

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

1) International NGOs and Their Projects

Organization and Project	Period	Budget	Target area	Major Activities
World Vision – Timor Leste – FMNR Projects (BRACCE and BACC)	BRACCE (2011-16) and BACC (2012-17)	BRACCE – US\$ 2.6 million BACC – US\$	BRACCE - Aileu (18 Sucos in Lacleo and Comoro Watersheds) BACC –Bobonaro (13 Sucos in Loes watershed)	<ul style="list-style-type: none"> Farmer managed natural regeneration – training of farmers on protection, pruning and thinning techniques Nurseries and Plantations Agriculture and agro-forestry Soil and water conservation
Conservation International/ Timor-Leste SNAP Project	2018-2021 (4 years)	US\$ 3.34 million	Baucau, Lautem, Viqueque, Liquica, Ermera (Irabere and Comoro Catchments) National level – Protected Areas Network	<ul style="list-style-type: none"> Establish a National Protected Area Network (Strategy, gaps in legislation, establishment of network etc.) – PAN will target about 255,000 ha Management Plan developed for two Protected Areas Improvement of CBNRM in priority catchment corridor (10 sucos – NRM Plan, Village Regulations, Youth Training, Sustainable Use of NRs etc.) – this intervention may target about 224,000 ha and Improvement of forest management and reforestation of degraded lands in priority catchment corridor (Community forest management plans developed, 500 ha forest areas brought under sustainable management, 500 ha degraded areas reforested etc.)
Hivos/ Integrated Actions for Resilience and Adaptation to climate change in the Raumoco Watershed Project (IA4RA)	June 2016 – Sep 2018	US\$ 0.55 million	Lautem (Raumoco watershed)	<ul style="list-style-type: none"> Sustainable, low-carbon food production technologies for vulnerable households Low-cost rainwater collection/drip irrigation systems Planting of fuelwood tree species (G. sepium or Gamal) Improved cooking stoves to vulnerable households
Catholic Relief Services/ REACT Project	2016-2019 (3 years)		Baucau region	<ul style="list-style-type: none"> Climate resilient home gardens Fraterna is a partner
Margaret Ann Cargill Foundation (MACF) / Developing Small Island Management Approaches in the Sunda Banda Seascape	Mar 2015 – Feb 2018 (3 years)	US\$ 0.65 million	Nino Konis Santana National Park – Lautem	<ul style="list-style-type: none"> Development of a Steering Committee for the National Park and further to help the committee to develop a management plan for the park

Organization and Project	Period	Budget	Target area	Major Activities
Mercy Corps/ M-RED 2 (Managing Risk through Economic Development)	May 2016 – April 2019 (3 years)		Ermera, Dili, Ainaro (35 Aldeias from 22 Sucos)	<ul style="list-style-type: none"> Participatory disaster risk assessment and plan for community based disaster risk reduction and mitigation measures Capacity building of SDMCs (Suco Disaster Management Committees) and communities Production enhancement of agriculture crops and marketing -Economic incentives through combining an economic crop with flood and erosion control measures to create communities' buy-in for DRR (Mercy Corps has partnership with CVTL for project implementation)
CARE International / HAFORSA-Atsabe Rural Development Project for Improvement of Livelihoods (Supported by the Government of Japan)	Feb 2016 – Jan 2019 (3 years)		Atsabe in Ermera (22 Aldeias in 4 Sucos)	<ul style="list-style-type: none"> Climate resilient agriculture and diversified sustainable livelihoods in agriculture Women's economic empowerment and engagement of women in different livelihood activities
Oxfam TL/ Action for Resilient Communities			Covalima, Oecussi	<ul style="list-style-type: none"> Food security and climate resilient agriculture Sustainable farming Home gardens

2) National NGOs

Name of the NGO	Geographical presence	Key areas of interventions (includes activities undertaken in the past)	Collaborations with DPs (for past and present projects)
Haburas Foundation (Established in 1998)	National – Dili, Lautem	<ul style="list-style-type: none"> Policy research and advocacy on land Advocacy on land and housing justice Reforestation including mangroves Food security and Biodiversity Ecotourism (Tutuala) Tara Bandu as traditional ecological wisdom Livelihood promotion 	<ul style="list-style-type: none"> AusAid Oxfam EU ACF Portugal Agency Cives Mundi AECID
Permatil (Established in 2001)	National with field presence in Covalima, Baucau, Viqueque, Aileu, Ainator, Lautem and Manatuto	<ul style="list-style-type: none"> Permaculture and climate resilient agriculture Nurseries Local seed production Home gardens Spring protection Watershed/ NR management Agri-biodiversity Food Security Communication materials 	<ul style="list-style-type: none"> CCFD Oxfam Caritas FAO GCCA – GIZ Plan International Ministry of Education APLA Earlier supports from Fundeso, World Vision, CARE International, GIZ- Agri-biodiversity

Name of the NGO	Geographical presence	Key areas of interventions (includes activities undertaken in the past)	Collaborations with DPs (for past and present projects)
Kdadalak Sulimutuk Institute (KSI) established in 2000 by group of students	National level – Ermera, Liquisa, Manufahi and Covalima	<ul style="list-style-type: none"> • Building social solidarity • Conflict resolution through community practices such as Tara Bandu • Tara Bandu as traditional ecological wisdom • Community based enterprises/ cooperatives • Promotion of CBOs • Agriculture promotion • Forest conservation 	<ul style="list-style-type: none"> • CCFD • Oxfam • APHEDA
FRATERNA (Established in 2004 and getting Hivos support from 2006)	Lautem, Viqueque, Baucau	<ul style="list-style-type: none"> • Climate resilient agriculture • DRR • Water and Sanitation • Aquaculture • Nursery and plantation • Income generation 	<ul style="list-style-type: none"> • CRS • HIVOS • Plan TL •
PROSPEK (Programa Spesifico fo Periode ba Ema Kiak) established in 2007 but received support from Hivos in 2010	Lautem and Baucau	<ul style="list-style-type: none"> • Addressing malnutrition and poverty through Aquaculture • Food security • Livelihood activities through women's groups • Savings and credit groups 	<ul style="list-style-type: none"> • HIVOS • GIZ • Civil Society Fund of GoTL
Santalum	National level - Dili, Aileu, Baucau, Ermera and Oecussi	<ul style="list-style-type: none"> • Sustainable agriculture • Training on agriculture • Reforestation • Forest conservation • Training on forestry 	<ul style="list-style-type: none"> • UNDP GEF Small Grant Program • AusAid • Mercy Corps (for training during M-RED 1)
Finis Esperansa	Covalima	<ul style="list-style-type: none"> • Sustainable agriculture • Reforestation 	<ul style="list-style-type: none"> • UNDP GEF Small Grants Program • Earlier support received from USAID and GTZ
RAEBIA TL	National – Aileu, Baucau, Manatuto, Dili and Manufahi	<ul style="list-style-type: none"> • Sustainable Agriculture • Conservation Agriculture • Slope land Agriculture • CB-NRM • Reforestation • Livelihood improvement 	<ul style="list-style-type: none"> • USC Canada • JICA CB-NRM • FAO • GIZ • Avansa • UASC-GPM • Civil Society Fund of GoTL
Halarae Foundation (Established in 1992)	Aileu, Bobonaro, Dili, Manatuto	<ul style="list-style-type: none"> • Sustainable Agriculture • CB-NRM • Livelihood improvement • Reforestation • Education 	<ul style="list-style-type: none"> • JICA CB-NRM • UNDP GEF SGP • AusAid
AHCAE (Associacao Haburas Capasidade Atoni Enclave)	Oecussi and Manatuto	<ul style="list-style-type: none"> • Agro-forestry • Sustainable agriculture • Reforestation • Cooperative promotion 	<ul style="list-style-type: none"> • Oxfam • Caritas Australia •
ETADEP (Fundasaun ema Matadalan ba progresiu)	National – Manatuto, Aileu, Ermera and Bobonaro	<ul style="list-style-type: none"> • Agriculture and rural development • Agro-forestry • Advocacy for sustainable agriculture 	<ul style="list-style-type: none"> • Oxfam • Earlier projects supported by USAID, UNDP-SGP, SOL • Civil Society Fund of GoTL

