation permits. Thus, this Activity will help the GoTL make presentations of the project results at a side event or any other opportunities arranged in some of COP meetings.

(5) Implementation Period

The component will be implemented from the 1st year to the last (7th) year of the project period. The time frames of the respective Activities are tentatively set as follows:

Table 8-20 Implementation Period and Schedule

Activity	Time frames
3.1.1 Development of new government legislative and technical documents	■Development of MAF MO on CBNRM Expansion: 1st and 2nd year ■Development of MAF MO on CF Implementation: 3rd and 4th year ■Development of MAF Circular on CF: 3rd and 4th year ■Development of other documents (e.g., institutionalization of watershed management council): 5th and 6th year
3.2.1 Arrangement and conduct of training courses on PLUP with CCVA and climate change adaptation measures for field-level officers	■Assessment of training needs and capacity gaps: 1st year ■Collection and review of existing resources and: 2nd year ■Development of training programs/plans: 2nd year ■Arrangement and conducts of training courses: 2nd ~ 4th year ■Evaluation of the training courses: 4th and 5th year
3.3.1 Institutionalization of the sub-watershed level platforms and CBPAs	■Consultations with MAF, Municipal Administrative Offices and national directorates of ESTATL: 3rd and 4th year ■Follow-up meetings with MAF and Municipal Administrative Offices after drafting the government regulatory document under Activity 3.1.1: 5th year
3.4.1 Arrangement and organization of national and international seminars on the results of the proposed project to enhance the awareness of CBNRM/CF among key government officials, decision makers and legislators in the GoTL.	■National or international conference/seminars: 2nd and 7th years ■Participation in COP meeting: 2nd, 5th and 7th years ■Presentation of the project results in a side events: 2nd and 7th years

Source: JICA (2020)

(6) Implementation Agencies (Organizations responsible for Implementation)

TET will be responsible for implementation of Activity 3.1.1. National NGOs, which have experiences in PLUP and climate change adaptation measures, will be hired for provision of training courses under Activity 3.2.1. TET will also provide technical support for the development of the training programs/plans based the assessment of training needs. Likewise, TET or external consultants hired by JICA TL will facilitate discussions with MAF and Municipal Administrative Offices for Activity 3.3.1. Activities 3.4.1 will be implemented by TET in collaboration with DGFCIP, NDFWM, NDA, and NDCC.

8.3.5 Component 4: Impact Assessment

(1) Objectives

The main aims of the component are to: i) evaluate effectiveness and efficiency in the project implementation, ii) assess the project impacts, iii) ensure the sustainability of the project effects even in the post project period, and iv) draw useful lessons learned and best practices gained.

(2) Proposed Activities

The component is composed of i) establishment of baseline conditions for impact assessment, ii) evaluation of the project impacts with established methodologies for impact assessment, and iii) development of the technical references for impact assessment in similar projects in future.

(3) Major Sub-activities

Activity 4.1.1: Establishment of baseline conditions for impact assessment

The socio-economic and forest cover conditions in the target watershed before the project will be clarified through the socio-economic survey and drone survey in several villages selected among 74 target villages. The socio-economic survey and drone survey will be carried out as Sub-activities of this Activity in the following manners.

a. Socio-economic survey

- JICA/ TET will hire external organizations to conduct the socio-economic survey at three villages each in the target watersheds to collect the baselines of socio-economic conditions of households, agriculture production, current forest and natural resource management practices, gender differences in activities and access to resources, and major drivers of forest degradation and deforestation in the target villages.
- In each village, 50 households will be randomly selected for the survey.
- TET will develop the design of the socio-economic survey together with their methodologies and questionnaires and checklists used in the survey.
- The external organizations will conduct the socio-economic survey at the selected villages in the watersheds under the supervision of the Municipal Project Monitoring Teams and TET.
- TET will set the baselines of socio-economic conditions of the sampled villages based on the results of the survey.

Drone survey

- TET will: i) take aerial photos of the villages selected for the socio-economic survey by using drone; ii) analyze the aerial photos taken and conduct ground truth surveys at the selected villages; and iii) develop forest cover and land use maps of the respective villages.
- The baseline data collection will be undertaken prior to the project or in the 1st year of the project to set up the baseline for impact assessment.

Activity 4.1.2: Evaluation of the project impacts with established methodologies for impact assessment

The impact assessment will be conducted at the interim and final evaluation of the proposed project, which are respectively to be done in 3rd/4th year and 6th/7th year. The major activities to be undertaken in both evaluations are outlined below.

Table 8-21 Major Sub-activities of Activity 4.1.2

Sub-activities	Procedures	Timeframe
Interim evaluation (Drone survey at sampled areas)	The interim evaluation /mid-term assessment will be conducted to evaluate the performance of the Components/ Activities and check if the designs of the project are still effective. The following activities will be carried out for this purpose. Interview to relevant MAF officials and leaders at post-administrative and village level ■ An external evaluator or consultant hired by JICA will conduct interviews to the relevant MAF officials (e.g., MAF municipal directors concerned, members of the Central and Municipal Monitoring Teams, MAF field officials concerned) and leaders of post-	1 month

Sub-activities	Procedures	Timeframe
	administrative offices and villages involved in the project to assess the achievement level of the expected outputs and evaluate the implementation process of the project. ■ The external evaluator/ consultant will also assess i) the progress of the project, ii) any hinderance or limiting factors affecting the implementation, iii) any changes in external factors from the beginning of the project, and iv) any positive factors supporting the implementation.	
	<u>Drone survey</u> ■ TET or consultant hired by JICA will take aerial photos of the villages where the forest cover and land use maps were developed in the beginning of the project on a sample basis. ■ TET or consultant hired by JICA will develop forest cover and land use maps of the villages by analyzing the aerial photos with a ground truth survey in the field. ■ TET will assess any changes in forest cover and land use in the respective villages for the 3rd/4th year of the project.	2 months
	<u>Evaluation of the project performance</u> ■ DGFCIP, NDA and JICA with technical assistance from TET will evaluate the performance of the Components in terms of "effectiveness," "efficiency," "relevance," "sustainability," and "expected impact" according to the evaluation guidelines generally used by MAF DP projects. ■ DGFCIP, NDA and JICA with technical assistance from TET will revise the action plan of the project, if necessary.	1~2 months
Final evaluation (Socio-economic survey and Drone Survey)	The final evaluation / program-end assessment will be basically conducted in the same manner as the mid-term evaluation is done. The focus of the program-end evaluation will be placed on the evaluation of the effects, sustainability, and impacts of the Components and extract useful lessons for future investments. The following activities will be carried out for this purpose.	
	<u>Socio-economic survey</u> ■ JICA with assistance from TET will hire external organizations to conduct the interview surveys at the same villages surveyed for baseline data collection. ■ The same households sampled for the socio-economic survey of the mid-term evaluation will be selected for the survey. ■ The same data and information collected in the baseline surveys will be collected through interviews to the selected households. ■ TET will assess the impact of the Components/Activities of the project on the households' economy by comparing the data collected with those at the mid-term and baseline data collection.	3 months 2 months
	<u>Drone survey</u> ■ TET or consultant hired by JICA will take aerial photos of the villages where the forest cover and land use maps were developed in the beginning of the project. ■ TET or consultant hired by JICA will develop forest cover and land use maps of the villages by analyzing the aerial photos with a ground truth survey in the field. ■ TET will assess any changes in forest cover and land use in the respective villages for the project period.	1~2 months
	<u>Evaluation of the project performance</u> ■ DGFCIP, NDA and JICA with technical assistance from TET will evaluate the performance of the Components in terms of "effectiveness," "efficiency," "relevance," "sustainability," and "expected impact" according to the evaluation guidelines generally used by MAF DP projects. ■ DGFCIP, NDA and JICA with technical assistance from TET will draw the lessons learned from the implementation of the proposed project.	

Source: JICA (2020)

Activity 4.2.1: Development of the technical references for impact assessment in similar projects in future

TET will develop technical guidelines or manuals for the conducts of the socio-economic survey and drone survey based on the results of the impact assessment activities, namely i) baseline surveys, ii) mid-term assessment, and iii) program-end assessment. The methodologies with simple guidelines for the respective surveys will be first developed by TET prior to the baseline surveys. These documents will be reviewed, revised, and updated occasionally, particularly prior to the conducts of the mid-term and program-end assessment, as they will be used as the part of terms of reference (TOR) for the contractors for the surveys. The final version of the technical guidelines for the survey will be finalized as technical references for MAF/ DGFCIP officials in the 7th year of the project.

(4) Implementation Period

The activities will be carried out according to the following time frames.

a.	Set-up of baseline data	1st year
b.	Mid-term and Program-end assessment	3rd/4th year and 6th/7th year
c.	Development of technical references	7th year

The socio-economic baseline data collection may be implemented by the on-going JICA CBNRM project prior to the official commencement of the proposed project to commence the key project activities immediately after the proposed project is launched.

(5) Implementation Agencies (Organizations responsible for Implementation)

JICA TL will hire an/ external organization/s (e.g., NGOs) for data collection for the impact assessment. A joint mission will be organized by DGFCIP, NDA, and JICA for assessment and evaluation of the project based on the data collected at the mid-term and program-end periods.

(6) Necessary Arrangements

In order to prepare the forest cover and land use maps of the selected villages using photos/ data taken by drone, a drone operator and GIS operator should be hired for the process and analysis of data taken by drone and for the preparation of the forest cover maps in GIS.

8.3.6 Project Management

(1) Objectives

Project management is the overarching component for proper and smooth implementation of Components 1 to 3 and their Activities in collaboration and coordination with relevant organizations. Hence, the main aim of the component is to enable JICA as AE and EE to operate and manage the respective Components using the PDCA cycle in collaboration with MAF/ DGFCIP as an implementing partner.

(2) Proposed Activities

As described above, the project management consists of i) preparatory work, ii) planning, iii) procurement, iv) regular monitoring, v) coordination and communication, and vi) data management and reporting. More details of the respective project management activities are described in the table below.

Table 8-22 Major Project Management (PM) Activities

PM Activities	Procedures
Preparatory works	■ JICA TL will hire national consultants or supporting staff, such as procurement officer, accountant, etc. for smooth operations and management of the proposed project. ■ JICA HQ will organize TET and deploy the TA team to Timor-Leste to commence the program management activities in collaboration with JICA TL and DGFCIP. ■ TET in consultation with DGFCIP will develop a set of implementation guidelines which will be used by organizations involved in the proposed project as guiding documents over the course of the project implementation.
Planning with budget estimation	■ TET in collaboration with DGFCIP and NDFWM will prepare a plan of operations of the proposed project for the entire project period as well as an annual plan for the 1st year in the beginning of the project. ■ Based on the entire and annual plans, DGFCIP and its subordinate national directorates as well as MAF municipal offices concerned will develop their work and budget plans. The plans will be endorsed by DGFCIP and Directors of MAF municipal offices concerned to MAF for approval so that the relevant offices could obtain sufficient budget for operations.
Procurement of project equipment	■ JICA with assistance from TET and MAF/DGFCIP will procure the following project equipment in the beginning of the project for effective monitoring of the project activities. - 5 units of Laptop PC (One each for target watersheds and one at central) - 5 units of Laser printer (ditto) - 5 units of MS Office software - 2 units of 4WD vehicle - 4 units of off-road motorbike (One each for the watershed) - 2 units of drone with software ■ JICA will procure national NGOs or other organizations through Quality Cost Based Selection (QCBS), Quality Based Selection (QBS) or Least Cost Selection (LCS) depending on the amount of the contract, for implementation of Activities 1.1.1~1.2.2, 2.1.1, 2.3.1 and 3.2.1. Some of the Activities can be combined as one contract package. Types of activities to be outsourced are described in Section 9.3: Procurement Plan of the report. ■ Prior to the implementation of the respective Activities, the terms of reference (TOR) for the works will be developed by JICA with technical assistance from TET.
Regular monitoring	■ TET and Central Project Monitoring Team formed under MAF/ DGFCIP will monitor the overall progress of the proposed project. ■ MAF Municipal Monitoring Teams formed at the respective MAF municipal offices concerned will monitor the progress of the Activities implemented in the respective watersheds periodically in collaboration with Central Project Monitoring Team and with technical assistance from TET. ■ Central Project Monitoring Team will prepare and submit the monitoring report to DGFCIP whenever they conduct field monitoring. ■ MAF Municipal Project Monitoring Teams will prepare and submit the monitoring reports on the results of the monitoring activities on a monthly basis. ■ Central Project Monitoring Team will prepare and submit quarterly and annual monitoring reports to DGFCIP. The reports should cover the following, but not limited to: i) results of the field monitoring, ii) progress reports submitted by the hired NGOs, and iii) monthly monitoring reports submitted by the municipal-level monitoring teams. ■ TET will give members of the monitoring teams the report formats and guidance on how to prepare the monitoring, monthly, and quarterly reports in the beginning of the project.
Monitoring of deforestation and forest degradation	■ Special attention should be given to monitoring of the GHG emission reduction achieved by the project. TET in collaboration with MAF Central Monitoring Team will monitor and estimate the GHG emission reduction achieved by the proposed project so that JCA will report the same to GCF secretariat annually during the project period. It is expected that MAF will continue the same monitoring and reporting activities adopting the techniques that they will learn over the course of the project implementation in the post project period. ■ Reduction of deforestation and forest degradation and estimation of the GHG emission reduction will be monitored and estimated by adopting the following methodologies. a. TET and the Central Project Monitoring Team will select one monitoring plot (1 ha) each from dense and sparse forests in the 12 villages selected for baseline data collection in the target 4 watersheds (or the three villages in each target watershed);

<table>
<tr><th>PM Activities</th><th>Procedures</th></tr>
<tr><td></td><td>
b. TET will take aerial photos of the monitoring plots in using drone during or immediate after PLUP in Activity 1.1.1;
c. TET and the Central Project Monitoring Team will select four villages (one village each in the watershed) among the 12 villages every year and take aerial photos of the monitoring plots in the four villages to observe changes in forest cover and status in the plots;
d. TET will estimate the reduction rates in deforestation and forest degradation in the monitoring plots and compare them with the ones used for calculation of the mitigation impact in this proposal;
e. TET will make the necessary adjustment of those used for calculation of the mitigation impact if the rates are lower than originally expected;
f. TET will calculate the GHG emissions in the target villages where the sustainable NRM mechanism is put in place using the reduction rates (the ones either adjusted or originally set) and estimate the annual emission reduction in the villages in comparison to the GHG emissions under BSU scenario;
■ The results of monitoring of deforestation and forest degradation with georeferenced data of the monitoring plots will be integrated into the baseline GIS data which will be developed in the initial stage of the proposed project.
■ JICA will develop and submit the Annual Monitoring Report including the estimated annual GHG emission reduction to GCF Secretariat every year.
■ Further clarification on the annual emission reduction monitoring and reporting will be made in the beginning of the project as described in Annex 14.
</td></tr>
<tr><td>Coordination and communication with relevant organizations</td><td>
■ DGFCIP in collaboration with TET will organize project inception seminars for DGFCIP's subordinate national directorates, MAF municipal offices, and Municipal Administrative Offices concerned at central and municipal levels in the beginning of the proposed project.
■ DGFCIP with technical assistance from TET will organize the project implementation guidance seminars for the subordinate national directorates, MAF municipal offices, and Municipal Administrative Offices concerned at central and municipal levels within 6 months after the commencement of the project.
■ DGFCIP with technical assistance from TET will organize project review meetings with DGFCIP and its subordinate national directorates, MAF municipal offices, and Municipal Administrative Offices concerned at central and municipal levels at the end of the year during the project period. In the meetings, the progress and results of the project will be reviewed and activities to be conducted in the following year will be discussed by the participants.
■ The workshops/ seminars/ meetings planned is outlined below.
<table>
<tr><th>Name</th><th>Target</th><th>Topics</th><th>Venue</th><th>Times</th><th>Timeline</th></tr>
<tr><td>Inception seminars (1-day seminar)</td><td>■ DGFCIP and relevant NDs
■ MAF municipal offices
■ Municipal administrative offices</td><td>■ Work plan of the project
■ Major activities
■ Organizational structure
■ Roles of the relevant offices</td><td>■ MAF central
■ MAF conference rooms of key municipalities</td><td>1 time at Dili
1 time each at the watersheds</td><td>Early part of the 1st year</td></tr>
<tr><td>Project implementation seminar (2-day seminar)</td><td>Ditto</td><td>■ Project implementation manual</td><td>Ditto</td><td>Ditto</td><td>Mid. of the 1st year</td></tr>
<tr><td>Project review meetings</td><td>Ditto</td><td>■ Progress of the project
■ Issues and lessons</td><td>Ditto</td><td>Ditto</td><td>Every year (year-end)</td></tr>
</table>
</td></tr>
<tr><td>Data management and reporting</td><td>
■ The results of the Sub-activity, such as future land use plans and village regulations from PLUP and CBAPs from CCVA, will be kept and stored in database system.
■ The Municipal Project Monitoring Teams with technical assistance from TET will prepare and submit the monitoring report on the results of the regular monitoring on a monthly basis. The report format will be given by TET with guidance in the beginning of the project.
■ Technical officials of the national directorates under DGFCIP will prepare and submit the monitoring report to DGFCIP whenever they conduct field monitoring.
■ The Central Project Monitoring Team will prepare a quarterly progress and monitoring report based on the results of the field monitoring, progress reports submitted by the hired
</td></tr>
</table>

PM Activities	Procedures
	NGOs, and monthly monitoring reports submitted by the municipal-level monitoring teams, with technical assistance from TET. The quarterly report will be submitted to DGFCIP and shared with members of the project steering committee. ■ The annual progress and monitoring reports will be prepared and submitted to DGFCIP in the same manner.

Source: JICA (2020)

(3) Implementation Period

Project management activities will be carried out over the course of the project implementation. However, the procurement of equipment and external organizations for implementation of the Activities should be done prior to or at the beginning of the relat

ed Activities on a timely manner. The timelines of the procurement activities are listed below.

a. Procurement of project equipment — 1st year
b. Procurement of NGOs for Activities 1.1.1 and 1.2.1 — 1st year
c. Procurement of external organizations for Activity 1.2.2 — 2nd year
d. Procurement of external organizations for Activity 2.1.1 — 2nd year
e. Procurement of external organizations for Activity 2.3.1 — 4th year
f. Procurement of external organizations for Activity 3.2.1 — 2nd ~5th year
g. Procurement of socio-economic surveys for impact assessment — 1st, 3rd/4th, 7th years

(4) Implementation Agencies (Organizations responsible for Implementation)

TET will play an important role in the project management in collaboration with DGFCIP, NDFWM, and NDA/NDCC.

8.3.7 Technical Assistant/ External Consultants

As the proposed project plans to implement a total of 11 Activities in extensive areas in the country simultaneously, many of the works will be outsourced to international/ national NGOs or other external organizations for implementation of the respective Activities of the project. It is not easy for JICA TL and DGFCIP to manage, monitor and supervise the works of the contractors, as they may not necessarily have the expertise on the project activities or experiences in management of a large-scale project. It is, therefore, judged that TET with professional experts should be arranged and deployed for smooth operations, management, and implementation of the proposed project. Particularly, the following expertise are in need for effective project management.

a. Project management
b. Institutional development
c. Community-based natural resource management
d. Training with Gender Mainstreaming
e. Carbon offset
f. Drone mapping and GIS

In addition to TET arranged by JICA HQ, an international consultant should be hired by JICA TL for i) Procurement and Financial Management and ii) Mid-term and Program-end Evaluation, respectively. A national consultant will also be hired by JICA TL for assistance in accounting and financial management, to smoothly process billing documents submitted by contractors and properly manage the budget provided by GCF. The terms of references of TET

arranged by JICA HQ and international and national consultants hired by JICA TL will be developed prior to the implementation of the project.

9. Implementation Plan of the Proposed Project

9.1 Proposed Implementation Procedures

(1) Procedures and Manuals used for Implementation

Almost all the field activities proposed in the Components/ Activities, except Activity 2.3.1, will be implemented in accordance with the methodologies/ procedures which have been already proven by the JICA CBNRM Project and other MAF development partners' projects. The existing technical references and procedures will be fully used for implementation of the Activities, while the procedures and technical guidelines for Activity 2.3.1 will be developed by the activities in Activity 3.1.1. The table below shows the proposed procedures to be employed for implementation of the respective Activity.

Table 9-1 Proposed Implementation Procedures

Activity	Proposed implementation procedures (MAF DP's Project related to the procedures)
Component 1	
Activity 1.1.1	■ Procedures for Introduction of the CBNRM Mechanism at the Village Level in the Planning and Assessment Phase (JICA CBNRM Project) ■ Manual for CCVA (Care International) ■ Revised procedures for PLUP with CCVA (JICA CBNRM Project and GCCA-TL)
Activity 1.2.1	■ Procedures for Establishment of the CBNRM Mechanism at the Village Level in the Implementation and Monitoring Phase (JICA CBNRM Project)
Activity 1.2.2	■ Manual for Formation of the Watershed Management Council (JICA CBNRM Project)
Component 2	
Activity 2.1.1	■ Procedures for Introduction of the CBNRM Mechanism at the Village Level in the Planning and Assessment Phase (JICA CBNRM Project) ■ Technical Manuals on CBNRM Techniques Vol.1~3 (JICA CBNRM Project) ■ Coffee Rehabilitation Manual (CCT/ Rural Development `Project/RDP 4) ■ Conservation Agriculture (FAO) ■ Other technical manuals developed by Seed of Life/ TOMAK, AVANSA
Activity 2.2.1	■ Technical guidelines/ manuals developed by the existing NGOs working for the carbon offset projects in Timor-Leste ■ Manuals and guidelines issued by the certification organization for carbon offset projects
Activity 2.3.1	■ Standard Operation Procedures for Implementation of CF (to be developed in Activity 3.1.1)
Activity 2.4.1	■ Training materials and modules used by JICA CBNRM Project, RDP4, FAO, Plan International
Component 3	
Activity 3.1.1	- (Any manual/guideline is not required.)
Activity 3.2.1	■ Same as Activity 2.4.1
Activity 3.3.1	- (Any manual/guideline is not required.)
Activity 3.4.1	- (Any manual/guideline is not required.)
Component 4	
Activities 4.1.1~4.2.1	- (Any manual/guideline is not required.)

Source: JICA (2020)

(2) Phased Implementation

As described in section 6.1, the proposed project targets a total of 74 villages in 14 post-administratives or eight municipalities related to the four target watersheds. As existing human resources who have competent to implement the activities similar in nature to those proposed in the project are still limited, the capacity of the field implementers, such as NGOs, may also need to be strengthened and finetuned while implementing the Components/ Activities. It is, therefore, important to implement the proposed project, particularly those at field level, in a phased manner as indicated in the work plans of the respective Activities, so that the limited resources could be used efficiently and the quality of the works could be maintained over the course of the project implementation.

(3) Cluster Implementation

In order to efficiently implement the Activities, the target villages should be clustered by post-administrative. Hence, villages under the same post-administrative should be considered as a cluster where the Activities are implemented around the same time. This arrangement will enable DGFCIP/NDFWM and MAF municipal offices as well as NGOs hired for field implementation to use their human and other resources in an efficient manner.

Toward this end, the 14 post-administratives concerned were sorted by the relevance to climate change adaptation and mitigation impacts. Hence, the results of the selection of the target post-administratives were fully used for evaluation. The results of the prioritization are shown below.

Table 9-2 Prioritization of the Post-Administratives

Watersheds	Municipality	Post-administratives (PAs)	No. of Villages related	Vulnerability (Slope condition)	Mitigation potential (dense forest)	Order of priority
Tafara	Covalima	Fatululic	1	Medium	Low	10
		Fatumean	3	Medium	Low	10
		Forohem	4	High	Medium	1
		Maukatar	2	Low	Medium	13
Calaurun	Manufahi	Same	7	Low	Medium	13
Caraulun/Laclo	Ainaro	Maubisse	9	High	Low	3
	Manufahi	Turiscai	10	High	Low	3
Calaurun/Laclo /Comoro	Aileu	Aileu vila	10	High	Low	3
	Aileu	Remexio	3	High	Low	3
Laclo	Aileu	Liquidoe	4	High	Low	3
	Manatuto	Laclo	4	Medium	Low	10
		Laclubar	5	Medium	Medium	8
Comoro	Ermera	Railaco	8	High	Medium	1
	Liquica	Bazartete	4	Medium	Medium	8

Source: JICA (2020)

Consequently, it is proposed that the project activities will be carried out in the respective target watersheds in the following order.

