Integrated Agro-ecosystem Approach for enhancing Livelihoods and Climate Resilience in Tuvalu

Part I: Project Information

GEF ID
10517

Project Type
FSP

Type of Trust Fund
GET

CBIT/NGI
CBIT **No**
NGI **No**

Project Title
Integrated Agro-ecosystem Approach for enhancing Livelihoods and Climate Resilience in Tuvalu

Countries
Tuvalu

Agency(ies)
FAO

Other Executing Partner(s)
Ministry of Local Government and Agriculture (MLGA), Food and Agriculture Organization of the United Nations (FAO)

Executing Partner Type
Others

GEF Focal Area
Land Degradation

Taxonomy

Focal Areas, Climate Change, Climate Change Adaptation, Private sector, Innovation, Least Developed Countries, Climate resilience, Livelihoods, Sea-level rise, Small Island Developing States, Ecosystem-based Adaptation, Community-based adaptation, Land Degradation, Land Degradation Neutrality, Land Cover and Land cover change, Land Productivity, Carbon stocks above or below ground, Sustainable Land Management, Income Generating Activities, Ecosystem Approach, Improved Soil and Water Management Techniques, Community-Based Natural Resource Management, Sustainable Livelihoods, Integrated and Cross-sectoral approach, Sustainable Agriculture, Food Security, Sustainable Development Goals, Influencing models, Demonstrate innovative approache, Strengthen institutional capacity and decision-making, Convene multi-stakeholder alliances, Transform policy and regulatory environments, Stakeholders, Indigenous Peoples, Communications, Behavior change, Public Campaigns, Strategic Communications, Awareness Raising, Local Communities, Type of Engagement, Consultation, Participation, Partnership, Private Sector, Individuals/Entrepreneurs, SMEs, Beneficiaries, Civil Society, Community Based Organization, Non-Governmental Organization, Gender Equality, Gender Mainstreaming, Sex-disaggregated indicators, Women groups, Gender-sensitive indicators, Gender results areas, Access and control over natural resources, Participation and leadership, Access to benefits and services, Capacity Development, Knowledge Generation and Exchange, Capacity, Knowledge and Research, Learning, Indicators to measure change, Adaptive management, Theory of change, Knowledge Exchange, Field Visit, South-South, Knowledge Generation, Training

Sector
Mixed & Others

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 1

Climate Change Adaptation
Climate Change Adaptation 1

Submission Date
3/20/2020

Expected Implementation Start
7/1/2022

Expected Completion Date
6/30/2026

Duration
48In Months

Agency Fee($)
250,774.00

A. FOCAL/NON-FOCAL AREA ELEMENTS

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount($)	Co-Fin Amount($)
LD-1-1	Maintain or improve flow of agro-ecosystem services to sustain food production and livelihoods through Sustainable Land Management (SLM)	GET	1,591,991.00	4,152,903.00
LD-1-4	Reduce pressures on natural resources from competing land uses and increase resilience in the wider landscape	GET	530,664.00	1,384,301.00
LD-2-5	Create enabling environments to support scaling up and mainstreaming of SLM and LDN	GET	517,071.00	1,235,791.00
		Total Project Cost($)	**2,639,726.00**	**6,772,995.00**

B. Project description summary

Project Objective

To reverse land degradation, enhance local livelihoods and increase climate resilience through integrated agro-ecosystem approach in all the islands of Tuvalu

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
1. Strengthening enabling framework for implementation of integrated agro-ecosystem approach.	Technical Assistance	1.1 Strengthened policies and planning mechanism for the integrated agro-ecosystem approach throughout the country *Indicators:* ? Commenced implementation of key priorities of Cabinet approved NFSNP and UNCCD NAP through multi-stakeholder institutional arrangements and cross-sectoral coordination. ? Multi-sectoral Land Degradation Neutrality (LDN) Forum established. ? Each island has an Island SOLA/OT Land Tenure Committee established[1] under the auspice of its Falekaupule to approve or not SOLA/OT land user rights and land use recordings. Spatial geo-referenced data recordings of land user rights and land use, approved by the 8 Island SOLA/OT Land Tenure Committees in databases cover 100% of the country land area of 26km2 (2,600ha). [1]Or integrated as part of an existing committee.	1.1.1. National Food Systems and Nutrition Policy (NFSNP) developed. *Indicators:* ? National Food Systems and Nutrition Policy approved by Cabinet. 1.1.2: Updated UNCCD National Action Plan (NAP) and National Land Degradation Neutrality (LDN) Strategy and a LDN target setting process. *Indicators:* ? UNCCD NAP updated and aligned with the new Convention Strategic Framework. ? Land Degradation Neutrality (LDN) Strategy developed with locally relevant and Tuvalu-	GET	295,678.00	802,291.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
2. Implementation of integrated agro-ecosystem approach in the islands	Investment	2.1 Local communities are applying integrated agroecosystem approach in the target area *Indicators:* ? Area of degraded **agricultural lands restored** (Hectares) =**150 ha,** as follows (i) 20 ha of abandoned pulaka pits areas rehabilitated and ecosystem services restored (ii) 100 ha of coastal littoral and scrub forest areas rehabilitated from alien invasive species removal and replanting (iii) 30 ha of coconut woodland and agro-forestry areas rehabilitated from alien invasive species removal and replanting ? Area of l**andscapes under SLM in production systems (excluding protected areas**) = **650 ha**, as follows: (i) 250 ha - SLM through establishment of livestock/ piggery ? crops integrated farming systems (ii) 150 ha - SLM through IPM and improved crop management in coconut agro-forestry systems (iii) 100 ha - SLM in village houseyard and urban gardens (iv) 150 ha -SLM in intensive vegetables and food gardens 30 % of households with a piggery waste management	2.1.1. Participatory integrated and whole Island Agro-ecosystem Action Plans (IAEAP) prepared, in the context of Islands Strategic Plans (ISP). *Indicators:* ? Eight (8) IAEPs developed and approved by each island Falekaupule. 2.1.2. IAE Toolkits/How-To-Manuals to support Integrated Agro-ecosystem approaches. *Indicators:* ? A series of at least six (6) IAE toolkits including, but not limited to: installation of piggery biodigesters; home gardening systems; composting; seed saving methods and seedlings; food	GET	1,913,736.00	4,648,805.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
3. Project coordination, monitoring and evaluation	Technical Assistance	3.1 Project implementation is supported by an M&E strategy based on measurable and verifiable outcomes and adaptive management principles	3.1.1. Project Monitoring and Evaluation Strategy *Indicators:* ? A Project M&E Strategy developed and implemented. ?Inception Workshop Report ?Mid-Term Review (MTR) Report ?Project Terminal Evaluation Report ?Project Terminal/Final Report	GET	308,326.00	983,399.00
			3.1.2. Food security and LDN target monitoring and reporting mechanisms established. *Indicators:* ? LDN target monitoring and reporting mechanism established to support the LDN			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
				Sub Total ($)	**2,517,740.00**	**6,434,495.00**
Project Management Cost (PMC)						
	GET	121,986.00			338,500.00	
	Sub Total($)	**121,986.00**			**338,500.00**	
	Total Project Cost($)	**2,639,726.00**			**6,772,995.00**	

Please provide justification

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
GEF Agency	FAO (Technical Cooperation Programme)	In-kind	Recurrent expenditures	200,000.00
GEF Agency	FAO	In-kind	Recurrent expenditures	200,000.00
Recipient Country Government	Ministry of Local Government and Agriculture (MLGA)	In-kind	Recurrent expenditures	215,000.00
Recipient Country Government	Ministry of Local Government and Agriculture (MLGA)	Public Investment	Investment mobilized	1,496,738.00
Recipient Country Government	Ministry of Public Works, Infrastructure, Environment, Labour, Meteorology and Disaster (MPWIELMD)	In-kind	Recurrent expenditures	30,000.00
Recipient Country Government	Ministry of Public Works, Infrastructure, Environment, Labour, Meteorology and Disaster (MPWIELMD)	In-kind	Recurrent expenditures	100,000.00
Recipient Country Government	Ministry of Fisheries and Trade, (MFT)	Public Investment	Investment mobilized	3,521,813.00
Recipient Country Government	Ministry of Finance (MOF)	In-kind	Recurrent expenditures	729,444.00
Recipient Country Government	Ministry of Health, Social Welfare & Gender Affairs (MHSWGA)	In-kind	Recurrent expenditures	15,000.00
Civil Society Organization	Live and Learn Environmental Education (LLEE-Tuvalu)	Public Investment	Investment mobilized	15,000.00

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Civil Society Organization	Live and Learn Environmental Education (LLEE-Tuvalu)	In-kind	Recurrent expenditures	250,000.00
			Total Co-Financing($)	**6,772,995.00**

Describe how any "Investment Mobilized" was identified

As part of the project formulation process, FAO in consultation with key stakeholders and project partners, identified closely related activities and budget that will support this proposed project. The ?Investment mobilized? total is $5,033,551 and comprised primarily of public investments that will contribute to the project objectives, including: a. MLGA ? $1,496,738: commercial sites for local produce in all islands under the Local Garden Project (2022-2031): Department of Waste Management demonstration site for DLT and green waste composting programme; and seedlings, nurseries and outreach services in outer islands. b. MFT - $3,521,813: Coconut replanting and rehabilitation programme across all islands that the project will partner with to support IAE approach in the form of agro-forestry systems. c. Live and Learn Environmental Education -Tuvalu - $15,000: Upscaling of wicking raised-bed gardening systems, building on the successes of food-cubes (modular wicking system).

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
FAO	GET	Tuvalu	Land Degradation	LD STAR Allocation	2,639,726	250,774	2,890,500.00
				Total Grant Resources($)	**2,639,726.00**	**250,774.00**	**2,890,500.00**

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount ($)

100,000

PPG Agency Fee ($)

9,500

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
FAO	GET	Tuvalu	Land Degradation	LD STAR Allocation	100,000	9,500	**109,500.00**
				Total Project Costs($)	**100,000.00**	**9,500.00**	**109,500.00**

Core Indicators

Indicator 3 Area of land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
150.00	150.00	0.00	0.00

Indicator 3.1 Area of degraded agricultural land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
150.00	150.00		

Indicator 3.2 Area of Forest and Forest Land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.3 Area of natural grass and shrublands restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.4 Area of wetlands (incl. estuaries, mangroves) restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4 Area of landscapes under improved practices (hectares; excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
650.00	650.00	0.00	0.00

Indicator 4.1 Area of landscapes under improved management to benefit biodiversity (hectares, qualitative assessment, non-certified)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4.2 Area of landscapes that meets national or international third party certification that incorporates biodiversity considerations (hectares)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Type/Name of Third Party Certification

Indicator 4.3 Area of landscapes under sustainable land management in production systems

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
650.00	650.00		

Indicator 4.4 Area of High Conservation Value Forest (HCVF) loss avoided

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Documents (Please upload document(s) that justifies the HCVF)

Title	Submitted

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO?e (direct)	160000	100694	0	0
Expected metric tons of CO?e (indirect)	189000	122008	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO?e (direct)	160,000	100,694		
Expected metric tons of CO?e (indirect)	189,000	122,008		

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Anticipated start year of accounting	2022	2022		
Duration of accounting	20	20		

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO?e (direct)				
Expected metric tons of CO?e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	510	1,100		
Male	540	1,650		
Total	1050	2750	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Core Indicator 3* Area of degraded agricultural lands restored (Hectares): 3.1 = 150 ha (i) Abandoned pulaka pits areas rehabilitated and ecosystem services restored ? 20 ha (ii) Coastal littoral and scrub forest areas rehabilitated from alien invasive species removal and replanting ? 100 ha (iii) Coconut woodland and agro-forestry areas rehabilitated from alien invasive species removal and replanting ? 30 ha Core Indicator 4 ** Area of landscapes under SLM in production systems (excluding protected areas) (Hectares): 4.3 = 650 ha (i) SLM through establishment of livestock/ piggery ? crops integrated farming systems ? 250 ha (ii) SLM through IPM and improved crop management in coconut agro-forestry systems ? 150 ha (iii) SLM in village houseyard and urban gardens ? 100 ha (iv) SLM in intensive vegetables and food gardens ? 150 ha Core Indicator 6*** - Direct - 100,274 metric tons CO2eq from land use change/crop management (based on direct project interventions on 800ha) - Indirect - 120,328 metric tons CO2eq from the long-term outcomes of GEF activities that remove barriers, such as capacity development and the national policies as well as Island Agro-ecosystem Action Plans (see EX-ACT file for indirect GHG targets, which includes 960 ha ? Note: total agricultural land in Tuvalu is 1,800 ha.) - Additionally, reduction of GHG emissions from improved management of pig waste is estimated at 2,000 metric tons of CO2eq over 20 years. The 2,100 metric tons CO2eq assumes 30% of households raising pigs (3,350 heads) will adopt a DLT or biodigester technology for piggery waste management. The 2017 Agricultural Census found a total of 1242 households own pigs at average of 8.8pigs per HH. Weight for weight, methane contributes 21 times the impact of carbon dioxide to global warming. The IPCC methane emission factor to estimate enteric fermentation from swine is 1.5 kg methane/head/year, and is used in this rough estimate - in a situation of no detailed scientific or disaggregated data available, other than household data in terms of number of pigs raised by households as mentioned above - to estimate enteric fermentation from swine. This means a 3,350-heads, if all housed in one facility, is estimated to emit, 5,025 kg (10.05 metric tons) of methane per year, which is equivalent to 105 metric tons CO2 eq/yr or 420/project 4yr duration. Plus capitalization of 16 years, total = 1,680 metric tons CO2eq. Core Indicator 11****: Final estimates of beneficiaries are: Men: 1,650; Women: 1,100; Total: 2,750 (roughly 25% of Tuvalu population). The gender disaggregated numbers were derived based on discussions with stakeholders during PPG. The 2017 Population and Housing Census reported 1,3178 (90%) of households participate in some type of agricultural activity, including livestock raising (84%), crop growing (69 %), buying or selling fish (60%) and handicrafts (35 %t). The Results Framework targets 310 (25%) out of 1,242 households raising pigs to install either a DLT or biodigester technology for managing piggery waste. Overall, around 25% of total population are expected to participate in training in, and establishment of food gardening systems.

Part II. Project Justification

1a. Project Description

PART II: PROJECT JUSTIFICATION

General context and background:

Tuvalu is the fourth smallest nation in the world in terms of land area, with a population of around 11,000 people on total surface area of 30km2, comprising of three four reef-top islands (Nanumaga, Niutao, Niulakita), five atoll islands (Nanumea, Nui, Nukufetau, Funafuti, Nukulaelae) and one composite island (coralline atoll/table reef) (Vaitupu). While small in land area, Tuvalu is relatively big in terms of ocean area and could be considered a Large Ocean State, spreading over about 1.3 million km2, between 5o and 10.5oS latitude and 176o and 179.5oE longitude. Tuvalu?s Exclusive Economic Zone (EEZ) covers an oceanic area of approximately 900,000 km2 (Figure 9 in section 1.b).

Livelihoods

Tuvalu?s main sources of income are from ?shing licence fees (48.5% of domestic revenues in the 2017 budget), revenue from the dot tv internet domain (13.7% of domestic revenues in the 2017 budget), and foreign grants. Government budgets are supplemented by the income earned from the Tuvalu Trust Fund, established in 1987 by the United Kingdom, Australia and New Zealand as an international sovereign wealth fund to provide income to cover shortfalls in the national budget, underpin economic development, and help the nation achieve greater financial autonomy. The Tuvalu Trust Fund has contributed roughly 15% of the annual government budget each year since 1990[1].

Most Tuvaluans practice subsistence fishing, farming and the harvest of a range of wild, mainly plant, products. This is especially true outside Funafuti, where people depend on fish, shellfish and other sea foods, coconut, breadfruit, bananas, taro, pandanus, a limited number of other crops, pigs, chickens, seabirds and some wild plants as the main locally produced foods. The limited number of plants within the low-lying atolls ecosystems are the main local sources of medicines, fuel, construction and boatbuilding materials, handicrafts, garlands and perfumes and a wide range of other products[2]. Only about one-quarter of the population participates in the formal wage economy and employment is almost exclusively within the public (government) sector.

Vegetation and soils

Like other low-lying limestone islands and atolls in the Pacific, Tuvalu has one of the lowest terrestrial flora and fauna among countries globally.[3] Indigenous plants are rare because of habitat modifications such as the extensive planting of coconuts and other food plants. The total number of terrestrial vascular plants reported present, at some time in Tuvalu is about 362 species, or distinct varieties, of which only about 59 (16%) are possibly indigenous. The remaining 303 species (83% of the flora) are non-indigenous species that have been introduced by humans, some of which may have been at one time or another early aboriginal introduction by Pacific Islanders into Tuvalu.[4],[5] The atolls have very limited terrestrial natural resources base, including poor soils

and scarcity of water resources, which makes Tuvalu?s agricultural ecosystem one of the most challenging for crop and livestock production with limited options to increase production.

A 1991 study ?Vegetation of Tuvalu? by Woodroofe discussed in detail the processes of plant dispersal and establishment that operate on the remote islands of Tuvalu, which concluded, the flora and vegetation of ?low? islands of the Pacific do not exhibit the diversity or endemism apparent on the ?high? islands. Woodroofe attributed this primarily as a larger reflection of the very young geological age (late Holocene, about 3,000 years) of the terrestrial ecosystems of these low islands. The detailed mapping of the atolls and reef-top islands of Tuvalu nevertheless demonstrates considerable variability in the distribution of plants both within vegetation units of islands, within archipelagos, and between archipelagos in the group.[6]

The very young geological age of the atolls is one of the general factors in the substrates and soils of Tuvalu being among the poorest in the world. As in all atolls, the young geological age of sand deposits being established on reef platforms means very minimal soil development. What soil does exist in Tuvalu is shallow, alkaline, coarse-textured, and lacks most nutrients required for plant growth, such as organic carbon, nitrogen, potassium, iron, and magnesium. The soils include exposed limestone rock, beach or reef rock, sand and gravel, loamy sands, acid peat soils, swamp or hydromorphic organic soils or muds created in excavated taro pits, and artificial soils. The natural soils are normally shallow, porous, alkaline, coarse-textured, and have carbonate mineralogy and high pH values of up to 8.2 to 8.9. The water holding capacity of these soils is very low, with plant nutrition dependent on the humus cycle and the retention of vegetation cover.[7]

Another general regional factor influencing plant diversity on islands in the Pacific is the proximity of source areas or centres of origin. Most of the Pacific island plants which are pantropical (and hence have not speciated on the remote islands of Tuvalu) will have been derived ultimately from the land masses surrounding the Pacific. For many groups of plants (i.e., mangroves), there is an attenuation in number of species from west to east across the Pacific[8]. This may largely reflect the geological time required for dispersal from, in most cases, a Southern Asian centre of origin. In terms of recolonization of atolls and reef-top islands as they emerged from below sea level in the mid- to late Holocene, what is of particular importance is not distance from Southeast Asia, but distance from a Pleistocene refuge. Some of the plants which were found on the Pleistocene limestone islands prior to their disappearance beneath the postglacially rising sea level, will be likely to have recolonised from nearby islands, which were not submerged beneath Holocene seas. In the case of Tuvalu, Fiji may have been a source of plants, though currents do not flow from Fiji to Tuvalu. Other islands such as Ocean Island and Christmas Island in Kiribati, Samoa, Society Islands, Marquesas and Solomon Islands are more probable sources[9].

In addition to poor soils and remoteness, there are further trends in vegetation diversity associated with climatic factors in the Pacific. Diversity tends to be greater where rainfall is higher. There may be further effects, such as in incidences of hurricanes, which may create conditions favourable for propagule establishment, or substrates which suit plants.

The already poor indigenous terrestrial flora of Tuvalu is highly disturbed and now numerically dominated by introduced exotic species. This has been due to the selective removal of indigenous species and vegetation for growth of settlements, construction, boatbuilding, firewood, medicine, tools and handicrafts and other purposes; and the deliberate and accidental introduction of a wide

range of non-indigenous plants, some of which have important cultural values and some invasive weeds. The resultant total number of terrestrial vascular plants reported present, at some time in Tuvalu is about 362 species, or distinct varieties, of which only about 59 (16%) are possibly indigenous. The remaining 303 species (83% of the flora) are non-indigenous species that have been introduced by humans, some of which may have been at one time or another early aboriginal introduction by Pacific Islanders into Tuvalu.[10]

Freshwater resources

The annual rainfall is low, usually in the order of 1,500 to 2,000 mm, and are subject to considerable seasonal and annual variability. Low rainfall and poor water holding capacity means that fresh water resources are very limited, with the only permanent supplies being groundwater lenses that are often brackish. Compared with volcanic islands, the permanent moisture stress found on atolls requires highly intensive application of labour if there is to be any arable cropping. As result the return to labour effort from farming tends to be very low.

Agriculture in Tuvalu

Limited land and water resources and low returns to labour effort puts binding constraints on any form of agricultural development. Thus, the main basis of subsistence is marine products, with supplementary agriculture limited to a few tree species mainly coconuts and breadfruit that can survive growing in virtual sand, high salinity, and water stress. The traditional structure of Tuvalu society and its subsistence economy have nevertheless been built on the sustainable use of these limited, but valuable natural resources base, and the conservation and careful exploitation of its fragile atoll ecosystems.

Despite, or because of, the poor soils, flora and fauna, the Tuvaluan people have strong spiritual and cultural connection to their terrestrial, coastal and marine ecosystems and biodiversity, including their agricultural biodiversity. Their traditional ecological knowledge and customary practices have been the foundation of their resilience over thousands of years. For example, the early indigenous settlers to the atolls have variously taken advantage of natural depressions in the landscape (where easy access to the fresh groundwater lens can be gained) or excavated depressions (often to a depth of 1.5 m and sometimes 100?s of square meters in area), to allow the reliable cultivation of their crops. This traditional ?pit? farming method is used primarily for the production of *pulaka* (swamp taro - *Cytrosperma chamissonis*) and traditional taro cultivars (*Colocasia esculenta*). It involves the importation (from surrounding vegetation) of large volumes of organic material to improve and stimulate crop production. Not only does this maintain the supply of nutrients to the crop but soil quality and chemistry in such humus rich environments is subtly changed to improve plant nutrient availability and uptake. The soils in ?pulaka pits? tend to have comparatively deep, dark, organic rich soils in comparison to surrounding soils, due to the natural propensity for organic materials (leaves, husks, etc.) to collect in such depressions but also (and importantly) through the efforts of the farmers who over the years have laboured intensively and applied systematic traditional cultivation practices.

The highly sustainable traditional ?pulaka pit? farming systems (Figure 7a in section 3) are now under threat from saltwater intrusion as a result of sea-level rise. The proximity of the pit floor to the upper layer of the groundwater lens ensures a constant level of moisture. It follows that since the crop is dependent on groundwater to maintain soil moisture it is also susceptible to any natural or human induced perturbation of groundwater quality in these fragile water lens systems. The

traditional food production systems, such as pulaka pits, are cultural heritage under threat with many of the pulaka pits now neglected or abandoned. Efforts to revive the interest and recognition of traditional food production techniques as cultural heritage, will go a long way to reducing land degradation vulnerabilities and to strengthening resilience to climate impacts.