Name of the NGO	Geographical presence	Key areas of interventions (includes activities undertaken in the past)	Collaborations with DPs (for past and present projects)
OHM (Organisation Haburas Moris) established in 2005	Bobonaro (works with about 50 sucos)	<ul style="list-style-type: none"> Famers cooperatives Agriculture (Horticulture, Organic farming, school garden, home garden etc.) Seed storage and seed distribution Rural Development Food Security and Nutrition Women's Development and Income generation (vegetables, food items, craft etc.) Suco development and suco development planning Health and Sanitation Communication materials 	<ul style="list-style-type: none"> Earlier Projects supported by AusAid, AusAid-ETGAS, Australian Embassy, Japan Embassy, GIZ-EU, CARE International, FAO, USAID-Asia Foundation, Austcare, WFP
Tuna Mutin Foundation	Dili, Ermera	<ul style="list-style-type: none"> Mangroves conservation Drinking water systems 	<ul style="list-style-type: none"> UNDP-GEF-SGP Embassy of Japan
Timor Verde	National – Dili, Liquisa, Baucau, Manatuto Lautem	<ul style="list-style-type: none"> Agro-forestry Education 	<ul style="list-style-type: none"> UNDP GEF SGP Earlier projects supported by ARC
MALAEDOI	Liquisa	<ul style="list-style-type: none"> Agriculture, Horticulture, Rehabilitation of Coffee Non-formal education 	<ul style="list-style-type: none"> ETCAS and AusAid (Earlier projects)
FONGTIL (Established as a Forum of NGOs and INGOs in TL – 376 members including 43 INGOs)	National level	<ul style="list-style-type: none"> Advocacy on change in policies and programs of the Government Interaction with DPs on various issues Promotion of Social Audit with the help of PMO (Establishment of RENAS for social audit) Institution Development and Capacity building of NGOs 	<ul style="list-style-type: none"> Civil Society Fund EU Asia Foundation
HASATIL (A network of 34 NGOs working on sustainable agriculture)	National level	<ul style="list-style-type: none"> Sustainable agriculture Advocacy on sustainable agriculture and food sovereignty Training of NGOs on sustainable agriculture 	<ul style="list-style-type: none"> Support received in recent past from EU, UNDP GEF – Small Grants Program
REDE BA RAI (A network of 16 NGOs and some individuals working on land rights established in 2009)	National level	<ul style="list-style-type: none"> Just and equal access to land Studies on land rights Advocacy with the Government for land rights 	<ul style="list-style-type: none"> Oxfam Asia Foundation (past support)
KONSSANTIL (MAF and Ministry of Health, UN Agencies, Donor and Civil Society Organisations) Established under the initiative of Community of Portuguese Language	National Council	<ul style="list-style-type: none"> Review of policies, programs and efforts of the Government and Development Partners on food security and nutrition Formulation of national strategy on food security and nutrition 	<ul style="list-style-type: none">

Name of the NGO	Geographical presence	Key areas of interventions (includes activities undertaken in the past)	Collaborations with DPs (for past and present projects)
Speaking Countries (CPLP).			
MAF – DP Harmonisation Initiative (started 4 years ago) – EU serves as the Chair and Australian Embassy acts as the Co-Chair	National level	<ul style="list-style-type: none"> • Help MAF in formulation of appropriate policies, strategies, programs, plan and budget • Quarterly review of programs of DPs and MAF • Assistance in formulation guidelines, operational strategies through Technical Working Groups (Currently there are 8 Technical Working Groups) 	

Table 2 Estimation of Annual Average CO₂ Emissions in the Watersheds

(1) Changes of forest areas between 2003 and 2012

a. Forest areas in 2003

Watershed	Dense forest	Sparse forest	Total
Caraulun	24,720	23,180	47,900
Tafara	13,410	13,310	26,720
Laclo	23,740	51,280	75,020
Comoro	9,170	8,180	17,350
Total	71,040	95,950	166,990

b. Forest areas in 2012

Watershed	Dense forest	Sparse forest	Total
Caraulun	12,840	20,550	33,390
Tafara	5,960	13,910	19,870
Laclo	17,270	53,270	70,540
Comoro	5,300	5,770	11,070
Total	41,370	93,500	134,870

c. Changes in forest areas between 2003 and 2012

Watershed	Dense forest	Sparse forest	Total
Caraulun	-11,880	-2,630	-14,510
Tafara	-7,450	600	-6,850
Laclo	-6,470	1,990	-4,480
Comoro	-3,870	-2,410	-6,280
Total	-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

(2) Carbon and CO₂ emission from Forest Area each watershed between 2003 and 2012

a. Carbon emissions in 2003

Watershed	Forest Degradation	Deforestation	Total
Caraulun	2,246,983	1,383,674	3,630,657
Tafara	1,109,827	843,852	1,953,679
Laclo	1,074,020	319,245	1,393,265
Comoro	747,529	525,950	1,273,479
Total	5,178,359	3,072,721	8,251,080

b. Carbon emissions in 2012

Watershed	Forest Degradation	Deforestation	Total
Caraulun	8,238,938	5,073,471	13,312,409
Tafara	4,069,366	3,094,124	7,163,490
Laclo	3,938,073	1,170,565	5,108,638
Comoro	2,740,940	1,928,483	4,669,423
Total	18,987,317	11,266,643	30,253,960

c. Annual average CO₂ emissions

Watershed	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

Note: Estimation was made in accordance with the following calculating formula.

Carbon emission: Changes of carbon stock (t-C/ha) x Changes of area of total forest or dense forest (ha)

CO₂ emission: Carbon emission (t-C) x 3.67

Average CO₂ emission: CO₂ emission (t-CO₂) / 9 years

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

(3) Changes in carbon stock for deforestation and forest degradation

Watershed	Forest degradation (t-C/ha)	Deforestation (t-C/ha)
Caraulun	189.14	95.36
Tafara	148.97	123.19
Laclo	166.00	71.26
Comoro	193.16	83.75

Note: The carbon stock was calculated in accordance with the following assumption.

Forest degradation: The difference of carbon stock between Dense forest and Sparse forest

Deforestation: The difference of carbon stock between Sparse forest and Grassland

Source: JICA Project Team (2020)

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

Name of district	Name of Subdistrict	Watersheds related	No. of Villages related	Ranking	Total score	Score of each indicator	
						Vulnerability	Potential of mitigation
Priority Post-Administratives							
Aileu	Laulara	Laclo, Comoro	6	1	6	3	3
Dili	Vera Cruz	Comoro	1	1	6	3	3
Covalima	Forohem	Tafara	4	3	5	3	2
Ermera	Railaco	Comoro	9	3	5	3	2
Aileu	Aileu Vila	Caraulun, Lalco, Comoro	10	5	4	3	1
Aileu	Liquidoe	Laclo	7	5	4	3	1
Aileu	Remexio	Laclo, Comoro	8	5	4	3	1
Ainaro	Maubisse	Caraulun, Laclo	9	5	4	3	1
Liquica	Bazartete	Comoro	4	5	4	2	2
Manatuto	Laclubar	Laclo	6	5	4	2	2
Manufahi	Turiscail	Caraulun, Laclo	11	5	4	3	1
Covalima	Fatululic	Tafara	2	12	3	2	1
Covalima	Fatumean	Tafara	3	12	3	2	1
Covalima	Maukatar	Tafara	3	12	3	1	2
Manatuto	Laclo	Laclo	4	12	3	2	1
Manufahi	Same	Caraulun	8	12	3	1	2
Others							
Ainaro	Hatu-Udo	Caraulun	2	17	2	1	1
Covalima	Tilomar	Tafara	4	17	2	1	1
Dili	Dom Aleixo	Comoro	3	17	2	1	1
Manatuto	Manatuto	Laclo	5	17	2	1	1
Note:The evaluation of the vulnerability and mitigation potential was made in accordance with the criteria shown below.							

Note: The evaluation of the vulnerability and mitigation potential was made in accordance with the criteria shown below.

Potential of mitigation (Dense forest coverage): 3-point: more than 30 %, 2-point: 20%~30%, 1-point: below 20%

Vulnerability (Proportion of steep sloping areas (over 26 degree)): 3-point: more than 80%, 2-point: 40%~80%, 1-point: below 40%

The post-administratives highlighted in yellow are excluded from priority post-administratives.

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

Category	Environmental Item	Main Check Item	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) The submission of EIA is not required as the proposed project would be categorized as Category C. The project document should be submitted to the environmental authority as stipulated in Decree law No 5/2011 "Environmental Licensing Law," as it has not been submitted yet. (b) Same as above. (c) Same as above. (d) Any other document is not required for approval.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) Initial consultations with local key stakeholders were made in the preparation of the project proposal in 2019/2020. More consultations are scheduled to be conducted to explain the contents and potential impacts to the stakeholders once a public gathering is allowed. (b) Comments given by the stakeholders in the initial consultations were incorporated in the project plan. Those given in the further meetings will also be reflected to the project design.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Due social and environmental considerations were made in designing of the project during the pre-FS study. All the planned activities were designed to have no or minimal environmental and social adverse impacts; therefore, no alternative plan was prepared.
Pollution Control	(1) Air Quality	(a) Do air pollutants, such as dust, soot and dust, Sulphur Oxides (SOx), Nitrogen Oxides (NOx), and organic chemical substances emitted from various sources, such as logging operations, forest products manufacturing processes, and incinerators comply with the country's emission standards and ambient air quality standards? Are any mitigating measures taken?	(a) N/A	(a) There will be no activities, which would lead to air pollution, planned in the project.
	(2) Water Quality	(a) Is there a possibility that the use of chemicals, such as fertilizers, and agrochemicals will cause water pollution? (b) Where facilities, such as forest products manufacturing facilities are installed, do effluents from the facilities comply with the country's effluent standards and ambient water quality standards?	(a) N (b) N/A	(a) No chemical fertilizer or agrochemical will be used for reforestation or horticulture development of the project. Instead of chemical materials, compost and natural pesticide made of natural resources locally available will be used for the same activities. Furthermore, the volume of compost used for reforestation will be too small to pollute the water sources. (b) No engineering work, such as installation of facilities or machines, is planned in the project.
	(3) Wastes	(a) Are wastes properly treated and disposed of in accordance with the country's regulations?	(a) N/A	(a) No engineering work or activity producing waste is planned in the project.
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by use of chemicals, such as agrochemicals? (b) Are any agrochemicals management plans prepared? Are any usages or any implementation structures organized for proper use of the plans?	(a) N/A (b) N/A	(a) No chemical fertilizer or agrochemical will be used for reforestation or horticulture development of the project as explained above. (b) Same as above.