Table 9-3 Results of Prioritization of the Post-Administratives

Watersheds	High priority	Medium priority	Low priority
Tafala	Forohem	Fatululic, Fatumean	Maukatar
Calaurun	Maubisse	Aileu vila, Turiscai	Same
Laclo <1	Maubisse, Liquidoe, Remexio	Aileu vila, Turiscai	Laclubar, Laclo
Comoro	Railaco	Aileu vila	Bazartete

Note: The number in the brackets are the number of villages targeted by the project in the post-administrative.
Source: JICA (2020)

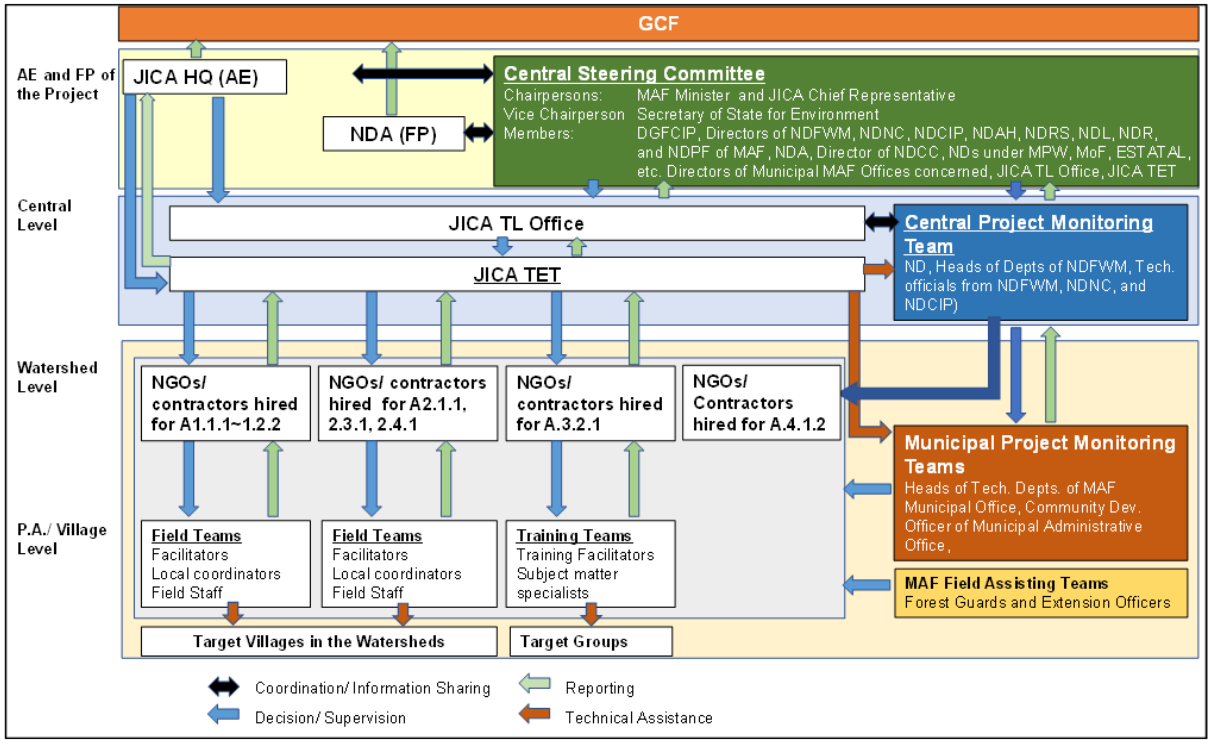
9.2 Institutional Framework for Implementation of the Project

9.2.1 Organizational Structure for Implementation

The Components and Activities proposed in the proposed project will be jointly implemented by JICA and NDFWM under the supervision of the central steering committee led by DGFCIP. TET will be arranged by JICA HQ under its co-financing scheme. JICA TL Office will hire contractors or NGOs for implementation of the Activities, except Activities 2.2.1, 3.1.1, 3.3.1, 3.4.1 and 4.2.1, for smooth and effective implementation.

Central Project Monitoring Team and Municipal Project Monitoring Teams will monitor and supervise the contractors/ NGOs' activities with technical assistance from TET. NGOs/ contractors hired by JICA will set up the field-level teams at village and/or post-administrative level so that they could provide adequate and intensive support to target groups, namely local communities in the target villages and MAF field officers. MAF Field Assistant Teams composed of forest guards and extension officers concerned will work together with the

contractors/ NGOs in the implementation of Activity 1.1.1, 1.2.1, 1.2.2, 2.1.1, 2.3.1, 2.4.1, 3.2.1, 4.1.1 and 4.1.2. Such arrangements will also give opportunities for MAF field officials to practice the project activities in the field as part of On-the-Job training. The proposed organizational structure for implementation of the Components/Activities is shown below.



Source: JICA (2020)

Figure 9-1 Proposed Organizational Structure for Implementation of the Roadmap

JICA acts as both AE and Executing Entity (EE). As the AE, JICA will have overall responsibility for planning, implementation and supervision of the proposed project, including financial management and procurement of goods and contractual services, while it, as EE, will also be responsible for operations, management, and monitoring of the Components and Activities including the use and management of the GCF proceeds for project implementation. Practically speaking, JICA HQ is the AE and its Timor-Leste Office performs as de facto EE for the proposed project in collaboration with Ministry of Agriculture and Fisheries (MAF) of the Government of Timor-Leste, which functions as an implementing partner. MAF, particularly General Director of Forest, Coffee, and Industrial Plants (DGFCIP) and its subordinate national directorates, will cooperate with JICA-TL for monitoring of the project activities in the field and reporting of the project outputs/ accomplishments to the Central Steering Committee as well as the relevant ministries/ departments of the GoTL.

In line with such an institutional set-up, both parties, JICA and MAF, jointly chair the Central Steering Committee (CSC) of the project in collaboration with Secretary of State for Environment (SSE), which acts as the vice chair of CSC, especially in the institutional coordination of Climate-Change issues. This means that JICA and MAF/ SSE will jointly lead the operations and management of the CSC, especially oversight of the performance of the project, approval of the work plans and budget allocation, and collaboration and coordination among the relevant government organizations.

All GCF proceeds will be managed by JICA, acting through its Timor-Leste Office, in its capacity of EE with overall oversight and support from JICA HQ as the AE focal point. All

procurement required for the execution of the funded activity will be thus managed by JICA directly, mainly by the JICA Timor-Leste office with some Project management staffs procured from the JICA HQ. JICA, acting through its Tokyo HQ Global Environment Department units, will perform the AE functions including procurement, project supervision, financial management and reporting. JICA, acting through its Timor-Leste Office, will act as an EE and will be responsible for the day-to-day project execution functions including the role of financial and procurement management ensuring that the objectives and outcomes of the project are delivered effectively.

The Components and Activities proposed in the proposed project will be jointly implemented by JICA-TL in collaboration with DGFCIP and its sub-ordinate national directorates under the supervision of the CSC. JICA TL office will disburse necessary budgets based on the budget plan approved by the CSC, and hire the contractors (e.g., NGOs) for implementation of the Activities of 1.1.1 (PLUP with CCVA), 1.2.1 (Monitoring with village regulations), 1.2.2 (Formation of watershed management councils), 2.1.1 (Microprograms), 2.2.1 (Carbon offsetting/ Private investment), 2.3.1 (CF) and 3.2.1 (Extended training on CBNRM/CF/CC). For smooth and effective implementation, JICA Technical Expert Team (TET) will technically support the contractors (NGOs) on implementation. Activities 3.1.1 and 3.3.1 will be implemented by TET.

(1) Central Steering Committee

The central steering committee is to be organized at the ministerial level to: i) oversee the overall progress of the implementation of the proposed project; ii) approve the work plans and implementation guidelines; and iii) facilitate coordination and collaboration between/among national directorates and also between the central and municipal offices for enhancing synergy and convergence effects. The proposed constitution of the central steering committee is shown below. As explained above, CSC is chaired by MAF and JICA with assistance of SSE as the vice chair. DGFCIP of the MAF is assigned as Director of the CSC, which takes the full responsibility for technical management and supervision of the overall implementation of the proposed project, while functioning as an entry points for further political coordination and consultation with minister-level officials in the government. NDFWM plays the role of the secretariat under the directions of DGFCIP. In addition to DGFCIP and NDFWM, the relevant departments from MAF and SSE will have a coordination and implementation role across project outputs.

Table 9-4 Proposed Constitution of Central Steering Committee

Position	Organizations/Personnel responsible for position
Chairpersons	Minister of MAF and JICA Chief Representative
Vice-chairperson	Secretary of State for Environment, MICE
Director	General Director of Forest, Coffee, and Industrial Plants (DGFCIP), MAF
Secretariat	National Directorate of Forestry and Watershed Management (NDFWM)
Members	■ NDFWM, National Directorate of Nature Conservation (NDNC), National Directorate of Coffee and Industrial Plants (NDCIP), National Directorate of Agriculture and Horticulture (NDAH), National Directorate of Research and Statistics (NDRS), National Directorate of Livestock (NDL), and National Directorate of Planning and Finance (NDPF) under MAF ■ National Designated Authority (NDA) and NDCC under the Secretary of State for Environment ■ National Directorates under the Ministry of Public Works, Ministry of Finance, Ministry of State Administration, and other relevant Ministries ■ MAF Municipal Offices concerned ■ JICA TL including its TET

Source: JICA (2020)

(2) Central Project Monitoring Team

The central project monitoring team will be set up under DGFCIP with an aim to i) monitor and supervise the project activities, particularly those conducted by the contractors/ NGOs in the target villages in collaboration with the municipal project monitoring teams and ii) provide guidance and technical advice to the contractors/ NGOs as well as local communities when needed in the field. National Director of NDFWM will lead the team as Team Leader, closely supported by Head of Dept. of Watershed and Coastal Management, as Deputy Team Leader. Technical officers from NDFWM, NDNC, and NDCIP will also be involved as members of the team. The proposed constitution of the central project monitoring team is shown below.

Table 9-5 Proposed Constitution of Central Project Monitoring Team

Position	Organizations/Personnel responsible for position
TL	ND of NDFWM
Deputy TL	Head of Dept of Watershed and Coastal Management
Members	Technical Officials from the technical departments of NDFWM, NDNC, and NDFCIP

Source: JICA (2020)

(3) Municipal Project Monitoring Team

The municipal project monitoring team will be organized at municipal level to monitor and supervise the village level project activities conducted by the contractors/ NGOs in the field. Heads of the relevant technical departments of the MAF municipal offices and community development officers of the Municipal Administrative Offices concerned will be the members of the municipal project monitoring teams. Daily to weekly monitoring of the field activities and technical assistance in hands-on training are the major tasks given to the monitoring teams. The teams will monitor if the materials and tools/ equipment procured under the project are properly used exclusively for the purposes originally intended and not misused for illicit purposes or in an improper manner. The proposed members of the municipal project monitoring team are shown below.

Table 9-6 Proposed Constitution of Municipal Project Monitoring Team

Position	Organizations/Personnel responsible for position
Members	Heads of the relevant technical departments, e.g., forestry, agriculture and extension, livestock, coffee and industrial plants, of MAF municipal office Community Development Officer/s of the Municipal Administrative Office

Source: JICA (2020)

9.2.2 Roles and Responsibilities of the Main Actors

The proposed roles and responsibilities of the relevant organizations involved in the structure is spelled out below.

Table 9-7 Roles and Responsibilities of the Relevant Organizations in the Structure

Organizations	Roles and Responsibilities
DGFCIP	■ Be responsible for technical management and supervision of the overall implementation of the Components/Activities of the project as the Implementing entity ■ Endorse and submit the annual work plans with budget plans of NDFWM, NDNC and NDCIP for monitoring, supervision, and implementation of the project to MAF for final approval. ■ Endorse and submit new regulations/guidelines/standard operating procedures for promotion of the CBNRM mechanism and implementation of CF to MAF or the council of ministers through MAF. ■ Facilitate the coordination and collaboration between/among the relevant national directorates and MAF municipal offices. ■ Facilitate the cooperation between MAF DPs and the relevant national directorates (NDFWM, NDNC, and NDCIP) for implementation, operations, and management of the Components/Activities of the project.
NDFWM (National Director)	■ Be responsible for monitoring, supervision, and implementation of the project with technical assistance from TET. ■ Prepare and submit the annual work plan with budget plan for monitoring, supervision, and implementation of the project to DGFCIP for endorsement. ■ Prepare and submit new regulations/guidelines/standard operating procedures necessary for implementation of the activities, particularly those for implementation of CF, to DGFCIP for endorsement. ■ Monitor and supervise the implementation of the project by organizing the Central Project Monitoring Team and report the results and progress of the project to DGFCIP. ■ Assign female officials to the Central Project Monitoring Team to ensure the gender sensitive monitoring of the project activities. ■ Report the results of the project in collaboration with JICA TL as well as its TA in the project steering committee meetings. ■ Evaluate the results of the project based on the results of the periodic evaluations together with JICA TL and submit the evaluation reports to DGFCIP through the project steering committee meetings at the middle and end points of the project.
NDNC and NDCIP (National Director)	■ Assist NDFWM in the monitoring, supervision, and implementation of the project. ■ Prepare and submit the annual work plans with budget plans for monitoring, supervision, and implementation of the project to DGFCIP for endorsement. ■ Assist NDFWM in reporting the results of the project to DGFCIP. ■ Assist NDFWM in evaluating the project based on the results of the periodic evaluations together with JICA TL and submit the evaluation reports to DGFCIP through the project steering committee meetings at the middle and end points of the project.
NDA	■ Monitor and supervise the overall progress of the project and expected effects made by the project on climate change adaptation and mitigation together with DGFCIP. ■ Report the results and accomplishments of the project to GCF in coordination with DGFCIP and JICA.
Other National Directorates of MAF	■ Provide technical advice to DGFCIP and NDFWM for effective implementation of the project in the project steering committee meetings. ■ Provide technical and administrative support to technical officials of the relevant national directorates who are working in MAF municipal offices concerned. ■ Collaborate with NDFWM and MAF municipal offices concerned for effective monitoring, supervision and implementation of the project.
MAF Municipal Offices	■ Cooperate with the relevant national directorates (NDFWM, NDNC, and NDCIP) for implementation of the project in the respective jurisdictional areas. ■ Assist the relevant national directorates (NDFWM, NDNC, and NDCIP) in monitoring and supervising the performance of the contractors NGOs hired for implementation of the project in the respective jurisdictional areas. ■ Organize the Municipal Project Monitoring Team for monitoring of the project activities in the field considering the gender balance of the members in the Monitoring Team. ■ Send technical and field officers (both male and female officers) to training courses arranged by the project. ■ Report the progress and accomplishments of the project in the respective jurisdictional areas to Municipal Administrative Officer and Central Project Monitoring Team.
Municipal Administrative Offices	■ Communicate and collaborate with NDFWM, JICA TL/TET and the contractors/ NGOs hired by JICA TL for management and supervision of the implementation of the project in the respective jurisdictional areas. ■ Facilitate the coordination and collaboration between/among the relevant municipal departments, post-administrative offices and villages concerned. ■ Share the results and accomplishments of the projects and lessons learned through implementation in the central steering committee meetings.
Post-Administrative	■ Cooperate with the relevant national directorates (NDFWM, NDNC, and NDCIP) for

Organizations	Roles and Responsibilities
Offices	implementation of the project in the respective jurisdictional areas. ■ Play a leading role in discussions and meetings organized in Activity 1.2.2. ■ Facilitate the coordination and collaboration between/among villages concerned.
Villages	■ Actively participate in discussions and activities arranged and conducted by the project in the respective jurisdictional areas. ■ Facilitate women's participation in the project activities by advising villagers to share women's roles in daily and other works among with male members. ■ Be responsible for management and protection of forests and other natural resources using the CBNRM mechanism introduced by Activity 1.1.1 and 1.2.1. ■ Replicate, continue, and expand techniques introduced in Activity 2.1.1 for further improvement of climate change adaptation and mitigation capacity in the target villages. ■ Protect existing forests and restore degraded ones in accordance with the community forest management agreement exchanged with NDFWM in Activity 2.3.1.
Contractors/ NGOs	■ Engage in the implementation of the following Activities and fulfill tasks specified/given by the TORs for the respective Activities: - Activities 1.1.1 and 1.2.1 - Activity 1.2.2 - Activity 2.1.1 - Activity 2.3.1 - Activity 3.2.1 - Activity 4.1.1 - Activity 4.1.2 ■ Encourage women in villages to take relevant roles in the implementation of Activities 1.1.1~1.2.2, 2.1.1 and 2.3.1. ■ Report to NDFWM and JICA TL through the Central Project Monitoring Team and TET, respectively, the progress, results, and accomplishments of the Activities contracted out to NGOs/ Contractors on a regular basis.
JICA TL	■ Be responsible for implementation of the proposed project as EE. ■ Procure project equipment and the contractors/ NGOs for implementation of the project with technical assistance of TET. ■ Manage and administer the project budget allocated by GCF through JICA HQ. ■ Monitor and supervise the implementation of the project with technical assistance of TET. ■ Report the financial status/ management of the project budget to DGFCIP and NDFWM periodically.
TET	■ Assist JICA TL in the procurement of the contractors/ NGOs. ■ Assist DGFCIP/NDFWM, other relevant national directorates and MAF municipal offices concerned in the monitoring and supervision of implementation of the Activities contracted out to the contractors/ NGOs. ■ Directly engage in the implementation of Activities 3.1.1, 3.3.1 and 4.2.1 in collaboration with DGFCIP/ NDFWM. ■ Take a leading role in management and operations of the project in collaboration with DGFCIP/ NDFWM. ■ Report the progress, results, and accomplishments of the project to DGFCIP, NDA, JICA TL, and JICA HQ periodically. ■ Prepare and submit the project reports (e.g., Implementation guidelines, Inception Report, Progress Reports, Technical References, and Completion Report) to GFCIP and JICA.

Source: JICA (2020)

9.3 Procurement Plan

9.3.1 Implementation Methods

Many of the Activities of the proposed project will be implemented by the contractors/NGOs hired by JICA TL with technical assistance of TET, in principle, as the majority of MAF technical and field officials at central and municipal levels has less experiences in the CBNRM activities. Activities 2.2.1, 3.1.1, 3.3.1, 3.4.1 and 4.2.1 will be implemented by TET in collaboration with DGFCIP/ NDFWM. The following tables shows the proposed implementation methods of the respective Components/Ativities of the action plan.

Table 9-8 Implementation Methods of the Components/Activities

Component	Activities	Implementation Methods	Expected time frame
Component 1	Activity 1.1.1: PLUP with CCVA	Contract-out Direct implementation by DGFCIP (Partially)	1st – 4th years

Component	Activities	Implementation Methods	Expected time frame
	Activity 1.2.1: Implementation and monitoring of NRM regulations and CBAPs	Contract-out Direct implementation by DGFCIP (Partially)	2nd – 7th years
	Activity 1.2.2: Formation of sub-watershed-level coordination platforms	Contract-out	2nd – 7th years
Component 2	Activity 2.1.1: Building of local capacity for climate change adaptation measures	Contract-out Direct implementation by DGFCIP (Partially)	2nd – 6th years
	Activity 2.2.1: Development and designing of an incentive mechanism	Direct implementation by TET	3rd – 6th years
	Activity 2.3.1: Implementation and promotion of CF	Contract-out	3rd/4th – 7th years
	Activity 2.4.1: Strengthening of the capacity of MAF's field officials in the watershed	Contract-out Direct implementation by TET	1st – 6th years
Component 3	Activity 3.1.1: Development of new government legislative and technical documents	Direct implementation by TET	1st – 6th years
	Activity 3.2.1: Strengthening of MAF's field officials' capacity in other priority watersheds	Contract-out	2nd – 6th years
	Activity 3.3.1: Institutionalization of the watershed-level coordinating platforms	Direct implementation by TET	4th – 7th years
	Activity 3.4.1: Knowledge sharing with key stakeholders through national/ international seminars and conferences	Joint implementation by DGFCIP and JICA	1st – 7th years
Component 4	Activity 4.1.1: Establishment of baseline conditions for impact assessment	Contract-out	1st year
	Activity 4.1.2: Evaluation of the project impacts with established methodologies for impact assessment	Contract-out	3rd/4th, and 7th years
	Activity 4.2.1: Development of the technical references for impact assessment in similar projects in future	Joint implementation by DGFCIP and JICA	7th year
Project Management	Preparatory works, planning, procurement, monitoring, and coordination	Joint management, operations, and reporting by DGFCIP, NDFWM, and JICA	1st – 7th years

Source: JICA (2020)

9.3.2 Procurement Plan

(1) Procurement of Equipment and Non-consultancy Services

As described above, many of the activities of the proposed project will be outsourced to external organizations (e.g., NGOs) for efficient and effective implementation. In addition to the project activities, the proposed project plans to purchase and procure several types of project equipment for smooth and effective implementation of the project.

- Office equipment (5 units of laptop PC, 5 units of laser printer, and 5 units of MS office software)
- Project vehicles (2 units of 4WD)
- Project motorbikes (4 units of off-road motorbike)
- Project Monitoring Equipment (2 units of drone with software, 5 units of GPS)

The following table shows the project activities and equipment to be outsourced or procured with the methods of procurement.

Table 9-9 Procurement Items and Methods

Type	Activities	Procurement Method	Potential Bidders	Expected Year
Project Activities	Activity 1.1.1: PLUP with CCVA	QCBS, QBS, or LCS	International & national NGOs	1st year
	Activity 1.2.1: Implementation and monitoring of NRM regulations and CBAPs	ditto	ditto	1st or 2nd year
	Activity 1.2.2: Formation of sub-watershed-level coordination platforms	ditto	ditto	1st or 2nd year
	Activity 2.1.1: Building of local capacity for climate change adaptation measures	ditto	ditto	1st or 2nd year
	Activity 2.3.1: Implementation and promotion of CF	ditto	ditto	3rd or 4th year
	Activity 2.4.1: Strengthening of the capacity of MAF's field officials in the watershed	ditto	ditto	1st year
	Activity 3.2.1: Strengthening of MAF's field officials' capacity in other priority watersheds	ditto	ditto	1st or 2nd year
	Activity 4.1.1: Establishment of baseline conditions for impact assessment	ditto	ditto	1st year
	Activity 4.1.2: Evaluation of the project impacts with established methodologies for impact assessment	ditto	ditto	3rd/4th, and 7th years
Project Equipment	Office equipment (5 units of laptop PC, 5 units of laser printer, and 5 units of MS office software)	Least Cost Selection (LCS)	Local shops	1st year
	Project vehicles (2 units of 4WD)	ditto	Local dealers	
	Project motorbikes (4 units of off-road motorbike)	ditto	Local shops	
	Project Monitoring Equipment (2 units of drone with software, 5 units of GPS)	ditto	ditto	1st, 3rd/4th, and 7th years

Source: JICA (2020)

Fairness, transparency, and accountability shall be ensured for all procurement that uses GCF fund. In the proposed project, the procurement of the external organizations and project equipment by JICA will be implemented in accordance with the procurement guideline of JICA as AE, which is in align with the international recognized practices, and the procurement rule of GoTL. JICA regulates the procurement process and control measures for anti-corruption as a series of guidelines and manuals.

Mode of procurement: International consultant will be procured by Quality Cost Based Selection (QCBS), Quality Based Selection (QBS), or Least Cost selection (LCS) depending on the amount. Equipment / material will be procured through 'comparison of quotation' or (Limited or open) Competitive Bidding. For local consultant procurements, Least Cost Selection (Bidding or Competition), or Quality and Cost Based Selection (QCBS), or Quality Based Selection (QBS) will be adopted following JICA's procurement guideline. Methods of procurement will be decided based on the thresholds of the JICA's procurement guideline. Detailed procurement plan is described in Annex 8.

(2) Short-listing of Contractors

NGOs or contractors will be selected in the local competitive bidding with technical proposals, in principle. However, they will be prequalified or short-listed prior to the bidding to shorten the time required for selection of NGOs/ contractors. The qualifications required for NGOs/ contractors should be finalized in the 1st year of the project with technical assistance from TET,

but the tentative ides on the qualifications are given below.

- Experiences in similar activities in Timor, i.e., PLUP. CCVA and formation of watershed management council for Component 1
- Experiences in providing field training or making demonstration on the relevant climate change adaptation techniques (namely climate resilient agriculture/ sloping land agriculture techniques/ sustainable upland farming techniques, nursery development and operation including fruit tree production, and aged coffee rehabilitation) for Activity 2.1.1.
- Experiences in providing training on livelihood improvement particularly focusing on women or women's groups in villages.
- Number of field facilitators who have experiences in the related fields
- Number of female facilitators or trainers who have experiences in empowerment of women and women-centered livelihood assistance
- Working experiences in the target watersheds
- Track record in working with MAF DPs

(3) Procurement of International and National Consultants hired by JICA TL

JICA TL will hire international and national consultants for the following purposes over the course of the project implementation.