Climate change impacts

Tuvalu is susceptible to a wide range of challenges that will continue to be exacerbated by climate change, such as more severe and longer-lasting droughts and heat waves, coastal erosion, increased acidity of ocean waters, sea level rise, wind-driven waves and king tides. With an average elevation of 1.83m and no more than 5m above sea level, it is the world?s second lowest low-lying country and one of the most vulnerable to the impacts of climate change.

Rising sea levels and creeping tides routinely engulf the low-lying atolls, degrading its shoreline, eroding its natural ecosystems and threatening the country?s very existence. The United Nations Intergovernmental Panel on Climate Change (IPCC) predicts a 0.9 metres (3 feet) increase in global sea levels by 2100 would degrade up to one meter of Tuvalu?s shoreline per year. The Tuvalu UNCCD National Action Plan (NAP 2006) also places land degradation in the context of serious long-term threats to Tuvalu?s land resources from the impacts of climate change, which is causing sea level rise, drought and severe weather events.

The climate predictions point to increase in intensity of extreme weather events such as spring tides, tropical cyclones, prevalence of heatwave and persistent droughts are forecasted with severe consequences on food systems, particularly in the context of widespread subsistence farming. FAO research suggests key issues affecting local food production and increasing vulnerability to degradation in agricultural systems include heat stress on plants, changes in soil moisture and temperature, loss of soil fertility due to soil erosion, and water stress due to salinization of soils and changes in the water table height.[11]

Not only is Tuvalu threatened by sea-level rise, it must contend with extreme exposure to tropical cyclones. Tuvalu lies close to the South Pacific convergence zone (SPCZ), where the north-east and south-east trade winds meet in the southern summer, is a prime area for cyclones to form. During an El Nino episode, the SPCZ shifts eastwards, making cyclones more common around the northern Cook Islands and less common around Tuvalu although the cyclones that do affect Tuvalu during an El Nino episode appear to be more powerful as was the case with Tropical Cyclone (TC) Pam in March 2015. TC Pam devastated major areas of Tuvalu as its winds ripped through the island nation. The impact on the island communities was considerable and recovery and rehabilitation continues especially in areas that were severely impacts. 45% of the population was displaced during the disaster with 90% of agriculture being decimated on the island of Nui[12].

The rapidly increasing population density in urban areas (Funafuti), soaring international fuel and oil prices and deteriorating diets, make it imperative that food sovereignty and the level of self-sufficiency in food production is improved. Integrated agro-ecosystem approach to agriculture and local food production systems will improve the level of self-sufficiency in food production, help address land degradation and contribute to adaptation measures and strengthening the adaptive capacity to mitigate the threats of climate change and sea level rise, which is of paramount importance to livelihoods and for continued survival of the nation and its people.

1.a Project Description

1) Global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)

Global environmental and/or adaptation problems:

Tuvalu is a Small Island Developing State (SIDS) that belongs to the category of Least Developed Countries (LDC) and is one of the most environmentally fragile states with highest vulnerabilities in the Pacific region due to its low-lying characteristics mentioned above; its geographical isolation, limited land-based natural resources and inability to reap economies of scale that significantly limit provisions of goods and services. Like most of LDC/SIDS, Tuvalu has many development challenges and among these, land degradation in the forms of loss in vegetation cover in agroecosystems, and loss of soil and soil fertility (erosion and sea water incursion) are some of the most critical environmental problems faced by Tuvalu. These environmental problems and vulnerabilities have been exacerbated by the disproportionate impacts of climate change on the very vulnerable and fragile ecosystems of the nine atolls that make up Tuvalu.

Loss of vegetation/land cover

Table 1 below shows the main vegetation or land cover types, including highly modified agricultural areas, village gardens and ruderal sites that constitute the main terrestrial ecosystems or land cover types found in Tuvalu. Table 2 shows the estimated land use or land cover types as presented in the 4th and 5th Reports to the CBD and Tuvalu NBSAP 2016, which roughly correspond to those listed in Table 1. There has been a lot of anecdotal evidence of changes to areas under various land use and land cover types since 2010, but there are no updated figures on the present areas of vegetation and land cover types available since 2010[13]. The areas of beaches, coral rubble and beach rock, which overlap with and grade into the coastal littoral forest and scrub, mangroves and intertidal flats are an important cover type on the interface between the land and sea that protect Tuvalu?s atolls from coastal erosion and saltwater incursion.

Table 1. Main vegetation and land cover types found on the main inhabited and uninhabited islets (motu) of Tuvalu, as described in Thaman *et. al*., 2012[14].

	Vegetation and Land Cover types
1	Inland Broadleaf Forest and Woodland
2	Coastal Littoral Forest and Scrub
3	Mangroves and Wetlands
4	Coconut Woodland and Agroforestry
5	Excavated Taro Gardens
6	Village Houseyard and Urban Gardens
7	Intensive Vegetable and Food Gardens
8	Constantly Disturbed Ruderal Vegetation
9	Beaches, coral rubble and coastal beach rock
10	Unvegetated recently reclaimed areas infilled with lagoon sediments

Table 2. Estimated areas of different land use/land cover types present in Tuvalu as reported in the CBD 5th Communication and 2016 NBSAP.

Cover/Vegetation	Area (ha)	%
Coconut woodland	1,619	53.9
Broadleaf woodland	122	4.1
Coconut and broadleaf woodland	51	1.7
Scrub	419	13.9
Pandanus	10	0.3
Mangroves	515	17.1
Pulaka pits & pulaka basins	65	2.2
Village, buildings	172	5.7
Other (i.e., low ground cover)	33	1.1
Total	**3,006**	**100**

Despite land cover changes, habitat degradation from infrastructure developments and extreme weather events, selective removal and harvesting of high-value trees and plants and increasing dominance of introduced species, there remains a significant amount of indigenous inland and coastal littoral vegetation in various stages of disturbance which constitute the main terrestrial ecosystems. This ranges from small stands of inland and coastal forest to mangroves and more extensive areas of scrub or shrub land. On uninhabited reef islets and areas away from the main settlements, indigenous species are still largely the dominant species, although impoverished by selective removal of some species and the planting of coconut palms. In villages and built-up and disturbed areas, introduced species are more dominant, many are invasive and many now have important ecological and cultural value.[15]

The indigenous terrestrial vertebrate fauna of Tuvalu includes no indigenous land mammals, amphibians or freshwater fishes. There are some of terrestrial reptiles, all lizards, one of which is Tuvalu?s only recorded endemic vertebrate, the Tuvalu forest gecko (*Lepidodactylus tepukapili)*, found on Tupuka Islet, Funafuti. Of particular importance are 28 species of indigenous birds, approximately 20 of which are sea birds and a few are migratory species. Birds are also a very important traditional food source and a wide range of birds have been traditionally hunted. Notable terrestrial invertebrates include land or shore crabs, including the coconut crab, with most of the smaller crabs being used as preferred fish bait. Also important are a range of land snails that are used to make shell leis and handicrafts.[16]

Loss of trees leading to soil erosion and loss of agrobiodiversity

Land degradation and extreme weather events from climate change are also putting the coastal atoll forests, coconut-dominant agroforests and village household food gardens under threat, with the reported loss of breadfruit, pandanus and banana cultivars.

Breadfruit, the archetypal Pacific food tree, is widely cultivated in the Pacific islands, and is of particular importance in atoll countries, such as Tuvalu. Seeded (diploid) and seedless (triploid) forms are cultivated, with the greatest diversity of seedless forms found further east in Polynesia but throughout Oceania many unique cultivars of breadfruit exhibiting diversity in many attributes can be found. Breadfruit trees can be quite tolerant to salinity, but with ageing trees, saltwater incursions further weaken the trees increasing their susceptibility to disease. Salt intrusion has been reported as a contributing factor to the ?trunkrot? disease experienced in Kiribati. The problem occurs especially in seeded breadfruit and rarely in seedless varieties. Hence, increasing sea-level events, such as storm surges, are likely to weaken old trees, making them more susceptible to disease. Breadfruit trees are also prone to damage from high winds and on atolls repeatedly

inundated by storm and El Ni?o Southern Oscillation (ENSO)-generated tides, breadfruit trees are often uprooted and destroyed. [17]

Coastal forests including pandanus and coconut woodlands are vulnerable to high sea-state events, both from increased storm surges and high waves and from damaging salt-laden winds associated with more intense cyclones, ENSO events, spring tides, and sea-level rise, particularly where the combination of these events increasingly results in higher and more frequent king tides moving further inland or completely submerging the low-lying atolls. Coastal forests will be progressively impacted by the more gradual sea-level rise. Perhaps just as concerning is accelerated coastal erosion and loss of beaches, which reinforces the loss of coastal littoral forest. Trees and shrubs are vital for coastal protection on open sea and sandy beaches. In such situations, trees such as *Hibiscus tiliaceus* (Chatenoux and Peduzzi 2007) and shrubs of *Scaevola taccada* and *Pemphis acidula* helped dissipate the 2004 Indian Ocean tsunami force (UNEP 2005). Furthermore, almost all coastal trees and palms have local uses as food, medicines, cultural products and wood. Examples include *Cocos nucifera* (myriad uses including food, edible oil and drinking nuts), *Cordia subcordata* and *Thespesia populnea* (premier carving woods, medicine), *Terminalia catappa* and *T. littoralis* (nuts, bark for medicine, timber), *Calophyllum inophyllum* (tamanu oil, timber, carving) and *Pandanus tectorius* (food, thatch and building timber on atolls).[18]

Also of concern is the loss of native agroforestry trees, such as pua (*Guettarda speciosa*) and tausunu (*Tournefortia argentea*).[19] As land degradation increases, land productivity and the food production capacity of the islands? ecosystems decreases, with severe impacts on food and nutrition security and loss of food sovereignty. The direct impact on the ability of the population to access more nutritious traditional food sources has had severe consequences on livelihoods and health of the population.

The land degradation processes affecting natural ecosystems include soil erosion from roaming pigs and king tides; gullying; soil salinization; and coastal inundation. The main drivers of land degradation in Tuvalu are land-use change for infrastructure development to meet urbanisation and unsustainable land-use practices like burning shrubs to clear the land but leave soil bare vulnerable to erosion.

In addition to the loss of agricultural biodiversity within Tuvalu?s traditional agricultural ecosystems, other main ecosystems under threat are coastal forest and vegetation, mangroves, coral reefs, beaches and near-shore lagoon and oceanside marine ecosystems. Within all of these ecosystems there is a wide range of threatened plants and animals, with over half of over 1000 named species or groups of species, considered extirpated, rare or threatened and in need of conservation by local communities. Among the most threatened species are marine and land crabs, a wide range of native coastal, mangrove and inland trees, shrubs, vines, ferns and other herbaceous species, almost all of which are culturally-important multipurpose plants, cultivated food, ornamental and multipurpose plants, land and seabirds and reptiles.[20]

Root Causes:

The main drivers of land degradation and loss in agricultural ecosystems in Tuvalu are:

a. Unsustainable agricultural practices.

Unsustainable agricultural practices include the overuse of pesticides and inorganic fertilizers, which degrade the soil by damaging the community of organisms living in the soil and further reduce quality of groundwater. The infertile nature of Tuvalu soils has led to an increase in the use of agricultural chemicals. Overuse of chemicals has caused land to become unsuitable for agriculture through changes in the physical and bio-chemical composition of the soil. Consequently, farmers have abandoned their land and moved to new locations for their crops.[21] Moreover, poor land management systems such as placing of pig pens in shoreline vulnerable areas, instead of trees and vegetation as natural coastal buffer to sea level rise, leads to soil erosion. In addition, the introduction of plants (for agriculture and as ornamentals) often unintentionally introduce alien invasive species due to lack of proper risk assessments prior to their introduction into the country. In the past decade alien plant seeds have been introduced as soil contaminants ? in the movement of soil from Fiji for the purposes of building a sport field/ centre. These introduced species have been documented in areas surrounding the sports site.[22] Two species *Sphagneticola trilobata* (common names - creeping oxeye, trailing daisy) and *Commelina diffusa* (common names - climbing dayflower, spreading dayflower) are described as invasive and spreading aggressively. [23] The well known yellow crazy ant (*Anoplolepis gracilipes)* is also causing a lot of damage to the health of the agro-ecosystem. As sap-sucking insects, they stress crops, fruit trees and encourage plant diseases, reducing vegetation ground cover and yields for farmers. They were introduced as hitchhikers in the nursery trade or in the transport of commodities.[24]

Moreover, it is a common practice in Tuvalu to clear the land for planting by burning undergrowth bushes and shrubs vegetation. Small bush fires often get started from these activities and they become more frequent in times of persistent drought[25], which expose already-vulnerable terrestrial ecosystems to increased risks including erosion and land degradation. The fires remove ground cover and leave soil prone to erosion when rain eventually fall and king tides in coastline areas. Fires also reduce soil organic matter which reduce the water-holding capacity of soil. Though each fire is small in size, they are nonetheless significant compared to the total land mass of the country.

Additionally, the current pig production systems are causing severe land erosion and damages to crops from free-roaming pigs, and the penned pigs are causing significant pollution to vulnerable water resources such as Tafua Pond situated in Fakaifou Village, close to Mangrove Swamp in Funafuti.

b. Infrastructure development and population growth.

The Tuvalu UNCCD NAP 2006 attributed land degradation primarily to rapid increases in development, such as infrastructure to serve the needs of a growing population, and highlighted it as a major threat to the nation that has been exacerbated by climate change. Increased infrastructure development has led to considerable pressure on water resources and a growing demand for earth material that has led to accelerated coastal erosion and considerable loss of land. This is a major concern, especially on the island of Fongafale on Funafuti atoll, where the capital is located, and where there has been a rapid growth in population as people move from outer islands to the capital for economic opportunities, and where there has been an increasing need from government for public infrastructure developments.

Based on data from the last census taken in 2017, 6,320 people ? over half of the 11,192 total population ? live on Funafuti atoll, which has a land area of only 2.4km2, and makes the population density of 2,633 people per km2 on Funafuti atoll over six time the national average, and one of the highest in the Pacific region. The infrastructure and other engineering and development pressures on the natural resource base are far greater here than the rest of the country. To put this in context, estimation of Funafuti?s early 1900 population was a mere 275 individuals.[26]

It must be noted that Fongafale islet on Funafuti atoll was already under tremendous environmental pressure from the biggest engineering and infrastructure development in the history of the country when the runway was built by the US Corps of Engineers during 1942-1943 as part of the WWII Pacific Campaign. The legacy of coastal instability, vast open borrow pits which line the island and the runway which covers a large portion of Fongafale are all testament to these unimaginably large changes on this small and extremely fragile atoll environment. Considering meagre land area of 1.43km2 (the runway alone accounts for approximately 14% of Fongafale islet?s surface area) the changes wrought on the landscape and the likely permanent devastating consequences on hydrology of the island cannot be ignored[27]. Since 1943, the environmental pressures on the already stressed ecosystems have continued to increase in the form of ongoing development and population expansion. (see comparison in Figure 1 below).

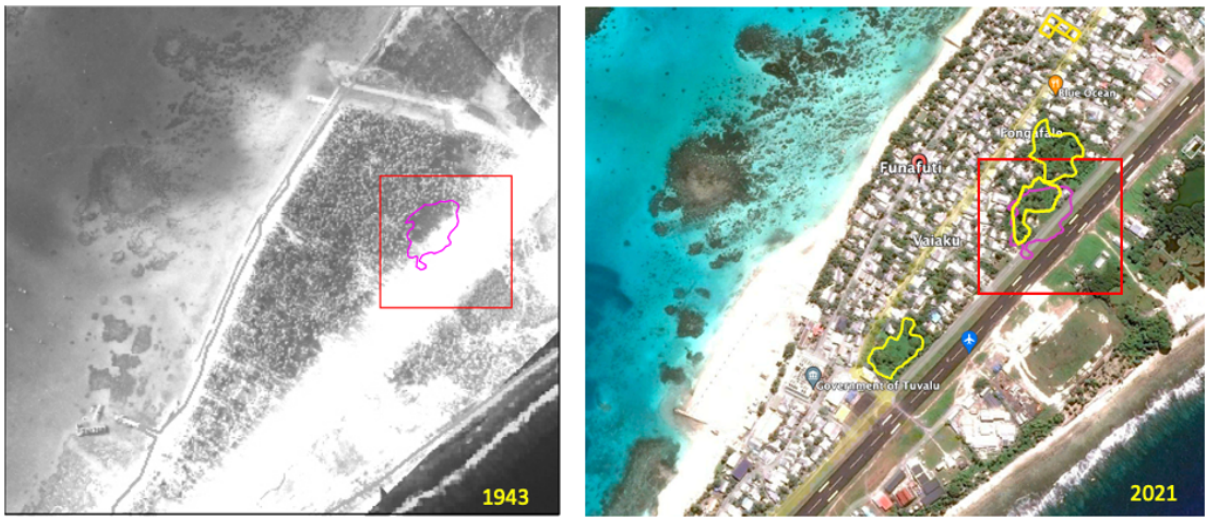


Figure 1: Land use change in terms of urban infrastructure and village expansion between 1943 and 2021. The 1943 aerial photograph shows the swamp taro ?pulaka? pit visible in 1941 (purple line). Note the large clearing and earthworks, north of the pit area and on the southeastern side of the runway. The exact volumes of material shifted, excavated and levelled is unknown, however Gibb Australia estimated over half a million cubic meters of material was required just to fill the borrow pits left by these efforts.[28] The 2021 aerial image shows the locations of the existing 3 pulaka pits (yellow lines) and reclaimed area on the shoreline in front of the Government building on the west/lagoon side of the island.

The significant expansion of urban land clearance for settlements and urban infrastructure, including land clearance and associated deforestation and vegetation clearance has led to significant losses of habitat and biodiversity. Similar concern has been noted on Nanumea, albeit to a much lesser degree[29]. As well as loss of vegetation cover, another main concern is unsustainable

coastal infrastructure development with increasing numbers of seawalls and reclaimed areas and pig pens built too close to the shorelines.[30] On both Nukulaelae and Niutao, anecdotal evidence suggests engineering from infrastructure developments may have contributed to high salinity in pulaka pits[31].

c. Climate change.

As described above, climate change induced sea level rise and coastal erosion lead to loss of soil and soil fertility, loss of tree cover, and agrobiodiversity. Extreme weather events are also putting the coconut-dominant agroforests and village household food gardens under threat, with the reported loss of breadfruit, pandanus and banana cultivars. Coastal flooding and erosion are expected to exacerbate the existing situation, with traditional crops such as *pulaka* already becoming difficult to grow as a result of saltwater intrusion into the *pulaka* pits.

d. Decline in local food production and heavy reliance on imported foods as monetisation of the economy increase.

The increasing monetisation of the economy has significantly changed the lifestyle pattern of the population that has fuelled the loss of food sovereignty as people become more reliant on imported foods such as rice, noodles and flour and the interest to participate in local food production is dramatically reduced. In addition, as the younger population leave the outer islands to look for work paid in dollars, there is loss in traditional subsistence skills and sustainable farming practices that are based on traditional ecological knowledge. Furthermore, as local food production declines and the population have lost food sovereignty to being totally dependent on imported foods, food nutrition insecurity has become a very big problem as reflected in the significant rise in Noncommunicable diseases (NCDs) in the country.

Barriers:

a. Inadequate, and lack of coherence in, existing policy and policy implementation frameworks to address land degradation and support the implementation of agro-ecosystem approach.

Despite the country facing severe land degradation issues, and accordingly recognised as a priority issue in the Tuvalu National Strategy for Sustainable Development (*Kakeenga o Tuvalu* 1995-1998*, Te Kakeenga II* 2005-2015*, Te Kakeenga III* 2016-2020 and the current *Te Kete* for the period 2021-2030), a process to develop a Land Degradation Neutrality (LDN) strategy and target setting has not begun yet. In addition, there is no national land use policy or land use plan in place to set limits and restrictions on what landowners can do to their land that account for impacts on the ecosystems. The need to establish land-use and management planning and legislation was recognized in the UNCCD NAP 2006 as urgently needed in order to minimize land degradation in Tuvalu. The UNCCD NAP itself needs to be updated to be aligned with the new Strategy Framework of the Convention. Similarly, food production systems are one of the key drivers of land degradation in Tuvalu, but the country does not have a National Food Security policy. These gaps in policy and policy implementation frameworks results in poorly coordinated government efforts to reduce land degradation and support sustainable food production processes and practices.

In addition, there is lack of coherence[32] in existing national policies and Sector Plans related to biodiversity & ecosystem services, land, food & agricultural development, recognizing that these issues are inter-related and multi-sector in nature, and ties together the agricultural production and environmental goals of *Te Kete*. When government policies are not harmonized and lack coherence in terms of scope and content, use of common terminologies and lack clarity in implementation coordination, the likelihood of achieving the desired results is hampered and the policies are ineffective.

The lack of coherence is a significant barrier in multi-sector approaches and for well-functioning coordination mechanisms. For example, in order for the various stakeholders and sector institutions to be better coordinated and inclusive in addressing these issues in a cooperative and synergistic manner, there is a need to use common terms and terminology to be able to communicate effectively with each other across sectors. A basic analysis carried out during PPG by searching for keywords most relevant to land degradation, ecosystem services and biodiversity in and for agriculture, found the key term ?ecosystem? is used extensively, but only in environmental related Strategies and Action Plans[33], such as the 5th Report to the CBD-Tuvalu National Biodiversity Strategy and Action Plan (NBSAP 2016); Tuvalu National Action Plan to Combat Land Degradation and Drought (UNCCD NAP 2006); Te Kaniva ? Tuvalu Climate Change Policy 2012. The term ?ecosystem? however, does not appear in agriculture and other sector plans such as the Tuvalu National Agriculture Sector Plan 2016-2023, where the term ?biodiversity? is used 8 times as reference to ?biodiversity products?, which is a key form of ?ecosystem service?. The term ?ecosystem? is not used in *Te Kete* and is also absent in the Tuvalu Agriculture Strategic Marketing Plan 2016?2025 and Sustainable and Integrated Water Policy 2012-2021. On the other hand, the terms ?agroforestry? and ?traditional farming/agricultural practices? are used consistently across national policies and sector Action Plans.

This barrier will be addressed in Component 1. Due to the integral role of ecosystems functions and services in sustainable food systems, this Component will ensure consistency and harmonisation of concepts and use of the terms ?ecosystem? and ?ecosystem services? prominently in the proposed National Food System and Nutrition policy (Output 1.1.1), and will establish close collaboration with the NCD Stakeholder Committee to ensure coherence with the strategies for promoting healthy diets in the National Strategic Plan for NCDs.

b. Land tenure insecurity.

During the project design consultations, land insecurity or lack of access to land was raised as a key issue limiting local food production and encourages unsustainable land use practices. The land tenure system of Tuvalu is a customary-based tenure system around the concept of ?*kaitasi*? or ?eat from the same land?, which is the customary governance structure where land is owned, cultivated, and cared for communally by families, and food shared as needed. Kaitasi applies to those people who are living on or subsisting from a piece of land.[34]

Since Funafuti became the capital of Tuvalu at independence in 1978, rapid internal migration has caused the population of Funafuti to boom as mentioned above. Today, 83% of Funafuti?s population is not indigenous to Funafuti[35], meaning they can only access and use land in Funafuti for food production. In Funafuti, all members in the kaitasi group must agree upon decisions affecting kaitasi land, which cannot be sold, although it can be exchanged or leased, primarily to

non-Funafuti people, families or community groups from outer islands. Lease agreements however, generally do not provide long-term guarantees that tenure and access to land is secured for one?s children. Under these circumstances, there is no incentive to invest in longer term SLM approaches and those that require higher levels of investment, such as agroforestry plantings, soil amelioration and soil amendments techniques. The tendency is to extract as much as possible from the limited land available while one has access to that land. For examples, use of fertiliser instead of fallowing or composting to build soil organic matter content, or raising pigs without investment in secure pens with proper waste management so they get to roam freely causing land degradation.