Category	Environmental Item	Main Check Item	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? (b) Is there a possibility that the project will affect the protected areas?	(a) Y (b) N	(a) There are some existing and proposed protected areas located in the edge of and adjacent to the target watersheds. (b) The possibility of affecting the existing and proposed protected areas is nil or minimal, owing to the following reasons: 1) Future land use plans and village regulations developed by villages which share the areas or boundaries with the protected areas are aimed at the protection and improvement of existing forests and other natural resources in the areas; 2) Due consideration will be given to the rules of Decree Law on Protected Area Management in the preparation of future land use plans and village regulations; 3) Compliance of people's activities with village regulations will be monitored and any illegal or irregular acts will be controlled by local communities in accordance with the regulations; and 4) Other Activities, such as Activities 1-3, 1-4 and 2-1, are also aimed at the enhancement of ecosystem services of existing forests; therefore, forest ecosystems in the existing and protected areas would benefit from the project activities.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) Is there a possibility that changes in localized micro-meteorological conditions, such as solar radiation, temperature, and humidity due to a large-scale timber harvesting will affect the surrounding vegetation? (d) Is there a possibility that a large-scale timber harvesting will result in loss of breeding and feeding grounds for wildlife? (e) In the case of reforestation projects, is there a possibility that mono-species plantations will adversely affect wildlife habitats? Is there a possibility that mono-species plantations will cause outbreaks of pests? (f) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (g) Isn't an illegal deforestation associated with the project being carried out, or is an acquisition of the forest certification by the project proponent being carried out?	(a) N (b) Y (c) N (d) N (e) N (f) N/A (g) N	(a) Majority of the forests in the target watersheds are the secondary forests with some classified as dense forests, and are not primeval or tropical rain forests. Limited areas of the target watersheds are overlapped with the existing or proposed protected areas, which are likely to be the natural habitats for wildlife. Hence, the value of ecosystem of such areas are considered high in terms of biodiversity conservation, which the project will aim to conserve. (b) Same as above. (c) No commercial logging is planned in the project design. If anything, the project will promote restoration and rehabilitation of degraded lands/ forests, which would contribute to the improvement and stabilization of micro-meteorological conditions. (d) Same as above. The project activities will contribute to the protection and improvement of breeding and feeding grounds for wildlife. (e) Mix planting of indigenous species will be the main design of rehabilitation of degraded forests in the existing and proposed protected areas. (f) No significant ecological negative impacts caused by the project are predicted. (g) There is no illegal deforestation associated with project activities. Instead, the project aims to halt illegal exploitation by enhancing the governance capacity through Activities 1-1 and 1-2.
	(3) Hydrology	(a) Is there a possibility that alteration of rainwater runoff and runoff characteristics due to a large-scale timber harvesting and access road construction will cause impacts on the hydrology of the surrounding areas? (b) Is there a possibility that decreased water retention capacity due to deforestation will affect the existing drainage patterns of the forest?	(a) N (b) N	(a) No commercial logging or road construction is planned in the project design. If anything, the project will promote sustainable protection of existing forests, rehabilitation of degraded forests, and restoration of wasted lands, which would contribute to the improvement and stabilization of water flows in the surrounding areas. (b) Same as above. Water retention capacity will be enhanced by the project.
	(4) Topography and Geology	(a) Is there a possibility that loss of forest stability due to timber harvesting will cause slope failures or landslides?	(a) N	(a) No commercial logging is planned in the project design. If anything, the project aims to protect existing forests particularly in hilly and mountainous areas to stabilize and protect sloping lands from landslide and slope failure.
	(5) Management of Abandoned Sites	(a) Are adequate restoration and vegetation plans considered for the harvested areas? In particular, are adequate measures taken to prevent soil runoff from the harvested areas? (b) Is a sustainable management system for the harvested areas established? (c) Are adequate financial provisions secured to manage the harvested areas?	(a) N/A (b) N/A (c) N/A	(a) No commercial logging is planned in the project design. No restoration and vegetation plan is required after harvesting. Instead, community-based reforestation and restoration of degraded areas may be initiated as part of the future land use plan/ community-based adaptation plan. (b) As described above, no commercial logging is planned in the project. (c) Same as above.

Category	Environmental Item	Main Check Item	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, and people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) Y	(a) The project will not cause any physical displacement, resettlement, land acquisition, or loss of livelihood opportunities. (b) Same as above. (c) Same as above. (d) Same as above. (e) Same as above. (f) Same as above. (g) Same as above. (h) Same as above. (i) Same as above. (j) The grievance redress mechanism (GRM) from village level to central level is drafted as described in Chapter 10 of the pre-FS report. The draft GRM will be finalized through consultations with relevant stakeholders prior to the commencement of the project.
	(2) Living and Livelihood	(a) 1 Is there a possibility that the project will adversely affect the living conditions of inhabitants? 2 Are adequate measures considered to reduce the impacts, if necessary? 3 Is particular attention paid to the inhabitants whose livelihoods are based on primary industries, such as farming, raising livestock, or hunting and gathering in the forests? (b) Are adequate measures taken to prevent illegal entry into the forestry resource areas from the outside through newly constructed access roads? (c) Is there a possibility that the forest right of common is obstructed? (d) Are considerations given to life of residents before implementation of project?	(a) 1N 2N/A 3Y (b) N/A (c) N (d) Y	(a) There is no possibility of adversely affecting the living conditions of local communities. In fact, local communities will develop their village regulations and future land use plan through PLUP with an aim to improve the social and environmental conditions of their village. Community-based adaptation measures (e.g., climate resilient agriculture), which will be introduced in Activity 2-1, will improve livelihoods of local communities by using natural and social resources available in the localities. (b) The project will not construct any access roads. Plus, village regulations will strictly prohibit illegal exploitation in existing natural forests, particularly dense forests in a village. Watershed management council to be formed in Activity 1-3 will also regulate illegal acts, such as illegal exploitation, wildfires, and other destructive acts, in the jurisdictional area of post-administrative concerned. (c) Due attentions will be paid to customary rules including customary forest rights in a village when village regulations are developed by local communities through PLUP under Activity 1-1. If anything, the project will enhance the customary rights over forests through PLUP and enhancement of the governance capacity. (d) The project is designed based on the CBNRM mechanism, which is the truly people-driven approach, where local communities will fully participate in assessment, planning, implementation and monitoring of the project activities. Future land use plans, community-based adaptation plans, and village regulations developed through PLUP are developed in a participatory manner with due considerations of the life of residents in the villages.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archaeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N/A	(a) There is no local archaeological, historical. Cultural, and religious heritage in the watersheds. Besides, future land use plans and village regulations developed through PLUP will strengthen the protective works for customary sacred sites (such as sacred water sources, sacred stones, and sacred forests in the villages).
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(b) There is no possibility that the project will adversely affect the local landscape as one of the main aims of the project is to promote sustainable forest and natural resource management on a watershed sale.

Category	Environmental Item	Main Check Item	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) Y (b) Y	(a) Village regulations developed by local communities through PLUP are based on customary rules and norms of the respective villages. As all the project activities will be carried in a fully participatory manner, the views and ideas of local communities including traditional and cultural aspects will be fully incorporated in the project activities. (b) Future land use plans and village regulations developed through PLUP will fully respect customary rights over lands and other natural resources in the localities.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N/A (b) N/A (c) N/A (d) N/A	(a) No physical development is planned in the project. (b) Same as above. (c) Same as above. The works to be undertaken by local communities are simple and less dangerous agriculture and forestry activities, such as land preparation, compost making, cultivation, weeding, harvesting, hole digging, and planting. Hence, health program and safety training are not necessarily required for the project. (d) No security guard will be hired or placed in the project, as no physical development is planned in the project.
Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) N/A (b) N/A (c) N/A	(a) No physical development is planned in the project. (b) Same as above. (c) Same as above.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) N/A (b) N/A (c) N/A (d) N/A	(a) Environmental Social Action Plan was developed as a basis for monitoring of the potential environmental risks. (b) Same as above. (c) Same as above. (d) Environmental monitoring will be carried out by MAF Monitoring Teams as part of the regular monitoring activities. The necessary formats and reporting systems will be defined and given in the implementation manual which will be developed in the beginning of the project.
Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Agriculture checklist should also be checked.	(a) Y	(a) The Agriculture check list was prepared as shown in Table 10-2.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) No transboundary global issues caused by the project is anticipated.

Remarks: "Y," "N," and "N/A" means "Yes," "No," and "Not Applicable."

Table 5 Checklist for Agriculture Project (for Activity 2.1 of the proposed project)