Table 9-10 Procurement of International and National Consultants by JICA TL Office

Type of consultant	Purpose	Duration	Procurement method	Timing
International consultant	Technical assistance in the implementation of Activity 2.3.1 (Community Forestry)	5 months for 4 years	QCBS	3rd/4th year
International consultant (Short-term)	Project evaluation at the mid-term evaluation	1 month	QCBS	3rd/4th year
Ditto	Project evaluation at the program-end evaluation	1 month	QCBS	'7th year
National consultant (long-term)	Supporting staff for procurement, billing, and financial management	6~7 years	QCBS	1st year

Source: JICA (2020)

9.4 Operation and Maintenance Plan

In principle, the proposed project does not include any physical development in the field. Hence, no physical operation and maintenance activities are required in the post project period unlike other infrastructure development project. However, the follow-up meetings and extension support listed below should be conducted in collaboration with the Municipal Administrative Offices as well as MAF Municipal Offices concerned to ensure the effectiveness of the project interventions.

- Follow-up meetings with village leaders on quarterly or biannual basis
- Continuation of the meetings of the watershed management councils formed at post-administrative level
- Follow-up extension services on climate resilient agriculture and others

MAF and the relevant national directorate/ MAF municipal offices as well as Municipal Administrative Offices could allocate necessary budget to conduct the above-listed activities as the amount required is minimal as compared to those required for infrastructure development.

In fact, NDFWM has allocated the budget for follow-up activities in the villages of the JICA CBNRM project since 2015. Likewise, the extension services at village level are the day-to-day tasks of MAF extension officials. Hence, the legacy developed by the project, such as demonstration plots and core farmers, could be used for follow-up as well as further expansion of the beneficiaries in the target villages.

9.5 Financial Management

The project fund provided by GCF will be managed by JICA TL under the supervision of JICA HQ and Central Steering Committee headed by DGFCIP and JICA. The proposed overall financial management of the project is illustrated below.

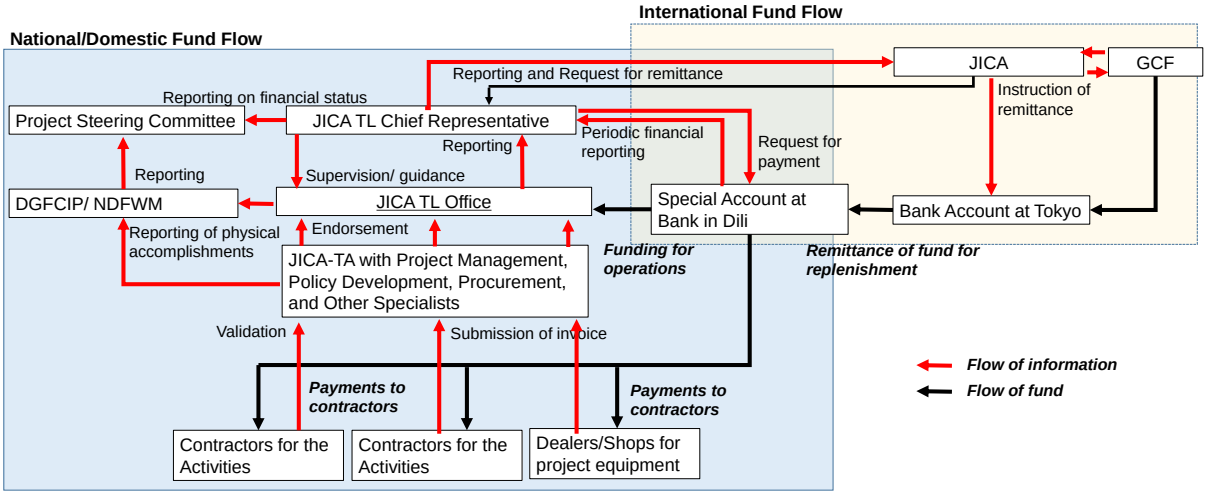


Figure 9-2 Proposed Overall Financial Management of the Project

Source: JICA (2020)

As shown above, the invoice submitted by the contractors hired for implementation of the Activities will be reviewed, validated and approved by JICA TL with assistance of TET. The remittance request will be made by Chief Representative of JICA TL for replenishment of project budget in the special account at a bank in Dili. Once the fund is transferred to the special account, the payments to the contractors will be made in accordance with validated amounts. JICA TL will periodically report the financial status and physical accomplishments to DGFCIP as well as other relevant national directors at the central project steering committee meetings.

The following are the main reasons why such an arrangement is proposed as the financial management for the proposed project.

- It would take one year for establishment of the Project Implementation Unit (PIU) and another year to make the PIU operational; hence the commencement of the Components/ Activities may be in the 3rd year of the project. The same problem was found in the case of SAPIP, the World bank-supported project, where the initial two years were mainly used for establishment of the project implementation unit.
- In the same World bank-supported project, it has taken more than 3 months for the government-led PIU to review, validate, approve and process the invoice and make the payment to the contractors. In Timor-Leste, many of national organizations are financially vulnerable and weak; hence it is crucial for them to receive the payment within a month after submission of their invoice. Slow or long process of payment would significantly affect the progress as well as the quality of the contractors' works.

- As many of the Activities will be contracted out to NGOs/ contractors, the expeditious financial management is essential for smooth operations of the project. JICA TL has adequate experiences in managing similar projects so that they could process the billing documents on a timely manner. Furthermore, TET dispatched by JICA HQ will assist JICA TL in the review and validation of accomplishments made by the contractors.
- JICA has its own financial management and auditing systems which are as strict as global standards. The proposed project could use such systems for proper find management without any additional inputs.

9.6 Implementation Schedule

An implementation schedule of the proposed project is outlined below.

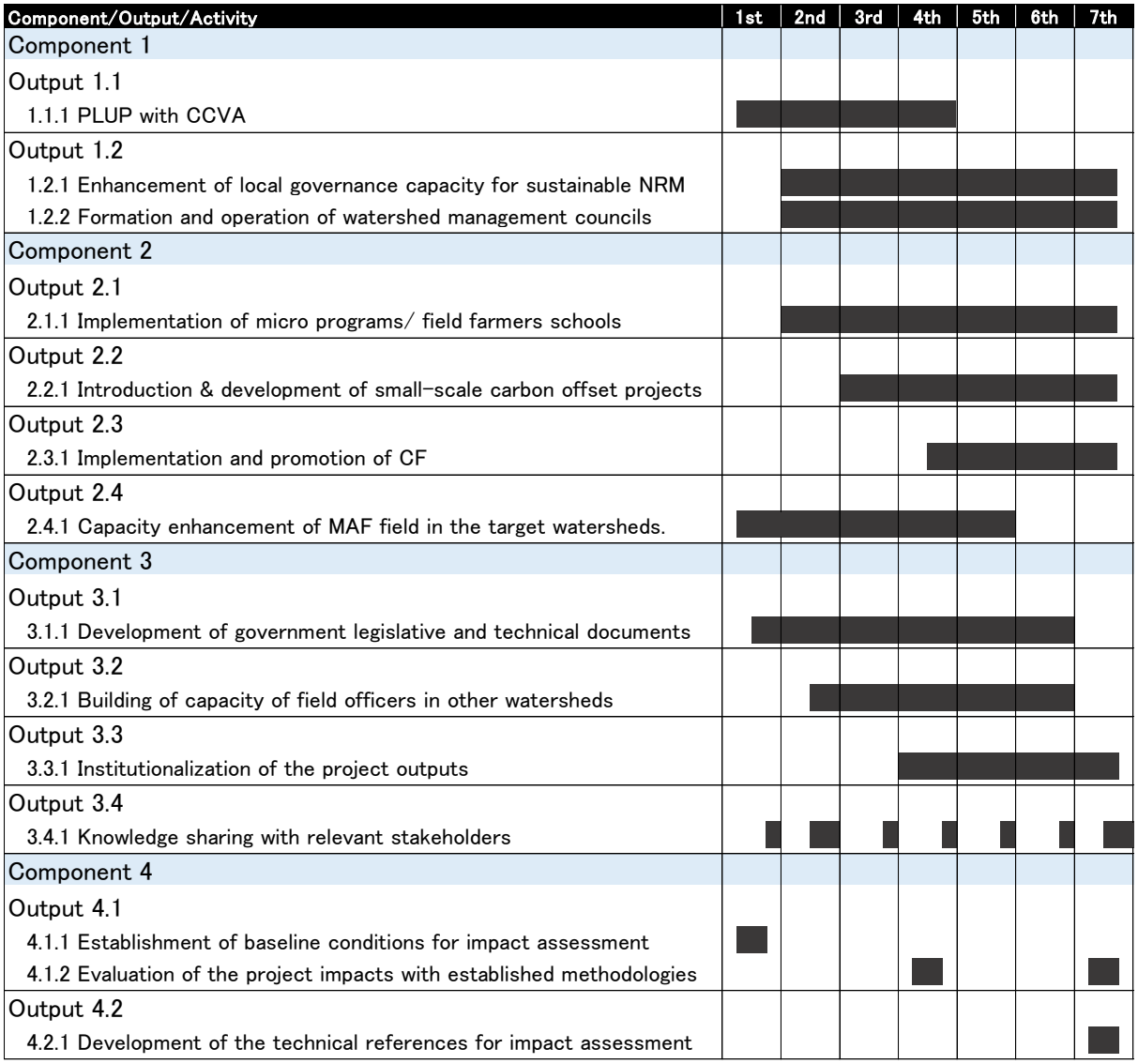


Figure 9-3 Summary of Draft Implementation Schedule of the Project

Source: JICA (2020)

10. Environmental and Social Considerations

This chapter describes the results of the environmental and social screening of Activities/ Sub-activities proposed by the project in accordance with the relevant guidelines and policies, namely the Guidelines for the Environmental and Social Screening of Activities Proposed under the Simplified Approval Process (GCF ESS guidelines); JICA Guidelines for Environmental and Social Consideration (JICA ESC guidelines); and Environmental and Social Policy of GCF (GCF-ESP). The relevant government regulations and guidelines on environmental assessment in Timor-Leste were also fully assessed in the screening.

- The Environmental and Social Action Plan (ESAP) was drafted (section 10.4) with an aim to minimize the potential environmental and social risks identified through the screening.
- The Grievance Redress Mechanism (GRM) of the project is proposed in the last section of this chapter based on the existing protocol of grievance mediation at local level as well as the guidelines mentioned above (section 10.5).

10.1 Regulatory Frameworks and Systems referred and used for the Environmental and Social Screening

(1) Regulatory Frameworks for Environmental and Social Management of GoTL

The following table shows the existing decree laws and municipal orders relating to environment and social management (ESM) in Timor-Leste.

Table 10-1 Legislation and Standards relating to ESM of the GoTL

Legislation and standards	Provisions and contents
Decree Law No.26/2012 "Environmental Basic Law"	■ The objective of the decree law is to establish a framework and provide guidance for environmental protection, conservation, and sustainable use of resources, as described in Section 3.4. ■ Environmental standards, such as emission regulations, environmental monitoring and evaluation, etc. are also stated in the provisions of the decree law.
Decree Law No.5/2011 "Environmental Licensing Law"	■ This decree law, composed of 13 chapters, describes the environmental licensing system for public and private projects in the country. ■ It stipulates the procedures and requirements to be fulfilled for the environmental license, defining the environmental categories and the procedures for the Environmental Impact Assessment (EIA). ■ Three environmental categories, namely Categories A, B, and C are used for the classification of the potential environmental impact caused by a project. For a project classified as Category A, the EIA is required along with the forest management plan (FMP) based on the EIA. For Category B projects, development of an Initial Environmental Examination (IEE) is necessary. ■ The procedures for the EIA are defined in the decree law as follows: ■ Environmental Impact Assessment (EIA) system including the followings: a. Presentation of the project for evaluation and application for environmental license; b. Public Consultation; c. Technical Analysis and Opinion by the Evaluation Committee; d. Decision on the procedure of Environmental Impact Assessment and Allocation of the Environmental License
Ministerial Diploma No. 44/2017 "Regulation on impact and benefits agreements"	■ The ministerial diploma defines the scope of and principle procedures for negotiations, public consultations, signature, and implementation of benefit agreements between project proponent and affected community for projects of Category A. ■ Annex of the diploma introduces some example conditions of the benefit agreements.
Ministerial Diploma No.45/2017 "Regulation on the status and rules of procedures for evaluation committee for managing the environmental assessment procedure for	■ The ministerial diploma prescribes the procedure and principles for (i) formulation of evaluation committee (composition, qualification of the members etc.) and (ii) operation of the evaluation committees to assess environmental and social impact for Category.

Legislation and standards	Provisions and contents
Category A"	
Ministerial Diploma No. 46/2017 "Regulation on the detailed requirements for screening, scoping and the terms of reference, environmental impact statements and environmental management plan for environmental assessment"	■ This diploma complements the decree law of Environmental Licensing Law with the provisions of detailed required for the respective steps of the EIA process. ■ Specifically, it defines the minimum contents of the following relevant documents: a. document for category definition; b. environmental license application; c. ToR for impact assessment of Category A; d. environmental impact statement; e. simplified environmental impact statement; and f. environmental impact management plan.
Ministerial Diploma No. 47/2017 "Regulation on the public consultation procedures and requirements during the environmental assessment process"	■ The diploma defines: i) required timeframe, ii) procedures for public consultations, iii) minimal contents of information to be disclosed in the consultations, and iv) method to ensure the public access to relevant information during the environmental assessment process.

Source: JICA (2020)

(2) Environmental Categories

As introduced above, Decree Law 5/2011 "Environmental Licensing Law", defines the environmental risk categories based on the extent of the potential environmental impacts in Article 4 as well as its annexes. The table below shows the outline of the categorization defined in the decree law.

Table 10-2 Environmental Risk Categories defined by Decree Law 5/2011

Category	Definition
A	Projects classified as Category A may cause significant environmental impacts. Examples of project scale of Category A (Annex of Decree Law 5/2011) in Agricultural, livestock and forestry sector are as follow: - Irrigation systems (includes irrigation infrastructure and drainage) ≥ 100 Ha; - Land clearance with conversion to agriculture (including intensive) ≥ 100 Ha; - Plantations ≥ 20Ha; - Forestry for logging ≥ 25Ha; and - Development of rice fields in forest areas ≥ 3 Ha.
B	Projects classified as Category B may cause environmental impacts. Examples of project scale of Category B (Annex of Decree Law 5/2011) in Agricultural, livestock and forestry sector are as follows: - Irrigation systems (includes irrigation infrastructure and drainage) <100 Ha; - Land clearance with conversion to agriculture (including intensive) <100 Ha; - Pigs (Production and Care) ≥ 2,500 m2; - Birds (Production and Care) ≥ 2,500 m2; - Operation of animals (cattle and sheep) ≥ 2,500 m2; - Plantations <20 Ha; - Forestry for logging <25 Ha; and - Development of rice fields in forest areas <3 Ha.
C	Project classified as Category C has a negligible or no environmental impact. The project scale of Category C is smaller than the ones described in Category B.

Source: JICA (2020) based on Decree Law 5/2011 "Environmental Licensing Law"

(3) Procedures for EIA and Requirements to be fulfilled in the Process of EIA

The procedures for EIA defined by Decree Law 5/2011 "Environmental Licensing Law" are illustrated below.

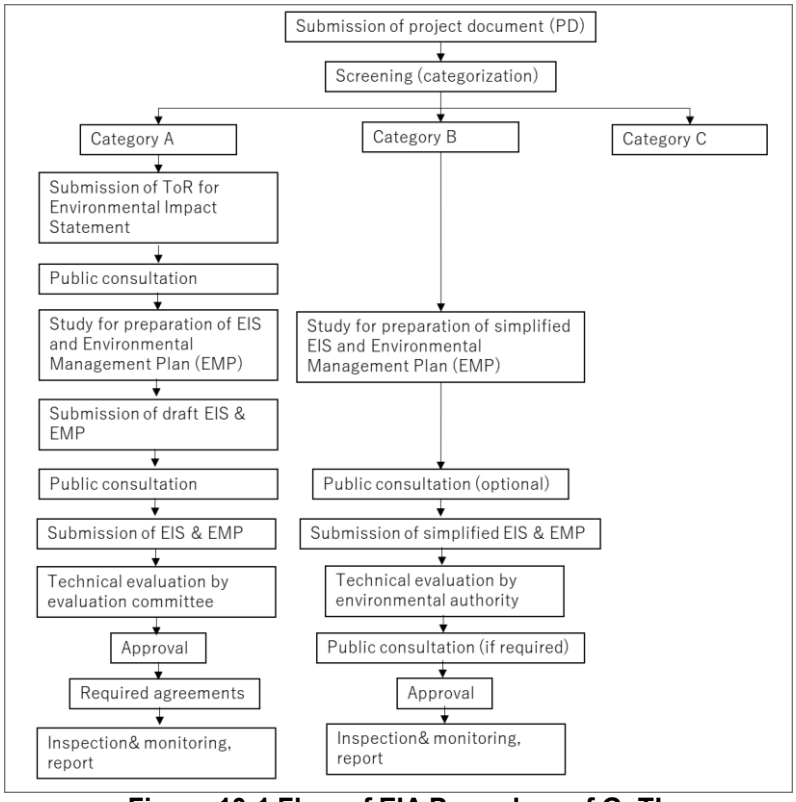


Figure 10-1 Flow of EIA Procedure of GoTL

Source: JICA (2020) based on Decree Law 5/2011 "Environmental Licensing Law"

The required procedures of the EIA process are outlined below.

Table 10-3 Requirements to be fulfilled in the EIA Procedures

Procedures	Brief Descriptions
Screening	The project proponent shall submit a project document to the environmental authority to provide information as defined in Annex I of Ministerial Diploma No. 46/2017. The environmental authority defines the category and notifies it to the project proponent (applicant) within 15 days after receipt of the documents. For a project of Category C, the further processes listed below are not required after the screening.
Scoping	**Category A** The project proponent/ applicant shall; i) conduct the environmental scoping to assess the extents of potential environmental and social impacts: ii) prepare terms of references (ToR) for the environmental impact assessment (EIA) study based on Annex III attached to Ministerial Diploma No.46/2017, and finalize the ToR after public consultations: and iii) conduct technical studies for preparation of Environmental Impact Statement (EIS) and Environmental Management Plans(EMP) based on the ToR prepared. **Category B** The project proponent/ applicant shall conduct an initial environmental assessment (IEE) and prepare the simplified EIS and EMP according to Annex V of Ministerial Diploma No. 46/2017.
Appraisal	**Category A** Within 10 days after receipt of draft EIS and EMP, the technical evaluation committee (EC) is established in accordance with Ministerial Diploma No. 45/2017. Within 24 days after receipt of draft EIS and EMP, public consultations on draft EIS & EMP is conducted. Revised and finalized after public consultations, EIS and EMP shall be submitted to EC for evaluation for 50 days in principle. After approval and issuance of the environmental license, the project proponent/ applicant shall prepare an impact and benefit agreement in consultation with the affected communities to determine the rights and obligations of the project proponent/ applicant and the affected communities paying due attention to traditional customs and inherent rights. Potential impacts which may be caused by the project shall be monitored, and surveillance of the project proponent's/ applicant's compliance with the agreement shall be undertaken. **Category B** After receipt of the simplified EIS and EMP, the environmental authority shall conduct a technical assessment of the submitted documents and decide whether or not to issue the environmental license based on the results of the assessment within 30 days after receipt. Potential impacts which may be caused by the project shall be monitored, and surveillance of the project proponent's/ applicant's compliance with the agreement shall be undertaken.

Source: JICA (2020) based on Decree Law 5/2011 "Environmental Licensing Law"

(4) Organizations responsible for Environmental Licensing

The National Environmental Licensing Agency (NELA) of the Ministry of Commerce, Industry and Environment (MCIE) is the central administrative body responsible for legislative preparation for environmental licensing, assessment, project classification, issuance of environmental license, and monitoring of the compliance. Some of the duties of NELA have been handed over to its municipal branches as part of administrative decentralization. Among others, the municipal branches shall be engaged in the evaluation of the project documents of Category C projects and response to any complaints from affected communities about project activities.

10.2 Outline of the Project Components and Activities

The table below outlines the activities programmed in the respective Components of the proposed project and the potential risks associated with the Activities.

Table 10-4 Target Components and Applicable Screening Instruments

Components	Activities	Type of activities programmed in the Activities	Potential risks
Component 1: Establishment of people driven sustainable NRM system	1.1.1 Conduct participatory land use planning (PLUP) with climate change vulnerability assessment (CCVA) to assist local communities in the watersheds in formulation and adoption of village natural resource management (NRM) regulations and community-based adaptation plans (CBAPs) at village level. 1.2.1 Assist local communities in the enforcement of village NRM regulations and monitoring of CBAP-related activities through regular meetings at village level 1.2.2 Formulate and strengthen the sub-watershed level coordinating platforms for enhancement of the local capacity for adaptive management of forest and natural resources in the target watersheds.	**Activities 1.1.1 – 1.2.2** ◆ Meetings and workshops for participatory assessment, planning of future land use, development of village rules especially on natural resource management, formulation of a community-based adaptation plan ◆ Meetings for implementation and use of the village regulations particularly for sustainable protection and management of forest and natural resources ◆ Meetings and workshops for assessment of natural resources in the watershed, coordination for protection and management of forests, and taking collaborative actions by local leaders	◆ Unless the free, prior and informed consent (FPIC) is not ensured in the process of planning and development of the rules, the plans and regulations may cause social conflict over natural resources among local communities at village and post-administrative levels. ◆ Forest management activities, such as reforestation, thinning, pruning, and harvesting of firewood, may affect the natural environment, particularly where important natural habitats exist.
Component 2: Reinforcement of food security and livelihood diversification through implementation of micro programs/ FFSs on sustainable and climate resilient livelihoods effective for reducing CO_2 emissions	2.1.1 Conduct a series of hands-on training or field farmers schools on climate resilient agriculture, sustainable forest management, horticulture development, and livelihood improvement at village level to enhance villagers' capacity to take adaptive measures using resources locally available; 2.2.1 Develop and design an incentive mechanism based on the carbon offset scheme. 2.3.1 Implement and promote community forestry (CF) with community forestry management agreement in selected villages to empower	**Activity 2.1.1** ◆ Establishment of demonstration plots (permanent farms) ◆ Establishment of community nurseries ◆ Application of a series of farming techniques on climate resilient agriculture, aged coffee rehabilitation and management, and horticulture development ◆ Production of agro-processing products and/or other products ◆ Meetings and workshops for planning, monitoring, and evaluation of the activities. **Activity 2.3.1** ◆ Meetings and workshops for formulation of community forest management agreement and plan	◆ The proposed sites for demonstration plots and community nurseries should be selected in close consultations with local communities. ◆ Agriculture and agroforestry activities in the demonstration plots may cause potential environmental damage in case agrochemical or chemical fertilizer is used in an improper manner.

Components	Activities	Type of activities programmed in the Activities	Potential risks
	forest management mechanism at village level; 2.4.1 Arrange and conduct on-the-job and off-the-job training courses for MAF field officials (such as extension officers, forest guards, municipal technical officers) working in the target watersheds prior to and during the hands-on training courses for local communities.	◆ Conducts of forest management activities including reforestation, thinning, pruning, and other silvicultural practices ◆ Harvesting of firewood forests in a sustainable manner **Activity 2.4.1** ◆ Lectures or seminar-type training on the skills and techniques relevant to hands-on training on climate resilient agriculture, aged coffee rehabilitation and management, and horticulture development ◆ Involvement of MAF officers in hands-on training on climate resilient agriculture, rehabilitation of aged coffee trees, horticulture development, and production of agro-processing products.	◆ Due consideration should be given to gender balance in training activities for local communities as well as MAF officers.
Component 3: Institutional and capacity development for scale-up of CBNRM/ CF beyond the target areas	3.1.1 Develop new government legislative and technical documents for effective implementation and promotion of the project activities in and beyond the target watersheds; 3.2.1 Arrange and conduct training courses on PLUP with CCVA and climate change adaptive measures for MAF field officers and NGO technical staff working in other priority watersheds; 3.3.1 Collaborate and consult with MAF and Municipal Administrative Offices about institutionalization of the sub-watershed level platforms organized by the proposed project as the municipal level mechanism; 3.4.1 Arrange and organize national and international seminars on the results of the proposed project to enhance the awareness of CBNRM/CF among key government officials, decision makers and legislators in the GoTL.	**Activity 3.1.1-3.4.1** ◆ Preparation of legislative and regulatory documents for promotion of CBNRM and CF activities in close consultation with relevant government and non-government stakeholders ◆ Lectures or seminar-type training for MAF officials and NGO staff on the skills and techniques relevant to hands-on training on PLUP with CCVA and climate change adaptation measures (e.g., climate resilient agriculture, etc.) ◆ Meetings with Municipal Administrative Offices and MAF to facilitate the process of institutionalization of the sub-watershed level platforms ◆ National/ international seminars/ conference on the results of the proposed project, CBNRM/ CF for community-based climate change adaptation and mitigation measures ◆ Participation in the COP meetings and arrangement/ organization of side events on the proposed project at the COP meetings	◆ No potential environmental and social adverse impact is foreseen by the implementation of the project activities.