The situation in Funafuti highlights the importance of tools and systems to support land governance, recognising and taking into account the customary nature of land tenure in Tuvalu. While lease arrangements are registered in the land registry administered by the Lands & Survey Division of MLGA, a significant proportion are under customary agreements not documented or recorded, including in outer islands.[36]

c. Limited human resources and institutional capacities to operationalise and implement existing policies and legislative frameworks related to land degradation and loss of food sovereignty in the country.

While acknowledging there are areas to strengthen in policy and implementation frameworks as mentioned above, the stakeholder consultations in the PPG process found the issues are generally well understood and the existing ?policy intentions? and objectives provide adequate guidance for tangible actions on the ground. The PPG process highlighted the main barrier is the weak capacity for enforcement and implementation due to limited human resources and institutional capacities, including:

c.(i) The national land administration system is not well resourced and not equipped with the right tools to support and facilitate negotiations in resolving land rights disputes.

The Native Lands Act of Tuvalu is underpinned by a customary land tenure system as currently practiced by communities. As in neighbouring Polynesian countries, customary land tenure systems are generally governed by traditional governance structures of the communities.

The Tuvaluan land tenure system is based on the principle of land inheritance (land passed down from father or mother) to sons/daughters and subdivision of land between the landowners themselves. This system has advantages and disadvantages, like fragmentation of land plots through continual subdivision that may be inconsistent with pattern of growth. Disputes over land boundaries and multiple ownership of land are prevalent due to limitations in land registration.

So far, the technical tools developed under many technical assistance projects, as related to strengthening of the land administration system in Tuvalu, often focus on building capacity at the Government level through training in mapping tools and developing GIS skills, which are very valuable capacity for Tuvalu. However, translating these skills to practical solutions on the ground for communities is non-existent, primarily due to the assumption that the communities do not have the skills to participate ?at all levels?.

As the communities are being integrated into the digitized world at a very fast pace, their participation is often limited to provision of data through responding to questionnaires, or *in-situ*. The Government agencies coordinating these technical support activities, gathering data and valuable information then forward/upload the data into regional and global platforms where the data is analysed and synthesised for global, regional and national purposes, albeit often to try and find solutions for communities. The ?intellectual? analyses and ?users? of the data and information are not the communities and as such, these tools are not fit for purposes of communities, such as resolving land disputes through customary practices.

This barrier was not highlighted in the PIF concepts. It was one of the key points raised by stakeholders during the PPG consultations and will be addressed in Component 1.

c.(ii) Lack of experience and capacities at community level to apply systems approaches to addressing land degradation

Despite several initiatives on natural resource management, there are still significant gaps in understanding and capacities related to agroforestry practices, livestock production and management, soil conservation/management and primary product processing/value addition at the community level. In addition, limited extension services pose challenges to mainstream and pass on knowledge to on-the-ground practitioners. During the project preparation phase, the key areas identified in a rapid capacity needs assessment conducted to identify the specific gaps and needs include; lack of scientific analytical capacity to generate knowledge on soil health/soil testing, water management, piggery biodigesters, seed propagations, nurseries management, integrated pest management, home gardening techniques and food processing. For example, there is no capacity at the moment to analyse nutrient content of various plant materials, in order to evaluate their potential for quality compost or fit for purpose protocols for using soil testing results to support integrated livestock-crop food systems and support supply chains in the agri-food system (see c(iv) below.

These capacity needs will be elaborated upon during the inception phase. This barrier will be addressed through Component 2.

c.(iii) Lack of sectoral coordination for addressing land degradation and achieving LDN

As mentioned above, the gaps and lack of coherence in existing policies and implementation frameworks (strategies and action plans) is a significant barrier in multi-sectoral well-functioning coordination mechanisms as reflected in the current situation of very little coordination and integration between sectors and island levels. There are also instances of policies and programmes being conflicting and indirectly influence the degradation of land and resources. This barrier will be addressed under Component 1.

c.(iv) Limited understanding of food systems value chains and limited opportunities for market-oriented sustainable/alternative livelihoods

One of the major barriers in ensuring sustainable resource management at community level is the lack of adequate understanding of the natural capital utilized along the value chain, to identify and

recognize income opportunities and support sustainable use of the natural resources base by local populations.

The 2016 Rapid Biodiversity Assessment of the Conservation Status of Biodiversity and Ecosystem Services (BES) in Tuvalu: Report on the Funafuti Community-Based R2R[37], reported only three activities were favoured by the communities for income generation from the use of their BES-base in a sustainable manner: 1) development of a market for handcrafts; 2) development of tourism facilities, particularly those focusing on or showcasing atoll biodiversity including the development of tourism sites related to diving and snorkelling and wildlife tourism on uninhabited atoll islets; and 3) production, marketing and encouraging the consumption of nutritious local foods.

The identified favoured income generation activities 1) and 3) mentioned above are the most relevant to sustainable land management practices and food sovereignty but no progress has been made primarily due to limited understanding of the value chains, including quantification of supply from primary production to meet market demand, ecosystem services such as water use during post-harvest and processing stages. The value chains that exist require further strengthening, especially in understanding market access and access to finance, and value-addition (primary and secondary processing). This barrier will be addressed through Component 2.

c.(v) Limited technical and scientific analytical capacity, weak knowledge management, insufficient datasets, data management and capacity for data analysis to inform appropriate decision making and planning

There is very limited technical and scientific analytical capacity to provide much needed data and evidence to inform planning and decision making and support the localization of global concepts such as Land Degradation Neutrality (LDN) in local food production practices and development programmes at the community level. This has been a major hurdle in development work within the agriculture sector in Tuvalu as it limits the ability and opportunities to institutionalise multi-sectoral and multi-stakeholder coordination mechanisms and integrated approaches to policy development, formulation of programmes and monitoring and evaluation.

For examples, composting plant materials is crucial for building soil fertility of Tuvalu soils, which as mentioned above, are among the poorest in the world because of the very young geological age of soil substrates. There are however, no data on the nutrients content of plants to assess their potential and quality as composting materials to build soil fertility. There are also no production (or marketing) data or information gathered routinely in the agriculture sector to support value chains and provide evidence to convince communities to adopt ecosystem-based agriculture.

There is currently a lack of data on the status of land degradation, land use and land productivity. There is also a lack of information and knowledge on current and proposed interventions to address unsustainable production practices and restore degraded land, and a lack of knowledge of integrated, holistic approaches to sustainable land management, linking land and water resources conservation, food security, resilience, and sustainable livelihoods of farmers and communities. There is a need to compile and update data in order to mobilize support for the most critical areas and interventions. Further, as noted above, a pervasive problem is the lack of awareness and knowledge about these issues. Shared awareness and the ability to understand and implement good

practices is key to better land management and climate response. A trained cadre of professionals are needed to implement GEF and related programs and build a strong knowledge base within the country.

Knowledge management systems are very weak with many project outputs (reports and publications) are not always available in-country due to documents not being saved in a central system and due to the high turnover of staff.

This barrier will be addressed through Components 2 and 3.

c.(vi) Growing disinterest within communities to participate in local food production.

As mentioned above, there is loss in traditional subsistence skills driven by increasing monetisation of the economy and as the lifestyle pattern of the population fuels their preference for imported foods such as rice, noodles and flour. Along with the loss of traditional skills in traditional food production systems, the project preparation inception workshop highlighted an overall loss of interest across the population, especially the younger population, to participate in all forms of local food production. The negative attitudes towards participation in traditional farming stems primarily from the perceptions among young people of imported food consumption being desirable and ?modern?, and the preference for foods that are quick and easier to prepare than local foods. The disinterest in community-based food production activities is a significant barrier to promoting measures to address land degradation and loss of ecosystem services across the landscape.

This barrier was not highlighted in the PIF concepts. It was one of the key issues raised by stakeholders during the PPG consultations and will be addressed in Component 2 by promoting economic opportunities in local trade, and support for the *faka Tuvalu* ? GoLocal campaigns and programmes to increase local food production and revival of food preservation techniques, as called for in *Te Kete*, the TASMP and the Food Security Strategy (2021-2031). Training of youth by elders on traditional farming techniques organised by Kaupule on each island, ensures collective community buy-in to reverse the decline in participation in food production. Additionally, the COVID-19 pandemic has presented an opportunity to revive interest among local communities, in particular youth, in local food production. The project builds on efforts by the Government and the Tuvalu Food Futures project to promote local food production and transfer of knowledge to younger generations.

2) Baseline scenario and any associated baseline projects/programmes

Key Policies, Strategies and Action Plans

Te Kete ? Tuvalu National Strategy for Sustainable Development (2021-2030)

The *Te Kete* outlines the policy direction of the Government for addressing the root causes of sea level rise and extreme weather events, seeking greater degree of security from climate change and natural disasters by increasing adaptive capacity and setting local food production, including crops, livestock and small agri-businesses, as key milestones for agriculture over the plan period. The key outcome results are:

- Coconut replanting associated with a small scale production of coconut by-products for income and healthier diets have reached all the islands.
- Traditional food production increased including revival of traditional food preservation techniques (*faka Tuvalu* ? go local)
- Collection of agricultural quality data and analysis is up-to-date to ensure informed decisions are made.

Tuvalu National Agriculture Sector Plan (2016-2023)

The Tuvalu National Agriculture Sector Plan 2016-2023 provides detailed and longer-term strategic guidance for the agriculture sector, beyond what is provided in *Te Kete*. It aims to systematically improve the most important aspects of the supporting environment for agriculture in Tuvalu, including: updating and harmonizing the policy, legislative and regulatory framework; improving access to financing for agricultural production and projects; strengthening facilitating institutions including government agencies and production and marketing organizations, establishing within the DOA a research & development unit and a home economics unit (to support development of value adding to agriculture products and promotion of consumption of local foods); repairing and replacing ageing DOA infrastructure and machinery; and improving the capacity and effectiveness of the extension service.

Food Security Strategy (FSS 2021 ? 2031) (DRAFT)

In May 2021, the Tuvalu Cabinet endorsed and sanctioned a whole of government approach led by the MOF, MLGA and MTET with key stakeholders and the Private sector to spearhead the National Strategy on Food Security. A national steering committee comprising of relevant departments and stakeholders with established roles and responsibilities are key to the successful implementation of the strategy and its cross-cutting synergies.

At the time of writing this project document, the FSS document was in draft form. The rationale in the draft FSS document include: improve food security; promote healthy living; reduce incidence of NCDs; reduce the cost of Tuvalu Medical Treatment Scheme; sufficient quantity and variety of local produce available for public consumption; transparency in communicating values (fair trade) throughout the food supply chain; delivery and distribution efficiency; discourage consumption of unhealthy imported foods; and improve the terms of trade. The rationale for the FSS does NOT cover the natural capital and health of ecosystems upon which the agri-food systems rely upon. This gap will be addressed at the policy level in the proposed National Food Systems and Nutrition Policy to be developed under Component 1 of this project.

Tuvalu Food Systems Pathway

In September 2021, Tuvalu submitted its National Food Systems Pathway as part of the United Nations Food Systems Summit.[38] The pathway document emphasises the importance of Tuvalu?s National Vision ? ?*A Peaceful, Resilient and Prosperous Tuvalu?* and outlines the following national priorities in relation to food systems:

1. Increase local food production
2. Strengthened partnerships
3. Change and shifting of diets

4. Eat safe and nutritious food
5. Governance and finance strengthened
6. Coalition with other Atoll Nations

The National Food Systems Pathway is well aligned with the FSS mentioned above, and like the FSS, it does NOT cover the importance of natural capital and health of ecosystems upon which the agri-food systems rely upon. This gap will be addressed at the policy level in the proposed National Food Systems and Nutrition Policy to be developed under Component 1 of this project.

Tuvalu National Biodiversity Strategy and Action Plan ? 5th National Report to the Convention on Biological Diversity (NBSAP 2016)

The NBSAP 2016 summarises the nature, cultural importance, conservation status and threats to Tuvalu?s Biodiversity and actions taken or that need to be taken to promote the conservation and sustainable use of biodiversity. The interventions outlined in the NBSAP 2016 that are relevant to integrated agro-ecosystems include: 1) enforceable conservation legislation, including stronger local by-laws; 2) designation of selected uninhabited, preferably pest-free, reef islets or forest remnants as reserves for threatened plants and animals; 3) replanting of coastal protection species; 4) establishment of agricultural conservation and enrichment areas, including improved excavated taro pit gardens, coconut dominant agroforestry plots and village gardens; 5) development of re-vegetation soil enrichment programmes for reclaimed barrow pit and lagoon land; 6) nursery and propagation capacity development; 7) improved pig and chicken husbandry systems, including improved fodder resources; 8) strengthened international and national biosecurity and IAS eradication and management programmes; and 9) national awareness and education programmes, including the recording and teaching traditional knowledge.

One of the actions under the theme of Climate Change and Disaster Risk Management is to identify options for ecosystem based adaptation. Under the theme on Trade, Biosecurity and Food security, actions relevant to this project include: establishment of organic home-gardening, establishment of nurseries, raising awareness and understanding on the value of organic farming as opposed to inorganic farming for example the use of chemical fertilizers and pesticides, increase cultivation and preservation of traditional food crops, and review of the national food policy to strengthen those elements fostering biodiversity.

The NBSAP 2016 highlighted the need to recognize the central role of Tuvaluan culture in biodiversity and ecosystem services conservation.

Tuvalu Agriculture Strategic Marketing Plan (TASMP) 2016?2025

Developed with support by the EU funded Global Climate Change Alliance - Pacific Small Island States regional project, the TASMP 2016-2025 aims to revive domestic and international trade of locally produced agricultural products through domestic activities and trade arrangements. It advocates for a revival of trading of local agricultural products and acknowledges the importance of traditional skills for the production and preparation of local food and handicrafts in this regard. The TASMP encourages the people of Tuvalu to eat more local food in order to enable them to live longer and healthier lives and a means for many families to earn extra income from the sales of local produce.

The TASMP support the increased sale and consumption of local food with emphasis on a ?Go Local? campaign and production of local food through organic farming, including development of the ?pulaka? pit system.

Tuvalu National Action Plan to Combat Land Degradation and Drought (UNCCD NAP 2006)

The vision articulated in the UNCCD NAP 2006 ?is to achieve sustainable development and all activities will be oriented to strengthen efficiency of sustainable land management and utilisation of natural resources to meet the demands of social development at an appropriate level?. It identified the natural characteristics that limit the ability of Tuvalu to rely on its land resources, including: soils are coarse, poorly developed and generally have low fertility; agricultural potential is limited in terms of species that can be grown and the volume of product able to be produced; very limited water supplies are available from ground or surface resources; and long lengths of coastline susceptible to erosion.

The UNCCD NAP 2006 needs to be updated to align with the Convention?s new Strategic Framework and to guide the development of land degradation neutrality (LDN) targets.

Tuvalu National Food and Nutrition Policy (NFNP 1996)

The NFNP was published in 1996 with as goal to improve the health and nutritional well-being of the total population through the consumption of nutritional foods. A key outcome under objective 1 of the NFNP to increase availability of nutritious foods and outcome is to increase self-sufficiency in nutritious foods, which are being or can be produced locally. The objectives and expected outcomes of the NFNP are as valid today as they were 25 years ago when it was published.

The proposed National Food Systems and Nutrition Policy to be developed under Component 1 of this project will review and update the NFNP 1996. It will highlight the importance of sustainability of food systems, including the critical importance of reducing and halting land degradation and of the health of agricultural ecosystems to improving the health and nutritional well-being of the total population through the consumption of nutritional foods.

Tuvalu National Strategic Plan for Non-Communicable Diseases (NSPNCD 2011-2015)

The goal of the NSPNCD 2011-2015 is to reduce the current and future burden of non-communicable disease (NCD) and nutrition related disorder in Tuvalu. Amongst the core areas in which strategies were identified to meet this goal is the promotion of healthy eating; the others being, the promotion of physical activities and reduction in consumption of alcohol and tobacco.

The proposed National Food Systems and Nutrition Policy to be developed under Component 1 of this project will build on progress made under the NSPNCD 2011-2015 towards healthy eating and its strategy to increase availability of vegetables and reduce/prevent reliance on processed foods. It will highlight the critical importance of reducing and halting land degradation and of the health of agricultural ecosystems to meeting the NSPNCD 2011-2015 goal.

Island Strategic Plans (?Palani Atiake?)

The Island Strategic Plans *(ISP - ?Palani Atiake?*) are four-year plans which map the key development priorities and outline proposed developments on each island. The ISPs are locally-led enterprises: developed at the local-level by Kaupules, with the input of local communities, focused on the aspirations of local people for improving their welfare and livelihoods. While the technical expertise to support implementation are offered from the national government and partners, communities determine their own requirements and needs.

All of the current round of ISPs (the third generation) for 2020-2023 have identified adaptation to climate change as a priority area requiring the attention of Kaupules and Falekaupules. To streamline and systematize development planning at Kaupule level, the MLGA has recently introduced the ?Kaupule Integrated Planning and Reporting Framework?. Under Component 2, the project will prepare integrated agro-ecosystem approaches toolkits, framed around the Kaupule Integrated Planning and Reporting Framework of the ISPs. The proposed toolkits to support integrated agro-ecosystem approaches will be developed to operationalise the agricultural-ecosystems and food security-related aspects of ISPs.

Baseline projects and programmes by Government Agencies, NGOs and Development Partners

The following programmes and projects were identified during the project preparation phase as most relevant in terms of related goals and objectives with, and thus provide the baseline for this project. There are several Government agencies, NGOs and Development Partners involved in these baseline activities outlined below according to their relevance to the objectives of this project:

Baseline programmes/ projects	Brief Summary and Focus	Potential linkages
DOA/MLGA Extension Services	Preliminary trainings on organic and conservation farming practices, and created organic school garden for demonstration.	Contribute to the baseline for more community level capacity building and uptake of home gardening systems, agroforestry and other SLM practices.
DOA/MLGA Agroforestry and Research	Operate nurseries to supply seedlings and planting materials including coconut seedlings to support extensive replanting efforts and carried out research on coconut hybrids Additionally, a Quarantine Unit was established within DOA/MLGA to address biosecurity risks/ requirements.	Upgrade and establishment of new nurseries under Component 2.
DOA/MLGA Livestock	Distribution of small livestock and livestock fencing materials	Support improvements in pig genetics and husbandry management and promotion of integrated livestock-crop farming systems.

Live & Learn Environmental Education Tuvalu (LLEE Tuvalu): *Tuvalu Food Futures project*	Promoted and supported the establishment of food gardens to improve long-term food security in Phase 1 ($0.8 million, 2019-2020). Phase 2 of the project ($1.7 million, 2020-2021) has been critical for supporting food security, especially during a global crisis such as COVID-19. Phase 2 expands the work to two outer islands; Nukufetau and Nukulaelae with additional food gardens for Funafala. LLEE Tuvalu led the development of a Tuvalu Food Security Community Stakeholders Engagement Strategy (CSES) published in October 2019, which seeks to understand the behaviour change required to support food security in Tuvalu in order to: (i) Increase local food consumption and decreasing reliance on imported foods; (ii) Revive traditional farming practices and embrace new technology (raised garden beds) and consequently increase land productivity; and (iii) increase knowledge and awareness of the benefits of local food. The LLEE Tuvalu also carried out a Compost Feasibility Study in 2020, in partnership with the Ekalesia Kelisiano Tuvalu (EKT) Women?s Centre Senala, Funafuti, on the recognition that compost production is an important climate adaptation and food security strategy for both increasing soil fertility of more traditional land-based agriculture as well as being required to support the development of more innovative raised bed home gardening systems that are less vulnerable to saltwater intrusion from sea level rise. The study addressed the fact that women are anecdotally more likely to be engaged in home vegetable production, but less likely to be involved in compost making ? primarily due to the labour demands involved in cutting and collecting the feedstocks, and turning the piles.	Expand on the food gardens in Component 2. The CSES will inform the participatory processes in engaging with communities. The Compost Feasibility Study explored the barriers in both demand and supply of composting and will be a useful contribution to the baseline for promoting and supporting compost production under Component 2.

Land Resources Division/ Secretariat for the Pacific Community (LRD/SPC)	The SPC as the main regional organization in agriculture, has a myriad of regional interventions with a range of capacity development and technical support activities in Tuvalu. In particular, SPC is implementing the Pacific Seeds for Life project (PS4L). The project distributes seeds and plant tissue culture materials in partnership with the Centre for Pacific Crops and Trees (CePaCT) genebank, technical support on organic farming, pesticides registration, technical support in soil health, pest and diseases management, etc.	The GEF-7 will seek close collaboration with SPC in particular to facilitate provision of technical advisory services and to build on previous sustainable agriculture initiatives and provision of seeds in Tuvalu.
Secretariat of the Pacific Regional Environment Programme (SPREP)	The SPREP is the main organization in environmental issues in the Pacific. SPREP has implemented several programs on climate change resilience and environmental governance in the region. It also hosts the Pacific Climate Change Centre (PCCC) that carries out regular online training course on various CC topics. The project may support participation of Tuvalu practitioners on PCCC courses.	Collaboration will be sought in particular during the preparation of training courses.
EU/GIZ/SPC/Tuvalu Government - *Adapting to Climate Change and Sustainable Energy (ACSE) project*	Executed by DOE/MTET in partnership with the Secretariat for the Pacific Community (SPC), funded by EU and GIZ. The project installed several biogas digesters across all islands in Tuvalu using a floating dome design, made from Rotamold water tanks. The ACSE project developed a Biodigester Toolkit based on the experiences of Tuvalu in biodigesters, including those installed under the ACSE project as well as four biogas units installed on the island of Nanumea, implemented and funded by Alofa Tuvalu NGO in 2009; and seven biogas units installed on the neighbouring island of Nanumaga under the University of the South Pacific - European Union Global Climate Change Alliance Project (USP-EU GCCA). The Biodigester Toolkit is in the form of a handbook, which provide a ?how to? manual for the installations, and to encourage households to use renewable energy alternatives for cooking purposes.	Build on the Biodigester Toolkit to include a wider range of biodigester models, specifically those designed for piggery waste as feedstock, and to shift the focus more on the biodigesters as a key component of integrated livestock-crop farming systems in Component 2.