Cat egory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(e) N (f) N (g) N (a) N	(a) The submission of EIA is not required as the proposed project would be categorized as Category C. The project document should be submitted to the environmental authority as stipulated in Decree law No 5/2011 "Environmental Licensing Law," as it has not been submitted yet. (b) Same as above. (c) Same as above. (d) Any other document is not required for approval.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) Initial consultations with local key stakeholders were made in the preparation of the project proposal in 2019/2020. More consultations are scheduled to be conducted to explain the contents and potential impacts to the stakeholders once a public gathering is allowed. (b) Comments given by the stakeholders in the initial consultations were incorporated in the project plan. Those given in the further meetings will also be reflected to the project design.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Due social and environmental considerations were made in designing of the project during the pre-FS study. All the planned activities were designed to have no or minimal environmental and social adverse impacts; therefore, no alternative plan was prepared.
1 Pollution Control	(1) Water Quality	(a) Are considerations given to water pollution of the surrounding water bodies, such as rivers and groundwater by effluents or leachates from agricultural lands? Are adequate use/disposal standards for fertilizers, agrochemicals, and livestock wastes established? (b) Is a framework established to increase awareness of the standards among farmers? Is a monitoring framework established for water pollution of rivers and groundwater?	(a) Y (b) N/A	(a) No chemical fertilizer or agrochemical will be used for climate resilient agriculture and horticulture development. Instead of chemical materials, compost and natural pesticide made of natural resources locally available will be used for the same activities. Furthermore, the volume of compost used for reforestation will be too small to pollute the water sources. (b) No engineering work, such as installation of facilities or machines, is planned in the project.
	(2) Wastes	(a) Are wastes properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) No engineering work or activity producing waste is planned in the project.
	(3) Soil Contamination	(a) Is there a possibility that impacts in irrigated lands, such as salinization of soils will result? (b) Are adequate measures taken to prevent soil contamination of irrigated lands by agrochemicals, heavy metals and other hazardous substances? (c) Are any agrochemicals management plans prepared? Are any usages or any implementation structures organized for proper use of the plans?	(a) N/A (b) N/A (c) N/A	(a) No irrigation development is planned in the project. (b) No chemical fertilizer or agrochemical will be used for climate resilient agriculture or horticulture development of the project as explained above. (c) Same as above.
	(4) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) No extraction of groundwater is planned in the project.
	(5) Odor	(a) Are there any odor sources? Is there a possibility that odor problems will occur to the inhabitants?	(a) N	(a) Although compost production is one of the activities introduced by hands-on training on climate resilient agriculture, compost will be produced at farms and the volume of compost produced is as small as about 1~2 ton/ household (or 1~2 m ³ / household). Aside from compost, there will be no odor sources used by the project. Consequently, no odor problem is foreseen in the project.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? (b) Is there a possibility that the project will affect the protected areas?	(a) Y (b) N	(a) There are some existing and proposed protected areas located in the edge of and adjacent to the target watersheds. However, no project activities related to Activity 2-1 will be implemented inside the protected areas. Other Activities, particularly Activities 1-1~1-4 activities will aim to conserve the forest ecosystems in the existing and proposed protected areas. (b) The possibility of affecting the existing and proposed protected areas is nil or minimal, owing to the following reasons: 1) Future land use plans and village regulations developed by villages which share the areas or

Cat egory	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				<p>boundaries with the protected areas are aimed at the protection and improvement of existing forests and other natural resources in the areas;</p> <p>2) Due consideration will be given to the rules of Decree Law on Protected Area Management in the preparation of future land use plans and village regulations;</p> <p>3) Compliance of people's activities with village regulations will be monitored and any illegal or irregular acts will be controlled by local communities in accordance with the regulations; and</p> <p>4) Other Activities, such as Activities 1-3, 1-4 and 2-1, are also aimed at the enhancement of ecosystem services of existing forests; therefore, forest ecosystems in the existing and protected areas would benefit from the project activities.</p>
	(2) Ecosystem	<p>(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?</p> <p>(b) Does the project site or discharge area encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?</p> <p>(c) Is there a possibility that the project will result in the loss of breeding and feeding grounds for valuable wildlife? If they are lost, are there substitutes for the grounds near the original locations?</p> <p>(d) Is there a possibility that overgrazing will cause ecological degradation, such as impacts on wildlife habitats and desertification?</p> <p>(e) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?</p>	<p>(a) N (b) Y (c) N (d) N (e) N/A</p>	<p>(a) Majority of the forests in the target watersheds are the secondary forests, with some classified as dense forests, and are not primeval or tropical rain forests. Limited areas of the target watersheds are overlapped with the existing or proposed protected areas, which are likely to be the natural habitats for wildlife. Hence, the value of ecosystem of such areas are considered high in terms of biodiversity conservation, which the project activities are designed to conserve.</p> <p>(b) Same as above.</p> <p>(c) The project activities will contribute to the protection and improvement of breeding and feeding grounds for wildlife.</p> <p>(d) One of the aims of future land use plans and village regulations developed through PLUP is to regulate animal free grazing to reduce the animal pressure on forest lands to minimize negative impacts on wildlife. Moreover, stall-feeding will be one of the techniques introduced as part of climate resilient agriculture.</p> <p>(e) No significant ecological impact is anticipated.</p>
4 Social Environment	(1) Resettlement	<p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Is the compensations going to be paid prior to the resettlement?</p> <p>(e) Is the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, and people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>	<p>(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) Y</p>	<p>(a) The project will not cause any physical displacement, resettlement, land acquisition, or loss of livelihood opportunities.</p> <p>(b) Same as above.</p> <p>(c) Same as above.</p> <p>(d) Same as above.</p> <p>(e) Same as above.</p> <p>(f) Same as above.</p> <p>(g) Same as above.</p> <p>(h) Same as above.</p> <p>(i) Same as above.</p> <p>(j) The grievance redress mechanism (GRM) from village level to central level is drafted as described in Chapter 10 of the pre-FS report. The draft GRM will be finalized through consultations with relevant stakeholders prior to the commencement of the project.</p>

Cat egor y	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Living and Livelihood	<p>(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(b) Is proper allotment made for rights to agricultural land use? Is there a possibility that the allotment will result in inequitable distribution or usurpation of land and available resources?</p> <p>(c) Are proper allotments, such as water rights allotment in the project area made? Is there a possibility that the allotments will result in inequitable distribution or usurpation of water rights and available resources?</p> <p>(d) Is there a possibility that the amount of water used (surface water, groundwater) by the project will adversely affect the downstream fisheries and water uses?</p> <p>(e) Is there a possibility that water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced? Is adequate consideration given to public health education, if necessary?</p>	<p>(a) N (b) N/A (c) N (d) N (e) N (f) 1N 2N/ A 3Y (g) N/A (h) Y</p>	<p>(a) There is no adverse effect on the living conditions of local communities. In fact, local communities will significantly benefit from the project activities, particularly those of Activity 2-1, namely hands-on training on climate change adaptation measures, which mainly aims to strengthen climate resilience of local livelihoods.</p> <p>(b) There is no allotment of agricultural land use right. The project will observe the existing and customary land use rights over agricultural lands.</p> <p>(c) Currently, local communities use water resources in a collective manner. Village regulations and future land use plans developed through PLUP will protect the customary use rights over such resources, so that they could use and access to crucial resources for their livelihoods.</p> <p>(d) The amount of water used by the project is quite small, since no irrigation development is planned.</p> <p>(e) No water -borne or water related diseases will be introduced by the project since no irrigation development is planned in the project.</p>
	(3) Heritage	<p>(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?</p>	(a) N/A	<p>(f) There is no local archaeological, historical, cultural, and religious heritage in the watersheds.</p> <p>(g) Besides, future land use plans and village regulations developed through PLUP will strengthen the protective works for customary sacred sites (such as sacred water sources, sacred stones, and sacred forests in the villages).</p>
	(4) Landscape	<p>(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?</p>	(a) N	<p>(a) There is no possibility that the project will adversely affect the local landscape as one of the main aims of the project is to promote sustainable forest and natural resource management on a watershed scale.</p>
	(5) Ethnic Minorities and Indigenous Peoples	<p>(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?</p> <p>(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?</p>	<p>(a) Y (b) Y</p>	<p>(a) Village regulations developed by local communities through PLUP are based on customary rules and norms of the respective villages. As all the project activities will be carried in a fully participatory manner, the views and ideas of local communities including traditional and cultural ones will be fully incorporated in the project activities.</p> <p>(b) Future land use plans and village regulations developed through PLUP will fully respect customary rights over lands and other natural resources in the localities.</p>
	(6) Working Conditions	<p>(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p>	<p>(a) N/A (b) N/A (c) N/A (d) N/A</p>	<p>(a) No physical development is planned in the project.</p> <p>(b) Same as above.</p> <p>(c) Same as above. The works to be undertaken by local communities are simple and less dangerous agriculture and forestry activities, such as land preparation, compost making, cultivation, weeding, harvesting, hole digging, and planting. Hence, health program and safety training are not necessarily required for the project.</p> <p>(d) No security guard will be hired or placed in the project, as no physical development is planned in the project.</p>
5 Others	(1) Impacts during Construction	<p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p>	<p>(a) N/A (b) N/A (c) N/A</p>	<p>(a) No physical development is planned in the project.</p> <p>(b) Same as above.</p> <p>(c) Same as above.</p>

Cat egor y	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) N/A (b) N/A (c) N/A (d) N/A	(a) Environmental Social Action Plan was developed as a basis for monitoring of the potential environmental risks. (b) Same as above. (c) Same as above. (d) Environmental monitoring will be carried out by MAF Monitoring Teams as part of the regular monitoring activities. The necessary formats and reporting systems will be defined and given in the implementation manual which will be developed in the beginning of the project.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry checklist should also be checked. (b) For the projects including construction of large-scale weirs, reservoirs, and dams, where necessary, pertinent items described in the Hydropower, Dams and Reservoirs checklist should also be checked.	(a) Y (b) N/A	(a) The Forestry check list was prepared as shown in Table 10-1. (b) No construction works are planned in the project.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) No transboundary global issues caused by the project is anticipated.

Remarks: "Y," "N," and "N/A" means "Yes," "No," and "Not Applicable."