Source: JICA (2020)

10.3 Environmental and Social Risk Screening

10.3.1 Present Environmental and Social Conditions of the Target Watersheds

In order to set the environmental and social baselines of the target watersheds, namely Caraulun, Tafara, Laclo and Comoro watersheds, for the environmental and social risk screening, the present environmental and social conditions of the four watersheds were reviewed and clarified as below.

Table 10-5 Environmental and Social Baseline of the Target Watersheds

Items	Sub-items	Brief features
Environment	Pollution control (air, water, waste, soil)	No industrial activities entailing significant pollution in air, water, and soils exist in the target watersheds. At household level, the in-door air pollution caused by using firewood for lighting and cooking is a significant environmental issue affecting human health, particularly women and children. Another predominant environmental issue at local level is the pollution of water and soils due to dumping of waste or improper solid waste management in a village[4].
Natural environment	Total area	The total area of the four target watersheds is 255,538 ha. The coverages of the respective watersheds are as follows: - Caraulun: 64,780 ha - Tafara: 31,718 ha - Laclo: 135,858 ha - Comoro: 23,182 ha
Natural environment	Forest Cover	More than 50% of the total area of the four watersheds are covered with forests, of which one third (about 30% of the existing forests or 41,370 ha) are still in dense conditions as shown below.

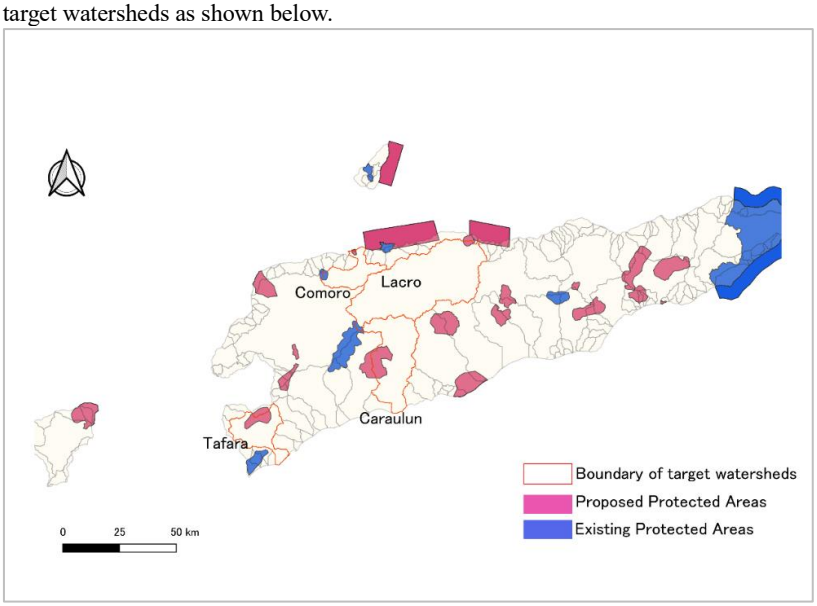
(unit: ha)

Watersheds	Dense Forest	Sparse Forest	V. Sparse Forest	Paddy & dry field	Glass land	Bareland	Others	Total
Caraulun	12,840	20,550	240	1,680	26,010	270	3,190	64,780
Tafara	5,960	13,910	0	260	8,950	1,430	1,208	31,718
Laclo	17,270	53,270	31,690	2,440	25,230	840	5,118	135,858
Comoro	5,300	5,770	1,380	190	8,120	1,230	1,192	23,182
Total	41,370	93,500	33,310	4,570	68,310	3,770	10,708	255,538

Source: Forest Conservation Plan (2012)

Protected area, ecosystem

Some parts of the existing and propose protected areas are geographically overlapped with the target watersheds as shown below.



Source: Forest Conservation Plan, JICS, 2012 (Arranged by JICA in 2020)

The following table shows the existing and proposed protected areas geographically relating to the target watersheds.

Status of protected area	Comoro	Laclo	Caraulun	Tafara
Existing	Mt.Fatumaisin	Mt.Tatarmailau	-	-
Proposed	Tasitolu	Mt.Kuri	Mt.Cablaque	Mt.Taroman

Source: JICA (2020)

Topography

More than 30 % of the areas in the watersheds have over 15 degrees of slopes angle.

(unit: ha)

Watersheds	More than 36 degrees	31-35 degrees	26-30 degrees	21-25 degrees	16-20 degrees	0-15 degrees	Total
Caraulun	1,928	3,007	4,938	7,088	9,176	38,643	64,780
Tafara	409	407	1,015	2,458	5,508	21,921	31,718
Laclo	778	2,379	6,538	15,588	30,716	79,859	135,858
Comoro	144	375	1,464	4,250	6,465	10,484	23,182
Total	3,259	6,168	13,955	29,384	51,865	150,907	255,538

Source: Forest Conservation Plan (2012)

[4] Environmental Assessment Study, World Bank, 2009

Items	Sub-items	Brief features
Social situation	Population	■ Total population of target watersheds: 373,772 persons ■ Total HH of target watersheds: 61,159 HHs ■ Population density: 146 persons /km2
	Economic activity	■ Almost all the households in the target watersheds are marginal farmers who heavily rely on subsistent agriculture for their livelihoods. ■ Shifting cultivation, backyard home garden, animal grazing, and coffee production are the major agricultural activities. ■ The main source of income is agricultural crops produce in the farms.
	Water and Energy	■ The public-shared water sources, such as public tap points and tube wells, are the main sources of drinking and domestic water for local communities in the target watersheds. ■ More than 80 % of households in the target watersheds rely on firewood for cooking. 45 % to 90 % of villages in the watersheds are electrified.
	Ethnicity	■ In general, there is no clear ethnic difference in Timor Lese; however, there are more than 40 different language or local dialects in the country.
	Gender	■ In the target watersheds, women are engaged in both productive (main farming) and reproductive works, such as fetching water, cooking, cleaning and caring of child, while men tend to concentrate on farming and other productive works. ■ The range of women's roles in domestic works tend to be broader than that of men.

Source: JICA (2020)

10.3.2 Guidelines used for Environmental and Social Risk Screening

As the JICA's Environmental and Social Consideration Guidelines are applicable to development projects of a wide range of sectors including forestry and agriculture and its screening checklists fully cover the relevant environmental and social issues, the checklists of the same guidelines, shown in **Tables 4 and 5,** were fully used for the environmental and social risk screening of the project.

10.3.3 Results of Environmental and Social Risk Screening

The results of the environmental and social risk screening are presented in **Tables 4 and 5,** and summarized below.

Table 10-6 Summary of the Results of the Environmental and Social Risk Screening

Category	Evaluated items	Potential risks associated with the project activities
Environ mental	Pollution control (air, water, waste, soil)	◆ No or minimal adverse impact is expected since the project has no activity entailing any pollutions of air, water, soils and waste. Neither of chemical fertilizer nor agrochemical will be used in the promotion of climate resilient agriculture or horticulture development under Activity 2.1.1, Instead, the Activity will introduce and promote the use of compost produced by using animal manure and other materials locally available so that local communities could continue the same even after the end of the project. ◆ Moreover, there is no manufacturing or engineering activities, which may cause significant damage to natural environment or produce any pollutants.
	Natural environment (protected area, ecosystem, hydrology, topography, geology)	◆ The protection of existing natural ecosystems, particularly proposed and existing protected areas, will be strengthened through implementation of Components 1 and 2. The reasons behind are summarized below. ✓ Activities 1.1.1~1.2.2 activities aim to protect natural forests, particularly dense forests, with the full consent of local communities residing around forests. ✓ Activity 2.1.1 will contribute to the prevention of further encroachment in existing forests through enhancing local people's capacity to increase crop productivity in existing farms and improve degraded lands for fruit and industrial plants production. None of the activities of this component will be conducted within the proposed and existing protected areas. ✓ Activity 2.3.1 activities aim to give legal backing to local communities for protection and sustainable management of forest resources in their localities. ◆ Besides, sustainable forest and land management will contribute to the stabilization of hydrologic conditions in the target watersheds. ◆ As described above, neither chemical fertilizer nor agrochemical will be

Category	Evaluated items	Potential risks associated with the project activities
		introduced/used in the course of implementation of Activity 2.1.1, especially climate resilient agriculture and horticulture development. ◆ No topographic change is foreseen as the proposed project does not contain any engineering works in the project activities. ◆ Consequently, no or minimal adverse impact is foreseen on natural environment. ◆ Although the potential adverse environmental impact will be nil or less, due attention should be paid to the regulations stipulated in Decree Law 5/2016 "Protected Area Management" when the relevant Activities will be implemented in the villages which geographically overlap their jurisdictional areas with the existing and proposed protected areas. ◆ The project activities in such villages shall be monitored in accordance with the draft Environmental and Social Action Plan (ESAP) described in Section 10.4 of this chapter.
Social	Resettlement	◆ No involuntary resettlement or loss of livelihoods is expected as a result of the implementation of the proposed project.
	Livelihood	◆ Community-based adaptation measures, such as climate resilient agriculture and horticulture development, of Activity 2.1.1 will improve local livelihood and strengthen its resilience against climate change. ◆ Protection of existing natural forests through Activities 1.1.1~1.2.2, 2.1.1 and 2.3.1 will improve the ecosystem services of forests, such as provision of water, alternative sources of income, and emergency food when crop production is limited. ◆ There may be social conflicts occurring between beneficiaries of Activity 2.1.1 and non-beneficiaries in villages. There is a need to introduce mechanisms to enable non-beneficiaries to learn and apply the techniques introduced by Activity 2.1.1 to address a sense of unfairness among villagers. ◆ Hence, no or minimal adverse impact is foreseen through the implementation of the proposed project. ◆ It is, however, important to monitor the livelihood conditions of households in villages as proposed in the draft ESAP described in Section 10.4.
	Heritage, landscape	◆ There is no heritage site within the target watersheds. ◆ PLUP with the village regulations and the follow-up capacity building for implementation of the village regulations will help local communities protect traditional sacred places, such as mountains, water sources, forests, and stones, from any damage by human activities. ◆ Component 1 aims to achieve the sustainable landscape management at village and watershed levels by enhancing local capacity for sustainable forest and land management. ◆ Thus, no or minimal adverse impact is expected on heritage and landscape in the watersheds.
	Indigenous culture and lifestyle	◆ Village regulations developed by local communities through PLUP are based on traditional rules and customary norms of the respective villages. As all the project activities will be carried out in a fully participatory manner, the views and ideas of local communities including traditional and cultural ones will be fully incorporated in the project. ◆ There is no indigenous people's issue in local communities in Timor-Leste. ◆ Due consideration should be given to gender equality in the implementation of the activities of Activities 1.1.1~1.2.2, 2.1.1 and 2.3.1, as there is a tendency to put women behind. ◆ In general, no or minimal adverse impact is expected on culture and rural lifestyle. It is, however, necessary to monitor the women's participation in the project activities to check if women's opinions/ ideas are reflected or the project benefits are equally shared between men and women.

Source: JICA (2020)

10.3.4 Classification of the Project Risk

Based on the result of the environmental and social risks screening described in Section 10.3.3,

the level of the project risk is evaluated and classified as Category C as shown in the table below in accordance with the existing JICA guidelines and GoTL's Decree Law 5/2011 on Environmental Licensing Law.

Table 10-7 Result of Risk Categorization

Applicable standard for categorization	Risk Category	Reasons for categorization
JICA	C	There is no potential negative impact or risk identified as shown in Tables 10-1 and 10-2, which shows the results of screening of the potential environmental and social risks of the proposed project.
GoTL	C	The type and scale of the proposed project so not satisfy the criterial of neither category A nor B in Annex 2 of Decree Law 5/2011.

Source: JICA (2020)

10.3.5 Results of the Initial Consultations with Stakeholders at Municipal Level

A joint team organized by DGFCIP taskforce and JICA CBNRM Project had the initial consultation meetings on the proposed project with relevant government and non-government stakeholders at municipal level in October and November 2019. Government officials from the relevant offices, such as Municipal Administrative Offices, Agriculture and Forestry Offices, Environmental Offices, Natural Disaster Management Offices, and national NGOs working in the municipalities concerned were invited to the meetings. The joint team introduced the outline of the proposed project with initial ideas on the activities of the project and asked the participants' views on the initial ideas. Some comments given by the participants are highlighted below.

- I highly expect that the GCF project could give greater benefits to the municipality of Manufahi, as the sustainable management of Calaurun watershed is one of the critical issues of the municipality.
- Municipal Administrative Office and its technical departments should have an important role in monitoring of the project activities implemented in the concerned watershed.
- National Directorate of Land and Property at municipal level should be involved in the process of the CBNRM mechanism, particularly PLUP, so that they could make inputs on land issues, such as the land law.
- Central government should also be involved in monitoring the project activities though most of the project activities will be carried out at either municipal or post-administrative level.

Another sets of consultation meetings about the draft project plan were supposed to be held in April/May, but they were canceled and postponed due to the spread of the infection of COVID-19 in Timor-Leste. Further consultations with the stakeholders about the contents and potential impacts will be held once a public gathering is allowed in Timor-Leste.

10.4 Environmental and Social Action Plan

Although the potential environmental and social risks identified in the environmental and social screening are nil or minimal, an environmental and social action plan (ESAP) is drafted so that the project could address the potential risks associated with the proposed project to minimize any adverse impacts in the future. The table below and **Annex 12** of the funding proposal show the draft ESAP. The draft ESAP shall be further reviewed and revised based on the results of the stakeholder consultations to be held in the beginning of the project.

Table 10-8 Draft Environmental and Social Action Plan (Annex 12 to GCF funding proposal)

Summary of risks	Mitigation measures*	Risk significance	Responsible party/person	Schedule	Expected results	Cost/Budget
1. Environment (protected area): Some existing and proposed protected areas are located in and adjacent to the target watersheds. Although the project activities such as PLUP, CF promotion, and climate resilient agriculture, would contribute to protection and sustainable management of existing forests in the watersheds, due attention should be paid to the government regulations (Decree Law 05/2016) on protected area management to prevent any damage to the ecosystem.	1. Enhancement of communities' understanding of the rules on protected area management (Decree Law 05/2016) in the discussions on the village regulations in PLUP, which is a part of the activities in the stakeholder engagement plan (SEP) 2. Ensuring of i) development of a future land use plan considering the conservation of the protected area and ii) incorporation of the rules and regulations on management of the ecosystems in the village regulations in PLUP 3. Monitoring of compliance of villagers with the future land use plan and village regulations along with the enhancement of local governance as described in the stakeholder engagement plan (SEP)	Level: No-minimal	Local leaders and communities NGOs hire for Activities 1.1.1 and 1.2.1 MAF Municipal and Central Project Monitoring Teams P.A-level coordinating platforms TET	1. & 2. PLUP including the formulation of a future land use plan and village regulations will be carried out in the target villages in the four watersheds in the initial 4 years. 3. Monthly monitoring meetings will be regularly held at the target villages in the four watersheds for at least 2 years after a set of village regulations is put in place. Hence, protection of the protected areas by using the village regulations is scheduled from 2nd year to 7th year.	No or minimal impact on protected areas is foreseen.	All the mitigation measures are part of the project activities proposed in the respective Activities. Measures 1 and 2 are those of PLUP of Activity 1.1.1, while Measure 3 is the main activity of Activity 1.2.1. Thus, no additional cost is required for the proposed migration measures.
2. Social conflict Activity 2.1.1 will directly benefit 120 families (30~90% of families) in a village during the project. Those who are not engaged in Activity 2.1.1 may have a feeling of inequality.	1. Ensuring of villagers' understanding that similar support would be provided by MAF officials even after the project in the planning stage 2. Development of a benefit sharing scheme, e.g., seed bank, at the target villages so that other communities could benefit from the project outputs 3. Enhancement of MAF field officials' capacity to conduct similar activities at village level	Level: No-minimal	Local leaders and communities NGOs hire for Activities 1.1.1 and 1.2.1 MAF Municipal and Central Project Monitoring Teams MAF field officials TET	1. The planning of community-based adaptation measures, such as climate resilient agriculture, will be undertaken after the conduct of PLUP. Hence, this activity will be carried out in the initial 4 years. 2. Possible benefit sharing mechanism will be discussed and examined in the course of the implementation of Activities 2.1.1, which will be implemented from the 2nd to 6th years. 3. The capacity building activities for MAF field officials, Activity 2.3.1 will be carried out from the 1st to 6th years. 4. GRM will be introduced in the planning process of PLUP, which will be implemented in the initial 4 years. Additionally, the awareness of GRM among local communities will be enhanced in the monthly	Ditto	All the mitigation measures are part of the project activities proposed in the respective Activities. All Measures, Measures 1 to 4, are contained in Activities 1.1.1, 2.1.1, 2.4.1, and 1.2.1, respectively... Thus, no additional cost is required for

	4. Introduction and enhancement of local communities' awareness of the Grievance Redressal Mechanism (GRM) developed/introduced for the project			meetings held at village level under Activity 1.2.1 from 2nd year to 7th year.		the proposed migration measures.

*The potential risks and proposed mitigation measures in this ESAP will be monitored as described in the monitoring plan.

Source: JICA (2020)

10.5 Stakeholder Engagement Plan

All the field level activities, namely those of Activities 1.1.1~1.2.2, 2.1.1 and 2.3.1, will be implemented in a participatory manner. In such Activities, local communities will be fully involved in the project activities as key players in the respective activities. The table below shows how the respective Activities will engage local communities in the project activities.

Table 10-9 Draft Local Stakeholder Engagement Plan

Type of Stakeholder	Activities	Measures of engagement	Participants
Local people of target villages of Component 1	1.1.1 Formulation of village regulation, PLUP, and CCVA	Initial consultation meeting with village leaders and local communities in target villages	Local leaders and other villagers
		Formulation of a working group composed of the members of village council, representatives from women, and other vulnerable groups	Local leaders such as village chiefs, youth group leaders, elders, traditional leaders, representatives from sub-villages (women and men), representatives from women and vulnerable groups
		Conducts of a series of workshops and meetings for formulation of a future land use plan and village regulations	Ditto
		Conducts of a series of consultation meetings with other villagers at sub-village level to introduce the draft village regulation, future land use plan, and community-based adaptation plan prepared by the working group through PLUP	all villagers in the village
	1.2.1 Enhancement of local governance	Organization of monthly meetings with the members of village council at village level to discuss any issues/ problems occurring in the village and how to solve/ settle such issues/ problems using the village regulations	Local leaders such as village chiefs, youth group leaders, elders, traditional leaders, representatives from sub-villages (women and men), representatives from vulnerable groups
		Organization of quarterly meetings with other villagers at sub-village level to share the results of the monthly meetings and obtain feedback on the village regulations from other villagers	all villagers in the village
Local people of target villages of Component 2	2.1.1 Improvement of local livelihood resilience and reduction of climate change vulnerability	Conduct of a series of meetings/ workshops for selection and prioritization of potential adaptation measures to be introduced in each village	Local leaders such as village chiefs, youth group leaders, elders, traditional leaders, representatives from sub-villages (women and men), representatives from vulnerable groups
		Consultation on selection of participants in hands-on training on selected adaptation measures, such as climate resilient agriculture, in sub-villages	All villagers
		Conduct of a series of hands-on training on climate change adaptation measures with the participation of female and male members at sub-village level	A total of 120 villagers, of which more than 40% are women, will be selected in each village.
		Conduct of meetings and workshops for participatory planning, monitoring, an evaluation of the hands-on training on climate change adaptation measures	Village leaders and those who participate in the hands-on training courses
	2.3.1 formulation of forest management plan	Consultation on development of forest management plan and forest management agreement, finalization of the draft plans Exchange agreements	Local leaders and other villagers
		Formulation of a working group composed of village leaders, representatives from sub-	Local leaders such as village chiefs, youth group leaders,

Type of Stakeholder	Activities	Measures of engagement	Participants
		villages (women and men), households who have used forests, and representatives from women and other vulnerable groups	elders, traditional leaders, representatives from sub-villages (women and men), representatives from vulnerable groups
		Conducts of a series of workshops and meetings for formulation of a forest management plan	ditto
Local leaders and Post-administrative officers concerned with the target watersheds	1.2.2 Establishment and operation of watershed management councils	Organization of an initial consultation meeting with Post-administrative officers and village chiefs of villagers concerned on the establishment of a post-administrative-level platform.	Post administrative officers, Community development officers of P.A., Village chiefs of villages concerned with P.A.
		Conducts of a series of meetings and workshops for development of by-laws on the platform, selection of members of the platform, determination of roles and responsibilities of the members, and development of a management plan	Ditto
		Organization of quarterly meetings of the platform to discuss any issues on forest and natural resource management in the localities and determine the necessary actions to be taken for sustainable natural resource management in the areas	Ditto

Source: JICA (2020)

10.6 Grievance Redress Mechanism

Although the potential environmental and social risks associated with the project are considered minimal, the grievance redress mechanism (GRM) of the proposed project should be in place in addition to those of JICA (AE and EE) and DGFCIP/NDFWM or MAF. Among others, the GRM at project level is crucial for sound management, operations of the proposed project, as it ensures that all complaints of affected or potentially affected people (AP/PAP) could be addressed, and necessary remedial actions could be taken in a timely and effective manner. The following sections describe the proposed GRM of the project and those of EE as well as AE.

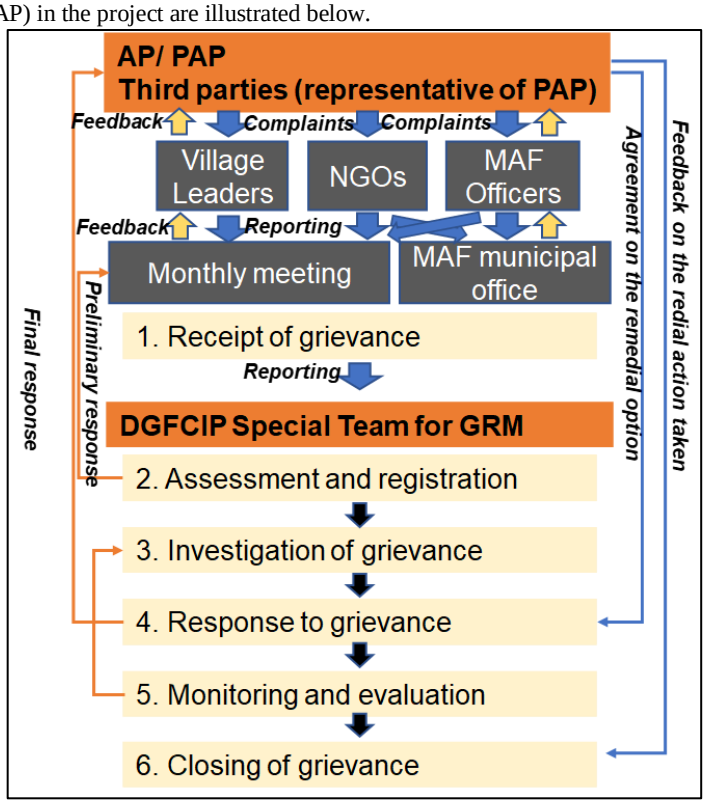
10.6.1 Grievance Redress Mechanism at the Project Level

(1) Outline of the Project-Level Grievance Redress Mechanism (GRM)

The GRM of the project shall be i) independent; ii) neutral; iii) easy to access for local communities; iv) transparent; v) efficiently transferred to the project management/ EE/ AE, and vi) customarily acceptable for local communities, though it should be in compliance with the JICA's Guidelines for Environmental and Social Considerations (2010) and Guidance for Projects and Companies Designing Grievance Mechanisms of IFC 2009. Based on the principles given above, the GRM of the project are designed as shown below.