EU/SPC regional project ?The Global Climate Change Alliance: Pacific Small Island States project in Tuvalu? (GCCA:PSIS Tuvalu)	Executed by DOA/MLGA in partnership with SPC, completed in 2016. The project developed three agroforestry demonstration sites that trialled crop varieties from around Tuvalu and from SPC?s Centre for Pacific Crops and Trees (CePaCT) climate-resilient crop collection. The trees planted include coconut, banana, local fig, breadfruit, cordia and calophyllum. The crops planted include taro, giant swamp taro, cassava, alocassia, pandanus, papaya, noni, lime, yam, bele, sweet potato and chaya. The project also provided community level agroforestry training, capacity development of DOA/MLGA staff, and supported the process of holding stocks on national plant varieties. Since the beginning of 2021, the agroforestry sites have been absorbed into the National Coconut Rehabilitation Program led by the Department of Trade.	Work carried out under this project will form the basis for the agroforestry related activities under Component 2
UNDP/GEF ? Ridge to Reef (R2R) International Waters demonstration project. (GEF-5 regional project)	Executed by the Department of Waste Management (DWM/MLGA). Installed a demonstration site for piggery Dry Litter Technology (DLT) system for managing pig waste, incorporating the use of carbon materials, sloping pen floors, and requires no water for pen clean-up. The resulting carbon mix is composted, resulting in a rich, organic soil amendment for crop production.	DLT technology will be expanded upon under Component 2.
Saugavaka Piggery Project	Executed by DWM/MLGA in partnership with Funafuti Falekaupule. Saugavaka Piggery proposal to relocate the pig pens from their current locations to a new location on Saugavaka, further away from home dwellings and the airport runway. The Saugavaka Piggery project contributes to the green urban infrastructure development thematic area of the *Te Moeakiga o Malefatuga II* - Funafuti Island Strategic Plan (ISP) for the period 2017-2020. The proposed piggery infrastructure will introduce and promote sustainable practices of managing animal waste that embraces the sustainability of ecosystems involving DLT and biodigesters.	Both DLT and biodigester technologies for the management of pig waste will be supported under Component 2, focusing on these technologies as a key component of an integrated livestock-crop farming system as examples of integrated agro-ecosystem approach.

UNDP/GEF project ?Implementing a Ridge to Reef (R2R) Approach to Protect Biodiversity and Ecosystem Functions? (GEF-5 - R2R Project)	The R2R project developed capacity in the Department of Environment (DoE) in GIS system, and established a database for ecosystem data including native and fruit trees using the mobile data collection app called EpiCollect (https://five.epicollect.net/project/ridge-to-reef-tools). Other key outputs include: the resource inventory performed (soils characterized and hazards to land and water resources identified and incorporated into GIS area mapping), and the SLM interventions in three islands of Funafuti, Nanumea and Nukufetau.	Under component 1, the project will reconfigure, customize and provide training at all levels on the open-source software developed by FAO, Solutions for Open Land Administration (SOLA) & Open Tenure (OT) to support community mapping and recording of land tenure and land use. Linkages will be established between the SOLA/OT database and existing databases such as the EpiCollect database in DoE/MPWIELMD.
Improving soil health, agricultural productivity and food security on atolls Project.	Executed by DPH/MHSWGA, funded by AusAid and with technical support by ACIAR in partnership with SPC. The project was carried out between 2016 and 2020, and was aimed at diversifying food crop production, including nutritious leafy vegetables, on outer island atolls of Kiribati and Tuvalu. The project produced 13 factsheets, 12 of which feature the most atoll suitable nutritious leafy vegetables identified during the project, including the Bird?s Nest Fern (Asplenium nidus; katafa, laukatafa, laulu) which is popular, especially in Tuvalu, in particular the youngest leaves cooked in coconut cream. The factsheet #13 discusses nutritional aspects of composting materials suitable for atolls.	The factsheets will be useful resource to build on in Component 2.

Government Food Gardens: *Friendship Garden (Funafuti) and Hope Garden (Vaitupu)*	The Food Gardens aim to improve the health of the people of Tuvalu by assisting in increasing the production of fruits and vegetables, promoting the cultivation technology of outer islands, and publicizing the concept of nutrition and healthy diet. The Gardens have provided training and demonstration of fruits and vegetables cultivation techniques and enhanced the cultivation of climate resilient agriculture and the technical capabilities of agricultural extension officer in the outer islands. A fruit and vegetable production area has also been established on the Funafala islet in Funafuti atoll to increase the types and quantities of fruit and vegetables; and organize fruit and vegetable nutrition promotion, cooking and competition activities to increase interest in fruit and vegetable consumption.	Build on the cultivation trainings already delivered and support replication in other outer islands not involved.

Active projects by Co-financing Partners

In addition, the following activities supported by other partners form the part of co-financing for this GEF project.

Co-financing source	Brief Description of the co-funded baseline project activities	Type of Co-financing
FAO	TCP ? Improved support to strengthen smallholder value chains in Tuvalu	Grant & In-kind
Live & Learn Environmental Education ? Tuvalu (LLEE Tuvalu)	Tuvalu Food Futures project	Grant

Government of Tuvalu	MLGA: DOA Extension Services; Elisefou Agricultural Station irrigation facility; Hope Garden and at Motufoua Secondary School in Vaitupu; Friendship Garden on Funafuti; Land and Survey Division for provision of survey maps. MOF: GCF TCAP project, NDC roadmap for implementation. MPWIELMD: LDN target setting programme, tree resources database. MFT: Trade Division partnership in sites of coconut agro-forestry systems and coconut replanting programme. MHSWGA: Department of Gender Affairs for monitoring and implementation of the Gender Action Plan, and Division for Public Health on NCD Committee.	Grant & In-kind

3) Proposed alternative scenario with a brief description of expected outcomes and components of the project and the project?s Theory of Change

Project?s Theory of Change (TOC)

The project?s expected Outcomes and associated Outputs and Activities were identified during the project conceptualization (PIF) phase and further refined in a participatory logical framework analysis (LFA) exercise and follow up consultations and interviews with stakeholders during the project design (PPG) phase. The participatory LFA exercise (Box 1) carried out in a multi-stakeholder workshop placed focus on the assumptions made regarding the conditions that need to be in place, primarily at the activities level and outputs level, in order for the activities to be successfully implemented so the outputs can be reached and the outcomes can be attained.

Box 1: The PPG Logical Framework Analysis (LFA) exercise

To develop the project?s Theory of Change and logframe, a participatory exercise was carried out during the PPG multi-stakeholder workshop. The exercise followed the logical frame (logframe) model, which has a ?vertical logic? that reads from bottom to top, as if activities were carried out, the output reached, the outcome attained, and the overall objective achieved; and a ?horizontal logic? that identifies verifiable indicators to track progress, and more importantly in terms of the focus of the PPG LFA exercise, the assumptions made on conditions that need to be in place in order for the activities to be successfully implemented, outputs reached and outcomes attained. Together, the logical framework follows the ?logic? that reads, IF the activities were carried out, AND the assumptions made on conditions that need to be in place are true, or risks associated with the assumptions can be addressed during implementation, it is only THEN that the output can be reached. The same logic is then repeated at the outputs level to attain the outcome.

The LFA exercise validated the Objective and Outcomes as proposed in the PIF and identified new Outputs to ensure the expected Outcomes are achieved, as outlined in the Results Framework (Annex A.1). As such, the project?s logic is: when IAE approach is put into practice in all islands of Tuvalu, the Outcome targets, tracked by indicators in the Results Framework will be met and accordingly, the Objectives of reversing land degradation, enhancing livelihoods and increase resilience to climate change will be achieved. While the LFA helped identify and elaborated on the Activities and Outputs proposed in the PIF to be delivered for the Outcomes to be achieved, the PPG consultations highlighted many important socio-cultural and socio-economic aspects of food security and livelihoods that could not be captured in the vertical and horizontal logics of the logical framework model. The project?s TOC therefore takes a broader view of change beyond the project, and attempts to capture the complexities of the realities of the social, political, technical and environmental context in Tuvalu.

The preliminary TOC proposed in the PIF, aligned the project with the Tuvalu UNCCD NAP, which highlights and documents the problem of land degradation, the root causes, the drivers of degradation and the directions to address the drivers in the country. As noted in section 2) above however, the UNCCD NAP was developed and published in 2006 (15 years ago) and need to be updated to align with the Convention?s new Strategic Framework, in particular, to introduce the concepts of land degradation neutrality (LDN). During PPG, the TOC exercise was elaborated upon, and as much as possible, followed the GEF STAP guidance at an attempt to capture the complexity of issues at the Science-Policy interface of LDN from a systems way of thinking.

The key socio-cultural and socio-economic aspects of food security and livelihoods raised by stakeholders, that were not easy to capture in the logframe model, include:

? Spirituality plays an integral role in every aspect of Tuvalu society and with culture form the foundation of Tuvalu?s resilience.

? Culture plays a crucial role in governing availability and access to local foods, yet today, the food system is being affected by a clash of cultures. The traditional Tuvaluan food system was based on land assets and cultural values for food distribution based on principles of caring and sharing. Land was owned, cultivated, and cared for communally by families, and food was shared as needed under the customary governance structure of ?***Kaitasi***?. Today, money rather than land is the primary means for acquiring food. Although money has supplanted land in the modern food system, many of the cultural practices about food, such as providing for the community over the nuclear family have remained intact.

? The Tuvalu population have access to adequate amounts of foods, but the foods available do not always meet their dietary needs or their food preferences. Local foods are often considered to be nutritionally superior and preferred but are consumed less often than nutrient-poor imported foods because of limitations in local food production. Imported foods are generally inexpensive, require little time to prepare, and are readily available.

? While acknowledging the significant negative impacts of climate change and a plethora of issues related to limited land availability and land access rights in Funafuti within the context of Tuvalu?s customary land tenure system, the disinterest in participating in local food production is having a much bigger impact on the loss of food sovereignty.

? Modern tools and farming techniques are very important in addressing land degradation and increasing local food production but there is an even stronger desire to promote and support the passing on of traditional skills and knowledge for food production and storage from older to younger generations. The enhancing of traditional food sources and revival of resilient

traditional food systems will increase self-sufficiency, which has long been a defining characteristic of Tuvaluan culture.

? Land availability is a major problem identified during consultation, but significant areas of pulaka pits in Funafuti and outer islands have been abandoned and have not been productive for many years.

? The term ?integrated agro-ecosystem approach? or ?integrated agroecological system approach? (IAE approach), is a nature-based approach to agriculture that recognises the inseparable connection between Tuvaluan people and their natural environment, and that which has shaped their culture since they first populated these low-lying atolls and coral islands.

? The concept of ?food sovereignty?[40], which contends that ?people should be able to have more control over their own food and agriculture than the current global food system allows?, could be a pertinent guiding principal for bringing about the long-term changes needed to achieve the project objective.

The sociocultural factors mentioned above, in many ways, highlighted the general discourse about tackling climate change in Tuvalu (and indeed the Pacific Islands region) that almost always place focus on biophysical threats, particularly sea-level rise, which consequently result in work on strengthening resilience to climate change and food security, tending to suggest technocratic scientific responses. One such technocratic response commonly suggested for the Pacific Islands region is the introduction of salt-tolerant plant species to ensure resilient crop production under sea-level rise (FAO 2008). The inclusion of such intervention in this project recognises the merits of the modern technologies, but the TOC for this project also recognise that such interventions are not sustainable on their own.

The above socio-cultural and sio-ecocomic issues are well articulated in various Government policies, both published as described in section 2 above, in particular *Te Kete* ? Sustainable Development Strategy, and many Tuvalu Government reported interventions in regional and global inter-governmental meetings and negotiations. One of the key policy intentions of the Government is to update its UNCCD NAP to realign with the 2018-2030 Strategic Framework of the UNCCD Convention, in particular, to support a LDN Strategy and target setting process.

During project design, it was recognized that there is very limited technical capacity at the national level to support the science end of the LDN science-policy interface and to provide quantitative and qualitative data and information to support a LDN target setting programme and to support evidence-based decision making and policy development. In this regard, the TOC recognise the need to develop scientific analytical skills to inform planning and decisions and to track the impact of those decisions on the land-based natural capital, by generating and managing locally relevant datasets for globally agreed LDN indicators and metrics as outlined in the UNCCD Scientific Conceptual Framework for LDN (SCF-LDN).

To bring about long-term changes required to achieve the overall objective of reduced land degradation, sustained livelihoods and strengthened resilience, the project?s TOC is framed around a systems approach by articulating how the various Outputs proposed below, contribute as components of a system that are inter-related and interdependent towards promoting and supporting the adoption of IAE in the form of integrated livestock-crop/plants farming systems while ensuring LDN in delivering the Outcomes. As IAE is adopted and local food production increases, the TOC proposes the principles outlined in the SCF-LDN that are of most relevant to

the Tuvalu context, which should guide the monitoring of the impacts on land degradation through a national LDN programme, are:
(i)The LDN **target equals** (is the same as) **the baseline o**f: land-based natural capital
(ii) The integration of results of the three global indicators (NPP, SOC, LCC) should be based on a **?one-out, all-out?** approach.

In general, the TOC articulates the IAE approach in Tuvalu as being underpinned by the recognition that both the biophysical constraints in terms of poor land-based natural capital of low-lying atolls and coral islands, and social and economic limitations, comprise of various components that are inter-related and interdependent, and that both contribute negatively on livelihoods and significantly reduce the resilience of communities. Thus, the IAE approach promoted and supported by the project, applies a systems approach that seeks to optimize the interactions between people and the land-base natural capital (plants, animals, water, soil) while taking into consideration the sociocultural and economic aspects across all levels that need to be addressed for food security, sustainable livelihoods and for strengthening resilience to climate change.

The TOC recognises the importance of land governance in the context of Tuvalu?s customary land tenure system, based on the concepts of ?*Kaitasi*?, where land is owned, cultivated, and cared for communally by families, and food shared as needed. The project recognizes that while money rather than land is now the primary means for acquiring food and that money has supplanted land in the modern food system, many of the cultural practices about food, such as providing for the community over the nuclear family have remained intact and remain the most solid foundation of Tuvalu?s resilience

In addition, the TOC recognises modern science and traditional knowledge are equally important and the concepts underpinning traditional farming system and traditional skills applied, for example, in the cultivation of *pulaka* (swamp taro - *Cytrosperma chamissonis*) are the same scientific concepts that underpin modern systems built from modern materials, such as hard plastics, fibreglass and cement. As a system, the traditional pulaka pit (Figure 7.a) comprise of raised-bed baskets weaved from pandanus leaves, standing in a pit dug to 1m-4m depths to access the top freshwater layer of the groundwater lens, weaved from pandanus leaves, within which organic matter from surrounding flora are composted creating a humus rich environment over time for pulaka to grow. The proximity of the pit floor to the upper layer of the groundwater lens ensures a constant level of moisture. Understanding the traditional pulaka basket at the bottom of a pit as a raised-bed makes it easier for communities to also understand the concepts and consequently easier to adopt various raised-bed home garden systems (wicking systems (e.g., Foodcubes (Figure 4.b), cement pulaka pit (Figure 7.b), traditional raised bed, keyhole-garden, etc., promoted under the Project.

The TOC recognise the need to develop scientific analytical skills to inform planning and decisions and to track the impact of those decisions on the land-based natural capital, by generating and managing locally relevant datasets for globally agreed LDN indicators and metrics as outlined in the UNCCD Scientific Conceptual Framework for LDN (SCF-LDN).

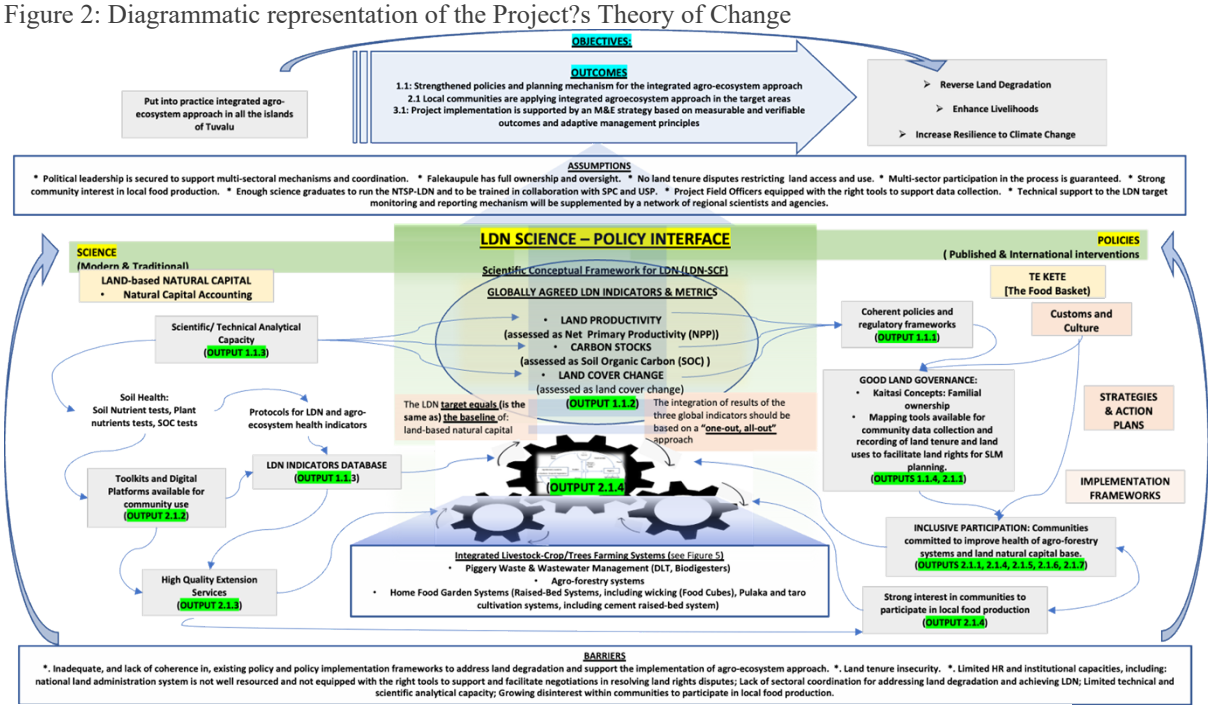
As shown in the TOC diagram in Figure 2 below, the project attempts to articulate the various inter-related components of the agri-food system that relies on both the land based natural capital and the decisions made to improve local food production and food security (supported by policies,

strategies and action plans) and that revolves around ensuring land degradation neutrality (LDN). The Outputs within the boxes in the TOC diagram are those described in the Project Description below. The boxes represent the system?s components of the TOC - at both the science and policy aspects of LDN ? and contain responses to the assumptions regarding the conditions that need to be in place and in which the respective Outputs responds to, as identified in the project?s Results Framework (Annex A1). For examples:

? One of the key assumptions under Outcome 1.1 is that political leadership is secured to support multi-sectoral mechanisms and coordination. The TOC in this regard recognize at the policies end of the LDN Science-Policy interface, both published and interventions made by political leaders at international meetings. In addition, the TOC recognizes Te Kete (Tuvalu National Sustainable Development Strategy), which has full political ownership of the current Government, as the overarching policy guide where other policy-related TOC system components such as Good Land governance and Inclusive Participation are hooked to.

? Under Outcome 2.1, key assumptions include; Project Field Officers equipped with the right tools to support data collection, and there is strong community interest in local food production. All the boxes presented under the Science side of the TOC diagram respond to ensuring the Field Officers and Extension Services are equipped with the right tools.

Figure 2: Diagrammatic representation of the Project?s Theory of Change



Project Description

The overall **Objective** of this project is to reverse land degradation, enhance local livelihoods and increase climate resilience through integrated agro-ecosystem approach in all the islands of Tuvalu.

The project is structured around 3 components and 3 expected outcomes with associated outputs as follows:

COMPONENT 1: Strengthening enabling framework for implementation of integrated agro-ecosystem approach.

This Component will focus on enhancing the policy and legal environment and strengthen planning mechanisms to remove barriers mentioned above and to facilitate and encourage the adoption of integrated agro-ecosystem approach to meet the project objective.

Outcome 1.1: Strengthened policies and planning mechanism for the integrated agro-ecosystem approach throughout the country.

Output 1.1.1. National Food Systems and Nutrition Policy (NFSNP).

The project will review relevant existing policies, strategies and legislations, focusing on policy gaps in, and coherence of, land food, and agro-ecosystems aspects and on harmonization of institutional arrangements towards better coordination. The review will include the National Food and Nutrition Policy (NFNP 1996) and the Draft Food Security Strategy (2021-2031) as starting points for the development of a National Food Systems and Nutrition Policy (NFSNP).

The proposed NFSNP will promote integrated agro-ecosystem approaches to local food production to ensure food and nutrition security, by reducing the reliance on imported foods, reversing land degradation, reversing the loss in food sovereignty, and takes into account climate change impacts and resilience. Traditional systems and values, as well as gender and youth perspectives and gender-responsive actions will also be incorporated.

The proposed NFSNP will respond to recommendation #9 of the TASMP 2016-2025 to ?Formulate and adopt a national Policy on Food Security to provide the supporting framework for the successful implementation of the TASMP?. It is important to note the term ?Food System? is used for the proposed NFSNP instead of ?Food Security? to highlight the importance of a systems approach to local food production given ?food security? can also be achieved through net food importation, contrary to the milestones outlined in *Te Kete*, which promotes the production and consumption of healthier local foods. The importance of local food production also features strongly in the TASMP, Draft Food Security Strategy (2021-2031), and Tuvalu Food Systems Pathway submitted by the Government to the United Nations Food Systems Summit in September 2021. As mentioned above however, the Food Security Strategy (2021-2031) and Tuvalu Food Systems Pathway do not recognize or cover the importance of the health of ecosystems as the foundation for local food production. The use of the term ?Food System? in the title aims to strike this balance and promote a systems approach to food production as articulated in the TOC and as illustrated in Figure 5, as well as to value chains in the agri-food system.

The NFSNP will be aligned with, and guided by, the key milestones outlined in *Te Kete* ? National Strategy for Sustainable Development 2021-2030 for achieving greater degree of security from climate change and natural disasters, the NAPA and the strategic guidance for the agriculture sector outlined in the Tuvalu National Agriculture Sector Plan 2016-2023. The formulation process will include close collaboration with the NCD Stakeholder Committee to ensure coherence with the

strategies for promoting healthy eating outlined in the National Strategic Plan for Non-Communicable Diseases (NSPNCD 2011-2015). In addition, the NFSNP will provide strategic policy guidance, in particular a need to account for land-based natural capital and agro-ecosystem services in the implementation of the Tuvalu Food Systems Pathway and the Food Security Strategy (2021-2031).

Output 1.1.2: Updated UNCCD National Action Plan (NAP) and National Land Degradation Neutrality (LDN) Strategy and a LDN target setting process.

The project will update the 2006 UNCCD NAP to realign with the 2018-2030 Strategic Framework of the Convention, in particular, support a LDN Strategy and target setting process. The development process will ensure the health of agricultural ecosystems and integrated agro-ecosystem approaches are mainstreamed in the updated UNCCD NAP and the baselines of the LDN Strategy. As per the GEF/STAP Guidelines for LDN[41], one of the overarching principles of a LDN Strategy is ?the LDN targets equals (is the same as) the baseline?. The baseline being the land-based natural capital as measured by the three global LDN indicators at the time of the decision to commit to LDN. The LDN indicators (and metrics) are:

- Land cover (land cover change, LCC)
- Land productivity dynamics (LPD; measured as net primary productivity, NPP)
- Carbon stocks (soil organic carbon, SOC).

The LDN Strategy and the LDN target setting process will identify Tuvalu-specific targets and will support the localisation of the LDN indicators, guided by the updated UNCCD NAP and will support Tuvalu?s contribution towards SDG 15.3 to ?restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world?. In this regard, the LDN target setting process will be carried out within the specific national contexts and development priorities of Tuvalu as related to, and in an integrated manner with, climate change adaptation, biodiversity conservation and health of agricultural ecosystems, food and water security and disaster risk reduction.