Table 6: Effect of CO₂ reducing forest degradation by implementation of PLUP

Year	Number of villages to be introduced PLUP					Total areas to be introduced PLUP each Watershed (%)					Effects of reducing forest degradation (%)				
	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total
2021	5	4	1	3	13	13.7%	17.5%	8.8%	11.6%	12.8%	0.0%	0.0%	0.0%	0.0%	0.0%
2022	8	4	3	5	20	35.6%	34.9%	35.2%	30.8%	34.0%	2.7%	3.5%	1.8%	2.3%	2.6%
2023	9	3	3	6	21	60.3%	48.0%	61.6%	53.9%	56.9%	9.9%	10.5%	8.8%	8.5%	9.4%
2024	8	3	3	6	20	82.2%	61.1%	88.0%	77.1%	78.8%	21.9%	20.1%	21.1%	19.3%	20.8%
2025	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	38.4%	32.3%	38.7%	34.7%	36.5%
2026	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	54.8%	44.5%	56.3%	50.1%	52.3%
2027	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	68.5%	53.2%	72.2%	63.2%	65.4%
2028	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	77.8%	58.5%	82.7%	72.4%	74.4%
2029	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2030	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2031	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2032	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2033	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2034	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2035	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2036	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2037	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2038	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2039	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%
2040	0	0	0	0	0	82.2%	61.1%	88.0%	77.1%	78.8%	82.2%	61.1%	88.0%	77.1%	78.8%

Note: Average area of target villages was used for cacluclating total areas to be introduced PLUP each watershed.
It is assumed that introduction of PLUP would be constantly reduced forest degaradtation at a rate of 20% annually and cut to zero within 5 years after PLUP.

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

(unit: ha)

Year	With-Project Condition					Without-Project Condition					Area of dense forest protected by the project (Differences between With and Without-Project Condition)				
	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total
2021	12,563	3,064	2,649	6,669	24,945	12,563	3,064	2,649	6,669	24,945	0	0	0	0	0
2022	12,139	2,889	2,425	6,212	23,665	12,127	2,882	2,421	6,201	23,631	12	7	4	11	34
2023	11,760	2,737	2,234	5,814	22,545	11,706	2,712	2,212	5,766	22,396	54	25	22	48	149
2024	11,442	2,609	2,083	5,487	21,621	11,299	2,552	2,021	5,361	21,233	143	57	62	126	388
2025	11,200	2,507	1,976	5,241	20,924	10,907	2,401	1,847	4,985	20,140	293	106	129	256	784
2026	11,029	2,428	1,907	5,066	20,430	10,528	2,259	1,688	4,635	19,110	501	169	219	431	1,320
2027	10,914	2,366	1,867	4,946	20,093	10,162	2,125	1,543	4,309	18,139	752	241	324	637	1,954
2028	10,836	2,314	1,844	4,862	19,856	9,809	2,000	1,410	4,007	17,226	1,027	314	434	855	2,630
2029	10,775	2,268	1,829	4,798	19,670	9,468	1,882	1,288	3,726	16,364	1,307	386	541	1,072	3,306
2030	10,717	2,225	1,816	4,738	19,496	9,139	1,770	1,177	3,464	15,550	1,578	455	639	1,274	3,946
2031	10,661	2,184	1,804	4,682	19,331	8,822	1,666	1,076	3,221	14,785	1,839	518	728	1,461	4,546
2032	10,607	2,146	1,793	4,630	19,176	8,515	1,567	983	2,995	14,060	2,092	579	810	1,635	5,116
2033	10,554	2,110	1,783	4,582	19,029	8,220	1,475	898	2,785	13,378	2,334	635	885	1,797	5,651
2034	10,503	2,076	1,774	4,537	18,890	7,934	1,388	821	2,589	12,732	2,569	688	953	1,948	6,158
2035	10,454	2,044	1,765	4,495	18,758	7,659	1,306	750	2,407	12,122	2,795	738	1,015	2,088	6,636
2036	10,407	2,014	1,757	4,456	18,634	7,392	1,228	686	2,238	11,544	3,015	786	1,071	2,218	7,090
2037	10,361	1,986	1,750	4,420	18,517	7,136	1,156	627	2,081	11,000	3,225	830	1,123	2,339	7,517
2038	10,317	1,960	1,744	4,387	18,408	6,888	1,088	573	1,935	10,484	3,429	872	1,171	2,452	7,924
2039	10,275	1,935	1,738	4,356	18,304	6,649	1,023	523	1,799	9,994	3,626	912	1,215	2,557	8,310
2040	10,234	1,912	1,733	4,327	18,206	6,418	963	478	1,673	9,532	3,816	949	1,255	2,654	8,674

Note : Transition of areas of dense forest was estimated using the following forest degardation rate observed between 2003 and 2012.
Laclo: 3.47%/year, Comoro: 5.91%/year, Tafara: 8.62%/year, Caraulun: 7.02%/year

Table 8: CO₂ Emission from forest degradation in the Target Watersheds under the without-project condition

(a) CO₂ Emission from forest degradation each watershed (unit: tCO₂)

Year	With-Project Condition					Without-Project Condition					Estimated Reduction of CO ₂ Emission (Differences between With and Without-Project Condition)				
	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total
2021	275,117	135,986	136,558	349,532	897,193	275,117	135,986	136,558	349,532	897,193	0	0	0	0	0
2022	258,075	123,944	122,353	316,936	821,308	265,379	128,194	124,538	324,566	842,677	7,304	4,250	2,185	7,630	21,369
2023	230,685	107,653	104,328	276,019	718,685	256,249	120,402	114,162	301,679	792,492	25,564	12,749	9,834	25,660	73,807
2024	193,556	90,655	82,478	226,780	593,469	247,727	113,322	104,328	280,874	746,251	54,171	22,667	21,850	54,094	152,782
2025	147,297	72,241	58,447	170,603	448,588	238,597	106,946	95,044	260,762	701,349	91,300	34,705	36,597	90,159	252,761
2026	104,082	55,953	37,690	121,367	319,092	230,685	100,573	86,849	242,730	660,837	126,603	44,620	49,159	121,363	341,745
2027	69,997	43,912	21,850	83,222	218,981	222,772	94,197	79,204	225,394	621,567	152,775	50,285	57,354	142,172	402,586
2028	47,476	36,828	12,562	58,256	155,122	214,859	89,239	72,648	210,133	586,879	167,383	52,411	60,086	151,877	431,757
2029	37,129	32,578	8,195	44,385	122,287	207,555	83,574	66,092	194,876	552,097	170,426	50,996	57,897	150,491	429,810
2030	35,303	30,455	7,102	41,609	114,469	200,251	78,617	60,632	181,702	521,202	164,948	48,162	53,530	140,093	406,733
2031	34,085	29,040	6,556	38,837	108,518	192,947	74,367	55,169	168,524	491,007	158,862	45,327	48,613	129,687	382,489
2032	32,868	26,913	6,010	36,062	101,853	186,252	69,410	50,798	156,735	463,195	153,384	42,497	44,788	120,673	361,342
2033	32,259	25,498	5,463	33,290	96,510	180,165	65,868	46,427	145,636	438,096	147,906	40,370	40,964	112,346	341,586
2034	31,042	24,079	4,917	31,207	91,245	174,079	61,618	42,060	135,234	412,991	143,037	37,539	37,143	104,027	321,746
2035	29,825	22,664	4,917	29,128	86,534	167,992	58,076	38,782	126,218	391,068	138,167	35,412	33,865	97,090	304,534
2036	28,607	21,248	4,371	27,045	81,271	161,905	54,534	35,504	117,205	369,148	133,298	33,286	31,133	90,160	287,877
2037	27,999	19,829	3,824	24,966	76,618	156,427	51,704	32,226	108,882	349,239	128,428	31,875	28,402	83,916	272,621
2038	26,781	18,414	3,278	22,887	71,360	150,949	48,162	29,495	101,251	329,857	124,168	29,748	26,217	78,364	258,497
2039	25,564	17,706	3,278	21,498	68,046	145,471	45,327	26,767	94,318	311,883	119,907	27,621	23,489	72,820	243,837
2040	24,955	16,291	2,732	20,112	64,090	140,602	42,497	24,581	87,384	295,064	115,647	26,206	21,849	67,272	230,974

Note: CO₂ emission from forest degradation with and without-project condition was calculated by the following calculating formula.
CO₂ emission each year = Changes in dense forests from the previous year x (Average carbon stock of dense forest – Average carbon stock of sparse forest) x 3.67

(b) CO₂ Emission from forest degradation each watershed (unit: tCO₂)

Year	With-Project Condition					Without-Project Condition					Estimated Reduction of CO ₂ Emission (Differences between With and Without-Project Condition)				
	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total	Laclo	Comoro	Tafara	Caraulun	Total
2021	394,001	247,152	359,697	682,403	1,683,253	394,001	247,152	359,697	682,403	1,683,253	0	0	0	0	0
2022	383,482	233,831	340,450	644,497	1,602,260	376,178	229,581	338,265	636,867	1,580,891	7,304	4,250	2,185	7,630	21,369
2023	373,568	220,817	323,298	609,023	1,526,706	348,004	208,068	313,464	583,363	1,452,899	25,564	12,749	9,834	25,660	73,807
2024	364,261	208,824	306,688	575,982	1,455,755	310,090	186,157	284,838	521,888	1,302,973	54,171	22,667	21,850	54,094	152,782
2025	354,346	197,843	290,628	544,331	1,387,148	263,046	163,138	254,031	454,172	1,134,387	91,300	34,705	36,597	90,159	252,761
2026	345,650	187,172	276,111	515,108	1,324,041	219,047	142,552	226,952	393,745	982,296	126,603	44,620	49,159	121,363	341,745
2027	336,956	176,495	262,592	487,286	1,263,329	184,181	126,210	205,238	345,114	860,743	152,775	50,285	57,354	142,172	402,586
2028	328,258	167,544	250,166	461,534	1,207,502	160,875	115,133	190,080	309,657	775,745	167,383	52,411	60,086	151,877	431,757
2029	320,169	158,194	237,736	436,487	1,152,586	149,743	107,198	179,839	285,996	722,776	170,426	50,996	57,897	150,491	429,810
2030	312,081	149,552	226,857	413,872	1,102,362	147,133	101,390	173,327	273,779	695,629	164,948	48,162	53,530	140,093	406,733
2031	303,996	141,617	215,974	391,604	1,053,191	145,134	96,290	167,361	261,917	670,702	158,862	45,327	48,613	129,687	382,489
2032	296,516	133,591	206,180	371,074	1,007,361	143,132	91,094	161,392	250,401	646,019	153,384	42,497	44,788	120,673	361,342
2033	289,644	126,977	196,841	351,582	965,044	141,738	86,607	155,877	239,236	623,458	147,906	40,370	40,964	112,346	341,586
2034	283,034	119,658	187,506	332,787	922,985	139,997	82,119	150,363	228,760	601,239	143,037	37,539	37,143	104,027	321,746
2035	276,166	113,351	179,710	316,078	885,305	137,999	77,939	145,845	218,988	580,771	138,167	35,412	33,865	97,090	304,534
2036	269,294	107,044	171,915	299,724	847,977	135,996	73,758	140,782	209,564	560,100	133,298	33,286	31,133	90,160	287,877
2037	263,032	101,758	164,120	284,057	812,967	134,604	69,883	135,718	200,141	540,346	128,428	31,875	28,402	83,916	272,621
2038	256,769	95,759	157,326	269,786	779,640	132,601	66,011	131,109	191,422	521,143	124,168	29,748	26,217	78,364	258,497
2039	250,770	90,467	150,081	256,209	747,527	130,863	62,846	126,592	183,389	503,690	119,907	27,621	23,489	72,820	243,837
2040	245,117	85,489	144,279	242,979	717,864	129,470	59,283	122,430	175,707	486,890	115,647	26,206	21,849	67,272	230,974