Table 10-10 Outline of Grievance Redress Mechanism proposed for the Project

Outline	Descriptions
Goal	■ To reduce any negative environmental and social impacts arising from the implementation of the proposed project by taking mitigation and remedial measures in a timely manner.
Objectives	■ To enable affected and/or potentially affected people to file complaints/ grievance to DGFCIP/NDFWM and JICA; ■ To enable DGFCIP/NDFWM, MAF Municipal offices, and JICA to properly and effectively assess complaints and grievance; ■ To enable DGFCIP/NDFWM, MAF Municipal offices, and JICA to take necessary remedial and mitigation measures; and ■ To enable DGFCIP/NDFWM, MAF Municipal offices, and JICA to monitor and evaluate the

Outline	Descriptions
	effectiveness of the remedial and mitigation measures taken.
Scope	■ GRM should accept complains/ issues on negative impacts arising from the project implementation on local livelihoods, human rights, living standards of local communities and natural environment in the target villages. Any allegation of corruptions or criminal acts will be filed to the relevant authorities but not to the GRM established for the proposed project.
Responsible body	■ DGFCIP/NDFWM shall form a special team for GRM with technical assistance from TET. ■ The head of the special team shall be Director of the Department of Watershed and Coastal Management of NDFWM or other relevant department under DGFCIP, such as Department of Community Forestry. ■ Members of the special team shall be composed of other relevant departments of NDFWM, NDNC, and NDCIP as well as the Forest Department of the MAF municipal offices concerned. ■ TET shall be involved in the operations and management of the special team especially in the initial few years to help the special team properly and efficiently assess, investigate, and address complaints from AP/PAP in a timely manner.
Procedures for receiving, recording, and handling complaints	The proposed procedures for handling complaints/ grievance from affected and/or potentially affected people (AP/PAP) in the project are illustrated below.  **Proposed Procedures of GRM of the Project** *Source: JICA (2020)*
Pre-information of the project-based GRM to local communities	■ After establishment of the special team and determination of the process of GRM, DGFCIP, DNFWM, and MAF municipal officers concerned, specially the Central and Municipal Project Monitoring Teams, shall explain to local communities in the target villages the propose GRM, namely its aims, mechanism, process, and expected outputs, and communities' rights to make complaints, when starting Activity 1.1.1. ■ The Project Monitoring Teams shall introduce, but not limited to, the following: • Objectives of the project-level GRM (What the purpose of the GRM is); • Target groups of the project-level GRM (Who can use the GRM); • How to make and file complaints (Where, when, and how community members can file complaints); • Process of receiving their complaints and actions to be taken after receipt (What will happen after filing complaints); • Persons/ organizations responsible for processing their complaints and taking actions (Who is responsible for receiving and responding to complaints); and • Communities' rights to be protected and safety of AP/PAP who make complaints ■ After introduction and explanation of the GRM in the1st consultation of PLUP (or Activity 1.1.1 at the respective target villages, the process and procedures of the GRM with the results will be re-introduced to local communities when the annual evaluation meetings of PLUP are held at the respective villages, so that local leaders and communities are reminded of the GRM.
Preparation and issuance of	■ Prior to the field introduction of the project-level GRM, a simple leaflet of the GRM shall be prepared and issued in local language for distribution of the same to local communities in the introductory

Outline	Descriptions
leaflet of the GRM and distribution of the leaflet/ poster	meeting. ■ The leaflet/ poster shall be posted on bulletin board of village and sub-village offices so that local people are aware of the GRM and its process.

Source: JICA (2020)

(2) Steps and Activities proposed in the Process of the Grievance Redressal Mechanism (GRM)

Key steps and activities proposed in the procedures of the GRM are detailed in the table below.

Table 10-11 Proposed GRM at the Project Level

Actions	Brief description of the actions	Responsibility	Timing
Step 1: Receipt of grievance	■ Any villager who have complaints about the project could file complaints through village leaders, NGOs working for Activities 1.1.1 ~ 1.2.2, 2.1.1 an 2.3.1, and MAF field officials (e.g., extension officers). ■ Village leaders and NGOs who receive complaints shall report the complaints to MAF Monitoring Teams directly or in the monthly meetings held in Activity 1.2.1. ■ MAF Monitoring Teams shall prepare the grievance document filling up the format of grievance by an interview to a/ complainant/s. The information covered by the format shall include, but not limited to, the following: ➢ Personal information on complainants (name, age, sex, address, ID & telephone number, organization if applicable); ➢ Summary of complaints (Events/ activities causing complaints, consequent damage or potential damage, affected or potentially affected people, etc.); and ➢ Recommended actions and expected resolutions. ■ MAF Monitoring Teams shall submit the grievance report to the special team for GRM under DGFCIP immediately after receipt of the complaints. ■ If any third party representing affected/ potentially affected person/s submits complaints, the third party is required to submit a proxy letter with signature of APs/PAPs with the complaints.	Village leaders, NGOs, MAF field officials, and Municipal Project Monitoring Team will be the potential receivers of complaints. MAF Municipal and Central Monitoring Teams will prepare and submit the grievance document with interviews to a/ complainant/s.	When any complaints arise
Stem 2: Assessment and Registration of grievance	■ The special team for GRM under DGFCIP shall review the grievance report to assess the severity of complaints. ■ In case the special team judges that the complaints are qualified for registration, the team in consultation with National Director of NDFWM and DGFCIP shall assign the focal person or party to address the complaints. ■ The special team shall record the grievance in the grievance log matrix (excel database) so that the team could track the status of the complaints. ■ The special team through the Monitoring Teams shall notify the receipt of the grievance with results of an initial assessment to the complainant/s. ■ The receipt of the grievance shall also be placed on the bulletin board of the MAF municipal office concerned.	The special team under DGFCIP shall review the report and evaluate the complaints. The special team shall record the complaints in the grievance log matrix. MAF Municipal and Central Monitoring Teams will notify the receipt of the grievance to the complainant/s.	Within 7 business days from the receipt of the grievance report
Step 3: Review and investigation of	■ The focal person/ party assigned in collaboration with the MAF Monitoring Teams will visit the village or the site to observe the situations and	Focal person/ party with the special team and MAF Municipal	After acknowledgement to complainant

Actions	Brief description of the actions	Responsibility	Timing
the complaints	interview the complainants and other persons concerned for investigation of the complaints. ■ After the field investigation, the focal person/ party and the special team under DGFCIP will figure out the possible solution with careful consideration of local custom, gender equality, government regulations and policies, experiences in the past, and potential outcomes.	Monitoring Team will conduct a field investigation. Focal person/ party with the special team will figure out the possible solution.	
Step 4: Response to grievance	■ The MAF Monitoring Teams shall notify the results of the investigation to the complainants an make an agreement on the solution measures. proposed by the special team under DGFCIP. ■ The solution measures will be undertaken by the relevant parties, namely MAF officials, NGOs, local authorities, and local communities according to the agreement. ■ The results of the investigation and the agreement made between MAF and the complainants will be shared with village leaders and other communities in the monthly meetings held in Activity 1.2.1 and posted on the bulletin board of the MAF municipal office.	MAF Municipal Monitoring Team will notify the results of the investigation and proposed solution to the complainant/s and share the results with village leaders in the monthly meetings.	Within 30 business days from grievance receipt
Step 5: Monitoring & Evaluation	■ The Municipal Monitoring Team will monitor the situations after undertaking the solution measures. ■ The Municipal Monitoring Team will report the results of monitoring in the monthly meetings held in Activity 1.2.1 and submit a simple monitoring report to Director of MAF Municipal office and the special team under DGFCIP. ■ Once the situations are improved and complaints are fixed, the special team under DGFCIP shall keep the results in the grievance log matrix. ■ JICA represented by its TA will conduct the post-evaluation of grievance cases and extract lessons to improve project implementation.	MAF Municipal Monitoring Team will monitor the situations from time to time and report the results to village leaders in the monthly meetings and DGFCIP. TET will conduct the post evaluation of the complains.	Every month after agreement between the complainant/s and the special team under DGFCIP.

Source: JICA (2020)

(3) Contents (Information) kept in the Grievance Log Matrix

The grievance log matrix will be used for monitoring and tracking the situations of the complaints. Hence, it shall be periodically updated from the registration to the closing of the case. The information recorded in the log matrix shall include, but not limited to, the following.

<u>At the time of registration:</u>

- Details of the complaint (when, where, how it occurred; who was involved; complainant's story; date and place when/where the grievance was received)
- Previous records of similar incidents
- Evidence, supporting documents and statements

<u>At the time of investigation and during the monitoring</u>

- Results of investigation
- Results of monitoring
- Any follow-up meetings, corrective actions, or additional agreements/ comments

<u>At the time of closing:</u>

- Results of the solution
- Closing report (feedback of the complainant/s, data of closing, etc.)
- Management actions needed to avoid recurrence

10.6.2 Grievance Redress Mechanism of the Executing Entity

At present, DGFCIP and its subordinate national directorates namely NDFWM, NDNC, and NDCIP, does not have a clear system/ mechanism in place for addressing any grievance from local communities. Though it is not formalized, the national directorates have sometimes received local claims through its extension arms and dealt with any critical issues in collaboration with MAF municipal offices concerned.

In general, local communities in the country use the local administrative lines for conveying their complaints to higher authorities. Village chief is the first contact for local communities, and village chief convey the complaint to Post-Administrative Office (P.A. Office), and if necessary, to Municipal Administrative Office. If the case was serious, P.A Office or Municipal Administrative Office would request relevant departments to take necessary actions to address the grievance.

Hence, the current protocol should be used for the proposed project so that the project-level GRM could be well accepted by local communities. The recording and tracking the grievance at P.A. and/or Municipal Office level are to be further confirmed prior to the commencement of the project, and if necessary, their GRM as well as the one of DGFCIP shall be strengthened and developed in the beginning of the project.

10.6.3 Grievance Redressal Mechanism of AE/JICA

JICA has its own GRM, namely the JICA Objection Procedures based on the Guidelines for Environmental and Social Considerations in April 2010. The mechanism is based on the principles of (i) independence; (ii) neutrality; (iii) efficiency; (iv) promptness; and (v) transparency in compliance with the Objection Procedures. The outline of the procedures for receiving, addressing, and tracking complaints submitted by affected or potentially affected people are shown below.

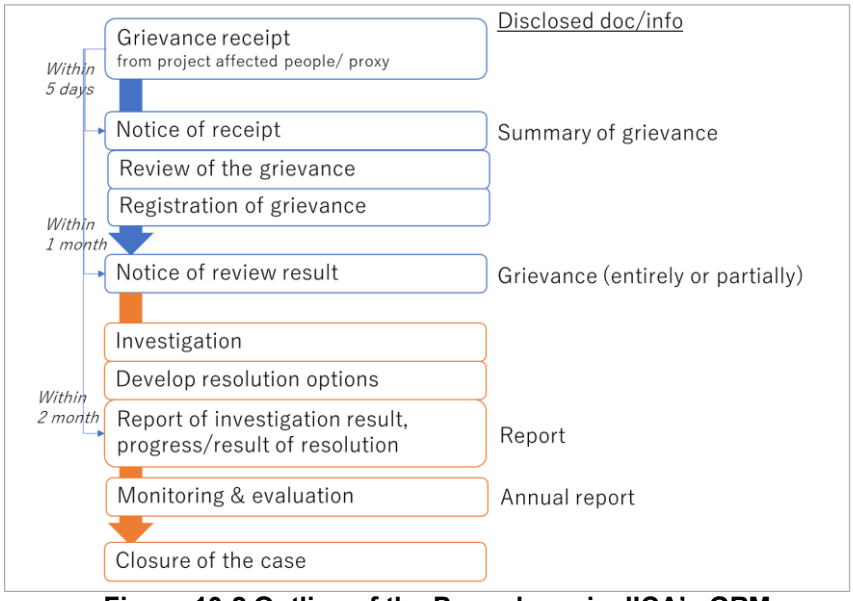


Figure 10-2 Outline of the Procedures in JICA's GRM

Source: JICA (2020)

Once the grievance is received from at least two project affected people or their proxy, independent examiners issue a notice of grievance receipt to the complainants and relevant JICA staff within 5 business days from the receipt. The examiners, appointed by the president

of JICA, do not belong to any project-operation departments to secure their independence. Once the eligibility of the complaint is confirmed and the grievance document is reviewed by the examiners, investigation including interviews with the complainants shall start within 1 month from grievance receipt to figure out possible solutions. An investigation report is submitted by the examiners to the president, the complainants, and relevant JICA departments within 2 months after the commencement of the procedures. After a series of dialogues with the president, the complainants and relevant JICA departments, the president of JICA orders relevant department/s to take necessary actions, if necessary. The status of the complaint shall be periodically monitored and evaluated until the case is closed.

In the course of the process of GRM, JICA discloses the process to the public on information related to grievance and progress of dealing with the received grievance in a timely and proper manner to ensure transparency and keep tracking of the progress.

More details on JICA's GRM is given in the following web page:
https://www.jica.go.jp/english/our_work/social_environmental/objection/index.html

10.7 Draft Monitoring Plan

Environmental monitoring and reporting will be part of the tasks of the MAF Monitoring Teams to ensure that no potential environmental and/or social impacts will be caused by the project activities. The Environmental and Social Action Plan (ESAP) will be used as the guidelines for the MAF Monitoring Teams to check if the proposed counter measures against the potential environmental and social impacts will be carried out in a proper manner. When the MAF Monitoring Teams have opportunities to attend the village-level meetings and training activities organized by Activities 1.1.1, 1.2.1. 2.1.1 and 2.4.1, the Teams will monitor the compliance of the hired NGOs and local communities in the target villages with the ESAP. The table below suggests the environmental monitoring plan, especially for monitoring of the ESAP.

Table 10-12 Draft Environmental Monitoring Plan

Items	Parameters	Location	Method	Frequency	Responsibility
Protected area	Communities' understanding of the rules on protected area management (Decree Law 05/2016)	Target villages located in and around protected areas	Observation of the meetings in Activities 1.1.1 and 1.2.1	Monthly	MAF Municipal Monitoring Teams
	Future land use plan and village regulations		Confirmation of the future land use plans and village regulations of the villages	Once after PLUP	MAF Central Monitoring Teams
	No. of cases of illegal cutting, forest fires, and animal free grazing		Observation of the monthly monitoring meetings in Activity 1.2.1	Monthly	MAF Municipal Monitoring Teams
Social conflicts	Any direct or indirect impact on economy	Target villages and watershed management councils in and around protected areas	Observation of the meetings in Activities 1.1.1, 1.2.1, and 1.2.2	Monthly	Extension officers, Municipal Project Monitoring Team
	Benefits sharing schemes developed in the villages	Target villages located in and around protected areas	Observation of the evaluation meetings of Activity 2.1.1 Interviews to village leaders	Annualy Occaisionally	MAF Municipal Monitoring Teams
	No. of grievance given by local communities		Observation of the meetings in Activities 1.1.1 & 1.2.1	Monthly	MAF Municipal Monitoring Teams

Source: JICA (2020)

11 Cost Estimate

11.1 Pre-conditions for Cost Estimates

11.1.1 Conditions and Assumptions

The following conditions are employed for estimation of the project costs.

a. All the project costs during the project period (7 years) are estimated based on April 2020 constant prices in Timor-Leste.

b. The costs of the Activities are estimated by summing up those of the Sub-activities under the respective Activities.

c. The cost breakdown structure of each activity is developed for estimation of the costs of the project activities.

d. Actual expenditures of the JICA CBNRM Project are fully referred to estimate the costs of the project activities, particularly those under Activities 1.1~1.3 and 2.1.

e. Price quotations are also collected from the relevant sources in Timor-Leste for cost estimation of the project equipment and some field activities in the Activities.

f. The exchange rate of US$ 1.0 = JPY 105.613 is used for the estimation of the cost of JICA.

g. 2.5% of the sum of direct and indirect costs for GCF fund is set aside as contingency cost to cover the price increase and exchange fluctuations.

11.1.2 Cost Component

The project cost is composed of i) Direct Cost and ii) Indirect Cost. The former covers the costs of the project activities which directly link to the project objectives, while the latter consists of those for management of the project activities. The composition of the cost component is shown below.

Table 11-1 Cost Components of the Project

Types	Component	Output	Activity	Major Cost Items
Direct cost	Component 1	Output 1.1: Improved management and protection of existing forests through introduction of PLUP and community-based NRM monitoring	Activity 1.1	Meetings, workshops, and traditional ceremony of PLUP and CCVA with cost of facilitators and operation expenses International experts, supporting staff, and other operational costs of TET
		Output 1.2: Enhanced governance capacity of local leaders at village and post-administrative levels for sustainable forest and natural resource management	Activity 1.2	Village level meetings on a monthly basis FOR capacity building with costs of facilitators and operation expenses International experts, supporting staff, and other operational costs of TET
			Activity 1.3	Meetings and workshops for formation of watershed management councils at post-administrative level with costs of facilitators and operation expenses International experts, supporting staff, and other operational costs of TET
	Component 2	Output 2.1: Enhanced food security and livelihood diversification of vulnerable living in hills and mountains in the target watersheds through implementation of micro programs/ FFSs on sustainable and climate resilient livelihoods	Activity 2.1	Meetings, workshops and training on climate change adaptation measures with costs of facilitators and operation expenses Training and workshops including transportation costs of MAF officials International experts, supporting staff,

Types	Component	Output	Activity	Major Cost Items
		Output 2.2: Development and demonstration of model cases of incentive mechanism based on the carbon offsetting scheme in selected villages	Activity 2.2	and other operational costs of TET
		Output 2.3: Rehabilitated degraded forests and lands through reforestation and sustainable forest management with introduction of CF	Activity 2.3	
		Output 2.4: Enhanced capacity of MAF field officials for provision of hands-on training and coaching on relevant sustainable and climate resilient livelihoods (e.g., climate resilient agriculture, agroforestry)	Activity 2.4	Training and workshops including transportation costs of MAF officials International experts, supporting staff, and other operational costs of TET
	Component 3	Output 3.1: Strengthened institutional and regulatory systems for implementation of the CBNRM and CF approaches in other watersheds	Activity 3.1	Workshops for introduction of new legislative documents to relevant stakeholders International experts, supporting staff, and other operational costs of TET
		Output 3.2: Enhanced MAF technical officials' capacity for implementation of the CBNRM and CF approaches, particularly PLUP, CCVA, enhancement of local governance capacity, CF, and climate change adaptation measures	Activity 3.2	Training and workshops including transportation costs of MAF officials International experts, supporting staff, and other operational costs of TET
		Output 3.3 : Institutionalization of the watershed management councils and community-based adaptation plans (CBAPs) as part of the formal institutional set-ups at municipal/post-administrative and village levels.	Activity 3.3	International experts, supporting staff, and other operational costs of TET
		Output 3.4 : Facilitation of scale-up of the CBNRM and CF approaches in other watersheds	Activity 3.4	National workshops / conferences Travel expenses of MAF and NDA officials to participate in COP meeting with costs of side events International experts, supporting staff, and other operational costs of TET
Indirect Cost	Component 4	Output 4.1 : Enhanced probability of achievement of the other project outputs through improvement of the project approaches, structures, and systems by i) evaluating the effectiveness and efficiency of the proposed project, ii) assessing the project impacts, and iii) drawing lessons from the project implementation	Activity 4.1 Activity 4.2	Costs of socio-economic surveys and drone monitoring International experts, supporting staff, and other operational costs of TET
		Output 4.2 : Development of tools for assessment of project impacts of similar types of project	Activity 4.3	
	Project Management	-	Preparatory works, planning with budget estimation, procurement, regular monitoring, and coordination and communication	International consultants hired by JICA TL for procurement and evaluation of the project National consultant hired by JICA TL for assistance in project management Cost of project equipment Assistance in implementation by MAF DGFCIP Other operation expenses

Source: JICA (2020)

11. 2 Results of Cost Estimation

Total project cost is estimated at US$15,398,169. The table below shows the breakdown of the project cost.

Table 11-2 Cost Breakdown of the Project Cost

Types	Component	Activity	Cost
Direct cost	Component 1	Activity 1.1	2,366,939
		Activity 1.2	1,237,619
		Activity 1.3	709,033
	Sub-total		4,313,591
	Component 2	Activity 2.1	6,885,182
		Activity 2.2	229,829
		Activity 2.3	1,331,517
		Activity 2.4	24,773
	Sub-total		8,471,301
	Component 3	Activity 3.1	216,842
		Activity 3.2	261,056
		Activity 3.3	199,742
		Activity 3.4	342,972
	Sub-total		1,020,612
Total of Direct cost			**13,805,504**
Indirect Cost	Component 4	Activity 4.1	28,350
		Activity 4.2	267,778
		Activity 4.3	140,404
	Sub-total		436,532
	Project Management	Preparatory works, planning, procurement, monitoring, and coordination	912,811
	Sub-total		912,811
Total of Indirect cost			**1,349,343**
Contingency			243,322
Grand Total			**15,398,169**

Source: JICA (2020)

As shown above, the total direct cost of the proposed project, which is the sum of the costs of Components 1 to 3, is estimated at US$ 13,805,504, while the indirect cost, which consists of Component 4 to 5, is estimated to be US$ 1,349,343.

11. 3 Financial Plan (Sources of Project Funds)

11.3.1 Concepts of Cost Sharing

The project cost is to be shared by GCF, JICA and the Government of Timor-Leste in accordance with the following concepts in principle.

- The Activities and project Sub-activities which directly link to the project objectives, namely to enhance local resilience against climate variability and reduce GHG emission from deforestation and forest degradation in the target watersheds, will be financed by GCF.
- Project equipment used for project operations and monitoring will be purchased by JICA support, while the operation and maintenance costs for project equipment during the project period will be financed by GCF.
- Socio-economic survey and drone monitoring for baseline data collection, which are the main activities of Activity 4.1: Establishment of Baseline Conditions for Impact Assessment, will be covered by JICA support, as TET will be responsible for implementation of both the activities. On the other hand, the monitoring survey for program-end evaluation will be covered by GCF.

- JICA will organize TET composed of international experts and supporting staff using its own budget to ensure the proper, effective, and efficient implementation of the Activities.
- As the capacity building on the CBNRM mechanism/approach among MAF officials and NGO technical staff in non-project municipalities is one of the tasks of TET, the costs for Activity 3.2 are included in the portion of JICA support.
- The costs for international and national consultants hired by JICA TL for implementation, evaluation, and management of the project will be part of GCF support.
- Expenses needed for monitoring, management, and operations by MAF/ DGFCIP/ NDFWM/ NDA, and other government officials are shouldered by the GoTL.

The table below shows the cost sharing of the project cost among the three parties in accordance with the concepts listed above.

Table 11-3 Financial Plan

Component	Activity	Cost Items	Cost	Responsibility
Component 1	Activity 1.1	PLUP with CCVA	1,363,672	GCF
		Follow-up for the PLUP-introduced villages	188,400	GoTL
		Implementation of Activity 1.1	814,867	JICA
	Activity 1.2	Enhancement of village leaders' capacity	811,632	GCF
		Implementation of Activity 1.2	425.987	JICA
	Activity 1.3	Formation of WMCs	129,612	GCF
		Seedlings for WMCs, Support for Community Activities	336,000	GoTL
		Implementation of Activity 1.3	243,421	JICA
Component 2	Activity 2.1	Hands-on training in the field	5,346,076	GCF
		Support for Community Activities, Equipment & Materials	996,710	GoTL
		Implementation of Activity 2.1	542,396	JICA
	Activity 2.2	Implementation of Activity 2.2	229.829	JICA
	Activity 2.3	Hands-on training in the field/ Implementation of Activity 2.3	1,187,185	GCF
		Implementation of Activity 2.3	144,332	JICA
	Activity 2.4	Lectures and training for MAF officials	22,015	GCF
		Implementation of Activity 2.4	2,758	JICA
Component 3	Activity 3.1	Consultation meetings	17,100	JICA
		Implementation of Activity 3.1	216,842	JICA
	Activity 3.2	Lectures and training for MAF officials	61,314	JICA
		Implementation of Activity 3.2	261.056	JICA
	Activity 3.3	Implementation of Activity 3.3	199,742	JICA
	Activity 3.4	National workshops and conference International travel expenses for the GoTL's officials and cost for side events	143,230	GCF
		Implementation of Activity 3.4	199,742	JICA
Component 4	Activity 4.1	Baseline data collection	28,350	JICA
	Activity 4.2	Mid-term and Program-end impact assessments	267,778	GCF
	Activity 4.3	Implementation of Activity 4.3	140,404	JICA
Project Management	Preparatory works, planning, procurement, monitoring, and coordination	Consulting service of procurement, monitoring financial management, procurement of project equipment, other operation expenses	461,700	GCF
		Implementation of the project by MAF DGFCIP, Project office	451,111	GoTL
Contingency			243,322	
Total			**15,398,169**	

Source: JICA (2020)

11.3.2 Cost Estimates by the Financing Parties

The total financing amount from GCF is estimated at US$ 9,976,222 as shown below. Co-financing amounts from the GoTL and JICA are calculated at US$ 1,972,222 and JPY 364,297,971 which is equivalent to US$ 3,449,726, respectively. The JICA cost was converted to US dollar by using exchange rate of US$ 1.0 = JPY 105.613. More details of the cost estimates, namely cost breakdown of the project activities used for estimation of the unit costs of Activities, are presented in **Annex 3** of the funding proposal of the project.