The project will also support tools and building of scientific analytical capacity for implementation of the LDN Strategy, including Output 1.1.3 for LPD/NPP and SOC and Outputs 1.1.4, 2.1.7 for LCC. In addition, the project will support the establishment of a multi-sectoral LDN Forum to provide oversight and strategic guidance in the development and implementation of a LDN Strategy and target setting process.

Output 1.1.3: National Technical Support Programme for Land Degradation Neutrality metrics and assessment of agro-ecosystem health.

There is very limited scientific technical capacity in Tuvalu to assess land productivity/land potential to support implementation of the NFSNP (Output 1.1.1), and to facilitate the development and implementation of the proposed LDN Strategy (Output 1.1.2). To address this gap, the project in close collaboration with regional technical agencies like SPC and USP, will establish a LDN National Technical Support Programme with overall objective to build analytical capacity at the national level to: (i) support the localization of the LDN general categories of land cover, land productivity and carbon stocks, under the LDN Strategy, using locally-relevant LDN indicators;

and (ii) assess land potential and health of agroecosystems that provide the ecosystem functions and services for livelihoods and climate resilience of agri-food systems.

The LDN National Technical Support Programme will be housed and hosted by DOA/MLGA, implemented in close cooperation with DOE/MPWIELMD and Climate Office at MOF responsible for climate adaptation projects. It will build capacity in developing and using protocols to implement the LDN strategy through collection and managing the necessary datasets and building of analytical capacity to ensure quality of data required for measuring locally relevant LDN indicators and metrics for land productivity dynamics (measured as net primary productivity, NPP) and carbon stocks (measured as soil organic carbon, SOC).

For the land productivity LDN indicator, perhaps the most important locally relevant datasets to be collected relate to soil health and soil quality. As mentioned earlier, the soils of Tuvalu are very weakly developed on young, porous and highly calcareous sands and gravels, and characterized by their alkalinity, immaturity of profile development, low water retaining capacity and by a lack of clay and natural fertility[42]. As fertility is very much dependent on the proportion of organic matter incorporated into the substrate, either naturally or artificially, and upon the size of the constituent coralline parent material, the minimal soil development from the atolls being of very young geological age means soil nutrients tests are not expected to change much over time. Improving organic matter through compost making is the most obvious solution and was indeed the traditional ecological knowledge underpinning traditional pulaka cultivation in pits. In this regard, soil nutrients testing and plant nutrient testing have to go hand-in-hand in order to understand land productivity dynamics. Plant nutrient testing of crops and vegetables is important in understanding their nutrient requirements for growth and that which healthy soils would supply. Nutrient testing of surrounding trees, shrubs and all plants providing ground cover, is also important in assessing their potentials as compost materials that can supply the nutrients desired by crops and vegetables. Nutrient testing other natural materials such as seaweed to assess their potentials to supply the nutrients for plant growth when composted also need to be carried out. In all, the ability to analyse for nutrient content of soil and plant materials is crucial to carrying out nutrient budgeting, essential for improving land productivity.[43]

There is current capacity in Tuvalu to carry out general soil tests using Palintest[44], which are portable soil testing kits suitable for in-field measuring of macro nutrients (soil pH, N/P/K), calcium, magnesium and conductivity. There is no capacity for testing nutrient content of plant materials. The LDN National Technical Support Programme in this regard will install laboratory equipment to supplement the soil Palintest methods, including an Atomic Absorption Spectrometry machine capable of testing for wider range of soil nutrients as well as nutrient testing of plant materials.

The LDN National Technical Support Programme will also include training on sampling technique and data management. The Programme will collect and manage data on production yields as impacted by improved soil fertility to provide evidence to convince communities to adopt ecosystem-based approaches to food production. In addition, the Programme will have the capacity to analyse nutrient contents of locally produced food products (e.g. breadfruit flour) to support the food value chain and marketing.

The LDN National Technical Support Programme will also build capacity to measure the LDN indicator on soil organic carbon, of which there are many soil organic carbon test kits available. The Programme will be guided in the design of its protocols for soil organic carbon measurements by the LDN Strategy and LDN target setting process.

As much as possible, the project will support the participation of the local communities, esp women, in the LDN National Technical Support Programme, including as part of the Programme team and collaboration with Women Groups to assess soil health in their gardening sites and nutrient content of their food products for marketing purposes.

Output 1.1.4: Open-source community mapping tool (SOLA/OT) for crowd-sourcing and recording of customary land tenure and land use (agro-ecosystem) data developed and applied by users.

The spatial mapping of land users (people using the land) and land use (agriculture, dwellings, conservation, agro-forestry, farming, cultural and community purposes, etc.) is a crucial aspect of community-based land use planning and tools for sustainable land management. Several projects and programmes have contributed to addressing this issue in the past, through capacity building in technical tools aimed at strengthening the land administration system and mapping coastal marine areas in Tuvalu, including in GIS tools. These efforts however have mostly been targeted at the national level and linked to regional and global platforms, such as the Pacific Data Hub (https://pacificdata.org/data/) and Pacific Environmental Data portal hosted by SPREP (https://tuvalu-data.sprep.org/).

The project will customize and reconfigure the suite of open-source software called Solutions for Open Land Administration (SOLA) and Open Tenure (OT) that was developed by FAO to help facilitate implementation of the FAO?s ?*Voluntary Guidelines for the Responsible Governance of Land, Fisheries and Forests in the context of Food Security?,* endorsed by the Committee on World Food Security in 2012. The main SOLA software provides the digitized/computerized platform to support cadastre and land registration functions of a typical national land administration system. It has been customized and already used in Samoa?s national land administration system. It has also been customized for Tonga where more work is needed to complete the digitization of survey maps and cadastral data as well as land registration records in the SOLA database. While SOLA-Registry is for formal land administration systems, the OT is a part of the SOLA suite of open-source software, specifically developed by FAO to support community-based recording of tenure rights and can be configured for land use recordings.

Under the Lands Act (2008 Revised Edition) a 6-member Lands Court is established in each island (Article 6) and establishes a Registrar of a Lands Court appointed by each Kaupule (Article 7), and a registry of native lands is established in each island under the provisions of the Native Lands Commission Act.

The project will support the establishment of an Island SOLA/OT Land Tenure Committee in each island under the auspice of its *Falekaupule*[45] (or integrated as part of existing committees such as the environment councils) to approve or not SOLA/OT land user and land use recordings. It is crucially important that the project ensures absolute clarity and understanding that the SOLA/OT recordings of land users is an ?informal? system, aligned with, but not a replacement of, the ?formal/legal? land registry native lands established under the provisions of the Native Lands

Commission Act, and that the Island SOLA/OT Land Tenure Committees are not the 6 member Lands Court. Eventually, alignment with the formally recognized land tenure will be sought based on the data collected, in order to improve land tenure security on the islands, help address drivers of land degradation and strengthen local food production/food security.

The proposed customization of SOLA/OT for Tuvalu will allow a community crowd-sourcing approach to data collection and will ensure the mapping tool is fully aligned with the ?customary? nature of Tuvalu?s land tenure system. The project will also reconfigure SOLA/OT for the specific land uses and the agricultural-ecosystem of Tuvalu.

Training on SOLA/OT will be carried out including on installation and administration of SOLA/OT Community Servers for each island. As part of this Output, training sessions will be organized to build women?s capacities in working with local leadership structures, negotiation and decision-making.

The project will also develop database driven spatial (GIS) applications and maps for monitoring land use changes and for M&E Plan implementation, linked to the SOLA/OT Community Server databases. In this regard, the project will provide useful contribution to the *Te Kete* Strategic Action 1.5.5 to implement an Integrated Geospatial Information Framework (IGIF) to measure, monitor, quantify and manage Tuvalu?s natural environment.

COMPONENT 2. Implementation of integrated agro-ecosystem approach in the islands.

The Component will promote and support tangible community implementation of IAE practices on the ground. As explained in the project?s Theory of Change (TOC), the IAE approach or ecosystem-based approach to agriculture is part of a general nature-based approach to land use practices, which seeks to optimize the interactions between people and the natural resource base.

The project will ensure every opportunity is taken to recognise and account for the importance of women in all cultural, social and economic aspects of Tuvaluan society, in particular the significant roles they play in food production and food preparation. It will also incorporate the concept of ?*kaitasi*?, which is the customary governance structure where land is owned, cultivated, and cared for communally by families, and food shared as needed.

Outcome 2.1 Local communities are applying integrated agro-ecosystem approach in the target areas

To achieve this outcome, the project will support SLM activities in terms of IAE approach to deliver on outputs that positively reinforce the linkages between the socio-economic well-being of the population and the health of the ecosystems. The proposed outputs will take a landscape approach in the context of low-lying atolls and coral islands, where the ground freshwater lens of each atoll is a fragile system and where the agricultural ecosystem covers the whole islands, including coconut agro-forestry areas that dominate the landscape, pulaka pit agricultural areas, as well as dwelling areas where home gardens for vegetables and fruit trees like breadfruit, pawpaw and bananas are grown. The project?s proposed outputs provide tools and capacity development for government agencies and communities to more effectively manage their land resources at an

island-wide level, thereby maintaining a sustainable balance between livestock production, crop production and agro-forestry biodiversity and ecosystem services.

Output 2.1.1 Participatory integrated and whole Island Agro-ecosystem Action Plans (IAEAP) prepared, in the context of Islands Strategic Plans (ISP)

As mentioned above, all eight Kaupule and Falekaupule have 4-year Island Strategic Plans *(?Palani Atiake?*) which map out their key development priorities and outline their proposed developments. Strengthening resilience to the impacts of climate change, land, ecosystems and food security feature strongly in the priorities. The project will support participatory development of IAEAPs for each island to operationalise the agricultural-ecosystems and food security-related aspects of these ISPs. Each of the proposed IAEAPs will include a Work Plan and implementation frameworks that will need to be aligned with the ?Kaupule Integrated Planning and Reporting Framework? introduced by MLGA to streamline the reporting and implementation of the ISPs.

The IAEAP development and formulation process will include synthesis of the ISPs to identify all the aspects and elements relevant to land and agricultural ecosystems and to outline and map out actions to address those aspects. The process will ensure the specific roles women play in agriculture are fully recognized and that their significant contributions are given the appropriate level of attention and support. The process will also include a facilitation of detailed participatory spatial diagnostic and mapping exercises of each island based on SOLA/OT under output 1.1. above.

Output 2.1.2: IAE Toolkits/How-To-Manuals to support Integrated Agro-ecosystem approaches.

To operationalise the policies and strategic action plans developed in component 1 and support implementation of the agro-ecosystem aspects of the ISPs outlined in the proposed IAEAPs, it is crucially important that the communities have the necessary capacity and are equipped with the tools to support actions on the ground. In this regard, the project will develop (or update/improve) a series of toolkits or how-to Manuals for IAE to support implementation of IAEAPs, developed within the context of the Kaupule Integrated Planning and Reporting Framework of the ISPs. The proposed series of IAE toolkits to be prepared to equip communities to practice IAE approaches will include, but not limited to: use of cover crops and composting; integrated crop-livestock systems with installation of household scale piggery biodigesters; home gardening systems (raised bed wicking, raised bed keyhole, raised bed, etc.); and homemade production of biochar and liquid organic fertiliser (including from seaweed). Training on these approaches will then be provided under Output 2.1.3, and the interventions will be implemented under Output 2.1.4 as part of an integrated agroecological approach aiming to improve soil fertility, reduce soil erosion, reduce groundwater use, and reduce the use of agrichemicals.

The project will take the innovative approach of making the toolkits available in the forms of ?how to? videos and other visual forms to delivering training virtually and making available over a digital platform for stakeholders to access on their mobile devices.

Use of cover crops and composting

Experiments in Fiji, Samoa and Tonga have shown that use of the cover crop *Mucuna cochinchinensis* can contribute significantly to soil nitrogen levels (an input of about 60kg N/ha compared with the guinea grass controls in a maize cropping system). In Samoa, the use of mucuna as cover crop during fallow period in taro production was shown to achieve optimum taro yields without any additional inputs of chemical fertilisers.[46] The project will develop a toolkit to promote and support the use of cover crops like mucuna to improve soil health in the coconut agro-forestry systems.

The project will also promote other sustainable land management (SLM) approaches such as agroforestry, composting, biochar and liquid organic fertiliser to address issues of soil fertility and soil erosion.

Integrated crop-livestock systems with Household scale Piggery Biodigesters

A key component of the integrated piggery/livestock-crop farming system will be planting of trees and crops with high nutritional value as pig feed such as moringa oleifera to improve pig health, along with the production of organic fertiliser from DLT and biodigester effluent.

A biodigester is a system that biologically digests organic material through anaerobic processes in a built system where anaerobic digestion takes place. Microbes and other microorganisms break down organic materials in a biodigester, such as animal waste, human waste, food waste, and plant materials can be processed in a biodigester. Biogas is generated during anaerobic digestion, mostly methane (CH_4) and carbon dioxide (CO_2), with very small amounts of water vapor and other gases. Methane is the primary component of natural gas. The material left after anaerobic digestion happens is called ?digestate.? Digestate is a wet mixture that is usually separated into a solid and a liquid. Digestate is rich in nutrients and can be used as fertilizer for crops[47].

There are reportedly over 30 million household scale biodigesters in China, over 3 million in India and tens to hundreds of thousands in other Asia developing countries and countries in Latin America and Africa[48]. A range of design philosophies and construction methods and materials are employed, as shown in examples in Figure 3 below.

The different models, designs and types of systems often reflect the quest for the most appropriate, economical and affordable given the national circumstances. In Tuvalu, the design and installation of several 6m^3 floating-dome design made from Rotamold water tanks were supported by the EU-GIZ-SPC-Government of Tuvalu Biogas project in 2018 under the ACSE programme. A cost-benefit analysis carried out under this ACSE project found the economic benefits to households, include:

- Reduced fossil fuel energy expenditure of up to AusD$495-500 per annum. The use of biogas by households for cooking had reduced the use of kerosene by 125 litres and the use of LPG by four bottles, which is around 82% and 92% reductions in household expenses for cooking using kerosene and gas stoves respectively;
- Avoided time to collect and prepare firewood worth up to AusD$500 per annum (based on the marginal returns to labour from home production and sales of agricultural output);
- When output from the digester is used as a substitute for liuid fertiliser benefits in the form of lower fertiliser costs and increased garden yields are worth around AusD$50-75 per annum; and

- When the costs to households are included in the analysis (cost of time, cost of water), households could be better off by around AusD$870-940 per annum (assuming similar energy substitution to previous trials).

Figure 3: Range of Biodigester design philosophies and construction methods and materials

Fixed-dome Chinese model in Tonga (concrete using steel molds)

Polyethylene bag digester in Costa Rica

Prefabricated HDPE Flexi Biogas in Kenya

Prefabricated HDPE SupSup Biodigester in Solomon Island

Prefabricated fibreglass system in New Zealand

Masonry brick style common in India

Rotamold water tank floating-dome design in Tuvalu

There has been no follow up monitoring of the floating dome biodigesters installed under the ACSE project. More than half of the floating dome biodigesters installed are not operational (personal communication with the former Project Coordinator for the R2R IW demonstration project and currently head of the Waste Management Unit/MLGA). The main hurdle is the manual handling of the feedstock, requiring premixing of pig manure or pre-digestion of organic materials, that are then fed into the biodigester using a bucket. As in other Polynesian islands, handling animal waste is often not a task many are willing to do and not socially accepted as it has not been part of their farming traditions. Another challenge is because of the open end of the outer tank, they

become breeding grounds for mosquitoes. To address these challenges, the project will ensure that in the design of biodigesters models to be installed, the inlet to the biodigester chamber is lower than the outlet of the piggery drainage system so the biodigesters are gravity fed to avoid handling and bucket feeding. To avoid the mosquito issue, the project will install models with fully closed biodigester chambers and not install floating dome biodigesters. The local beneficiaries will be closely engaged in the selection of the biodigester models.

The successful upscaling of biodigesters for piggeries would provide many benefits for households in Tuvalu, including:

- improved soil fertility through integrated crop-livestock systems and organic fertilizer production;
- less soil erosion and crop damages from penning pigs instead of free-roaming;
- reduced pressure on tree resources as source of firewood;
- improvements in water quality from better management of livestock waste;
- improvements in household income (from savings on costs of cooking fuels such as kerosene and LPG; saving time in collecting fuelwood);
- food security (breeding of pigs and by using the digestate as organic fertiliser, see integrated livestock/piggery-crop/plants farming system in output 2.1.4 below);
- sanitary housing for pigs (concrete floor pig-pens provided as part of the Biogas System can be easily kept clean using fresh water from the water tank that is also supplied as part of the system);
- clean air and no foul smell from traditional pig pens;
- water security ? The water tank and pig-pen roof collection area provide an alternative fresh water collection and storage facility.

The 2017 Population and Housing Census conducted by the Central Statistics Division reported 75% or 1,242 out of the 1,464 total number of households raise pigs, and the total number of pigs nationally as 10,894.[49] The average size of household piggeries is 9, including no more than 2 sows. The main production systems are free roaming and pig pens.

A good working digester will have approximately 40 days retention time of the animal waste, i.e. the waste will stay within the biodigester for 40 days before it is expelled. The optimum temperature to achieve this is 27^{o}C. In relation to the outputs, 1 kg of pig dung is expected to produce 45 L of biogas and each adult pig is expected to produce 2.5 kg dung per day. Based on these parameters and average number of pigs per household, the features required of a biogas system suitable for household level in Tuvalu include:

- No more than 7.5m^{3} in size, based on number of pigs and whether a toilet will be connected to the biodigester.
- A pig pen with concrete floor and drainage, fencing and a tin-sheet roof with plastic guttering. Roof provides shade and protection for the pigs and acts as a catchment for fresh water.
- Biodigester inlet to be below the drainage trough so biodigester can be fed by gravity.
- Materials can be recycled or reused after lifetime of biodigester (more than 20 years).

A key factor for the required features above is to ensure the biodigester inlet is below the drainage from the piggery floor so biodigester can be fed by gravity, which would eliminate the social stigma associated with handling animal waste. The biodigester models to be installed will be

decided during implementation, after consultations with communities. The project will review lessons learned from the floating-dome biodigesters already installed in Tuvalu to inform consultations and decisions on preferred model and design. The decisions also need to consider the layout and design of integrated livestock/piggery-crop/plants farming system that the biodigester is an integral component of (output 2.1.4). It is important to also note as lessons learned, that the prefabricated HDPE and polyethylene bag models have been successfully adopted in Solomon Islands and Samoa and meet the requirements above. The HDPE materials can be reused as water-ponding liners, or as cover for raised bed wicking gardens after their use as biodigesters.

Home Gardening Systems ? Raised Bed, Keyhole Raised Bed and Wicking Raised Bed gardens

Raised-bed gardening is a form of gardening in which the soil is enclosed in three-to-four-foot-wide (1.0?1.2 m) containment units (?beds?), which are usually made of wood, rock, or concrete and which can be of any length or shape. The soil is raised above the surrounding soil (approximately six inches to waist-high) and may be enriched with compost. They allow more control over the health of the soil in which plants grow. A raised garden bed is simply mounded soil or a contained bed of soil above the surrounding grade. The goal is to create a deep, wide growing area that encourages plant roots to grow down and outward. As such, vegetable plants can be spaced much closer together in raised bed gardens than in conventional row gardening. The resulting increase in yields and improved productivity reduces demand for land and in this regard, home gardening systems will help address soil erosion, reduce groundwater use, and increase local food production.

A variation of raised bed garden is a circular raised bed with a path to the center (a slice of the circle cut out) are called keyhole gardens. Often the center has a chimney of sorts built with sticks and then lined with feedbags or grasses that allows food scraps to be composted inside and water placed at the center to flow out into the soil and reach the plants' roots.

Another variation of raised bed is self watering raised bed known as a wicking bed (Figure 4a & 4b), which would be particularly beneficial in dry climates or where water is of short supply, as in Tuvalu. Wicking raised bed gardens are based on the principle of sub-irrigation, where the water supply sits below that is wicked upward into the soil in the soil above, as shown below.

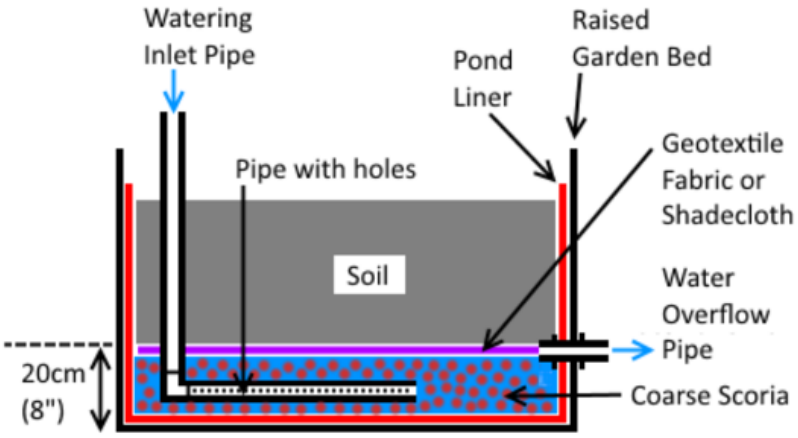


Figure 4a:Wicking Raised-Bed Garden

Figure 4b. Foodcube ? a modular wicking gardening system (source: Live&Learn Foodcube Guide[50])

In Tuvalu, a modular wicking gardening system called the Foodcube was developed under the Australian DFAT funded Innovation Xchange program and introduced to Tuvalu under a partnership between ACIAR, MLGA, Funafuti Falekaupule and LLEE-Tuvalu under the Food Futures Project. The Foodcubes use raised beds made of hard plastic; each bed can be connected to more in a modular fashion and uses a wicking process, enabling plants to draw water from a reservoir under the soil via soil cones within the plastic bed. Air circulates through the system via the air towers, aerating the soil (Figure 4b).

Because the concepts of raised bed gardens allow for more control on soil health, they are ideal for atolls like Tuvalu. The main hurdle is availability of topsoil to get them started. During consultations, some stakeholders raised the idea of bringing in soil from Fiji or New Zealand in containers for installation of raised bed gardens. It was noted in the PPG consultations that Tuvalu has experience importing topsoil from Fiji, but it was not successful as they accompanied a lot of weeds. They were also lost as they were placed directly on the ground.

The toolkit to be developed will expand and build on the LLEE-Tuvalu Foodcube Guide[51], and cover other designs using other available materials. The toolkit will link the wicking raised-bed gardens with compost making from DLT technologies and digestate from biodigesters for managing piggery waste (Figure 5) and supported by soil health assessment by the proposed National Technical Support Programme for LDN metrics and assessment of agro-ecosystem health

(Output 1.1.3). The toolkit will also address biosecurity requirements if imported top soil are to be used and how to protect soil in raised beds.

The IAE toolkits will be developed in both English and Tuvaluan and will be disseminated and published as hardcopies as well as digital versions made available on a digital platform.

Output 2.1.3: Farmer Field Schools (FFS) and Training on IAE approaches.