Note: CO₂ emission from deforestation and forest degradation with and without-project condition was calculated by the following calculating formula.
CO₂ emission each year = Changes in dense forests from the previous year x (Average carbon stock of dense forest – Average carbon stock of sparse forest) x 3.67

Table 9: Estimated CO₂ emission reductions to be credited
(unit: tCO₂)

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

Note : CO₂ emission reductions resulting from project activities was adjusted using 20% discount factor for the risk of reversals during a monitoring period.

Table 10 Annual and Total Benefits from CO₂ Reduction
through Protection of Dense Forests
(unit: US\$)

Year	Laclo	Comoro	Tafara	Caraulun	Total
2021	0	0	0	0	0
2022	24,541	14,280	7,342	25,637	71,800
2023	85,895	42,837	33,042	86,218	247,992
2024	182,015	76,161	73,416	181,756	513,348
2025	306,768	116,609	122,966	302,934	849,277
2026	425,386	149,923	165,174	407,780	1,148,263
2027	513,324	168,958	192,709	477,698	1,352,689
2028	562,407	176,101	201,889	510,307	1,450,704
2029	572,631	171,347	194,534	505,650	1,444,162
2030	554,225	161,824	179,861	470,712	1,366,622
2031	533,776	152,299	163,340	435,748	1,285,163
2032	515,370	142,790	150,488	405,461	1,214,109
2033	496,964	135,643	137,639	377,483	1,147,729
2034	480,604	126,131	124,800	349,531	1,081,066
2035	464,241	118,984	113,786	326,222	1,023,233
2036	447,881	111,841	104,607	302,938	967,267
2037	431,518	107,100	95,431	281,958	916,007
2038	417,204	99,953	88,089	263,303	868,549
2039	402,888	92,807	78,923	244,675	819,293
2040	388,574	88,052	73,413	226,034	776,073
Total	7,806,212	2,253,640	2,301,449	6,182,045	18,543,346

Note: US\$ 4.2/t CO₂ was used for calculation of benefit, which is average price of carbon credit for REDD+ project in 2016.

Table 11 (1) Results of the Cash Flow Analysis of the Proposed Project

(1) Whole Project

Year	Project Cost			O&M Cost		Total Cost	Benefit			Total Benefit	Balance
	Activities 1-1~1.3	Activity 2-1	Others	Activities 1-1~1.3	Activity 2-1		Yield increase	Reduction of GHG emission	CO ₂ absorption by afforestation		
1	359,917	77,222	334,065			771,205	0	0	0	0	-771,205
2	877,414	496,020	581,791			1,955,226	0	71,800	0	71,800	-1,883,426
3	984,399	1,144,379	496,603			2,625,381	5,760	247,992	0	253,752	-2,371,629
4	1,106,798	1,738,310	770,915			3,616,024	236,160	513,348	0	749,508	-2,866,516
5	678,029	1,912,336	915,561			3,505,925	728,820	849,277	0	1,578,097	-1,927,828
6	211,834	1,127,097	572,055			1,910,985	1,382,520	1,148,263	0	2,530,783	619,798
7	95,200	389,817	528,406			1,013,423	1,995,780	1,352,689	12,519	3,360,988	2,347,565
8				43,136	68,852	111,988	2,166,780	1,450,704	8,198	3,625,682	3,513,694
9				43,136	68,852	111,988	2,166,780	1,444,162	8,645	3,619,587	3,507,599
10				43,136	68,852	111,988	2,166,780	1,366,622	8,495	3,541,897	3,429,909
11				43,136	68,852	111,988	2,166,780	1,285,163	7,899	3,459,842	3,347,854
12				43,136	68,852	111,988	2,166,780	1,214,109	8,048	3,388,937	3,276,949
13				43,136	68,852	111,988	2,166,780	1,147,729	8,495	3,323,004	3,211,016
14				43,136	68,852	111,988	2,166,780	1,081,066	7,452	3,255,298	3,143,310
15				43,136	68,852	111,988	2,166,780	1,023,233	8,347	3,198,360	3,086,372
16				43,136	68,852	111,988	2,166,780	967,267	8,645	3,142,692	3,030,704
17				43,136	68,852	111,988	2,166,780	916,007	8,645	3,091,432	2,979,444
18				43,136	68,852	111,988	2,166,780	868,549	9,092	3,044,421	2,932,433
19				43,136	68,852	111,988	2,166,780	819,293	8,645	2,994,718	2,882,730
20				43,136	68,852	111,988	2,166,780	776,073	9,688	2,952,541	2,840,553
NPV						11,415,047	9,591,972	6,462,167	34,035	16,088,174	4,673,127
										B/C	1.41
										EIRR	18.7%