Table 11-4 Financial Plan for each Financing Party

(unit: USD)

Component	Activity	Project Cost			
		GCF	GoTL	JICA	Total
Component 1	Activity 1.1	1,363,672	188,400	814,867	2,366,939
	Activity 1.2	811,632	0	425,987	1,237,619
	Activity 1.3	129,612	336,000	243,421	709,033
Component 2	Activity 2.1	5,346,076	996,710	542,396	6,885,182
	Activity 2.2	0	0	229,829	229,829
	Activity 2.3	1,187,185	0	144,332	1,331,517
	Activity 2.4	22,015	0	2,758	24,773
Component 3	Activity 3.1	0	0	216,842	216,842
	Activity 3.2	0	0	261,056	261,056
	Activity 3.3	0	0	199,742	199,742
	Activity 3.4	143,230	0	199,742	342,972
Component 4	Activity 4.1	0	0	28,350	28,350
	Activity 4.2	267,778	0	0	267,778
	Activity 4.3	0	0	140,404	140,404
Project Management	Preparatory works, planning, procurement, monitoring, and coordination	461,700	451,111	0	912,811
Contingency		243,322	0	0	243,322
TOTAL		9,976,222	1,972,222	3,449,726	15,398,169

Source: JICA (2020)

11.4 Annual Cost Disbursement Schedules

An annual disbursement schedule of the project cost during the project period (7 years) is structured in reference to the project implementation schedule. **Annex 3** of the funding proposal of the project shows the detailed annual disbursement schedule of the overall project. The disbursement schedules of the entire project costs and those shouldered by the respective parties (GCF, GoTL and JICA) are summarized below.

Table 11-5 Summary of Annual Cost Schedule for GCF fund

(Unit: US$)

Items	1st (2021)	2nd (2022)	3rd (2023)	4th (2024)	5th (2025)	6th (2026)	7th (2027)	Total
Activity 1.1	140,378	401,080	421,134	401,080	0	0	0	1,363,672
Activity 1.2	32,859	71,285	147,971	224,837	224,852	109,830	0	811,632
Activity 1.3	0	10,693	34,348	38,884	38,884	6,804	0	129,612
Activity 2.1	0	272,196	903,759	1,605,433	1,961,795	1,342,017	391,937	5,346,076
Activity 2.2	0	0	0	0	0	0	0	0
Activity 2.3	0	0	34,877	176,154	378,714	405,120	192,320	1,187,185
Activity 2.4	15,930	0	6,085	0	0	0	0	22,015
Activity 3.1	0	0	0	0	0	0	0	0
Activity 3.2	0	0	0	0	0	0	0	0

Items	1st (2021)	2nd (2022)	3rd (2023)	4th (2024)	5th (2025)	6th (2026)	7th (2027)	Total
Activity 3.3	0	0	0	0	0	0	0	0
Activity 3.4	0	51,335	0	0	40,560	0	51,335	143,230
Activity 4.1	0	0	0	0	0	0	0	0
Activity 4.2	0	18,439	18,439	35,877	18,439	18,439	158,147	267,778
Activity 4.3	0	0	0	0	0	0	0	0
Project Management	105,243	105,243	55,243	80,243	55,243	30,243	30,243	461,700
Contingency	7,360	23,257	39,955	60,220	59,056	37,683	15,792	243,322
Total Cost	301,770	953,527	1,638,157	2,469,022	2,421,276	1,545,015	647,453	9,976,222

Source: JICA (2020)

Table 11-6 Summary of Annual Cost Schedule for the GoTL

(Unit: US$)

Items	1st (2021)	2nd (2022)	3rd (2023)	4th (2024)	5th (2025)	6th (2026)	7th (2027)	Total
Activity 1.1	13,700	21,100	28,500	28,500	32,200	32,200	32,200	188,400
Activity 1.2	0	0	0	0	0	0	0	0
Activity 1.3	0	21,000	63,000	63,000	63,000	63,000	63,000	336,000
Activity 2.1	14,010	95,100	158,500	158,500	190,200	190,200	190,200	996,710
Activity 2.2	0	0	0	0	0	0	0	0
Activity 2.3	0	0	0	0	0	0	0	0
Activity 2.4	0	0	0	0	0	0	0	0
Activity 3.1	0	0	0	0	0	0	0	0
Activity 3.2	0	0	0	0	0	0	0	0
Activity 3.3	0	0	0	0	0	0	0	0
Activity 3.4	0	0	0	0	0	0	0	0
Activity 4.1	0	0	0	0	0	0	0	0
Activity 4.2	0	0	0	0	0	0	0	0
Activity 4.3	0	0	0	0	0	0	0	0
Project Management	23,779	46,636	69,493	69,493	80,570	80,570	80,570	451,111
Contingency	0	0	0	0	0	0	0	0
Total Cost	51,490	183,836	319,493	319,493	365,970	365,970	365,970	1,972,222

Source: JICA (2020)

Table 11-7 Summary of Annual Cost Schedule for JICA

(Unit: JPY)

Items	1st (2021)	2nd (2022)	3rd (2023)	4th (2024)	5th (2025)	6th (2026)	7th (2027)	Total
Activity 1.1	10,028,570	20,422,202	16,780,948	20,320,256	18,499,629	0	0	86,051,605
Activity 1.2	5,242,622	10,676,087	8,772,554	10,622,793	9,671,027	0	0	44,985,083
Activity 1.3	2,995,784	6,100,621	5,012,888	6,070,168	5,526,301	0	0	25,705,762
Activity 2.1	6,675,263	13,593,521	11,169,812	13,525,663	12,313,809	0	0	57,278,069
Activity 2.2	2,828,501	5,759,966	4,732,971	5,731,213	5,217,716	0	0	24,270,368
Activity 2.3	1,776,299	3,617,259	2,972,306	3,599,202	3,276,725	0	0	15,241,791
Activity 2.4	33,942	69,120	56,796	68,775	62,613	0	0	291,244
Activity 3.1	2,458,225	5,908,774	4,113,382	5,883,785	4,534,669	0	0	22,898,836
Activity 3.2	2,458,225	6,689,392	5,784,291	8,101,238	4,534,669	0	0	27,567,816
Activity 3.3	2,458,225	5,005,934	4,113,382	4,980,945	4,534,669	0	0	21,093,156
Activity 3.4	2,458,225	5,005,934	4,113,382	4,980,945	4,534,669	0	0	21,093,156
Activity 4.1	2,994,096	0	0	0	0	0	0	2,994,096
Activity 4.2	0	0	0	0	0	0	0	0
Activity 4.3	1,727,957	3,518,816	2,891,415	3,501,250	3,187,550	0	0	14,826,988
Project Management	0	0	0	0	0	0	0	0
Contingency	0	0	0	0	0	0	0	0
Total Cost	44,135,934	86,367,627	70,514,129	87,386,234	75,894,047	0	0	364,297,971

Source: JICA (2020)

(Unit: US$)

Items	1st (2021)	2nd (2022)	3rd (2023)	4th (2024)	5th (2025)	6th (2026)	7th (2027)	Total
Activity 1.1	94,966	193,389	158,906	192,424	175,182	0	0	814,867
Activity 1.2	49,645	101,098	83,071	100,593	91,580	0	0	425,987
Activity 1.3	28,369	57,770	47,469	57,482	52,331	0	0	243,421
Activity 2.1	63,212	128,724	105,772	128,082	116,606	0	0	542,396
Activity 2.2	26,785	54,544	44,819	54,272	49,409	0	0	229,829
Activity 2.3	16,821	34,254	28,146	34,083	31,029	0	0	144,332
Activity 2.4	321	655	538	651	593	0	0	2,758
Activity 3.1	23,278	55,954	38,951	55,717	42,941	0	0	216,842
Activity 3.2	23,278	63,346	54,775	76,715	42,941	0	0	261,056
Activity 3.3	23,278	47,404	38,951	47,167	42,941	0	0	199,742
Activity 3.4	23,278	47,404	38,951	47,167	42,941	0	0	199,742
Activity 4.1	28,350	0	0	0	0	0	0	28,350
Activity 4.2	0	0	0	0	0	0	0	0
Activity 4.3	16,363	33,322	27,380	33,155	30,185	0	0	140,404
Project Management	0	0	0	0	0	0	0	0
Contingency	0	0	0	0	0	0	0	0
Total Cost	417,945	817,863	667,730	827,509	718,679	0	0	3,449,726

Note: The costs shouldered by JICA were converted to US dollar by using exchange rate of US$ 1.0 = JPY 105.613.
Source: JICA (2020)

Table 11-8 Summary of Annual Cost Schedule for the Entire Project

(Unit: US$)

Items	1st (2021)	2nd (2022)	3rd (2023)	4th (2024)	5th (2025)	6th (2026)	7th (2027)	Total
Activity 1.1	249,044	615,569	608,540	622,004	207,382	32,200	32,200	2,366,939
Activity 1.2	82,504	172,382	231,042	325,430	316,431	109,830	0	1,237,619
Activity 1.3	28,369	89,463	144,817	159,365	154,215	69,804	63,000	709,033
Activity 2.1	77,222	496,020	1,144,379	1,738,310	1,912,336	1,127,097	389,817	6,885,182
Activity 2.2	26,785	54,544	44,819	54,272	49,409	0	0	229,829
Activity 2.3	16,821	34,254	63,023	210,237	409,743	405,120	192,320	1,331,517
Activity 2.4	16,251	655	6,623	651	593	0	0	24,773
Activity 3.1	23,278	55,954	38,951	55,717	42,941	0	0	216,842
Activity 3.2	23,278	63,346	54,775	76,715	42,941	0	0	261,056
Activity 3.3	23,278	47,404	38,951	47,167	42,941	0	0	199,742
Activity 3.4	23,278	98,739	38,951	47,167	83,501	0	51,335	342,972
Activity 4.1	28,350	0	0	0	0	0	0	28,350
Activity 4.2	0	18,439	18,439	35,877	18,439	18,439	158,147	267,778
Activity 4.3	16,363	33,322	27,380	33,155	30,185	0	0	140,404
Project Management	129,022	151,879	124,736	149,736	135,813	110,813	110,813	912,811
Contingency	7,360	23,257	39,955	60,220	59,056	37,683	15,792	243,322
Total Cost	771,205	1,955,226	2,625,381	3,616,024	3,505,925	1,910,985	1,013,423	15,398,169

Source: JICA (2020)

12. Economic Assessment

A cost and benefit analysis including a sensitivity analysis was made to evaluate the proposed project in terms of its economic viability. The project benefits, namely, incremental benefits to be generated by the project, and the project costs were estimated in the economic terms for the analysis. Details of the results of the estimation of the project benefits, calculation of the economic project costs, and evaluation of the cost and benefit analysis are described in **Annex 9** of the funding proposal of the project, and some highlights are summarized in the following sections in this chapter. The overall framework of the economic assessment of the project are described in the table below.

Table 12-1 Overall Framework of Project Evaluation

Items	Description
1) Evaluation Method	A cost and benefit analysis is used for assessment of the project viability. In particular, Economic Internal Rate of Return (EIRR) and the benefit, cost ratio (B/C ratio) and net present values (NPV) are used as indicators for evaluation.
2) Project Benefits used for Evaluation	The following three types of project outcomes are counted as project benefits. - Reduced CO_2 emission through reduction of deforestation and forest degradation by the project* - Increased livelihoods opportunities of local communities participating in hands-on training courses of Activity 2.1** - Absorbed CO_2 from the atmosphere through implementation of reforestation/ afforestation micro program whose areas could be used for carbon offsetting projects * Only the benefits from the reduced CO_2 emissions through reduction of forest degradation is estimated in the evaluation since forest degradation or conversion of dense forests is considered as the major source of CO_2 emissions in the country. **For estimation purpose, the agricultural benefit to be generated from training courses on climate resilient agriculture is estimated and used as the benefit of increased livelihood opportunities.
3) Project Cost	Direct project costs and indirect costs except government staff salary are counted as the project costs for the analysis.
4) Inflation, Subsidies, and Taxes	The influence of inflation is not considered in the estimation of the benefits and costs in the future. Likewise, taxes and government subsidies are excluded from the estimation of the project economic cost and benefit.
5) Discount rate	A discount rate of 11.87% is adopted for the calculation of the net present values of the project benefits and costs referring to the average real interest rate in Timor-Leste for the last five years, which is published by World Bank[1]. Although the real interest rate may not necessarily be used as the discount rate for the investment project in Timor-Leste due to market distortions, the rate of 11.87% is still justifiable because of the following reasons: 1) ADB has used 12% as the standard discount rate for any public investment projects in the region until recently. 2) The standard discount rate is now replaced with 9% considering the economic development in the counties in the region. However, Timor-Leste is one of the counties newly established and still categorized as the least developing countries. The 12% is considered still appropriate. 3) The proposed project can be categorized as a social-targeting and environmental protection project, which justify a lower rate (i.e., 6% in the ADB guidelines); hence the evaluation with 11.87% is considered as more conservative.
6) Conversion factor	The SCF of 1.0 is used for simple and quick but conservative assessment.
6) Evaluation period	The evaluation period is set as 20 years, which is the same as the project life.

[1] Real interest rate was referred to the data published by World Bank at the URL/https://data.worldbank.org/.

Items	Description
5) With-project and without-project conditions for estimation of the project benefits	The project benefits were estimated by comparing "the area of dense forest", "the production of maize" and "carbon sequestration by afforestation" under the "with-project" and "without project" conditions. The following table shows the basic assumptions in the changes of forest status and agricultural production with-project and without-project conditions.

Benefit	With-Project Conditions	Without-Project Conditions
Area of dense forest	The reduction rates of dense forest will decline in villages where the village-level NRM or CBNRM mechanism is in place.	The reduction rates of dense forest will be maintained as it is. The degradation rates between 2003 and 2012 is used as the BAU scenario.
Agricultural production	Yield of maize produced by trained farmers/ families of Activity 2.1 (households who participate in Activity 2.1) will increase after the training courses on climate smart agriculture.	Yield of maize produced by households will be maintained as the status quo. It may range from 0.3 ~ 2.0 ton/ha in the target watersheds based on the sampled survey done in 2018/2019.
Carbon sequestration by afforestation	Trees planted by reforestation/ afforestation micro program of Activity 2.1 will be properly managed by the community.	Reforestation/ afforestation micro program will not be implemented in the target villages.

Source: JICA (2020)

12.1 Economic Benefit of the Project

12.1.1 Summary of the Results of Estimation of Economic Benefits

The following benefits were estimated and converted into the monetary value.

a. Benefits from reduced CO_2 emission through reduction of forest degradation of dense forests in the project villages[2]
b. Benefits from increased maize production in the farms of trained farmers in the project villages
c. Benefits from carbon sequestration by reforestation/ afforestation micro program in the project villages

The methodologies of estimating and calculating the monetary values of the respective benefits are summarized below.

Table 12-2 Summary of Methodologies for Estimation of the Project Benefits

Type of benefits	Outline of Calculation
Reduced CO_2 emission	Reduced CO_2 emission =∑(Changes in dense forests under the "with project" and "without project" conditions x (Average carbon stock of dense forest – Average carbon stock of sparse forest) x unit price of CO_2 at the carbon market) Summary of the equation: $ER_y = (A_{B,y} - A_{D,y}) \times (NT_D - NT_S) \times 44/12 \times (1 - DF)$

[2] As described in the overall framework of project evaluation, the focus of the benefit assessment on the reduced CO_2 emissions was placed on those from reduction of forest degradation as the conversion of dense forests or forest degradation was considered as the major source of CO_2 emissions in the country.

Type of benefits	Outline of Calculation
	ER_y = Net anthropogenic GHG emission reduction by the project in year *y* (t-CO_2e/y) $A_{B,y}$ = The area of stratum *D* 'dense forest' in year *y* based on the baseline assumption within the project area (ha) $A_{D,y}$ = The area of stratum *D* 'dense forest' in year *y* within the project area (ha) NT_D = Carbon stock in the stratum *D* 'dense forest' in year y (t-C/ha) NT_S = Carbon stock in the stratum S 'sparse forest' in year y (t-C/ha) DF = Discount factor (20% was applied as a conservative accounting, comparing with other project level application, such as the JCM-REDD+ Cambodia as 20%, and VCS project ranging from 15-30%.) ➢ Project Boundary: ・The spatial extent of the project boundary encompasses the project village areas. ・GHG sources included in the project boundary: CO_2 (CH_4 and N_2O are excluded). ・Carbon pool included in the project boundary: Above-ground biomass and Below-ground biomass. (Dead wood, litter, soil organic carbon, and wood products are excluded.) ・Forest definition: 'Dense forest' is defined as a land with tree crown cover of more than 60%. 'Sparse forest' is defined as a land with tree crown cover of 10-60% (definition by the GoTL). ・Leakage: Migration of many farmers and farming activities out of the project boundary is not assumed in the course of the project implementation. Where: 1) The area of dense forests under "with project" condition is estimated by assuming that the degradation rate would be reduced gradually and stopped 5 years after the village regulations are in place in the project villages; 2) The area of dense forests under "without-project" condition is estimated by assuming that dense forest would be reduced at the current degradation rates of 3.5% ~ 8.6% p.a. of the respective watersheds (5.8% p.a. on average). 3) Average carbon stock of dense forest is 272.4 tC or 998.1 tCO_{2eq} per ha; 4) Average carbon stock of sparse forest is 97.9 tC or 358.9 tCO_{2eq} per ha; and 5) Unit price of CO_2 is US$ 4.2/t CO_{2eq}, which is average price of carbon credit for REDD+ project in 2016. The estimated reduction of CO_2 emissions is adjusted by the discount factor of 20% in consideration of the potential risk of reversals of net emission reduction due to unexpected events or changes of internal/external conditions.
Increased maize production	Increased maize production = Σ ((Changes in maize yield under the "with project" and "without project" conditions x Average unit farmgate price of maize – Balance amount of the production costs under the "with project" and "without project" conditions) x total area of trained farmers' farms) Where: 1) Maize yield would increase up to 1.5 ton/ha in Laclo and Comoro watersheds (northern parts of the country) and 2.4 ton/ha in Tafara and caraulun watersheds (central and southern parts of the country) one year after 2-year hands-on training courses end in the project villages; 2) Average unit farmgate price of maize is US$ 0.75/ kg; 3) Balance amount of the production costs under both the conditions is estimated by calculating the increased cost of farm laborers; and 4) Total area of farms used by trained farms is estimated by multiplying the number of trained farmers (120 households/village) with the average maize cropping area of household (0.5 ha/household).
Carbon sequestration by reforestation/ afforestation	➢ Summary description of the methodology on Project benefits Project benefits from carbon sequestration by reforestation/ afforestation =∑(Changes in carbon stock of planted trees) x unit price of CO_2 at the carbon market)

Type of benefits	Outline of Calculation
	➢ Assumptions: 1) Changes in carbon stock of trees planted by the micro program is estimated by referring to the existing carbon offset project in Timor-Leste. The basic conditions of the existing project are as follows: ✓ Tree species: Casuarina angustifolia, Swietenia macrophylla, Gmelina arborea, Tectona grandis, Paraserianthes falcataria and Gliricidia sepium ✓ Carbon pools: Tree biomass (Above and below ground), soil organic carbon, long lived harvested products, litter and dead wood ✓ 15% of risk buffer was applied. ✓ Risk level of leakage was considered low and set zero. 2) Unit price of t-CO_{2eq} of US$ 8.1/t CO_{2eq} was applied, which was the average price of carbon credit for afforestation/reforestation project in 2016.

Source: JICA (2020)

The total values of the economic benefits generated in each watershed over the project life span are summarized below.

Table 12-3 Summary of the Economic Benefits

Watershed	Type of benefits	Total estimated values
Laclo	Reduced CO_2 emission	US$ 7,806,212
	Increase of maize production	US$ 17,652,240
	Carbon sequestration by reforestation/ afforestation	US$ 48,058
Comoro	Reduced CO_2 emission	US$ 2,253,640
	Increase of maize production	US$ 6,999,960
	Carbon sequestration by reforestation/ afforestation	US$ 21,357
Tafara	Reduced CO_2 emission	US$ 2,301,449
	Increase of maize production	US$ 2,699,640
	Carbon sequestration by reforestation/ afforestation	US$ 16,021
Caraulun	Reduced CO_2 emission	US$ 6,182,045
	Increase of maize production	US$ 5,165,340
	Carbon sequestration by reforestation/ afforestation	US$ 37,377
Overall	Reduced CO_2 emission	US$ 18,543,346
	Increase of maize production	US$ 32,517,180
	Carbon sequestration by reforestation/ afforestation	US$ 122,813

Source: JICA (2020)

Details of the calculation of the project benefits are further described in the following sections.

12.1.2 Benefit from Reduced CO_2 Emissions through Reduction of Forest Degradation

The benefit from reduced CO_2 emissions is calculated according to the following formula.

Benefit of Reduced CO_2 emission = Σ (Changes in dense forests under the "with project" and "without project" conditions x (Average carbon stock of dense forest – Average carbon stock of sparse forest) x Discount factor x unit price of CO_2 at the carbon market)

The results of the calculation are summarized in the table below.

Table 12-4 Results of Calculation of Benefit from Reduced CO_2 Emission

Items	Outline of Calculation
Reduction of Forest Degradation	It was assumed, based on the results of the impact assessment made by the JICA CBNRM Project shown in Section 5.3 of this report, that the forest degradation rates (3.5~8.6%/year of the respective watersheds or 5.8%/year on average) would be constantly reduced at a rate of 20% annually after completion of PLUP and cut to zero within 5 years after PLUP under the "with-project" condition. In contrast, the areas of dense forests in the four watersheds were presumed to constantly reduce at the same degradation rates observed between 2003 and 2012 under the "without-project" condition.

Items	Outline of Calculation

(unit: ha)

Year	With-Project Condition					Without-Project Condition				
	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total
2021	12,563	3,064	2,649	6,669	24,945	12,563	3,063	2,649	6,669	24,945
2022	12,139	2,889	2,425	6,212	23,665	12,127	2,882	2,421	6,201	23,631
2023	11,760	2,737	2,234	5,814	22,545	11,706	2,712	2,212	5,766	22,395
2024	11,442	2,609	2,083	5,487	21,621	11,299	2,552	2,021	5,361	21,233
2025	11,200	2,507	1,976	5,241	20,924	10,907	2,401	1,847	4,985	20,139
2026	11,029	2,428	1,907	5,066	20,430	10,528	2,259	1,688	4,635	19,110
2027	10,914	2,366	1,867	4,946	20,093	10,162	2,125	1,543	4,309	18,140
2028	10,836	2,314	1,844	4,862	19,856	9,809	2,000	1,410	4,007	17,226
2029	10,775	2,268	1,829	4,798	19,670	9,468	1,882	1,288	3,726	16,364
2030	10,717	2,225	1,816	4,738	19,496	9,139	1,770	1,177	3,464	15,551
2031	10,661	2,184	1,804	4,682	19,331	8,822	1,666	1,076	3,221	14,785
2032	10,607	2,146	1,793	4,630	19,176	8,515	1,567	983	2,995	14,061
2033	10,554	2,110	1,783	4,582	19,029	8,220	1,475	898	2,785	13,377
2034	10,503	2,076	1,774	4,537	18,890	7,934	1,388	821	2,589	12,732
2035	10,454	2,044	1,765	4,495	18,758	7,659	1,306	750	2,407	12,122
2036	10,407	2,014	1,757	4,456	18,634	7,392	1,228	686	2,238	11,545
2037	10,361	1,986	1,750	4,420	18,517	7,136	1,156	627	2,081	10,999
2038	10,317	1,960	1,744	4,387	18,408	6,888	1,088	573	1,935	10,483
2039	10,275	1,935	1,738	4,356	18,304	6,649	1,023	523	1,799	9,994
2040	10,234	1,912	1,733	4,327	18,206	6,418	963	478	1,673	9,532

Source: JICA (2020)

The potential leakage is assumed to be zero, since the village-level NRM regulations with continuous governance capacity enhancement as well as local livelihood improvement is expected to cause a behavioural change among local communities in the target villages. Operations of the watershed management councils at post-administrative level will enhance the village level mechanism and result in the reduction of inter-village cases of illegal cutting, wildfires, and animal grazing in the sub-watersheds/ post-administratives.

As for firewood collection for household consumption, local communities in the target villages collect dead trees/ fallen branches and/or prune branches of shade trees in coffee plantations and regenerated trees in fallow areas for shifting cultivation. Thus, the introduction of the village-level regulations is not expected to affect their firewood collection practices or cause any shifting of firewood collection activities to existing forests, particularly dense forests, in the target villages. If anything, the project activities of Activities 2.1 (micro programs) and 2.3 (CF) will enable local communities to sustainably produce firewood trees in their own lands through reforestation, production of fodder trees, and introduction improved silvicultural practices.