Training at all levels will be provided, including training of Extension Officers in DOA/MLGA in FFS and extension methods for delivery of training at the community level on IAE approaches for strengthening agroforestry and adoption of SLM practices. In particular, training and FFS activities will be delivered on integrated livestock-crop farming systems, agroforestry and home gardening food systems (see output 2.1.4), and based on the IAE toolkits to be developed under output 2.1.2. above. As much as possible, the participation of women and Women Groups will be promoted and supported.

The organized trainings will have gender sensitivity components and will take into account women?s workload and allow for flexibility in timing and location.

To address climate risks, national institutions involved in climate data collection and assessment will be involved in the preparation of training and implementation of project interventions. Integrated pest management, including early detection, will also be promoted by the project. The project?s training activities will integrate topics related to climate driven impacts on the agro-ecosystem, including changes in pest and diseases, hazards and meteorological information

Output 2.1.4: Island Agro-ecosystem Action Plans implemented, in synergy with, and in support of Islands Strategic Plans.

As mentioned above in Output 2.1.1, each of the IAEAPs to be developed will include clear Work Plans and implementation frameworks. While the IAEAP Work Plans will not be developed until the early stages of project implementation, the stakeholder consultations and logical framework analysis carried out in the project design phase, identified priorities activities to be included in the proposed IAEAPs, including:

? Promote integrated livestock/piggery-crop/plants farming systems (Figure 5) that underpins the integrated agro-ecosystem approach and sustainable intensification of agriculture. The integrated systems enable the recycling of waste within the farming system and rely on synergistic relationships between people, plant and animal system elements to bolster critical agroecosystem processes.

The integrated livestock/piggery-crop/plants farming system revolves around the needs for wellbeing and livelihood of the farm family through improved provisions of ecosystem services in terms of food, fibre and biogas energy for cooking.

The livestock components of the integrated farming system are piggery and technology options for managing piggery waste and wastewater. The farm family may choose a biodigester and/or DLT and/or fish pond / water ponding systems, appropriate for their situation in terms of labour and land availability, availability of and cost of materials, spatial layout of their land, and size of their

piggery. When choosing the biodigester technology, the farm family may choose to link their toilets to the system, taking into the size of the biodigester to be able to obtain the optimum 40 days retention time, as mentioned above, when combined with piggery waste and wastewater. The spatial layout in terms of proximity of both toilet and piggery to the biodigester is an important factor in considering this option.

The crop/plant components of the integrated farming system include agro-forestry systems involving crops and vegetables under coconut and fruit trees, pulaka pits, and home gardening food systems for growing crops and vegetables. These components will improve productivity from the organic fertilisers which are by products of both biodigester and DLT technologies, and/or nutrient rich irrigation from overflow off the fish-pond or water-ponding system, if chosen. The farm family will receive the benefits in terms of increase in yields as food or fibre and fodder for pigs.

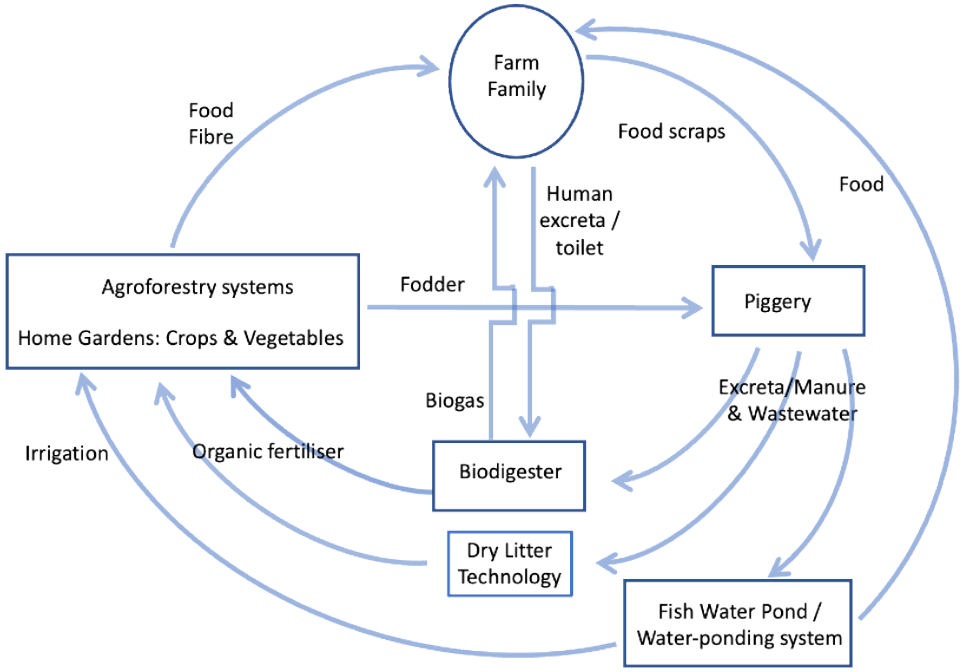


Figure 5: Integrated livestock/piggery-crop/plants farming system.

? Installation and improvements in Home Gardening Food Systems (HGFS), such as: wicking raised bed gardens; keyhole raised bed gardens; and water-ponding gardens. The project will support the design and installation of demonstration sites for these various types of HGFS in schools, community groups/CSOs/NGOs, and at households. The HGFS demonstration sites will be linked directly to the chosen piggery waste management technology or receive organic fertiliser from these technologies off site. For example, organic waste from DLT can be transported to be applied to HGFS or to be used for composting before application.

? To provide support and incentive for HGFS and to motivate the population in local food production, the project will revive a local fresh Produce Market on Funafuti for the communities to sell their surplus fruits and vegetables, in support of the TASMP 2016-2025 aim ?to revive the marketing of local food and other local produce to increase the resilience of the Tuvalu people to climate change?. Synergistic implementation will be established with the Tuvalu Food Futures Project in partnership with LLEE Tuvalu. Cooperative partnerships will also be established with the Learn to Local Food Project by the Women?s Group, *Fafine Nui i Funafuti Association* (FNFA) and *Matapulapula* Women?s Group. A participatory process to

agree on design, location and organizational/management arrangements for the proposed Produce Market will be carried out during project implementation, in close collaboration with LLEE Tuvalu and all interested NGOs. ? TNPSO will play a crucial role in providing training and support in developing business plans for the above-mentioned Women?s Groups and other agri-businesses.

? Carry out a study to better understand the value chains and to make recommendations for actions to support and facilitate local trading and marketing of locally produced foods, both for domestic and overseas, in line with, and is support of, the TASMP 2016-2025. In addition, a collaborative partnership will be established with SPC to leverage new market avenues and SPC pilot projects to support greater women?s economic empowerment through marketing of local organic food produce. Training sessions will also be organized to support women?s participation in the coconut oil value chain. Women-owned business structures where women are shareholders (like cooperatives, social enterprise, etc.) will be strengthened for the virgin coconut production and processing.

? In Funafuti, the project will contribute to implementing key priorities to move the Saugavaka Piggery Project proposal forward, aimed at relocating the piggeries away from their current locations close to dwellings next to the airport runway, to the Saugavaka site located on the coastline. The proposal for the Saugavaka Piggery Project was developed under the R2R international waters (IW) demonstration project that was completed at the end of 2019 and has the full support of the Funafuti Falekaupule, with the aim to promote sustainable practices of managing animal waste. From a review of the draft Saugavaka Piggery Project proposal and consultations with key stakeholders during the project design phase, it was clear that the proposed infrastructure and organizational management arrangements of the proposed Saugavaka piggery are at the conceptual stage only. The detailed spatial layout of the proposed Saugavaka piggery infrastructure, including locations of pens and piggery waste management technologies (DLT and biodigesters) have not been carried out. Environmental impact assessments, including viability and effectiveness of the proposed waste management solutions, have also not been carried out. The specific activities to be supported under this project to move the Saugavaka Piggery proposal forward, will be identified and validated during inception phase, in close consultation with Funafuti Kaupule and MLGA.

? Build on the demonstration of the DLT installed under the R2R IW demonstration project for managing piggery waste to include a demonstration of piggery biogas digesters. The emphasis of the proposed demonstrations will be on these livestock waste management technologies (DLT and biodigesters) being key components of integrated livestock-crops farming systems. As such, the demonstrations will include home gardening systems to demonstrate the use of the dry composts from DLT and the liquid effluent from the biodigesters as organic fertilisers for food production.

? Expand the demonstration of DLT and piggery biodigesters and integrated livestock-crop food production systems in all islands, including areas beyond the Saugavaka site on Funafuti and in all outer-islands.

? Other activities to support the adoption of IAE practices will include, but not limited to:

- support implementation of key priorities identified in the Coconut Rehabilitation Plan at selected sites;
- support planting of trees and high nutritional value crops in agro-forestry systems, to help address soil erosion and increase local food production;
- support community initiatives utilising both traditional and modern food preservation methods in support of Te Kete objectives;

- training and implementing post-harvest food processing methods, including but not limited to utilize the very high percentage of under-utilised breadfruit into food and fodder products (anecdotal estimate of unutilized breadfruit every season is >75%);
- provisions for soil health and soil amendments, such as through cover crops, biochar, composting, home-made liquid organic fertilisers;
- provisions for integrated pest management and removal of invasive alien species and implement key priorities under the NISAP in priority agricultural and agro-forestry areas.

Under this Output 2.1.4, the project will address climate risks as follows:

? The project will climate-proof its interventions by ensuring that any of the small-scale structures put in place by the project can withstand storms and floods, such as by increasing the elevation of pulaka pits.

? Sea level rise and saltwater intrusion will be taken into consideration when selecting agricultural areas. The crop and tree species used for restoration and agroforestry will be selected based on the local site suitability and their resilience to the most likely impacts of climate change (e.g. outbreak of pests and diseases, changes in rainfall, increased salt water intrusion, etc.).

? Disaster preparedness and integrated water management will be integral part of the project risk management, in collaboration with other climate change projects implemented in Tuvalu.

Output 2.1.5: Improved productivity of pulaka pit areas through revival of applied traditional ecological knowledge and modern production techniques.

The project will support the rehabilitation and improve productivity of pulaka pit areas that have been abandoned, including an estimated 50% - 75% of the areas covered by the 3 large pits on the island of Funafuti, shown in Figure 6 below, and in many pulaka pits in outer-islands. These areas have been abandoned primarily due to the increased disinterest in local food production and changes in lifestyle patterns. This will include a revival of the sustainable traditional ?pulaka pit? farming system for the production of *pulaka* and taro, which involves an extensive composting technique using pits dug to a depth of between 1m - 4m and then filled with compost (Figure 8a).

Figure 6: The 3 pulaka pit areas in Funafuti

Several stakeholders expressed the view during the project design consultations that the changing way of life is having a much greater impact on food security than climate change and seal-level rise. This is not to say that climatic factors are not impacting food production. What the consultations highlighted and what evidence in the field has shown, is the importance of addressing both the social and climatic factors together instead of being considered in isolation from one another. In this regard, the project needs to address both the sociocultural and ecological factors that have contributed to the decline in pulaka cultivation in all islands, taking into account the majority of locally produced food consumed in Funafuti comes from outer-islands.

The cultivation of pulaka is highly laborious, and the slower-growing larger variety, *teikalaoi*, can take up to 4-5 years before harvest and can grow up to 12 years. As commented by an elderly farmer during the project design interviews, the improved soil conditions within pulaka pits are dependent on continual cultivation (composting) efforts over the lifetime of pulaka and any long-term reduction in such effort will have a corresponding negative impact on overall soil fertility and production potential of the pits.

Figure 8a below shows a traditional pulaka pit as a form of raised-bed garden, with careful attention to traditional composting techniques on the larger *teikalaoi* variety in woven pandanus leaf baskets forming raised-beds, and the smaller (*Ikamava or Kasusu*) variety. With the availability of modern material such as cement, the community on the island of Nanumaga has successfully ?modernise? the pulaka pits by replacing the pandanus leaf baskets with cement raised-bed. These ?cement pulaka pits? (Figure 8b) are less labour intensive and the cement raised bed help keep the compost mounds above the higher salinity part of the watertables. Being less labour intensive, the cement pulaka pits allows continuity of cultivation and therefore sustain the composting process over longer periods to maintain soil health.

The project will make provisions available for casual labour to support the rehabilitation of the abandoned areas to re-establish healthy soil compost levels as baseline for ongoing cultivation. A training element will be incorporated to train the youth by the elders on the traditional knowledge of pulaka pit composting systems and to keep traditional ecological knowledge as a crucial part of Tuvaluan culture alive.

In carrying out the rehabilitation of and improve productivity of the pulaka pit areas, the project will focus on maximizing opportunities where the concepts of integrated farming system can be applied. In this regard, the project will consider as much as possible, the pulaka pit areas to fit in the ?Agro-forestry systems, Home Gardens: Crop&Vegetables? component of the integrated livestock/piggery-crop/plants farming system illustrated in Figure 5 and as described in Output 2.1.4 above. For examples, wherever possible, the project will encourage to locate the piggeries closer to the pulaka pit areas so the organic fertilisers can be utilized in the area. If piggery are not possible to be located close, organic fertilizer from the DLT solid waste effluent and sludge from biodigesters can be transported to the area. The organic fertilizer will in return, improve supply of fodder from trees and ground cover crops (eg. Moringa oleifera, grass) for the pigs.

To support the demonstration of organic fertilizer production and to improve soil fertility in pulaka pit areas, the project will install compost bins to demonstrate composting of DLT solid waste materials as mentioned above and composting of plant materials from pulaka pit areas, for topping up compost in the pits and feed the trees and crops in the whole areas.

The traditional pulaka pit areas comprise of both the pits where pulaka and taro are grown, and the surrounding areas where the banana, pandunas and other fruit trees grow, as shown in the photos of the abandoned pulaka pits in Funafuti and in Vaitupu in Figure 8a and 8b below. Traditionally, the farmers farm the area as one system maximizing the connectivity between these two components (the pits where pulaka grow and the surrounding areas): the composting materials and pandanus baskets for the composting mounds are sourced from the organic plant materials from the surrounding areas. When pulaka cultivation is ceased, the cultivation of, and caring for the, bananas, pandanus, and fruit trees in the outer areas of the pulaka areas also tend to cease, resulting in loss of productivity of the whole areas. The project will also support various innovative ways to counter water salinity, including increasing the elevation of mounded soil to help taro growth in the pit areas as shown in Figure 8c.

The project will also support the expansion of the modern cement pulaka pits to increase overall local production. The modernized cement pulaka pit system was an innovation born out of the Nanumaga community as they tried to find ways to reduce labour time required for cultivation of pulaka. They found that composting in a 6m (l) x 5m (w) x 1m (h) raised bed built from cement, with a cement bottom allows more control of salt water inundation and achieve good composting environments effectively. Figure 7c below shows the design prepared under the NAPA project. Figure 7a and 7b shows a traditional pulaka pit and a modern cement pulaka pit respectively. A cement pulaka pit with dimensions above require 84 bricks according to NAPA 1 reports. The cost of materials is therefore not high, exclusive of shipping cost to outer islands.

Photo: Arthur Webb.

Figure 7a. A typical healthy traditional pulaka pit. The two commonly grown varieties are also evident in this picture; to the left is the smaller (*Ikamava or Kasusu*) variety; and to the right is the slower-growing much larger (*Teikalaoi*) variety in carefully woven pandanus baskets.

Figure 7b. A modernised version of pulaka pit using cement instead of pandanus baskets. This innovative approach was by the Nanumaga island community.

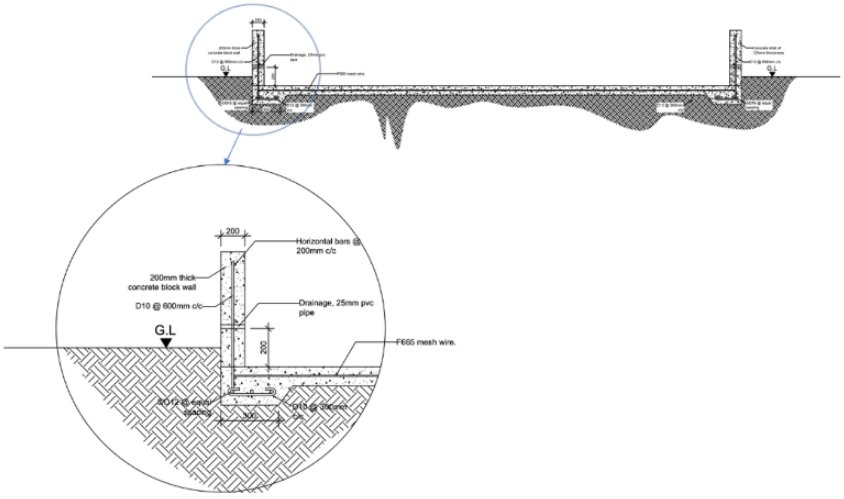


Figure 7c. NAPA 1 design for modern cement pulaka pit

Figure 8a. Abandoned pulaka pit in Funafuti. The ?snapshot? salinity test by SOPAC in 2007 was outside the adequate range of water quality, but the lifetime of at least 5 years means there are periods when water quality is within the range and pulaka continue to grow. Bananas and fruit trees grow along the edges.

Figure 8b. Abandoned pulaka pit in Vaitupu. An example of a pit with ?snapshot? water salinity test within the water quality range considered adequate for growing pulaka but with the area lacking evidence of traditional composting techniques and no longer intensively cultivated, the dense weeds have taken over. Bananas and fruit trees grow along the edges.

Figure 8c. Taro (*Colocasia esculenta*) grown in pulaka pit in Fongafale. Water salinity test outside the adequate range for pulaka but taro seems to have a higher level of saline tolerance and healthier when not as waterlogged as shown in the growth on the higher elevation of mounded soil at the back.

Output 2.1.6. Nurseries (for both native trees, introduced trees and crops) installed and/or upgraded.

There is currently no commercial nursery in the whole of Tuvalu. The Friendship Garden in Funafuti and Hope Garden in Vaitupu initiatives established nurseries to supply seedlings for their own demonstration sites which produced tons of fruits and vegetables at two agricultural centres. These nurseries, however, do not supply seedlings to communities. The DOA/MLGA has nurseries in each outer island operating at different capacities, some not operational at all, and will not be able to meet the expected increase in demand as local production is increased under the project.

The existing nurseries tend to focus on supplying seedlings and planting materials for agri-food system. There is very limited attention to nurseries supporting the conservation of rare plants with high cultural and medicinal values, such as Tulla tulla, (*Triumfetta procumbens*); Nonou, (*Morinda citrifolia*); Tausoun, (*Heliotropium foertherianum*); Valla valla, (*Premna taitensis*); Talla talla gemoafern, (*Psilotum triquetrum*); Lou, (*Cardamine sarmentosa*); and Lakoumonong, (*Wedelia strigulosa*). These plants are valued by womenfolk so the project will ensure the nurseries will support conservation of these high valued plants.

The project will carry out a participatory review of needs and capacity for seeds and planting materials, linked to targets related to demand for increased local food production and increased agricultural productivity as well as conservation of plants with high cultural and medicinal values, especially those that are becoming rare. The review will include a stocktake of existing nurseries capacities across all islands to assess existing capacities to meet the expected increase in demand as local food production increase. Based on this capacity review and assessment, the project will provide provisions of materials and advisory support to design new and/or upgrade existing nurseries to fill the gaps and meet the expected increase in demand, specific to each island as informed by their IAEAPs.

Some of the nurseries will be managed by Government agencies such as the Department of Trade/MFT responsible for the Coconut Agroforestry sites under the National Coconut

Rehabilitation Program and DOA/MLGA extension programmes in outer islands. Some will be managed by communities to meet their demand for planting materials at kaitasi land areas or by community groups to meet seedling demands for, and integrated with, their community initiatives, e.g., Women Groups: Fafine Nui i Funafuti Association ?Lean to Local Food Project?; Matapulapula Women?s Group home gardening initiative; Ekalesia Kelisiano Tuvalu (EKT) Women?s Centre home gardening and food processing initiative. Youth and schools may also be engaged in the nurseries.

The project will also provide training on key factors that should be considered when planning to establish a small-scale nursery for seedlings, including propagation techniques and Operational Plans to ensure sustainability.

Output 2.1.7: Inventory of Tree Resources (native and introduced timber and fruit trees)

The project will provide training and implement a programme on tree resources inventories, building on the preliminary work carried out under the R2R project. The project will use SOLA/OT and its Community Server for collecting and managing tree inventory data and for mapping spatial distribution of tree resources, and establish link with the database developed by the R2R STAR project using EpiCollect mobile app data-collection. The EpiCollect app and database, does not include data on land users and land user rights, an important aspect to consider in terms of who owns and manages those tree resources, which is a functionality available in SOLA/OT &CS. In this regard, the SOLA/OT&CS can be a useful mapping tool for planning how tree resources are incorporated into agro-forestry systems and across the landscape.

To ensure sustainability, the project will develop a format for a periodic report on the State of Tree Resources of Tuvalu, which sets out the procedures for monitoring and reporting of outcomes linked to periodic Biodiversity Rapid Assessment (Biorap) of biodiversity and ecosystem services (BES) in Tuvalu. The project will ensure inventory of tree resources and spatial distribution information in the Biorap database in DOE/MPWIELMD are available in a form accessible to relevant staff in DOA/MLGA and Department of Trade responsible for the Coconut Agroforestry sites under the National Coconut Rehabilitation Program. Youth and schools may also be engaged in the inventory.

COMPONENT 3. Project coordination, monitoring and evaluation

Outcome 3.1: Project implementation is supported by an M&E strategy based on measurable and verifiable outcomes and adaptive management principles

Output 3.1.1. Project M&E strategy developed with all stakeholders, designed to measure progress towards achievement of the project objective.

The M&E strategy aims to monitor the resources invested, the activities undertaken and work implemented, services delivered as well as evaluate outcomes achieved and long-term impacts achieved by the different components of the project. A draft of the project?s M&E strategy will be prepared during the inception phase as an adaptable and living document and will be reviewed periodically during the implementation phase.

To ensure effective implementation of the M&E strategy, clear methodologies, tools and mechanisms will be put in place for data collection and information or progress flow mechanisms to ensure good quality, validity, and accuracy of data for improved project work plan implementation. The mechanisms will be designed in a manner that ensures data quality and validation.

The M&E strategy will help develop understanding of the NPC, the PSC and other stakeholders (including FAO) develop understanding of the extent to which the project is tracking towards achieving the outcomes and the objective. During implementation of the project work plan activities, the M&E will identify good practices and derive lessons from operational experiences and can help improve overall performance of the project. Designed properly, the M&E support the design of an Exit Strategy to ensure sustainability by integrating lessons learned from project experiences and add clarity on who is impacted and responsible for the various outputs.

Output 3.1.2. Food security and LDN target monitoring and reporting mechanisms established and relevant information shared through national and global platforms

Based on the LDN targeting setting process and proposed LDN Forum in Output 1.1.2, the project will support the LDN strategy implementation through regular planning, review and monitoring of progress towards the LDN targets and their impacts on food security. The project will support the LDN Forum by providing information related to the effectiveness of the IAE approach as a measure for improving the 3 LDN categories of Land Productivity, Land Cover, Soil Organic Carbon Stock.

Information on LDN targets will be shared through national and global platforms. The monitoring process to support the LDN Forum will be institutionalized in DOA/MLGA with additional training and setting up of systems.

Output 3.1.3. Communications and Knowledge Management Strategy

The project will design and prepare a Communications and Knowledge Management Strategy during the inception phase, aligned with, and supported by, the M&E strategy to ensure lessons learned and good practices are captured and disseminated at the national, regional and global level to support replication of results.