Table 11 (2) Results of the Cash Flow Analysis of the Proposed Project

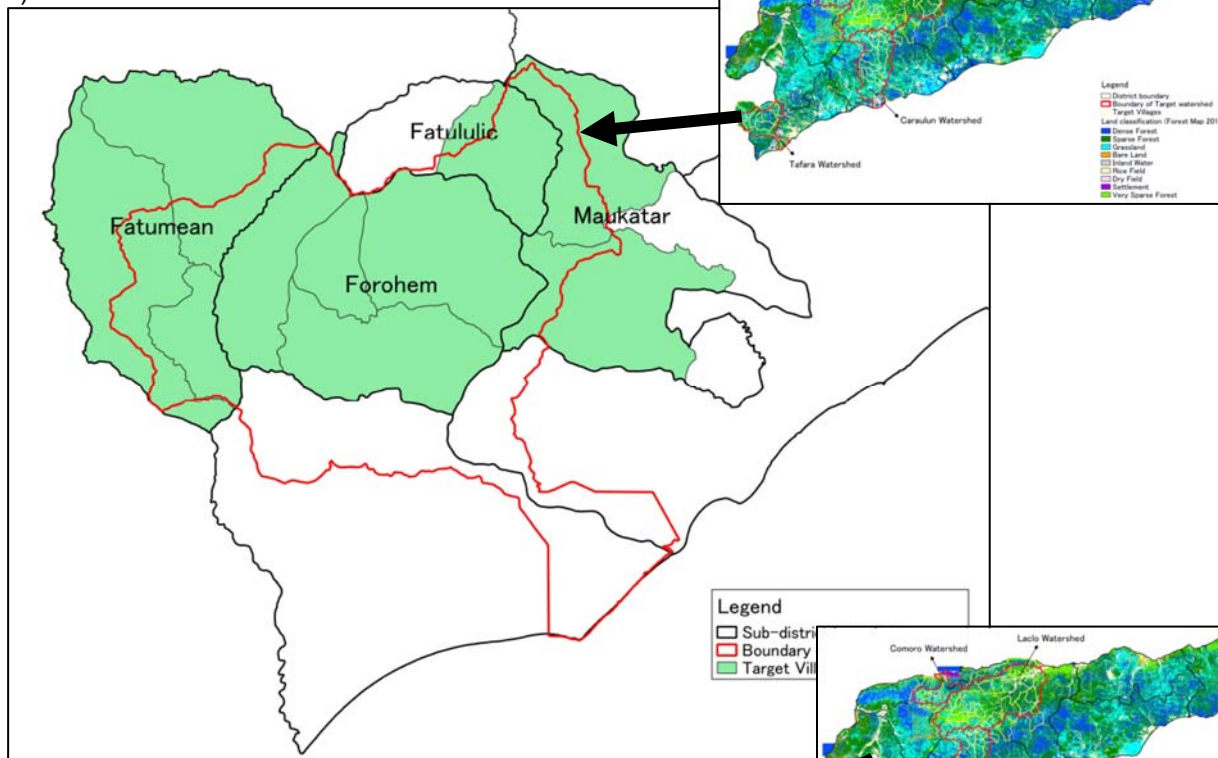
Watershed	Items		Total	NPV	Year																			
					2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Lacro	Total Cost		-6,877,500	-4,658,714	-315,136	-798,024	-1,069,901	-1,476,242	-1,431,308	-781,517	-413,086	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561	-45,561
		Sub-component 1.1	28 villages	-1,101,323	-813,277	-102,548	-253,470	-250,575	-256,119	-85,393	-13,259	-13,259	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746	-9,746
		Sub-component 1.2	30 villages	-566,963	-388,859	-33,448	-69,885	-93,666	-131,931	-128,283	-44,526	0	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017	-5,017
		Sub-component 1.3	4.83 WMC	-276,417	-183,440	-9,787	-30,865	-49,962	-54,981	-53,204	-24,082	-21,735	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446	-2,446
		Sub-component 2-1	28 villages	-3,203,634	-2,045,170	-31,797	-204,244	-471,215	-715,775	-787,433	-464,099	-160,513	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351	-28,351
		Others		-1,729,163	-1,227,967	-137,556	-239,561	-204,483	-317,436	-376,996	-235,552	-217,579	0	0	0	0	0	0	0	0	0	0	0	0
	Total Benefit		25,506,510	7,891,517	0	24,541	114,815	351,695	768,588	1,245,886	1,598,103	1,726,495	1,736,894	1,718,429	1,697,747	1,679,399	1,661,168	1,644,400	1,628,387	1,612,144	1,595,781	1,581,642	1,567,151	1,553,245
	Reduction of CO2 emission		7,806,212	2,591,200	0	24,541	85,895	182,015	306,768	425,386	513,324	562,407	572,631	554,225	533,776	515,370	496,964	480,604	464,241	447,881	431,518	417,204	402,888	388,574
	Yield increase		17,652,240	5,286,999	0	0	28,920	169,680	461,820	820,500	1,079,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880	1,160,880
	CO2 absorption by afforestation		48,058	13,318	0	0	0	0	0	0	4,899	3,208	3,383	3,324	3,091	3,149	3,324	2,916	3,266	3,383	3,383	3,558	3,383	3,791
Balance of cost and benefit		18,629,010	3,232,803	-315,136	-773,483	-955,086	-1,124,547	-662,720	464,369	1,185,017	1,680,934	1,691,333	1,672,868	1,652,186	1,633,838	1,615,607	1,598,839	1,582,826	1,566,583	1,550,220	1,536,081	1,521,590	1,507,684	
	EIRR of the project in Lacro	22.7%	B/C	1.69																				
Comoro	Total Cost		-2,797,089	-1,894,326	-128,162	-324,626	-436,878	-600,305	-582,040	-314,961	-166,480	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741	-18,741
		Sub-component 1.1	11 villages	-432,663	-319,502	-40,287	-99,577	-98,440	-100,618	-33,547	-5,209	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829	-3,829
		Sub-component 1.2	14 villages	-264,583	-181,468	-15,609	-32,613	-43,711	-61,568	-59,865	-20,779	0	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341	-2,341
		Sub-component 1.3	2.83 WMC	-161,958	-107,482	-5,735	-18,084	-29,274	-32,215	-31,173	-14,110	-12,735	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433	-1,433
		Sub-component 2-1	11 villages	-1,258,571	-803,460	-12,492	-80,239	-185,120	-281,197	-309,348	-182,324	-63,059	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138	-11,138
		Others		-679,314	-482,416	-54,040	-94,113	-80,333	-124,707	-148,105	-92,538	-85,478	0	0	0	0	0	0	0	0	0	0	0	0
	Total Benefit		9,274,957	2,938,577	0	14,280	57,297	161,001	325,829	483,523	600,195	633,587	628,910	619,361	609,733	600,250	593,180	583,487	576,496	569,404	564,663	557,594	550,370	545,797
	Reduction of CO2 emission		2,253,640	813,531	0	14,280	42,837	76,161	116,609	149,923	168,958	176,101	171,347	161,824	152,299	142,790	135,643	126,131	118,984	111,841	107,100	99,953	92,807	88,052
	Yield increase		6,999,960	2,119,127	0	0	14,460	84,840	209,220	333,600	429,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060	456,060
	CO2 absorption by afforestation		21,357	5,919	0	0	0	0	0	0	0	2,177	1,426	1,503	1,477	1,374	1,400	1,477	1,296	1,452	1,503	1,503	1,581	1,503
Balance of cost and benefit		6,477,868	1,044,250	-128,162	-310,346	-379,581	-439,304	-256,211	168,562	433,715	614,846	610,169	600,620	590,992	581,509	574,439	564,746	557,755	550,663	545,922	538,853	531,629	527,056	
	EIRR of the project in Comoro	21.1%	B/C	1.55																				
Tafara	Total Cost		-2,572,947	-1,740,971	-116,362	-297,882	-403,410	-549,985	-533,187	-289,396	-157,768	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304	-17,304
		Sub-component 1.1	10 villages	-393,330	-290,456	-36,624	-90,525	-89,491	-91,471	-30,497	-4,735	-4,735	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481	-3,481
		Sub-component 1.2	10 villages	-188,988	-129,620	-11,149	-23,295	-31,222	-43,977	-42,761	-14,842	0	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672	-1,672
		Sub-component 1.3	4 WMC	-228,916	-151,917	-8,105	-25,561	-41,376	-45,533	-44,061	-19,944	-18,000	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026	-2,026
		Sub-component 2-1	10 villages	-1,144,155	-730,418	-11,356	-72,944	-168,291	-255,634	-281,226	-165,749	-57,326	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125	-10,125
		Others		-617,558	-438,560	-49,127	-85,558	-73,030	-113,370	-134,641	-84,126	-77,707	0	0	0	0	0	0	0	0	0	0	0	0
	Total Benefit		5,017,110	1,598,313	0	7,342	20,502	67,296	142,226	241,314	352,442	392,558	385,262	370,569	353,970	341,138	328,347	315,372	304,475	295,335	286,159	278,875	269,651	264,277
	Reduction of CO2 emission		2,301,449	846,547	0	7,342	33,042	73,416	122,966	165,174	192,709	192,709	194,534	179,861	163,340	150,488	137,639	124,800	113,786	104,607	95,431	88,089	78,923	73,413
	Yield increase		2,699,640	747,327	0	0	-12,540	-6,120	19,260	76,140	158,100	189,600	189,600	189,600	189,600	189,600	189,600	189,600	189,600	189,600	189,600	189,600	189,600	189,600
	CO2 absorption by afforestation		16,021	4,440	0	0	0	0	0	0	0	1,633	1,069	1,128	1,108	1,030	1,050	1,108	972	1,089	1,128	1,128	1,186	1,128
Balance of cost and benefit		2,444,163	-142,658	-116,362	-290,540	-382,908	-482,689	-390,961	-48,082	194,674	375,254	367,958	353,265	336,666	323,834	311,043	298,068	287,171	278,031,					

Table 12 Results of Sensitivity Analyses

Year	Case 0: Base Case			Case 1: Cost 10% Up			Case 2: Cost 20% Up			Case 3: Benefit 10% Down			Case 4: Benefit 20% Down		
	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance
1	771,205	0	-771,205	848,325	0	-848,325	925,445	0	-925,445	771,205	0	-771,205	771,205	0	-771,205
2	1,955,226	71,800	-1,883,426	2,150,748	71,800	-2,078,948	2,346,271	71,800	-2,274,471	1,955,226	64,620	-1,890,606	1,955,226	57,440	-1,897,786
3	2,625,381	253,752	-2,371,629	2,887,919	253,752	-2,634,167	3,150,457	253,752	-2,896,705	2,625,381	228,377	-2,397,004	2,625,381	203,002	-2,422,379
4	3,616,024	749,508	-2,866,516	3,977,626	749,508	-3,228,118	4,339,229	749,508	-3,589,721	3,616,024	674,557	-2,941,467	3,616,024	599,606	-3,016,418
5	3,505,925	1,578,097	-1,927,828	3,856,518	1,578,097	-2,278,421	4,207,110	1,578,097	-2,629,013	3,505,925	1,420,287	-2,085,638	3,505,925	1,262,478	-2,243,448
6	1,910,985	2,530,783	619,798	2,102,084	2,530,783	428,699	2,293,182	2,530,783	237,601	1,910,985	2,277,705	366,720	1,910,985	2,024,626	113,641
7	1,013,423	3,360,988	2,347,565	1,114,766	3,360,988	2,246,222	1,216,108	3,360,988	2,144,880	1,013,423	3,024,889	2,011,466	1,013,423	2,688,790	1,675,367
8	111,988	3,625,682	3,513,694	123,186	3,625,682	3,502,496	134,385	3,625,682	3,491,297	111,988	3,263,114	3,151,126	111,988	2,900,546	2,788,558
9	111,988	3,619,587	3,507,599	123,186	3,619,587	3,496,401	134,385	3,619,587	3,485,202	111,988	3,257,628	3,145,641	111,988	2,895,670	2,783,682
10	111,988	3,541,897	#####	123,186	3,541,897	3,418,711	134,385	3,541,897	3,407,512	111,988	3,187,707	3,075,720	111,988	2,833,518	2,721,530
11	111,988	3,459,842	3,347,854	123,186	3,459,842	3,336,656	134,385	3,459,842	3,325,457	111,988	3,113,858	3,001,870	111,988	2,767,874	2,655,886
12	111,988	3,388,937	3,276,949	123,186	3,388,937	3,265,751	134,385	3,388,937	3,254,552	111,988	3,050,043	2,938,056	111,988	2,711,150	2,599,162
13	111,988	3,323,004	3,211,016	123,186	3,323,004	3,199,818	134,385	3,323,004	3,188,619	111,988	2,990,704	2,878,716	111,988	2,658,403	2,546,415
14	111,988	3,255,298	3,143,310	123,186	3,255,298	3,132,112	134,385	3,255,298	3,120,913	111,988	2,929,768	2,817,780	111,988	2,604,238	2,492,251
15	111,988	3,198,360	3,086,372	123,186	3,198,360	3,075,174	134,385	3,198,360	3,063,975	111,988	2,878,524	2,766,536	111,988	2,558,688	2,446,700
16	111,988	3,142,692	3,030,704	123,186	3,142,692	3,019,506	134,385	3,142,692	3,008,307	111,988	2,828,423	2,716,435	111,988	2,514,154	2,402,166
17	111,988	3,091,432	2,979,444	123,186	3,091,432	2,968,246	134,385	3,091,432	2,957,047	111,988	2,782,289	2,670,301	111,988	2,473,146	2,361,158
18	111,988	3,044,421	2,932,433	123,186	3,044,421	2,921,235	134,385	3,044,421	2,910,036	111,988	2,739,979	2,627,991	111,988	2,435,537	2,323,549
19	111,988	2,994,718	2,882,730	123,186	2,994,718	2,871,532	134,385	2,994,718	2,860,333	111,988	2,695,246	2,583,258	111,988	2,395,774	2,283,787
20	111,988	2,952,541	2,840,553	123,186	2,952,541	2,829,355	134,385	2,952,541	2,818,156	111,988	2,657,287	2,545,299	111,988	2,362,033	2,250,045
NPV	11,415,047	16,088,174	4,673,127	12,556,552	16,088,174	3,531,623	13,698,056	16,088,174	2,390,118	11,415,047	14,479,357	3,064,310	11,415,047	12,870,540	1,455,493
		B/C	1.41		B/C	1.28		B/C	1.17		B/C	1.27		B/C	1.13
		EIRR	18.7%		EIRR	16.7%		EIRR	14.9%		EIRR	16.5%		EIRR	14.1%