As a result, a total of 8,674 ha of dense forest in total would be protected from degradation as summarized below.

Watersheds	With-project	Without-project	Balance (Protected)
Laclo	10,234	6,418	3,816
Comoro	1,912	963	949
Tafara	1,733	478	1,255
Calaurun	4,327	1,673	2,654
Total	18,206	9,532	8,674

Source: JICA (2020)

Average Carbon Stock of Dense and Sparse Forests

Above-ground and below-ground tree biomasses were counted as major carbon pools of dense and sparse forests in the estimation. Other carbon pools, i.e. above-ground non-tree biomass, dead wood, litter and soil organic carbon, were not used in the estimation due to a lack of data and also for conservative estimation.

Data collected by the forestry inventory survey conducted by NDFWM and NDNC with technical assistance from the JICA CBNRM Project Phase II from July 2019 to January 2020 were used to estimate the average stocks in the respective types of forests. To supplement the survey results, data of the Forest Conservation Plan (2012) were also fully used for estimation. The average CO_2 stocks of dense and sparse forests are estimated at 998.1 ton CO_{2eq}/ha and 358.9 ton CO_{2eq}/ha, respectively, as shown below.

Watersheds	Dense forest <1		Sparse forest		Balance
	Carbon stock (t C/ha)	CO_2 stock (t CO_2eq/ha)	Carbon stock (t C/ha)	CO_2 stock (t CO_2eq/ha)	CO_2 stock (t CO_2eq/ha)
Laclo	281.4	1031.8	88.3	323.6	708.2
Comoro	241.8	886.5	75.8	277.8	608.7
Tafara	276.7	1014.4	127.7	468.2	546.2
Calaurun	289.0	1059.7	99.9	366.2	693.5

Items	Outline of Calculation

Average	272.2	998.1	97.9	358.9	639.2

Note: CO_2 stock is calculated by multiplying 3.67 with the carbon stocks.
Source: JICA CB-NRM Project Team (2020)

Estimation of Reduced CO_2 Emission from Dense Forests

The reduction of potential CO_2 emissions was estimated by assessing the differences in CO_2 emissions from degradation of dense forest (conversion of dense forest into sparse forest) in the target watersheds under the "with-project" and "without-project" scenarios.

It was assumed that dense forests located in the project villages, 74 villages in the target watersheds in total, would be protected from degradation under the "with-project" scenario. As mentioned in the previous section, PLUP is expected to exert a reduction effect on forest degradation from the following year after introduction of the village-level NRM regulations. The calculation was made on the assumption that the forest degradation rates would be constantly reduced by 20% annually, and become 0% from the 6th year.

The following tables show the CO_2 emissions of both the baseline (without-project) and with-project scenarios. More details in the estimation are described in **Tables 12-3 and 12-4** of this report and **Annex 9** of the funding proposal of the project.

a. CO_2 Emission from forest degradation of the Baseline Scenario (unit: tCO_2)

Year	Laclo	Comoro	Tafara	Caraulun	Total
2021	275,117	135,986	136,558	349,532	897,193
2022	265,379	128,194	124,538	324,566	842,677
2023	256,249	120,402	114,162	301,679	792,492
2024	247,727	113,322	104,328	280,874	746,251
2025	238,597	106,946	95,044	260,762	701,349
2026	230,685	100,573	86,849	242,730	660,837
2027	222,772	94,197	79,204	225,394	621,567
2028	214,859	89,239	72,648	210,133	586,879
2029	207,555	83,574	66,092	194,876	552,097
2030	200,251	78,617	60,632	181,702	521,202
2031	192,947	74,367	55,169	168,524	491,007
2032	186,252	69,410	50,798	156,735	463,195
2033	180,165	65,868	46,427	145,636	438,096
2034	174,079	61,618	42,060	135,234	412,991
2035	167,992	58,076	38,782	126,218	391,068
2036	161,905	54,534	35,504	117,205	369,148
2037	156,427	51,704	32,226	108,882	349,239
2038	150,949	48,162	29,495	101,251	329,857
2039	145,471	45,327	26,767	94,318	311,883
2040	140,602	42,497	24,581	87,384	295,064

b. CO_2 Emission from forest degradation of the With-Project Scenario (unit: tCO_2)

Year	Laclo	Comoro	Tafara	Caraulun	Total
2021	275,117	135,986	136,558	349,532	897,193
2022	258,075	123,944	122,353	316,936	821,308
2023	230,685	107,653	104,328	276,019	718,685
2024	193,556	90,655	82,478	226,780	593,469
2025	147,297	72,241	58,447	170,603	448,588
2026	104,082	55,953	37,690	121,367	319,092
2027	69,997	43,912	21,850	83,222	218,981
2028	47,476	36,828	12,562	58,256	155,122
2029	37,129	32,578	8,195	44,385	122,287
2030	35,303	30,455	7,102	41,609	114,469
2031	34,085	29,040	6,556	38,837	108,518
2032	32,868	26,913	6,010	36,062	101,853
2033	32,259	25,498	5,463	33,290	96,510
2034	31,042	24,079	4,917	31,207	91,245
2035	29,825	22,664	4,917	29,128	86,534
2036	28,607	21,248	4,371	27,045	81,271
2037	27,999	19,829	3,824	24,966	76,618
2038	26,781	18,414	3,278	22,887	71,360
2039	25,564	17,706	3,278	21,498	68,046
2040	24,955	16,291	2,732	20,112	64,090

Source: JICA CB-NRM Project Team (2020)

Items	Outline of Calculation
Estimation of Reduced CO_2 emission	The reduced CO_2 emissions in the target watersheds were calculated by assessing the differences in CO_2 emissions under the different scenarios. The table shown below indicates that the project interventions could reduce approximately 21,369 ~ 431,757 ton CO_2eq annually.

(unit: tCO_{2eq})

Year	Laclo	Comoro	Tafara	Caraulun	Total
2021	0	0	0	0	0
2022	7,304	4,250	2,185	7,630	21,369
2023	25,564	12,749	9,834	25,660	73,807
2024	54,171	22,667	21,850	54,094	152,782
2025	91,300	34,705	36,597	90,159	252,761
2026	126,603	44,620	49,159	121,363	341,745
2027	152,775	50,285	57,354	142,172	402,586
2028	167,383	52,411	60,086	151,877	431,757
2029	170,426	50,996	57,897	150,491	429,810
2030	164,948	48,162	53,530	140,093	406,733
2031	158,862	45,327	48,613	129,687	382,489
2032	153,384	42,497	44,788	120,673	361,342
2033	147,906	40,370	40,964	112,346	341,586
2034	143,037	37,539	37,143	104,027	321,746
2035	138,167	35,412	33,865	97,090	304,534
2036	133,298	33,286	31,133	90,160	287,877
2037	128,428	31,875	28,402	83,916	272,621
2038	124,168	29,748	26,217	78,364	258,497
2039	119,907	27,621	23,489	72,820	243,837
2040	115,647	26,206	21,849	67,272	230,974
Total	2,323,278	670,726	684,955	1,839,894	5,518,853

Source: JICA CB-NRM Project Team (2020)

Estimated CO_2 emission reductions adjusted by the discount factor	The reduced CO_2 emission calculated above were adjusted by the discount factor of 20% in consideration of the potential risks of reversals of net emission reduction due to unexpected events of changes of internal and external conditions of the project during the project life span. As a result of the adjustment, the reduced CO_2 emissions during the project life span are estimated at 17,095 ~ 345,406 ton CO_2eq/year. In total, around 4.4 million ton CO_{2eq} will be reduced from forest degradation by project interventions over the project life span

(unit: tCO_{2eq})

Year	Laclo	Comoro	Tafara	Caraulun	Total
2021	0	0	0	0	0
2022	5,843	3,400	1,748	6,104	17,095
2023	20,451	10,199	7,867	20,528	59,046
2024	43,337	18,134	17,480	43,275	122,226
2025	73,040	27,764	29,278	72,127	202,209
2026	101,282	35,696	39,327	97,090	273,396
2027	122,220	40,228	45,883	113,738	322,069
2028	133,906	41,929	48,069	121,502	345,406
2029	136,341	40,797	46,318	120,393	343,848
2030	131,958	38,530	42,824	112,074	325,386
2031	127,090	36,262	38,890	103,750	305,991
2032	122,707	33,998	35,830	96,538	289,074
2033	118,325	32,296	32,771	89,877	273,269
2034	114,430	30,031	29,714	83,222	257,397
2035	110,534	28,330	27,092	77,672	243,627
2036	106,638	26,629	24,906	72,128	230,302
2037	102,742	25,500	22,722	67,133	218,097
2038	99,334	23,798	20,974	62,691	206,798
2039	95,926	22,097	18,791	58,256	195,070
2040	92,518	20,965	17,479	53,818	184,779
Total	1,858,622	536,581	547,964	1,471,915	4,415,082

Source: JICA CB-NRM Project Team (2020)

Benefits from Reduced CO_2 Emission	The reduced CO_2 emissions were converted into the monetary value by using the market carbon price of US$ 4.2/ t CO_2eq, which is used for REDD+ project in the voluntary carbon market in 2016. The total benefit from CO_2 reduction during the project life span is estimated at US$ 18,543,346. Details of the results of benefit estimation are described in **Table 12-5** of this report and **Annex 9** of the funding proposal of the project.

Source: JICA (2020)

Tables 6~10 show the details of the calculation of the progress of forest degradation, estimated CO_2 emission, and benefits from reduced CO_2 emissions in the target watersheds under the "with-project" and "without-project" conditions

12.1.3 Benefit from Increased Maize Production in Trained Famers' Farms

The benefit from increased maize production is calculated according to the following formula.

Benefit from Increased production = Σ((Changes in maize yield under the "with project" and "without project" conditions x Average unit farmgate price of maize – Balance amount of the production costs under the "with project" and "without project" conditions) x total area of trained farmers' farms)

The results of the calculation are summarized in the table below.

Table 12-5 Result of Calculation of Benefit from Increased Maize Production

Items	Outline of Calculation
Estimation of Increased Maize Yields under the With-Project and Without-Project Conditions	Maize yield under the with-project condition was estimated by fully referring to the results of the impact survey made by the JICA. The same survey indicated that the project interventions, namely enhancement of local capacity for climate resilient agriculture through hands-on training, would increase maize yield by 1.5 ton/ha even under the unfavorable weather conditions in the drier areas and 2.4 ton/ha under the normal weather conditions in the same areas. Consequently, the potential increase of yield which trained farmers could achieve was set at 1.5 ton/ha in Laclo and Comoro watershed and 2.4 ton/ha in Tafara and Caraulun watersheds for conservative estimation of the total incremental maize production. It was also assumed that the yield would achieve 50% of the target in the 2nd year (or the last year) of the training courses and 100% of the same in the 3rd year (or one year after the end of the training courses) in the target villages.
Estimation of Crop Budgets under the With-Project and Without-Project Conditions	Crop budgets of maize production by trained farmers under the with-project and without-project conditions in the respective target watersheds were also estimated by converting maize production and family labor cost into monetary values. The table below compares the estimated crop budgets per household between the with-project and without-project conditions, taking into account the opportunity costs for crop production in shifting cultivation areas by households who convert the farming practices. a) Estimated Crop Budgets for Laclo and Comoro watersheds

Items	Under the with-project condition					Under the without-project condition							Incremental Benefit =1)-2)-3) (USD/hh)
	Value from land with Climate-resilient agriculture					Value from the existing land					Opportunity cost of giving up shifting cultivation***		
	Q'ty (kg/ha)	Price (USD)	Value (USD/ha)	Land size (ha/HH)	1) Value (USD/hh)	Q'ty (kg/ha)	Price (USD)	Value (USD/ha)	Land size (ha/HH)	2) Value (USD/hh)	Land size (ha/HH)	3) Value (USD/hh)	
Total production & sales													
2nd year (50%)*	900	0.75	675	0.5	337.5	300	0.75	225	0.5	112.5	0.5	112.5	
3rd year on wards (100%)**	1500	0.75	1,125	0.5	562.5	300	0.75	225	0.5	112.5	0.5	112.5	
Production cost													
Family labor	40 MD	4	160	0.5	80.0	22MD	4	88	0.5	44.0			
Gross Profits													
2nd year (50%)*			515	0.5	257.5			137	0.5	68.5	0.5	68.5	121
3rd year on wards (100%)**			965	0.5	482.5			137	0.5	68.5	0.5	68.5	346

Note: * Baseline value (300kg)+ Incremental effects (1200kg) x 50% ** Baseline value (300kg) +Incremental effects (1200kg) x 100%, *** The value from land that should have been expanded/ used for shifting cultivation.

Source: JICA (2020)

Items	Outline of Calculation

b) Estimated Crop Budgets for Tafara and Caraulum watersheds

Items	Under the with-project condition					Under the without-project condition							Incremental Benefit =1)-2)-3) (USD/hh)
	Value from land with Climate-resilient agriculture					Value from the existing land					Opportunity cost of giving up shifting cultivation***		
	Q'ty (kg/ha)	Price (USD)	Value (USD/ha)	Land size (ha/HH)	1) Value (USD/hh)	Q'ty (kg/ha)	Price (USD)	Value (USD/ha)	Land size (ha/HH)	2) Value (USD/hh)	Land size (ha/HH)	3) Value (USD/hh)	
Total production & sales													
2nd year (50%)*	1700	0.75	1,275	0.5	637.5	1000	0.75	750	0.5	375.0	0.5	375.0	
3rd year on wards (100%)**	2400	0.75	1,800	0.5	900.0	1000	0.75	750	0.5	375.0	0.5	375.0	
Production cost													
Family labor	40 MD	4	160	0.5	80.0	22MD	4	88	0.5	44.0			
Gross Profits													
2nd year (50%)*			1,115	0.5	557.5			662	0.5	331.0	0.5	331.0	-105
3rd year on wards (100%)**			1,640	0.5	820.0			662	0.5	331.0	0.5	331.0	158

Note: * Baseline value (1000kg) + Incremental effects (1400kg) x 50% ** Baseline value (1000kg) +Incremental effects (1400kg) x 100%, *** The value from land that should have been expanded/ used for shifting cultivation.

Source: JICA (2020)

The incremental benefits per unit area (1 ha) in the 3rd year were estimated at USD 346/HH in Laclo and Comoro watersheds, USD 158/HH in Tafara and Caraulun watersheds, respectively.

Estimation of Total Beneficiaries and Areas used for Maize Production

It was assumed that all the 68 villages covered by Activity 2.1 would choose "climate resilient agriculture" as the topics of hands-on training on climate change adaptation measure and 120 farmers/ families in each village would take part in the training courses. Hence, 120 farmers/ families per village and 8,160 farmers/ families in total are expected to learn climate resilient agriculture techniques through the 2-year training courses. (8,160 families = 120 families/village x 68 villages)

Assuming each trained farmer would apply the learned techniques to 0.5 ha of their farms for upland crop production, it was estimated that 60 ha of upland farms per village or 4,080 ha of upland farms in total would be used for maize production with climate resilient agriculture techniques. (4,080 ha = 120 families/village x 68 villages x 0.5 ha/family)

Estimation of Benefit from Increased Maize Production

The incremental benefit from increased maize production was estimated at village and watershed levels. The results of the calculation are summarized below. The total benefit during evaluation period is US$ 32,517,180.

(unit: US$)

Year	Laclo	Comoro	Tafara	Caraulun	Total
2021	0	0	0	0	0
2022	0	0	0	0	0
2023	28,920	14,460	-12,540	-25,080	5,760
2024	169,680	84,840	-6,120	-12,240	236,160
2025	461,820	209,220	19,260	38,520	728,820
2026	820,500	333,600	76,140	152,280	1,382,520
2027	1,079,880	429,060	158,100	328,740	1,995,780
2028	1,160,880	456,060	189,600	360,240	2,166,780
2029	1,160,880	456,060	189,600	360,240	2,166,780
2030	1,160,880	456,060	189,600	360,240	2,166,780
2031	1,160,880	456,060	189,600	360,240	2,166,780
2032	1,160,880	456,060	189,600	360,240	2,166,780
2033	1,160,880	456,060	189,600	360,240	2,166,780
2034	1,160,880	456,060	189,600	360,240	2,166,780
2035	1,160,880	456,060	189,600	360,240	2,166,780
2036	1,160,880	456,060	189,600	360,240	2,166,780
2037	1,160,880	456,060	189,600	360,240	2,166,780
2038	1,160,880	456,060	189,600	360,240	2,166,780
2039	1,160,880	456,060	189,600	360,240	2,166,780
2040	1,160,880	456,060	189,600	360,240	2,166,780
Total	17,652,240	6,999,960	2,699,640	5,165,340	32,517,180

Source: JICA (2020)

12.1.4 Benefit from Carbon Sequestration by Reforestation/ Afforestation Activities

The benefit from carbon sequestration by reforestation/ afforestation is calculated according to the following formula.

Benefits from carbon sequestration = Σ (Changes in carbon stock of planted trees) x (unit price of CO_2 at the carbon market)

The results of the calculation are summarized in the table below.

Table 12-6 Result of Calculation of Benefit from Carbon Sequestration by Reforestation/ Afforestation Activities

<table>
<tr><th>Items</th><th>Outline of Calculation</th></tr>
<tr><td>Net benefit of carbon sequestration by reforestation/ afforestation</td><td>The amount of carbon dioxide absorption of trees planted by reforestation/ afforestation micro program under Activity 2.1 was estimated by fully referring to the existing carbon offset project named “Halo Verde Timor Community Forest Carbon project” in Timor-Leste. The project planted 6 tree species about 75 ha in 9 villages in Manatuto Municipality. The estimated average net benefits from the plantations for 20 years are tabulated below.

Average net benefit reported by Halo Verde Timor Community Forest Carbon project
<table>
<tr><th>Age of planted tree (year)</th><th>Average net benefit (tCO_2/ha)</th><th>Annual net benefit (tCO_2/ha/year)</th></tr>
<tr><td>1</td><td>8.4</td><td>8.4</td></tr>
<tr><td>2</td><td>13.9</td><td>5.5</td></tr>
<tr><td>3</td><td>19.7</td><td>5.8</td></tr>
<tr><td>4</td><td>25.4</td><td>5.7</td></tr>
<tr><td>5</td><td>30.7</td><td>5.3</td></tr>
<tr><td>6</td><td>36.1</td><td>5.4</td></tr>
<tr><td>7</td><td>41.8</td><td>5.7</td></tr>
<tr><td>8</td><td>46.8</td><td>5.0</td></tr>
<tr><td>9</td><td>52.4</td><td>5.6</td></tr>
<tr><td>10</td><td>58.2</td><td>5.8</td></tr>
<tr><td>11</td><td>64.0</td><td>5.8</td></tr>
<tr><td>12</td><td>70.1</td><td>6.1</td></tr>
<tr><td>13</td><td>75.9</td><td>5.8</td></tr>
<tr><td>14</td><td>82.4</td><td>6.5</td></tr>
<tr><td>15</td><td>89.4</td><td>7.0</td></tr>
<tr><td>16</td><td>96.9</td><td>7.5</td></tr>
<tr><td>17</td><td>104.9</td><td>8.0</td></tr>
<tr><td>18</td><td>113.5</td><td>8.6</td></tr>
<tr><td>19</td><td>122.6</td><td>9.1</td></tr>
<tr><td>20</td><td>132.4</td><td>9.8</td></tr>
</table>
Source: Project Design Document of Halo Verde Timor Community Forest Carbon (2020)

The same assumptions and estimation employed by the Halo Verde Timor Community Forest Carbon project were used for estimation of carbon sequestration by plantations developed by reforestation/ afforestation micro program of the proposed project.</td></tr>
<tr><td>Plantation area of community nursery and reforestation program</td><td>Assuming that reforestation/ afforestation micro program will be implemented in one third of the target villages or 23 villages in the target watersheds and each village will develop a total of 8 ha of new plantation, which is the same size as the villages of the Halo Verde Timor Community Forest Carbon project developed, the total plantation areas to be developed in the respective watersheds are estimated as shown below.

Plantation area for reforestation/ afforestation activities
<table>
<tr><th>Watersheds</th><th>Target villages for Activity 2.1</th><th>No of villages targeted by Refo/Affo MP</th><th>Plantation area (ha)</th></tr>
<tr><td>Laclo</td><td>28</td><td>9</td><td>72</td></tr>
<tr><td>Comoro</td><td>11</td><td>4</td><td>32</td></tr>
<tr><td>Tafara</td><td>10</td><td>3</td><td>24</td></tr>
<tr><td>Caraulun</td><td>19</td><td>7</td><td>56</td></tr>
<tr><td>Average</td><td>68</td><td>23</td><td>184</td></tr>
</table>
Source: JICA (2020)</td></tr>
<tr><td>Estimation of CO_2 absorption from the atmosphere</td><td>The amount of carbon sequestration by reforestation/ afforestation in the target watersheds were calculated by multiplying annual net CO_2 absorption with the estimated plantation area of each watershed. Annual CO_2 absorption from the atmosphere are expected to be reduced by approximately 920 ~ 1,546 ton CO_2 as shown in the table below.
(unit: tCO_{2eq})
<table>
<tr><th>Year</th><th>Laclo</th><th>Comoro</th><th>Tafara</th><th>Caraulun</th><th>Total</th></tr>
<tr><td>2021</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2022</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2023</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2024</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table></td></tr>
</table>

Items	Outline of Calculation
		2025	0	0	0	0	0
		2026	0	0	0	0	0
		2027	605	269	202	470	1,546
		2028	396	176	132	308	1,012
		2029	418	186	139	325	1,067
		2030	410	182	137	319	1,049
		2031	382	170	127	297	975
		2032	389	173	130	302	994
		2033	410	182	137	319	1,049
		2034	360	160	120	280	920
		2035	403	179	134	314	1,030
		2036	418	186	139	325	1,067
		2037	418	186	139	325	1,067
		2038	439	195	146	342	1,122
		2039	418	186	139	325	1,067
		2040	468	208	156	364	1,196
		Total	5,933	2,637	1,978	4,614	15,162
	Source: JICA CB-NRM Project Team (2020)						
Benefits from carbon sequestration by reforestation/ afforestation	The amount of carbon sequestration from the atmosphere by reforestation/ afforestation micro program was converted into the monetary values by using the market carbon price of US$ 8.1/ t CO_2, which was used for reforestation/ afforestation project in the voluntary carbon market in 2016, to estimate the project benefits from carbon sequestration by reforestation/ afforestation. The total benefit from carbon sequestration during the project life span is estimated at US$ 122,813. Details of the results of benefit estimation are described in **Annex 9** of the funding proposal of the project.						

12.2 Economic Cost

The economic project cost consists of the direct and indirect investment costs to be covered by the project and operation and maintenance cost (O&M cost) to be shouldered by the GoTL in the post-project period. The results of the calculation are summarized in the table below.

Table 12-7 Summary of Methodologies for Estimation of the Project Benefits

Items	Outline of Calculation
Project Investment Cost	The costs estimated for the project activities under the respective Components including those of project management were counted as the project cost. Since the e SCF (Standard Conversion Factor) of 1.0 was applied for estimation of the economic project cost, the same amount of the financial project cost estimated in Chapter 11 was allocated as the economic project cost. The following table shows the economic project investment cost.

(unit: US$)

Cost Items (Output)		Financial Cost	SCF	Economic Cost
Component 1	Activity 1.1	2,366,939	1.0	2,366,939
	Activity 1.2	1,237,619	1.0	1,237,619
	Activity 1.3	709,033	1.0	709,033
Component 2	Activity 2.1	6,885,182	1.0	6,885,182
	Activity 2.2	229,829	1.0	229,829
	Activity 2.3	1,331,517	1.0	1,331,517
	Activity 2.4	24,773	1.0	24,773
Component 3	Activity 3.1	216,842	1.0	216,842
	Activity 3.2	261,056	1.0	261,056
	Activity 3.3	199,742	1.0	199,742
	Activity 3.4	342,972	1.0	342,972
Component 4	Activity 4.1	28,350	1.0	28,350
	Activity 4.2	267,778	1.0	267,778
	Activity 4.3	140,404	1.0	140,404
Project Management	Preparatory works, planning, procurement, monitoring & coordination	912,811	1.0	912,811
Contingency	2.5% of total GCF cost	243,322	1.0	243,322
TOTAL		**15,398,169**		**15,398,169**

O&M cost	Expenditures required for maintenance of the project effects at village and post-administrative levels were counted as operation and maintenance costs. Follow-up meetings, extension

Items	Outline of Calculation
	services and follow-up training, and regular meetings of the watershed management councils, which would be done on the initiative of MAF, DGFCIP, and Municipal Administrative Offices concerned, would be included. It was assumed that 1% of the Activities 1.1~1.3 and 2.1 would be allocated as annual O&M cost in the post-project period. The annual O&M cost in the post project period is estimated at USD 111,988/ year.