The Communications and Knowledge Management strategy will include the preparation of communication materials, socialization of activities and results, systematization of lessons learned and best practices, and dissemination through various media. A particular focus will be placed on youth as a target audience to increase their interest in local food production and traditional systems. The Strategy will also include a project website to share experiences, disseminate information, highlight project outcomes and progress, and facilitate the replication of results throughout the duration of the project.

The KM strategy will also take into account traditional knowledge systems and the passing on of traditional knowledge from the elders to younger generations.

Furthermore, the project will support exchange with other countries at the biome and ecoregion level, as well as regional/global exchange and sharing of IAE approach as experiences in SLM. A mechanism will be developed to support dissemination and exchange of best practices and lessons for the replication of results in other similar atoll nations.

4) Alignment with GEF focal area and/or Impact Program strategies

The project will contribute to achieving GEF objectives in the focal area of Land Degradation, specifically Objective 1 - Support on the ground implementation of SLM to achieve LDN, and its (sub)objectives 1-1 Maintain or improve flow of agro-ecosystem services to sustain food production and livelihoods through Sustainable Land Management (SLM) and 1-4 Reduce pressures on natural resources from competing land uses and increase resilience in the wider landscape; and Objective 2 - Creating an enabling environment to support voluntary LDN target implementation. 2-5. Create enabling environments to support scaling up and mainstreaming of SLM and LDN.

Towards Objectives 1-1 and 1-4, the project will support implementation of SLM by promoting and supporting IAE approach that positively reinforce the linkages between the socio-economic well-being of the population and the health of the ecosystems. The proposed project will take a landscape approach in the context of low-lying atolls and coral islands, where the ground freshwater lens of each atoll is a fragile system and where the agricultural ecosystem covers the whole islands, including coconut agro-forestry areas that dominate the landscape as well as dwelling areas where vegetables and fruit trees like breadfruit, pawpaw and bananas are grown. The IAE approach in terms of integrated livestock/piggery-crop/plant integrated farming system promoted by the project (Figure 5) will effectively improve the flow of agro-ecosystem services to local communities in terms of higher crop and vegetable yields and improved provisions for food and livestock fodder from agro-forestry systems as a result of improvements in soil health from organic fertiliser generated from piggery waste and improved compost products. The project will also provide communities with the tools and capacity development plan and manage their land resources at an island-wide level, thereby maintaining a sustainable balance between livestock production, crop production and agro-forestry biodiversity and ecosystem services and contribute to diversified agro-ecological food production systems.

In terms of Objective 2-5, the project will update the 2006 UNCCD NAP to realign with the 2018-2030 Strategic Framework of the Convention and support a LDN Strategy and target setting process. The project will establish a National Technical Support Programme for LDN (Output 1.1.3) to generate and manage relevant datasets for assessing the health of ecosystems and will provide tools to support resolution of land tenure issues in the context of Tuvalu?s customary land tenure system by the customization of the FAO SOLA/OT open-source software for Tuvalu community use, thereby removing obstacles to LDN objectives. This will promote good governance in view of addressing land degradation and promoting IAE approach as SLM practices for improving food security and reduce loss of food sovereignty. It will also contribute to building national capacity to monitor land degradation in the country for enhanced decision-making processes.

5) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

Component 1:

The project will strengthen cross-sectoral, multi-stakeholder collaboration for integrated land management planning and monitoring , the project will contribute to the development processes of a National Food Systems and Nutrition Policy and LDN Strategy and a LDN target setting programme. The National Food Systems and Nutrition Policy will strengthen the linkages between food systems, ecosystems and the health of the population by working closely with the existing NCD Stakeholder Committee to promote and support IAE approach as a measure for achieving the healthy-eating aim of the National Strategic Plan for Non-Communicable Diseases. The development of a LDN Strategy will similarly strengthen multi-sectoral mechanisms by establishing a LDN Forum to provide oversight and strategic guidance in the development and implementation of a LDN Strategy and target setting process. The LDN target setting process will be carried out in an integrated multi-sectoral manner, bringing together stakeholders in the areas of climate change adaptation, biodiversity conservation, agriculture, water resources management and disaster risk reduction. Without the GEF support, coordination and collaboration across sectors will remain weak and not all relevant stakeholders will participate and have ownership of the LDN target setting programme.

The project will also strengthen land governance by providing communities with tools to help resolve land tenure disputes and facilitate negotiations related to land access rights for use, by the customization of the FAO developed SOLA/OT mapping tool, in the context of Tuvalu?s customary land tenure system and the concepts of ?kaitasi? and familial land ownership, governed by the Falekaupule ? the traditional assembly of elders or *te sina o fenua* (literal translation: ?grey-hairs of the land?) ? which is the customary and traditional governance structure on each island. As mentioned in Output 1.1.4, the Lands Act (2008 Revised Edition) establishes a 6-member Lands Court in each island (Article 6) and establishes a Registrar of a Lands Court appointed by each Kaupule (Article 7). A registry of native lands is established in each island under the provisions of the Native Lands Commission Act and is administered by the Lands and Survey Division of MLGA. The SOLA/OT recordings of land users is an ?informal? system, aligned with, but not a replacement of, the ?formal/legal? land registry of native lands. It will allow recognition of the very common practice of ?informal? customary agreements that are considered valid but not recorded in the land registry. Land disputes however, often emerge from informal customary agreements especially when such agreements are passed on from one generation to the next. Without this GEF support, land disputes will continue to go unresolved so the limited land available are not fully utilized for food production and short-term unsustainable land use practices will continue.

Component 2:

Under this component the project will utilize the MLGA?s investments with regards to promotion of good agricultural practices and provisions of seedlings, planting materials, nursery materials, livestock, fencing materials, etc. GEF incremental resources will strengthen at least eight nurseries to ensure regular supply of seedlings and planting materials of indigenous tree species to improve agro-forestry systems and diverse fruit trees and vegetables that are climate resilient and suited to the local conditions. The establishment of nurseries will go hand-in-hand with training on seed collection and propagation techniques to build stock of rare plants and support conservation of native plants with high cultural and medicinal value (eg., pandanus, breadfruits, coconuts). In this regard, the nurseries will be linked to agro-forestry plots that serve as in-situ conservation of

various plant species and cultivars and where the seeds for the nurseries are sourced from. In the absence of GEF incremental resources, the nurseries would not have ability to supply the required seedlings and planting materials to support the expected improvements in productivity and increased community participation in local food production systems. In the absence of GEF incremental resources, the conservation through collection of seeds and propagation of rare plants, in particular those with high medicinal and cultural values, will also not happen.

In addition, the GEF incremental actions will include participatory processes for developing whole Island Agro-ecosystem Action Plans to operationalise IAE approach and strengthen the importance of agricultural ecosystems to achieving the objectives of Islands Strategic Plans. The IAEAPs will build on results of the GEF-5 project which built capacity on R2R landscape approach, including database developed on trees and crops. The GEF incremental support will build on this database to include capacity development in community crowd-sourcing of data and extend it to include recordings of land users to link land use with households using particular geo-referenced areas using SOLA/OT, which will also support land tenure governance through community led resolution of land disputes, within the context of Tuvalu?s customary land tenure system. Without the GEF support, the importance of the health of agricultural ecosystems will not be fully recognised in implementation of Island Strategic Plans and the capacity in communities to adopt IAE practices will remain limited.

Furthermore, the GEF incremental resources will strengthen the capacity of Extension Officers and of DOA/MLGA in FFS skills and strengthen cooperative partnerships with LLEE-Tuvalu and TTMT by establishing synergistic implementation with the Food Future Project and Fruit and Vegetable Production and Nutrition Enhancement Project. Synergistic implementation will also be established with the coastal protection measures to be implemented under the GCP adaptation project. Co-financing through the FAO Technical Cooperation Programme will directly feed into the value chain strengthening activities carried out under Output 2.1.4. in support of the TASMP 2016-2025.

Training programmes will be delivered and stakeholder consultations held, at all levels, through the GEF incremental resources, building on the previous government and development partner-funded training and capacity building initiatives. Trainings will focus on each component of integrated livestock/piggery-crop/plants farming systems as illustrated in Figure 5, including the transfer of technologies such as DLT and biodigesters for utilizing piggery waste as organic fertiliser for growing food for the farm family and fodder for livestock feed. Training of youth will also be provided by elders on traditional farming techniques. In addition, the establishment of a LDN National Technical Support Programme (Output 1.1.3) will build capacity in scientific analysis of nutrient contents of soil and plant materials, to support production of quality compost based on known nutrient content of plant materials. Furthermore, training will be provided on various parts of the value chain to promote trading of local food and food products. Without GEF resources, the Government and the communities of Tuvalu will not have the tools and sufficient knowledge and skills to implement integrated agro-ecosystem approach to reverse land degradation in order to strengthen their resilience to climate change and improve livelihoods.

Finally, this component will address the sociocultural aspects of food security, in particular the key limiting factor in adopting IAE approach, which is the increasing disinterest of the population in local food production, despite the overwhelming preference for traditional foods. The GEF

incremental resources will support activities to reverse the loss in traditional ecological knowledge related to composting farming skills for cultivation of pulaka by providing training opportunities for the elders to deliver training to the youth. The project will also expand the installation of modern techniques to lift the compost mounds using cement pulaka pits and designs of various types of raised-bed gardens. These efforts will contribute to rehabilitation of the abandoned pulaka pits to improve provisions of ecosystem services and negate the impacts of saltwater intrusion in some of these areas. Overall, the project will integrate cultivation of pulaka and taro in the compost pits, the crops and fruit trees in areas surrounding the traditional pulaka pits, home gardens, and agro-forestry systems as components of livestock/piggery-crop/plants farming system illustrated in Figure 5, utilizing piggery waste as organic fertiliser for crops, vegetables and fruits production. Adopting farming practices based on the concepts of integrated farming systems as illustrated in Figure 5, will open up opportunities for income generation (e.g, selling organic fertiliser, selling surplus crops), and/or import replacement (e.g., LPG gas and kerosene) that could stir interest to participate in local food production.

Without GEF incremental resources, 800 ha on the islands of Tuvalu will remain under the threat of continuous degradation, resulting in loss of vital ecosystem services and goods, severely affecting the livelihoods and well-being of the local community.

Component 3:
The GEF incremental resources will contribute to the generation and sharing of knowledge at the project level, and improved collection, monitoring and access to land-use data for land use and SLM planning. For example, the project will support collection, management and analysis of data and information on land cover and land use by the National Technical Support Programme for LDN, to inform the proposed IAEAPs, NFSNP and LDN target setting programme. Furthermore, it will support exchange with other countries at the biome and ecoregion level, as well as regional/global exchange and sharing of IAE approach as experiences in SLM. In the absence of GEF support, data and knowledge of agricultural ecosystems and the value of the ecosystem services they provide will remain limited. Consequently, IAE approaches will not be considered in policy development and therefore not promoted and supported in communities through national development programmes.

7) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The project will generate global environmental benefits in the area of Land Degradation, in particular the improved provision of agro-ecosystem goods and services. Overall, the project will improve the flow of agro-ecosystem services across at least 800 ha (ca. 31% of total land) where SLM practices will be carried out through adopting IAE approach, including: revival of traditional ecological knowledge to improve productivity and rehabilitate around 20ha of abandoned pulaka pits; improvements in coconut agro-forestry systems; Home Gardening Food Systems (HGFS) around household areas and at schools; removal of invasive alien species and pest management; and improvements in water quality from better management of livestock waste. The resulting improvements in vegetation cover and reduction in land degradation will ensure continued ecosystem functions and provision of key goods and services, especially in the context of livelihoods and resilience to climate change. Specifically, the project will bring 650 ha of landscapes under sustainable land management in production systems, restore 150 ha of degraded

agricultural land, and will mitigate 222,702 metric tons of CO_2e through carbon sequestered and emissions avoided.

It is envisaged that the range of interventions through agro-ecosystems approaches, such as agroforestry, sustainable land management, restoration interventions, etc. will diversify trees and crops grown for food and rehabilitation, address the drivers of land degradation and reduce pressure on natural resources leading to better flow of ecosystems services and sustainable livelihoods that enhance resilience to the increasing threats of climate change in Tuvalu. Strengthened traditional knowledge and customary governance systems as well as land tenure and land use, will also contribute to the communities? resilience. Further, the policy and governance mechanisms, such as the National Food Systems and Nutrition Policy, the updated UNCCD National Action Plan and LDN voluntary targets, will take into account climate change impacts and will create an enabling environment for enhanced resilience in Tuvalu.

Innovativeness, sustainability, potential for scaling up and capacity development

Innovation: The project is innovative in recognizing the crucial importance of the customs and culture of Tuvaluan people in the proposed solutions, and in acknowledging that the traditional ecological knowledge of the communities go hand-in-hand modern scientific knowledge and therefore go hand-in-hand in bringing about the necessary changes needed to reduce land degradation and minimize the impacts of climate change. In this regard, the project is innovative in supporting good land governance as an important step in SLM by introducing the SOLA/OT software developed by FAO specifically for communities to record their land use and land tenure as a tool to resolve land disputes and add clarity to land use rights aligned with the formal land registry of native lands administered by the Land and Survey Division in MLGA. In addition, the introduction of SOLA/OT and Community Server will strengthen the evidence-based land management decision making through better availability of data, collected and managed by communities for their own purposes. For example, Kaupule will have the capacity to quantify agricultural production, including potential capacity for coconut production based on coconut stock linked to each land user/household.

As mentioned above, the project will be innovative in promoting integrated farming systems as illustrated in Figure 5 including piggery as a livestock component. Pigs have very high cultural value in Tuvalu and are normally reserved for special occasions and feasts. They amount to 17 percent of the meat consumption home produced and in Funafuti, pigs represent the most valuable items home produced and consumed before fishes, as reported in the 2016 household incomes and expenditures survey. The current pig production systems however, are causing severe land erosion and damages to crops from free-roaming pigs, and the penned pigs are causing significant pollution to vulnerable water resources such as Tafua Pond situated in Fakaifou Village, close to Mangrove Swamp in Funafuti. In addition, the piggeries with no wastewater management systems currently produce foul odour around dwellings. To date, the solutions through various projects have typically operated in a sectoral and ad-hoc manner. This project will install DLT and biodigesters technologies as components of integrated piggery/livestock-crop farming system as mentioned, rather than as wastewater management or energy solutions in isolation. The other key component of the integrated piggery/livestock-crop farming system will be planting of trees and crops with high nutritional value as pig feed such as moringa oleifera to improve pig health, and grown with organic fertiliser from DLT and biodigester effluent. The organic fertilisers as by-products from

these technologies will also improve soil fertility in the whole system for crop and food production (Figure 5).

To date, most of the ?how-to? Manuals and toolkits as outputs from previous projects have been developed and disseminated as hardcopy publications. As mentioned above, the feedback from stakeholders during the PPG phase was these glossy publications are often not read nor used by communities to inform their farming practices as it is simply not in their culture to read manuals for farming purposes. On the other hand, the number of the population with access to cell phones and mobile devices has grown exponentially within the last decade and is where the population now generate and use information. The project will take the innovative approach of making the toolkits available in the forms of ?how to? videos and other visual forms to delivering training virtually and making available over a digital platform for stakeholders to access on their mobile devices. Due to COVID-19 travel restrictions, the PPG process was carried out mostly through virtual meetings, allowing the FAO international team to provide technical advisory services and representatives of outer-island Falekaupule to provide inputs into the project design. A digital platform was also developed in the form of a restricted access website where the stakeholders could access all the documents and provide feedback to the project PPG team. The project will build on this innovative approach during implementation.

Sustainability: The sustainability of the project will be ensured through: a) capacity development at management/decision making level in both Government agencies and islands Falekaupule; b) institutionalised programme for capacity development for scientific and technical analysis; c) strengthening land governance based on Tuvalu?s customary land tenure system; c) reviving traditional farming skills and traditional ecological knowledge that has been the foundation of Tuvalu?s resilience and survival through many generations; d) livelihood benefits (through market oriented value chains and promoting local trade) generated through the project; and e) the toolkits and training programs and materials developed by the project including FFS programs will be institutionalized for future ongoing support to communities.

Local communities are at the core of project activities and sustainability will be ensured by aligning the implementation of IAEAPs with the ?Kaupule Integrated Planning and Reporting Framework? introduced by MLGA to streamline the reporting and implementation of the ISPs. By developing the IAEAPs in the context of operationalising the agricultural ecosystem aspects of the ISPs, the project will ensure the Kaupule and Falekaupule are in the driving seat and have full ownership of the project outcomes beyond the project?s 4-year duration.

The development of toolkits and Manuals as videos and other visual forms to be made available on a digital platform, will also ensure sustainability beyond the end of the project. To ensure the outputs will be ?phased over? and institutionalised in ongoing programmes and activities of local organizations and communities, the project will develop a M&E Plan during the inception phase with the following criteria to assess its effectiveness during implementation:

(i) the structures developed and organizations and individuals trained or empowered by the project will continue to function effectively.

(ii) the relevant activities will be continued in the same or modified format; and

(iii) the project impact will be sustained, expanded or improved at the end of the project.

The project will commence the development of a ?phased over? Exit Strategy during the inception phase, in conjunction with the M&E Strategy. The M&E Strategy in this regard, will have to continuously ask and check back to the question of how strong is the community?s sense of ownership/commitment to continue program activities beyond the project duration? The most important indicator of the M&E Plan in this regard, is the increase in the number of people participating, and showing interest, in local food production.

Scaling Up: This project will be implemented in all of Tuvalu (nine islands), the project approach and lessons learnt can be replicated in other atoll countries, in the Pacific, with similar ecological and socio-economic characteristics. This will be facilitated through the project?s Output 4.1.3.

8) Summary of changes in alignment with the project design with the original PIF

1.a Sub-Section	**Changes in alignment with original PIF**
1) Global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)	*Global environmental and/or adaptation problems:* The PIF attributed land degradation primarily on poor land use practices and impact of severe weather events on vegetation cover, and highlighted the impacts on livelihoods. The CEO ER expanded on this to elaborate more on the losses of ecosystem services linked to land degradation, in particular the provisioning services of agricultural crops and agroforestry to supply food. The CEO ER also highlights the loss of traditional ecological knowledge and traditional skills in sustainable traditional food production systems as an impact of the reduction in capacity for agroecosystem provisioning services, notwithstanding the impacts of climate change. *Root causes:* The PIF identified inappropriate and unsustainable agriculture practices in terms of monocropping practices and extreme weather events in terms of storm surges as the root causes. The CEO ER does not give attention to monocropping as there is very minimal monocropping in Tuvalu. The CEO ER also separates sea-level rise and extreme weather events as root causes to recognise the differences in their temporal patterns, with extreme events having acute impacts such as drought events that often cause fire when continuing with slash and burn in dry conditions. There are two other root causes not identified in the PIF: land tenure insecurity that result in short-term unsustainable land use practices; and increasing monetisation of the economy that has changed lifestyles and dependency on imported foods and reducing the interest in local food production and therefore the traditional practices that value and protect the land. *Barriers that need to be addressed:* The CEO ER places emphasis on the need for coherence in existing policies as a significant barrier in multi-sector approaches and for well-functioning coordination mechanisms, in particular, the need to use common terms and terminology to be able to communicate effectively with each other across sectors. The rest of the barriers are packaged under limited human resources and institutional capacities. Two new barriers were identified during project design phase: the national land administration system is not well resourced and not equipped with the right tools to support and facilitate negotiations in resolving land rights disputes; and growing disinterest within communities to participate in local food production.

2) Baseline scenario and any associated baseline projects/programmes	The CEO ER expanded on the PIF, including an added sub-section describing the existing national policies, strategies and action plans the project will work from and build upon. It places the project solidly in the context of, and in alignment with the existing priorities of the country, both at national level and at islands level. It also recognises the need to align with, and to identify opportunities to contribute to strengthening of, existing coordination mechanisms and implementation frameworks, including the Kaupule Integrated Planning and Reporting Framework of the ISPs. The CEO ER updated information on government agencies to the restructuring introduced by the new Administration who came in since the PIF, including the change from the Ministry of Home Affairs and Agriculture (MHAA) to Ministry of Local Government and Agriculture (MLGA). Several baseline projects and programmes have been added in the CEO ER, over and above the two UNDP/GEF projects and the EU/SPC funded ?The Global Climate Change Alliance: Pacific Small Island States project in Tuvalu?, which are also further elaborated upon as alluded to in the PIF. The added baseline projects are listed under Government agencies as well as other project partners in-country. They cover projects with outputs (e.g., toolkits, manual, factsheets, databases) that contribute to institutional strengthening and to capacity development in technical skills to support the adoption of relevant technologies this project will build upon. In addition, the baseline projects listed also established mechanisms for engagement with, and coordination amongst, stakeholders, such as the CSES by LLEE Tuvalu under the Tuvalu Food Futures project. Furthermore, the baseline projects address health related outputs such as ?Improving soil health, agricultural productivity and food security on atolls? executed by DPH/MHSWGA aimed at diversifying food crop production, including nutritious leafy vegetables. Linking land degradation and production of more nutritional local foods for better human health is an important factor in reversing the disinterest of the local population in food production, and by extension, improve their interest in protecting the health of agricultural ecosystems that provide the provisional services for food.

3) Proposed alternative scenario with a brief description of expected outcomes and components of the project and the project?s Theory	*Component 1, Outcome 1.1:* The PIF proposed four outputs: 1.1.1. National Food Security Policy developed; 1.1.2. National LDN strategy and target setting developed; 1.1.3. Training programmes on IAE approach and relevant practices implemented targeting government staff; and 1.1.4. Multi-sectoral and multi-stakeholder LDN forum established. The CEO ER revised the outputs under outcome 1.1 from four to three, as follows: Output 1.1.1 has been revised to include ?nutrition? in the proposed policy and is now called ?National Food Systems and Nutrition Policy?. The stakeholders in DPH/MHSWGA expressed the importance of recognizing the existence of the 1996 National Food Systems and Nutrition Policy (NFSNP 1996) that should be updated and to highlight the need to reverse the loss in food sovereignty as a key guiding principle. The CEO ER also propose the NFSNP formulation process to be carried out in close collaboration with the NCD Stakeholder Committee to ensure coherence and alignment with the NSPNCD 2011-2015. The CEO ER revised Output 1.1.2 to include a review and update of the 2006 UNCCD NAP to ensure alignment with the Convention?s new Strategic Framework and to inform the proposed LDN Strategy and LDN target setting process. The CEO ER also moved the establishment of a LDN Forum that was proposed Output 1.1.4 in the PIF to this revised Output 1.1.2. The CEO ER moved training on IAE approaches that was proposed as Output 1.1.3 in the PIF to outcome 2.1 to become Output 2.1.3, combining training on IAE approaches with FFS. This provides better flow of outputs under Outcome 2.1 and places training on IAE approaches to be implemented in a synergistic manner with FFS in the context of implementation of IAEAPs (Output 2.1.1) and utilizing the toolkits and ?how to? manuals (Output 2.1.2). Output 1.1.3 has been revised to address the very limited scientific technical and analytical capacity for LDN and for assessment of health of agro-ecosystems. The CEO ER proposes a new Output 1.1.4, which is the customization and configuration of the FAO developed open-source software as a community mapping tool (SOLA/OT) for crowd-sourcing and recording of customary land tenure and land use (agro-ecosystem) data. The responsible governance of tenure of land is crucial to SLM through IAE approaches and LDN target setting. The PPG process identified a need for support in resolving land disputes within the Tuvalu?s customary land tenure system. It was recognized during the PPG that while there is limited land available in the country, there are significant areas in the production landscape that are standing idle or abandoned that are not being utilized for food production due to tenure issues. The configuration of SOLA/OT for land use recordings would also empower communities to collect and manage their own data for their own purposes, including to facilitate trading in local foods. *Component 2, Outcome 2.1:* The PIF proposed four outputs to attain Outcome 2.1: 2.1.1 Participatory integrated and whole island agro-ecosystem management plans prepared; 2.1.2 Agro-ecosystem management plans implemented 2.1.3 Nurseries (for both native trees and tree crops) in the target island upgraded 2.1.4 Inventory created for native tree and fruit tree species. The CEO ER expanded on the PIF and propose seven outputs. The three added outputs include the development of toolkits to support implementation of IAE Action Plans, FFS and trainings on IAE approach based on the toolkits and manuals, and revival of traditional composting farming system to improve productivity in and around pulaka pits.