Year	Case 5: Cost +10% & Benefit-10%			Case 6: Cost +10% & Benefit-20%			Case 7: Cost +20% & Benefit-10%			Case 8: Cost +20% & Benefit-20%		
	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance	Total Cost	Total Benefit	Balance
1	848,325	0	-848,325	848,325	0	-848,325	925,445	0	-925,445	925,445	0	-925,445
2	2,150,748	64,620	-2,086,128	2,150,748	57,440	-2,093,308	2,346,271	64,620	-2,281,651	2,346,271	57,440	-2,288,831
3	2,887,919	228,377	-2,659,542	2,887,919	203,002	-2,684,917	3,150,457	228,377	-2,922,080	3,150,457	203,002	-2,947,455
4	3,977,626	674,557	-3,303,069	3,977,626	599,606	-3,378,020	4,339,229	674,557	-3,664,671	4,339,229	599,606	-3,739,622
5	3,856,518	1,420,287	-2,436,231	3,856,518	1,262,478	-2,594,040	4,207,110	1,420,287	-2,786,823	4,207,110	1,262,478	-2,944,633
6	2,102,084	2,277,705	175,621	2,102,084	2,024,626	-77,457	2,293,182	2,277,705	-15,478	2,293,182	2,024,626	-268,556
7	1,114,766	3,024,889	1,910,123	1,114,766	2,688,790	1,574,025	1,216,108	3,024,889	1,808,781	1,216,108	2,688,790	1,472,682
8	123,186	3,263,114	3,139,927	123,186	2,900,546	2,777,359	134,385	3,263,114	3,128,729	134,385	2,900,546	2,766,160
9	123,186	3,257,628	3,134,442	123,186	2,895,670	2,772,483	134,385	3,257,628	3,123,243	134,385	2,895,670	2,761,284
10	123,186	3,187,707	3,064,521	123,186	2,833,518	2,710,331	134,385	3,187,707	3,053,322	134,385	2,833,518	2,699,132
11	123,186	3,113,858	2,990,671	123,186	2,767,874	2,644,687	134,385	3,113,858	2,979,473	134,385	2,767,874	2,633,488
12	123,186	3,050,043	2,926,857	123,186	2,711,150	2,587,963	134,385	3,050,043	2,915,658	134,385	2,711,150	2,576,764
13	123,186	2,990,704	2,867,517	123,186	2,658,403	2,535,217	134,385	2,990,704	2,856,318	134,385	2,658,403	2,524,018
14	123,186	2,929,768	2,806,582	123,186	2,604,238	2,481,052	134,385	2,929,768	2,795,383	134,385	2,604,238	2,469,853
15	123,186	2,878,524	2,755,338	123,186	2,558,688	2,435,502	134,385	2,878,524	2,744,139	134,385	2,558,688	2,424,303
16	123,186	2,828,423	2,705,236	123,186	2,514,154	2,390,967	134,385	2,828,423	2,694,038	134,385	2,514,154	2,379,768
17	123,186	2,782,289	2,659,102	123,186	2,473,146	2,349,959	134,385	2,782,289	2,647,904	134,385	2,473,146	2,338,760
18	123,186	2,739,979	2,616,792	123,186	2,435,537	2,312,350	134,385	2,739,979	2,605,594	134,385	2,435,537	2,301,152
19	123,186	2,695,246	2,572,060	123,186	2,395,774	2,272,588	134,385	2,695,246	2,560,861	134,385	2,395,774	2,261,389
20	123,186	2,657,287	2,534,100	123,186	2,362,033	2,238,846	134,385	2,657,287	2,522,902	134,385	2,362,033	2,227,648
NPV	12,556,552	14,479,357	1,922,805	12,556,552	12,870,540	313,988	13,698,056	14,479,357	781,301	13,698,056	12,870,540	-827,517
		B/C	1.15		B/C	1.03		B/C	1.06		B/C	0.94
		EIRR	14.6%		EIRR	12.3%		EIRR	12.9%		EIRR	10.8%

1) Tafara Watershed



2) Comoro, Lacio, and Caraulun Watersheds

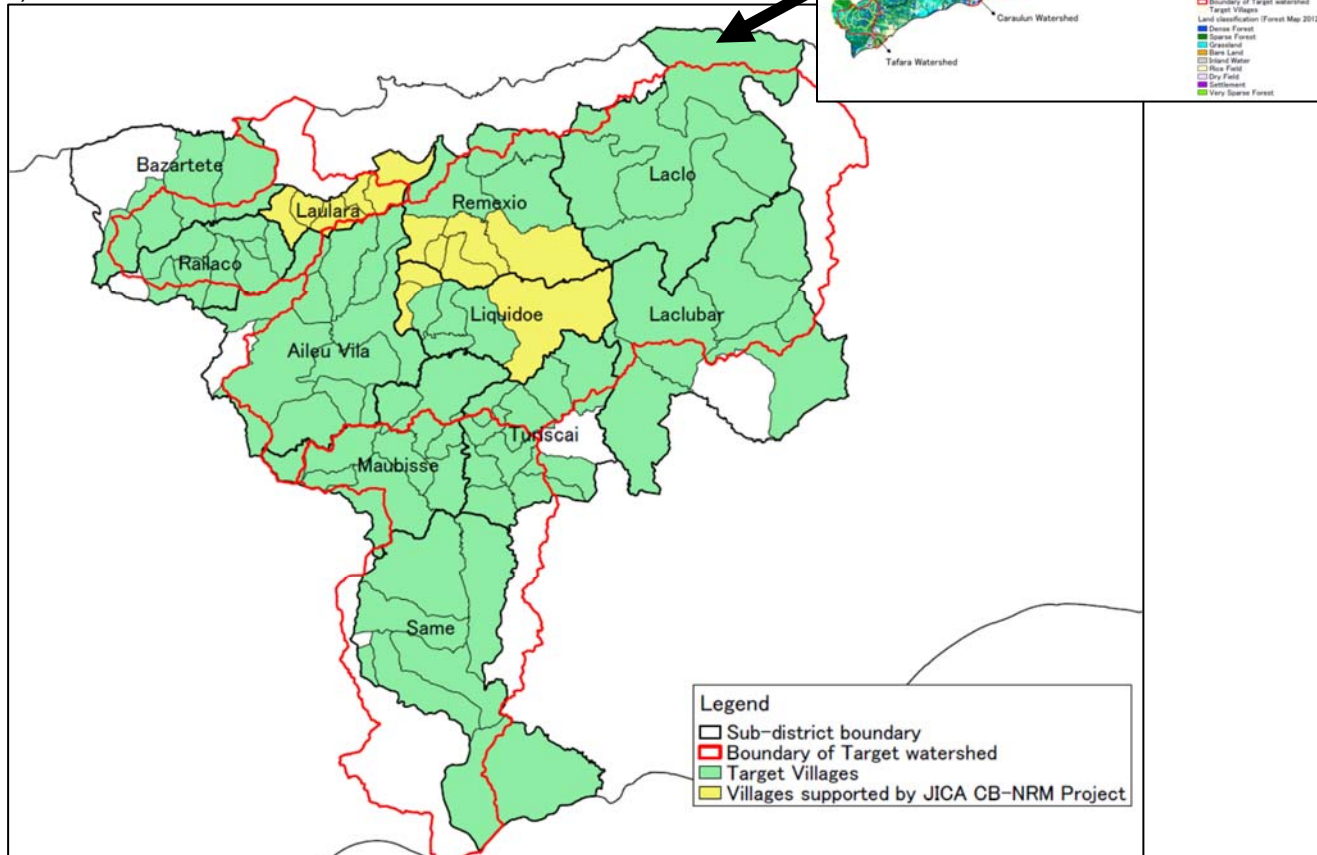


Figure 1 Location Maps of the Target Watersheds, Post-Administratives, and Villages