Source: JICA (2020)

12.3 Cost-Benefit Analysis

12.3.1 Cash Flow Analysis

The cash flow of the economic cost and benefits during the project life span is presented below.

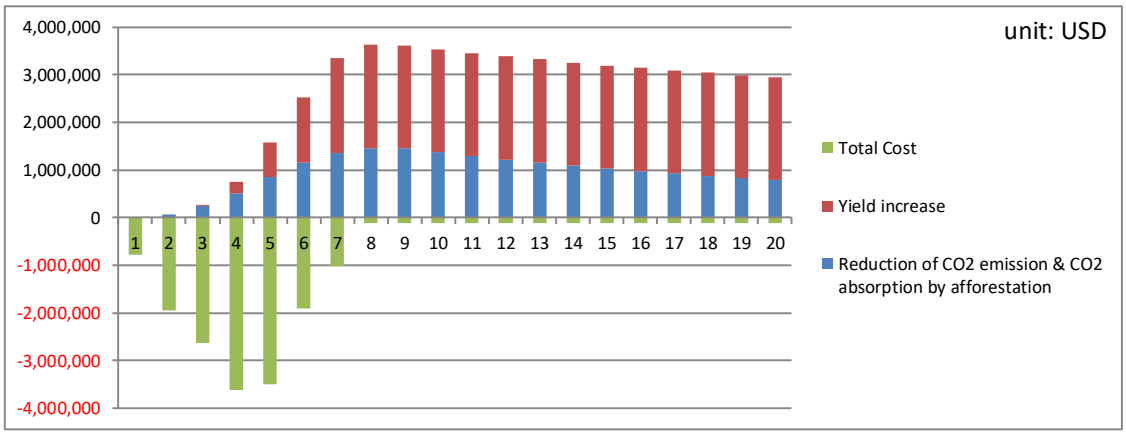


Figure 12-1 Cash Flow of Economic Costs and Benefits of the Project

Source: JICA (2020)

The economic rate of return (EIRR), cost-benefit ratio (B/C) and the net present values (NPV) were estimated by using the discount rate of 11.87% to validate the economic feasibility of the project. The results of the respective indicators are shown in **Table 11,** and summarized below.

Table 12-8 Result of Economic Analysis each watershed

Watershed	EIRR	B/C	NPV (US$)
Overall	18.7%	1.41	4,673,127

Source: JICA (2020)

As the B/C is above 1.0, validity of the project to be implemented as public project is confirmed. The results also showed that the project economic viability turned positive from the year 6 of the project, and the project was predicted to generate benefits throughout the lifetime period of the project.

12.3.2 Sensitivity Analysis

To evaluate the reliability and stability of the project effect from the economic viewpoint, a sensitive analysis was made with the following scenarios. Increase of work volume or project inputs and delay in the project activities due to unpredictable reasons are considered as the main factors affecting the project cost, while the price fall of carbon values and maize price in the markets is the major factor affecting the project benefit.

- Case 1: 10% increase of the project cost
- Case 2: 20% increase of the project cost
- Case 3: 10% reduction of the project benefit
- Case 4: 20% reduction of the project benefit
- Case 5: 10% increase of the project cost &10% reduction of the project benefit

- Case 6: 10% increase of the project cost &20% reduction of the project benefit
- Case 7: 20% increase of the project cost &10% reduction of the project benefit
- Case 8: 20% increase of the project cost &20% reduction of the project benefit

The calculation results of the sensitivity analysis are shown **Table 12**, and summarized in the table below.

Table 12-9 Result of Sensitivity Analysis of the Economic Analysis of the Project

Scenarios	EIRR	EIRR Difference from the Base Case	B/C	NPV (US$)
Base Case	18.7%	-	1.41	4,673,127
Case1: Cost +10%	16.7%	- 2.0%	1.28	3,531,623
Case2: Cost +20%	14.9%	- 3.8%	1.17	2,390,118
Case3: Benefit -10%	16.5%	- 2.2%	1.27	3,064,310
Case4: Benefit -20%	14.1%	- 4.6%	1.13	1,455,493
Case5: Cost +10% & Benefit -10%	14.6%	- 4.1%	1.15	1,922,805
Case6: Cost +10% & Benefit -20%	12.3%	- 6.4%	1.03	313,988
Case7: Cost +20% & Benefit -10%	12.9%	-5.8%	1.06	781,301
Case8: Cost +20% & Benefit -20%	10.8%	- 7.9%	0.94	-827,517

Source: JICA (2020)

The sensitivity analysis indicates that the project may be still feasible even under the scenario of 10% reduction of project benefits plus 20% increase of project costs or 20% reduction of project benefits plus 10% increase of project costs.

12.4 Potential Impact on CO_2 Emissions from Deforestation

To assess the potential impact on CO_2 emissions from deforestation, the possible reduced CO_2 emissions from reduction of deforestation were estimated based on the same assumption used for the assessment of reduced CO_2 emissions from forest degradation. In the assessment, it was assumed that the deforestation rates in the respective watersheds would be constantly reduced by 20% per annum from one year after introduction of PLUP and cut to zero in the 6th year.

The changes in forest areas in the watersheds under the “with-project” and “without-project” conditions and the number of villages where the village-level NRM regulations is in place are summarized below.

Table 12-10 Estimated Changes in Forest Areas in the Watersheds

Year	With-Project condition	Without-Project condition	Balance	No. of villages with NRM regulations
2021	111,442 ha	111,442 ha	0 ha	13
2022	109,306 ha	109,253 ha	53 ha	20
2023	107,382 ha	107,135 ha	247 ha	21
2024	105,751 ha	105,086 ha	665 ha	20
2025	104,483 ha	103,103 ha	1,380 ha	0
2026	103,556 ha	101,183 ha	2,373 ha	0
2027	102,904 ha	99,323 ha	3,581 ha	0
2028	102,436 ha	97,522 ha	4,914 ha	0
2029	102,059 ha	95,777 ha	6,282 ha	0
2030	101,697 ha	94,086 ha	7,611 ha	0
2031	101,347 ha	92,448 ha	8,899 ha	0
2032	101,009 ha	90,860 ha	10,149 ha	0
2033	100,683 ha	89,321 ha	11,362 ha	0
2034	100,366 ha	87,828 ha	12,538 ha	0
2035	100,060 ha	86,379 ha	13,681 ha	0
2036	99,764 ha	84,973 ha	14,791 ha	0
2037	99,478 ha	83,609 ha	15,869 ha	0
2038	99,201 ha	82,284 ha	16,917 ha	0
2039	98,933 ha	80,998 ha	17,935 ha	0
2040	98,674 ha	79,749 ha	18,925 ha	0

Source: JICA (2020)

Annex 9 (Economic Analysis) attached to the Funding Proposal shows the detailed results of the estimation. It is estimated that a total of 78,363 ha of existing forests are expected to be protected by the village-level NRM regulations, which will be introduced and enhanced by Activities 1.1 and 1.2 in 74 villages. The results of the estimations indicate that around 993,000 tCO_2eq may be reduced by the project at the end of the project as shown below.

Table 12-11 Reduced CO_2 Emissions from Deforestation

(Unit: ton CO_2eq)

Items	Laclo	Comoro	Tafara	Caraulun	Total
Reduced CO_2 Emissions from Deforestation after adjustment with DF (20%) in 2027	180,606	116,198	303,906	392,450	993,160
Reduced CO_2 Emission after adjustment with DF (20%) in 2040	1,107,442	490,088	1,639,118	1,984,912	5,221,560

Source: JICA (2020)

12.5 Other Intangible Benefits/Impacts of the Project

In addition to the quantified benefits described above, the proposed project is expected to generate the following intangible benefits/ impacts, which could not be counted in the monetary value due to a lack of related data or difficulty in the conversion. Some of the major intangible benefits are highlighted below.

Table 12-12 Summary of Intangible Benefits

Expected Benefits	Project Component	Remarks
Protection of crops from damage caused by free grazing animals	Activities 1.1 and 1.2	PLUP with participatory planning of the village regulations in Activity 1.1 and the follow-up meetings for capacity enhancement of local leaders in Activity 1.2 could reduce the number of cases of crop damage caused by animals, as those activities could regulate free animal grazing practices.
Stabilization of domestic water supply at village level	Activities 1.1 and 1.2	Protection of forests, particularly dense forest, would contribute to the stabilization and improvement of water flow in the water sources used for drinking and domestic purposes. The experience of the JICA CBNRM Project indicates that the CBNRM approach would be effective in the restoration of dried sources.
Reduction of soil erosions	Activities 1.1, 1.2, and 2.1	PLUP in Activity 1.1 would reduce the practice of shifting cultivation in the project villages, while hands-on training on climate resilient agriculture including techniques on sloping agricultural land techniques in Activity 2.1 could prevent the progress of soil erosion in the sloping farms in the villages.
Stabilization of peak flows and reduction of downstream flooding	Activities 1.1~1.3, and 2.1~2.3	Sustainable forest protection and management including rehabilitation of degraded forests under Activities 1.1~1.3, and 2.1~2.3 at village and watershed levels would contribute to the stabilization of water flow of the mainstream in the target watersheds.
Reduction of domestic violence	Activities 1.1 and 1.2	Likewise, PLUP with participatory planning of the village regulations in Activity 1.1 and the follow-up meetings for capacity enhancement of local leaders in Activity 1.2 could reduce the incidence of domestic violence as domestic violence issues would be monitored by local leaders.
Stabilization of food security	Activities 1.1, 1.2, and 2.1	Hands-on training on climate change adaptation measures in Activity 2.1 would help local communities increase crop production or produce marketable products to either secure the means of livelihood or income generation. Sustainable natural resource management at village level through Activities 1.1 and 1.2 would enable local communities to have non-timber forest products which could be used for sale at markets or supplemental or emergency foods for household consumption.

Expected Benefits	Project Component	Remarks
Biodiversity conservation	Activities 1.1~1.3, and 2.3	Protection of dense forests and improvement of degraded forests near dense forests would improve existing natural habitats of wild animals in the target watersheds.
Improvement of women's status in rural communities	Activities 1.1~1.3, 2.1, 2.3, 2.4 and 3.2	As proposed in the Gender Action Plan of the proposed project, the significant number of women would be involved in the project activities at village and government levels in a substantial way. Naturally, the project is expected to improve the status of women in local communities as well as the government institutions.

Source: JICA (2020)

12.6 Financial Impacts on Household Economy

In order to assess the financial viability of the proposed project, financial impacts on household economy of local communities in the target villages are estimated assuming that local communities either adopt the climate resilient agriculture with sloping agricultural land techniques or establish an plantation to be used for a carbon offset project. To this end, the household budgets of the following two cases are estimated for assessment of the potential financial impacts of the project on household income.

Case 1: Households who replicate the climate resilient agriculture techniques in their own plot (0.5 ha)

Case 2: Households who establish an plantation for a carbon offset project in their own plot (0.5 ha)

Sales of surplus maize or saving of expenditures for buying maize are counted as cash earnings in Case 1, while the share of carbon credit sales is considered as the major source of income for Case 2. The tables below show the results of the estimation.

Table 12-13 Household Budget Analysis of Case 1

1. Gross income (Sales of Maize/ Saving of expenditures) per household *1		
1) Incremental maize production	300 kg (Laclo/Comoro) 350 kg (Tafara/ Calaurun)	600 kg (Laclo/Comoro) 700 kg (Tafara/ Calaurun)
2) Unit price of maize	US$ 0.75/kg	US$ 0.75/kg
3) Sales of maize production	US$ 225 (Laclo/Comoro) US$ 263 (Tafara/ Calaurun)	US$ 450 (Laclo/Comoro) US$ 525 (Tafara/ Calaurun)
2. Cost of Production	US$ 0	US$ 0
3. Gross revenue per household	US$ 225 (Laclo/Comoro) US$ 263 (Tafara/ Calaurun)	US$ 450 (Laclo/Comoro) US$ 525 (Tafara/ Calaurun)

*Note *1 The same assumptions used for the calculation of benefits from increased maize production in Table 12-5 are used for estimation of household gross income.*

Source: JICA (2020)

Table 12-14 Household Budget Analysis of Case 2

1. Gross income (Share of sales of carbon credit trading)					
1) Estimated CO_2 absorption *1	4.2 tCO_2/HH	2.75 tCO_2/HH	2.90 tCO_2/HH	2.85 tCO_2/HH	2.65~2.90 tCO_2/HH
2) Unit price of CO_2	US$ 8.1/tCO_2				
3) Carbon sales	US$ 34.0/HH	US$ 22.3/HH	US$ 23.5/HH	US$ 23.0/HH	US$ 21.5~23.5/HH
2. Cost of maintenance	US$ 0.0	US$ 0.0	US$ 0.0	US$ 0.0	US$ 0.0
3. Gross revenue	US$ 34.0/HH	US$ 22.3/HH	US$ 23.5/HH	US$ 23.0/HH	US$ 21.5~23.5/HH

*Note: *1 Estimated by JICA based on the existing carbon offset project in Timor-Leste, "Halo Verde Timor Community Forest Carbon (2020)"*

Source: JICA (2020)

The results of the assessments indicate that local communities in the target villages, particularly those who replicate the climate resilient agriculture techniques, would improve their household

economy significantly. Households involved in a carbon offset project can also increase the gross revenue from carbon trading by expanding their plantations, though the estimated revenue of Case 2 is rather lower as compared to the ones of Case 1.

13. Risk Assessment

13.1 Potential Risks

The proposed project might face technical, operational, institutional, and environmental risks over the course of the project implementation. As the proposed project is basically based on the tested and proven approach (i.e., CBNRM mechanism) and techniques (e.g., climate resilient agriculture, agroforestry, and horticulture development), major risks exist mainly in relation to implementation, operations and management of the project. The table below shows potential risks with the level of impact and probability of occurrence.

Table 13-1 Potential Risks of the Project

Potential risks	Type	Level	Probability	Description
Insufficient capacity of NGOs/ contractors hired for implementation	Technical & Operational	Medium	Medium	NGOs/ contractors selected for implementation of Activities 1.1, 1.2, and 2.1 might have less experiences in implementation of similar activities in the past. In particular, PLUP and CCVA, as well as the follow-up capacity enhancement of Activity 1.2 require a thorough understanding of the process and procedures for those activities for effective and smooth implementation. Less understanding of the works would cause delay in the implementation of the Activities In the worst possible scenario, the project might face difficulties in achieving its expected outputs, namely i) reduction of deforestation and forest degradation through enhancement of community-based NRM and ii) increase of local livelihoods through hands-on training.
Lack of coordination/ collaboration between NGOs / contractors hired for the same and/or different Components	Technical & Operational	Medium	Medium	Different NGOs/ contractors might be hired for the respective Activities and in the respective locations. It is, however, important to closely communicate and collaborate with each other, as the Activities interrelate with one another. For instance, the results of PLUP and CCVA are the basis for the subsequent Activities, namely Activities 1.2 and 2.1. Information exchange between/ among the NGOs/ contractors hired for the same Activity but in the different watersheds is also quite critical for standardization of the methodologies, ensuring of the quality of the works, and smooth implementation of the Activities. Insufficient collaboration or coordination between/ among the NGOs/ contractors might affect the progress and results of the works.
Limited communities' participation in hands-on training or adoption of demonstrated techniques	Technical & Operational	Medium	Medium	Due to a lack of understanding, some local communities may be reluctant to participate in a series of hands-on training activities as well as OJT at demonstration plots, which would affect their field application of climate change adaptation techniques demonstrated in the training courses. Less application of the adaptation techniques would result in lowering the positive effect in strengthening local climate resilience against climate variability.

Potential risks	Type	Level	Probability	Description
Limited experience of DGFCIP and relevant MAF offices concerned in project management and operation	Technical & Operational	Medium	High	DGFCIP and its national directorates as well as MAF municipal offices has limited experiences in managing and operating a large-scale project like the proposed one. Hence it would not easy for DGFCIP and other relevant MAF offices to manage and operate the project without any operational and technical difficulties.
Lack of MAF officials' participation in the project activities	Institutional	Low	Medium	MAF officials, particularly extension officials, often engage in multiple MAF DPs' projects along with the MAF's activities at the same time. It may not be always easy for MAF officials to participate in the project activities. Limited participation in the project activities, particularly those of training for the officers, would affect the sustainability of the project effects, as the MAF officers at both municipal and field levels should be the main players in continuous follow-ups in the target villages.
Insufficient financial support by the GoTL for project monitoring	Institutional	Medium	Medium	MAF monitoring teams at central and municipal levels will monitor the project activities in the field with technical assistance from TET. DGFCIP and its national directorates, particularly NDFWM, and MAF municipal offices concerned need to allocate enough budgets for operations of the monitoring teams. Delay in passing the budget or squeezing the proposed budget would affect the monitoring works of the GoTL.
Delay in procurement of NGOs/ contractors	Institutional	High	Medium	NGOs or contractors will be procured for implementation of almost all the field activities as described in Chapter 9 of this report. They will be selected and procured through the competitive bidding according to the procurement guidelines of GCF as well as JICA. If the process of procurement of NGOs or contractors for the Activities take longer than expected, it would affect the schedule of the project. In fact, one of the on-going donor-funded projects took more than years for procurement of contractors, which caused significant delay in the implementation.
Occurrence of extreme climate events, such as high heats, long drought, and long-strong rains	Environmental	High	Medium	Extreme climate events, such as high heats, long drought, and strong rains, would also significantly affect the results of the Activities. For instance, high heats and long drought might lead to wild/ forest fires, which would accelerate forest degradation and deforestation. Long drought and long-strong rains would adversely affect crop production even under climate resilient agriculture, although the application of climate resilient agriculture practices would lessen crop failure damage. If such climate adverse events happen consecutively, people might over-exploit forest resources for their livelihoods.
Environmental damage to	Environmental	Low	Low	Some existing and proposed protected areas located in and adjacent to the target watersheds

Potential risks	Type	Level	Probability	Description
natural habitats				might be affected by local communities' activities, in case the community-based NRM regulations would not be in line with the government regulations on protected area management (Decree Law 05/2016).
Conflict among local communities	Social	Low-Medium	Low	Activity 2.1 will directly benefit 120 families, which is likely 30~90% of total families in a village, during the project. Those who are not engaged in Activity 2.1 might have a feeling of inequity, which might result in negative action against other project activities, particularly the future land use plans and village regulations developed in Activity 1.1.
Spread of an infectious disease	Environmental	High	High	Spread of infectious diseases, such as COVID-19, would significantly affect the progress of the project. Any diseases similar in nature to COVID-19 would make any meetings/ workshops where people gather at one place difficult. In fact, meetings and hands-on training have been suspended in the JICA CBNRM Project since the outbreak of COVID-19.

Source: JICA (2020)

13.2 Proposed Mitigation Measures against the Potential Risks

Mitigation measures are also proposed to address the respective potential risks listed in the previous section. All the mitigation measures are basically incorporated into the project Activities/ Sub-activities to reduce potential negative impacts. The table below shows the proposed mitigation measures against the potential risks.

Table 13-2 Proposed Mitigation Measures

Potential risks	Mitigation Measures	Description
Insufficient capacity of NGOs/ contractors hired for implementation	Selection of NGOs/ contractors which have experiences and/or sufficient capacity to implement the Activities	In the selection of NGOs/ contractors, the potential bidders should be pre-qualified or short-listed based on the work experiences of the organizations. Furthermore, the QCBS or QBS method should be adopted for selection of bidders so that NGOs/ contractors technically viable could be selected as implementers. TET will provide technical assistance in shortlisting, evaluating and selecting NGOs/ contractors capable to implement the respective Activities.
Lack of coordination/ collaboration between NGOs / contractors hired for the same and/or different Components	Packaging of project Activities / Sub-activities Arrangement of coordination meetings	Implementation of Activities 1.1 and 1.2 in one watershed should be packaged as one contract so that Sub-activities of the Activity could be carried out seamlessly, and most importantly, the experiences in Activity 1.1 could be fully used for Activity 1.2. In order to standardize the methodologies and facilitate communication and collaboration between/ among NGOs/ contractors hired for implementation of the Activities, the following meetings should be arranged and held by TET over the course of the Activity implementation. - Orientation of the methodologies - Inception meeting - Progress meetings on a quarterly basis - Annual review of the project activities In the orientation and inception meetings, full guidance on the procedures and methodologies for implementing the Activities will be given to the selected NGOs/ contractors, while they

Potential risks	Mitigation Measures	Description
		could exchange their experiences and lessons with each other in the progress and annual review meetings.
Limited participation in hands-on training or adoption of demonstrated techniques	Awareness raising of the effect of the project activities through the consultation/ preparatory process	Prior to the conduct of the main activities of Activities 1.1 and 2.1, consultation meetings and exposure visits will be organized with participation of local communities so that they could be fully aware of the project activities as well as their effects. In particular, the exposure visits, where local communities will visit one of the CBNRM villages and learn about the project activities from the predecessors, would be effective in enhancing their understanding of the project.
Limited experience of DGFCIP and relevant MAF offices concerned in project management and operation	Direct management of the project by JICA	JICA should have the leading role in operations and management of the project with technical assistance from TET as well as FAO TCP. DGFCIP, its national directorates, and MAF municipal offices concerned should play an important role in monitoring the project activities with TET. By doing such arrangements, the risk of delay in implementation could be minimized.
Lack of MAF officials' participation in the project activities	Joint planning of the project activities	TET should develop a quarterly work plan of the project activities in the respective target watersheds by consolidating the work plans of the respective Activities. The plans should be shared with MAF municipal offices concerned every three months, so that MAF offices could arrange and allocate their staff to the project activities. In addition to the quarterly work plan, TET and MAF municipal offices should have a regular meeting at the beginning of every month to adjust the schedule of the project activities, so as to ensure the participation of MAF officials in the activities.
Insufficient financial support by the GoTL for project monitoring	Preparation of rational work and budget plan	TET should support DGFCIP and its national directorates and MAF municipal offices concerns in the preparation of a rationale work and budget plan/proposal so that they could convince the higher authority of MAF and the Ministry of Finance of the necessity of securing the proposed budget for effective implementation of the project.
Delay in procurement of NGOs/ contractors	Advance preparation for the bidding of NGOs/ contractors	JICA should prepare a set of bid documents required for selection of NGOs/ contractors for the respective Activities in advance. The documents required for pre-qualification and bidding of NGOs/ contractors are the ones to be prepared in advance. If time allows, the process of pre-qualification of candidate organizations for Activities 1.1 and 1.2 should start one or a half year before the commencement of the project.
Occurrence of extreme climate events, such as high heats, long drought, and long-strong rains	Enhancement of people's preparedness against extreme climate events	NGOs/ contractors hired for Activities 1.1 ~ 1.2, and 2.1 with technical assistance from TET should help local communities enhance the preparedness against extreme climate events by bringing people's attention to wildfire in the dry season and advising them to plant several types of crop in their farms to secure production of food crops even under extreme weather conditions. In the case that climate resilient agriculture is selected as the topics of hands-on training of Activity 2.1, NGOs should measure crop yields in the demonstration plots to evaluate the effect of the demonstrated techniques as compared to those in non-members' farms.
Environmental damage to natural habitats	Due attention to rules and regulations on protected area management in PLUP	Due attention should be paid to the rules on protected area management in the discussions on village regulations in PLUP in villages located in and adjacent to the existing and proposed protected areas. By doing so, local communities would develop

Potential risks	Mitigation Measures	Description
	(Activity 1.1) and follow-up meetings for capacity enhancement of village leaders (Activity 1.2)	a future land use plan considering the protected area and incorporate rules and regulations on ecosystem management in the regulations. In the monthly monitoring meetings to be held in Activity 1.2, people's compliance o with the rules on ecosystem management could also be monitored.
Conflict among local communities	Ensuring of additional benefits to be shared with villagers who are not engaged in the project activities	During the project period, benefit sharing mechanisms, such as village seed bank, carbon offsetting, and small-scale enterprise development, which could benefit many communities in a village, should be developed in close consultations with local communities. The capacity of MAF field officials, namely extension officers, would be enhanced to effectively conduct extension activities similar in nature to those of Activity 2.1, so that the remaining villagers could have similar support from MAF extension officers even after the end of the project.
Spread of an infectious disease	Provision of proper guidance with a guidebook for protection against infectious diseases	Due consideration should be given to any potential risk of infectious diseases. In the case of COVID-19, guidance for protection against the disease should be fully given to the NGOs/ contractors prior to the commencement of the activities. A guidebook should also be developed and shared with NGOs/ contractors, so that they could organize and conduct meetings and workshops in a proper manner to avoid close contact with people in the meetings.

Source: JICA (2020)