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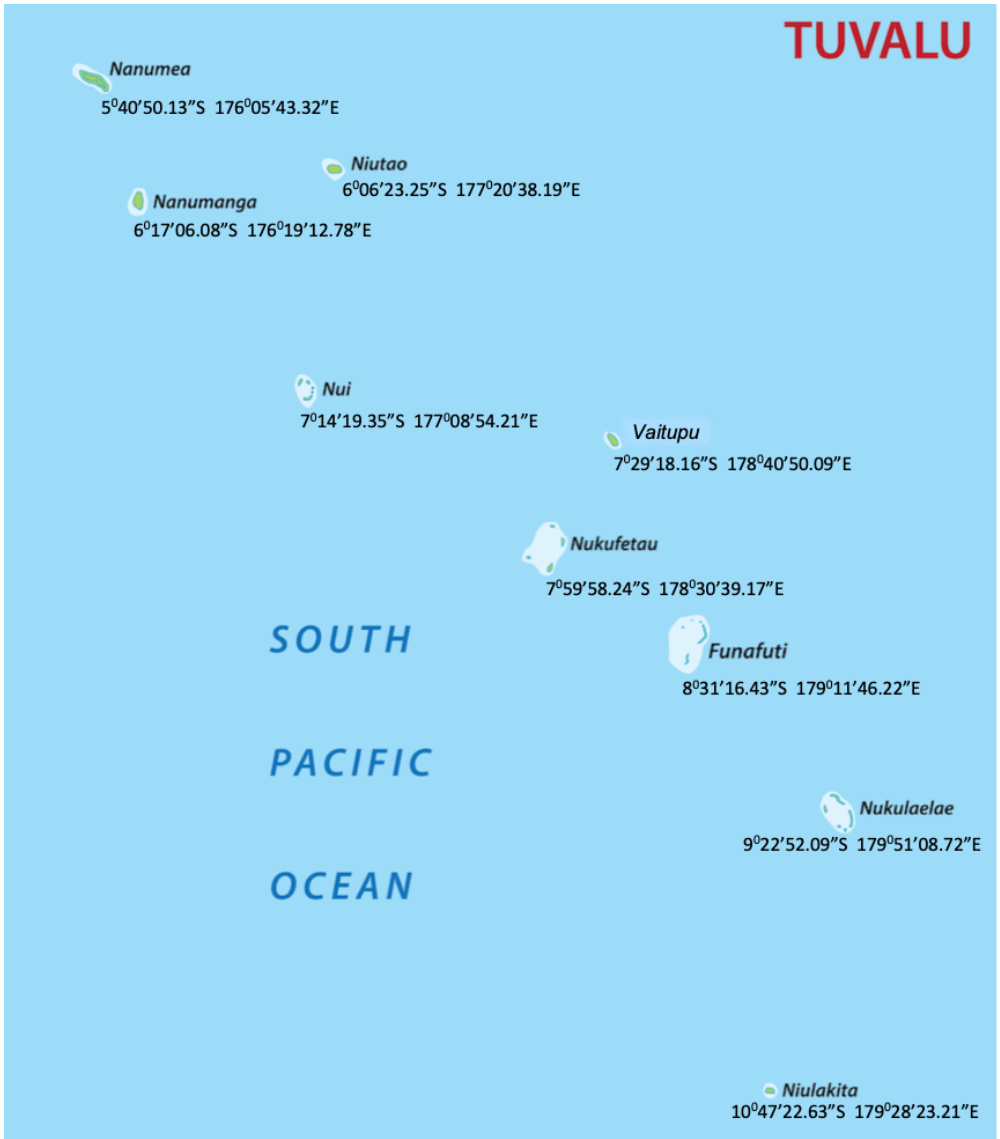
1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.



Source: map - WorldAtlas.com; geo coordinates - GoogleEarth

1c. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Civil Society Organizations Yes

Indigenous Peoples and Local Communities Yes

Private Sector Entities

If none of the above, please explain why:

Please provide the Stakeholder Engagement Plan or equivalent assessment.

Stakeholder Engagement Plan

The attached Stakeholder Engagement Plan (Annex I2 SEP) for the project is designed to ensure effective engagement between all stakeholders throughout the lifecycle of the project. The SEP is in accordance with the requirements for stakeholder engagement and public consultations, as specified in the GEF Policy on Public Involvement in GEF Projects. It ensures enough disclosure on information is made available in order to promote better awareness and understanding of the project objectives, strategies, and operations. It outlines a roadmap for maintaining a constructive relationship with stakeholders on an on-going basis through meaningful engagement during project implementation, and it ensures that stakeholders are informed about environmental and social consequences of the project implementation and provide opportunities for feedback.

The SEP builds on, and will foster synergistic implementation with, other projects and programmes with regard to community participatory planning and impact assessment processes, in particular, the Community and Stakeholder Engagement Strategy (CSES) (https://livelearn.org/what/resources/tuvalu-food-security-community-engagement-strategy) prepared by LLEE Tuvalu in 2019 under the Tuvalu Food Futures project. The primary audience for the CSES is LLEE Tuvalu and the donor DFAT Australia, offering a roadmap of suggestions for the next phases of the Tuvalu Food Futures project, aligned with the TASMP 2016-2025.

Annex I2 provides the details of the SEP, which identifies all the different stakeholders consulted during the project design phase and those foreseen in project implementation. To ensure inclusive participation and consultation, the list includes the identified persons and entities for on-going consultations and presents their types and profiles based on the different ways they are associated with the project at all stages in terms of whether they: (i) are affected directly or indirectly by the outcomes of the project implementation; (ii) participate in the project directly or indirectly; and (iii)

are able to influence and decide the outcomes and the manner of the project implementation or make decisions based on the outputs of the project.

During the PPG/project design phase, three workshops were held and carried out in a participatory manner: PPG Inception Workshop; PPG Multi-stakeholder Workshop; and a Prodoc Validation Workshop. Due to covid 19 travel restrictions the participation of the Project Design Specialist and FAO staff was over zoom. The outer island Kaupule representatives also participated over zoom. All documents, presentations and zoom video recordings of all workshops were made available on a controlled access online platform, with restricted access provided to stakeholders only.

A series of one-to-one interviews with key stakeholders were also carried out virtually, to follow up on key issues raised at the Workshops, including a group meeting with Funafuti Falekapule representatives to discuss the Saugavaka Piggery project.

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement

The table below provides a summary of the key stakeholders and their potential role in project implementation

Stakeholder Name	Stakeholder Type	Stakeholder profile	Consultation Methodology	Key issues raised (during PPG) and how they were addressed	Foreseen role in project implementation	Able to influence and decide the outcomes and the manner of the Project implementation or make decisions based on the outputs of the project? (Y/N)

Ministry of Public Works, Infrastructure and Environment (MPWIE)	Direct beneficiary	National Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop. Interviews with key staff. Regular meetings with project design team.	Executing agency for baseline projects. The Department of Environment (DOE) of MPWIE was the key department consulted during PPG development and their inputs were incorporated into the baseline description and project design. In particular, DOE/MPWIE is the focal point for all Multilateral Environment Agreements (MEAs) Tuvalu is a Party to, including the Rio Conventions: UNFCCC, CBD, UNCCD. During PPG consultations, it was emphasized that the project should leverage and build on ongoing investments by DOE/MPWIE, in particular the datasets and databases developed under previous GEF projects, such as the BioRAP and trees and plants inventory	The project will ensure inventory of tree resources and spatial distribution information in the Biorap database in DOE/MPWIE are available in a form accessible to relevant staff in DOA/MLGA and Department of Trade responsible for the Coconut Agroforestry sites under the National Coconut Rehabilitation Program. The DOE/WPWIE as focal point for the UNCCD will receive training and lead work plan activities related to LDN target setting programme and will Chair the proposed LDN Forum.	(Y) The Director of DOE is the GEF OP and will be a key member of the Project Steering Committee during implementation.

Ministry of Local Government and Agriculture (MLGA)	Direct beneficiary	National Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop. Interviews with key staff. Regular meetings with project design team.	The following departments of MLGA were consulted during the PPG Prodoc development phase and their inputs were incorporated into the baseline description and project design. In particular, it was emphasized that the project should leverage and build on ongoing investments by these departments. ●Department of Agriculture (DOA) ●Department of Planning (DOP) ●Lands and Survey Division ●Quarantine and Research Unit. Executing agency for baseline projects.	DOA/MLGA is the Operating Partner for the project and will host the PMU. A member of the MLGA senior management will play the role of National Project Director to support coordination with other Government agencies and provide strategic guidance to the National Project Coordinator. DOA/MLGA oversight secured in the context of the ?Kaupule Integrated Planning and Reporting Framework? for the ISPs. Lands & Survey Division will make available survey maps for project sites to support community land use mapping.	(Y) Executing/Operating Partner for the project. Member of Project Steering Committee during implementation.

Ministry of Finance (MOF)	Direct Beneficiary	National Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop. Interviews with key staff.	Executing agency for NAPA and GCF. Phase 2 of NAPA will be implemented by UNEP and will also address strengthening resilience of the food system.	Provide financial management services for the project. Facilitate synergistic implementation with the NAPA Phase 2.	(Y) Member of Project Steering Committee during implementation.

Ministry of Health, Social Welfare & Gender Affairs (MHSWGA)	Direct Beneficiary	National Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG. Prodoc Validation Wshop. Interviews with key staff. Interviews with key staff	Department of Public Health is responsible for the National Strategic Plan for Non-Communicable Diseases (NSPNCD 2011-2015), which promotes healthy eating and consumption of local foods, and coordinates the work of the NCD Stakeholder Committee. It is important to strengthen alignment of the project with the NSPNCD strategy to increase availability of vegetables and reduce/prevent reliance on processed foods. Department of Gender Affairs is responsible for the National Gender Policy and works closely with Women Groups at the community level.	The formulation process for the update of the National Food and Nutrition Policy will include close collaboration with the NCD Stakeholder Committee to ensure policy coherence for promoting healthy eating and availability of more nutritious local foods. Promote and provide oversight on the GAP for the project in advocating for gender equality and empowerment of women.	(Y) Member of Project Steering Committee during implementation.

Ministry of Fisheries and Trade (MFT)	Direct Beneficiary	National Government institution/body	Prodoc Validation Wshop.	The Division of Trade, MFT has overall responsibility for implementation of the TASMP 2016-2025 that aims to revive domestic and international trade of locally produced agricultural products through domestic activities and trade arrangements and advocates for a revival of trading of local agricultural products. The TASMP encourages the people of Tuvalu to eat more local food in order to enable them to live longer and healthier lives and a means for many families to earn extra income from the sales of local produce. Limited data and understanding of agricultural value chains. The three coconut agro-forestry demonstration sites established under the GCCA:PSIS Tuvalu project was absorbed into	Designing the activities in relation to identification and strengthening of value chains under the project. Replicate the coconut agro-forestry demonstration sites in outer islands, including expansion of coconut replanting. The TASMP encourages the people of Tuvalu to eat more local food in order to enable them to live longer and healthier lives and a means for many families to earn extra income from the sales of local produce. The Division of Trade will play a key role in the ?Go Local? campaign to support the increased sale and consumption of local foods. Lead data collection and capacity building in value chains, including facilitation of sales at the proposed Produce Market.	(Y)

Falekaupule Nanumea	Direct Beneficiary	Local Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.	The Nanumea ISP/*Palani Atiake* has been revised and provide context for the proposed IAEAP-Nanumea. Limitation in shipping services for transporting materials and food in and out of the island.	Approval and ownership of the IAEAP-Nanumea. Oversight of all project activities in Nanumea.	(Y)
Falekaupule Nanumaga	Direct Beneficiary	Regional inter-Governmental institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.	The Nanumaga ISP/*Palani Atiake* has been revised and provide context for the proposed IAEAP-Nanumaga. Nanumaga community successfully ?modernise? the pulaka pits by replacing the pandanus leaf baskets with cement borders. Limitation in shipping services for transporting materials and food in and out of the island.	Approval and ownership of the IAEAP-Nanumaga. Oversight of all project activities in Nanumaga. Share experiences and design of cement pulaka pits to support replication in other outer islands.	(Y)

Falekaupule Niutao	Direct Beneficiary	Local Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.	The Niutao ISP/*Palani Atiake* has been revised and provide context for the proposed IAEAP-Niutao. Limitation in shipping services for transporting materials and food in and out of the island.	Approval and ownership of the IAEAP-Niutao. Oversight of all project activities in Niutao.	(Y)
Falekaupule Vaitupu	Direct Beneficiary	International inter-Governmental institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.	The Vaitupu ISP/*Palani Atiake* has been revised and provide context for the proposed IAEAP-Vaitupu. Several pulaka pit areas have been abandoned. Limitation in shipping services for transporting materials and food in and out of the island.	Approval and ownership of the IAEAP-Vaitupu. Oversight of all project activities in Vaitupu.	(Y)
Falekaupule Nukulaelae	Direct Beneficiary	Local Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.		Approval and ownership of the IAEAP-Nukulaelae. Oversight of all project activities in Nukulaelae.	(Y)
Falekaupule Nukufetau	Direct Beneficiary	Local Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.		Approval and ownership of the IAEAP-Nukufetau. Oversight of all project activities in Nukufetau.	(Y)

Falekaupule Nui	Direct Beneficiary	Local Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.		Approval and ownership of the IAEAP-Nui. Oversight of all project activities in Nui.	(Y)
Falekaupule Funafuti	Direct Beneficiary	Local Government institution/body	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop. Interview with Kaupule		Represent Falekauple in PSC. Approval and ownership of the IAEAP-Funafuti. Oversight of all project activities in Funafuti.	(Y)
Live & Learn Environmental Education ? Tuvalu (LLEE-Tuvalu)	Direct Beneficiary	Non-Governmental Organization	PPG Inception Wkshop. PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop. Interview with Senior Management. Email correspondences.		Member of TAG Ensure synergistic implementation with ongoing LLEE Tuvalu projects, in particular the Food Future Project.	(Y)
Tuvalu Association of Non-Governmental Organizations (TANGO)	Indirect Beneficiary	Non-Governmental Organization	PPG Multi-stakeholder Wkshop. PPG Prodoc Validation Wshop.		As the umbrella NGO in Tuvalu, TANGO will represent NGOs in the PSC.	(Y)

Land Resources Division/Pacific Community (LRD/SPC)	Non Beneficiary	Regional inter-Governmental institution/body	Zoom meetings with key staff. Email correspondences.	Identification and confirmation of baseline programmes as co-financing, including: Pacific Seeds4Life distributing seeds and plant tissue culture materials in partnership with the Centre for Pacific Crops and Trees (CePaCT) genebank, technical support on organic farming, pesticides registration, technical support in soil health, pest and diseases management.	Technical advisory services in areas of soil health, plant propagation, pest & diseases management, data collection and management. Provision for training on organic farming building on SPC/POETCom reports and feasibility study of women economic empowerment through organic farming.	(N)

Tuvalu National Council of Women (TNCW)	Indirect Beneficiary	Civil Society Organization	Prodoc Validation Wkshop	Shared experiences of TNCW since its establishment in 1980 by women mainly for women to improve their status, to be more recognized in decision making and in all areas of development in the country. The TNCW is an umbrella body for all women organizations, including the 8 Matapulapula Women groups established in each island. The TNCW advocates for the importance of why women should be involved in all areas of development and in relevant institutions of decision making.	Facilitation and coordination of participation of Women Groups in project activities and advocacy for gender equality. Participate in monitoring progress on the GAP. Represent Women Groups in the Project Steering Committee.	(Y)

Fafine Nui i Funafuti Association (FNFA)	Direct Beneficiary	Civil Society Organization	Prodoc Validation Wkshop	The FNFA ?Lean to Local Food (L2LF) Project? was approved by the GEF/SGP in early 2021, with oversight by the TANGO Board Committee. The L2LF project strengthens the linkages between Nui community in the outer islands with those living in Funafuti. It provides training by community elders who are experts in local food processing and preservation to reduce reliance on imported foods. Local grown produces or raw products will be transported from the mainland, Nui Island to Funafuti and then following local food preservation processes. The FNFA members have experience in making breadfruit chips.	Synergistic implementation of project activities with the L2LF Project?, in particular training on traditional food preservation techniques.	(N)

Ekalesia Kelisiano Tuvalu (EKT) Women?s Centre	Direct Beneficiary	Civil Society Organization	PPG, Multi-stakeholder Wkshop. Prodoc Validation Wkshop	Established a home-garden as a partner in various baseline programs by LLEE Tuvalu and the Taiwanese Technical Mission to Tuvalu. The home-garden provide food and raw materials for food preservation and food processing initiatives.	Synergistic implementation of project activities with EKT home-gardening and food processing initiatives.	(N)
Pacific Women Shaping Pacific Development (Pacific Women	Indirect Beneficiary	Civil Society Organization	To be consulted during implementation (through the Department of Gender Affairs)	10-year programme funded by Australian Aid, supports initiatives for women?s empowerment in 14 Pacific Island countries, including Tuvalu.	Synergistic implementation of training on negotiation and decision-making.	(N)
Ministry of Transport, Energy & Tourism (MTET)	Direct Beneficiary	National Government institution/body	Project Inception Wkshop. Liaison with the PMU	No consultations during PPG.	TAG member. Share experiences as executing agency for baseline project on biodigesters. Co-financing through shipping services for project materials and food between Funafuti and outer islands.	(Y)

Schools	Direct Beneficiary	Local Community	Direct communication. Online digital platform. Radio. Factsheets and educational materials.	No consultation during PPG. The PPG workshops highlighted the importance of involving schools in project activities, including as demonstration sites to improve interest of the younger generation in local food production and in consuming healthier local foods.	Implement a schools programme to demonstrate a range of Home Gardening Food Systems (HGFS), targeting youth and children.	(N)
Tuvalu Coconut Traders Cooperative	Direct Beneficiary	Local Community	Project Inception Wkshop. Liaison with the PMU	No consultation during PPG. Invited to the Workshops but not available.	Play a key role in coordinating the replanting of coconuts activities amongst its members and in designing the project outputs/activities related to value chains of coconuts and coconut products.	(Y).

Tuvalu Climate Action Network (TuCAN)	Indirect Beneficiary	Local Community	Project Inception Wkshop. Liaison with the PMU	No consultation during PPG. Invited to the Workshops but not available. TuCAN is the only NGO on climate change in Tuvalu and has been the voice of the Tuvalu communities in international forum and meetings.	Incorporate experiences and lessons from the Project on the importance of integrated agro-ecosystem approaches as adaptation measures, into TuCAN?s interventions at international and regional meetings.	(Y)
Taiwanese Technical Mission to Tuvalu (TTMT)	Non Beneficiary	Other	Project Inception Wkshop. Liaison with the PMU	No consultation during PPG. Invited to the Workshops but not available.	Provision for technical expertise and capacity development in local food production, build on TTMT?s baseline programmes and activities.	(N)
Tuvalu National Youth Council	Direct Beneficiary	Civil Society	Project Inception Wkshop. Liaison with the PMU	No consultation during PPG. Invited to the Workshops but not available.	Participate and coordinate participation of youths in trainings and workshops.	(N)

Pacific Climate Change Centre/Pacific Environment (PCCC/SPREP)	Non Beneficiary	Regional inter-Governmental institution/body	Zoom meeting. Email correspondences.	No consultation during PPG. During PPG workshops, the issue of training Project Field Officers in CC adaptation and mitigation issues was highlighted.	PCCC/SPREP carries out regular online training courses on various CC topics. The project may support participation of Practitioners in Tuvalu in PCCC/SPREP training courses during implementation. The project can also provide case studies for training materials.	(N)

Select what role civil society will play in the project:

Consulted only;

Member of Advisory Body; Contractor;

Co-financier;

Member of project steering committee or equivalent decision-making body; Yes

Executor or co-executor; Yes

Other (Please explain)

3. Gender Equality and Women's Empowerment

Provide the gender analysis or equivalent socio-economic assesment.

A Gender Analysis and Action Plan (GAAP) with budget is presented in **Annex C**.

Given that Tuvalu is predominantly a subsistence economy with agriculture and fishing accounting for at least 80% of national income per capita, it is not a surprise that 75% of the labour force works in subsistence agriculture and the informal economy, female labour participation is about 47% percent in subsistence agriculture.

Tuvalu is a patriarchal society with strong religious rules and morals imposed by Christianity. These rules ?set the regulations on men and women?s behaviour and concepts of the family structure and contribute to gender relations or the social constructs of relationships between men and women.? According to the Government?s Gender Profile, most women follow their traditions and choose to remain at home, forgoing the opportunity for a career with difficulties in balancing family life with the demands of full time employment. However, a study by the SPC/Pacific Organic and Ethical Trade Community (POETCom) in 2018 found that women are interested in employment and business but are hindered by a range of reasons and a lack of opportunity. According to the Asian Development Bank?s Participatory Assessment in 2003, women and single mothers without regular incomes, women with alcoholic spouses and abandoned elders are vulnerable groups in Tuvalu.

In 2013, the Government of Tuvalu develop its first National Gender Policy. In the current plan (2014-2019), the policy focuses on four key policy measures: institutional strengthening and capacity building; women?s economic empowerment; women in decision-making; and ending violence against women. As part of this initiative, it was also determined that the Department of Women Affairs should be changed to the Gender Affairs Department to reflect an inclusive approach and a broader focus on gender equality and women?s empowerment.

Tuvaluan women face numerous challenges in becoming economically empowered such as financial security (in lacking ownership and control over land and assets). For instance, the Development Bank of Tuvalu (DBT) acknowledges that women in Tuvalu are disadvantaged in starting businesses because loans from the banks are dependent on the husband?s employment and that women do not own land, which can be used as collateral. Women from the outer islands face additional challenges due to transportation delays, handling and packaging.

The study by POETCom mentioned above concluded that coconut oil is the most promising economic empowerment opportunity (related to organic agriculture) for women (and men/families) in Tuvalu (on an outer island). This study also noted, that a significant amount of further research needs to be done to determine the growth potential, feasibility and opportunity for women of this (organic) subsector. In addition, further gender analysis is required to have a strong understanding of the gender dynamics at the household level (on the outer island of choice). In addition to coconut oil, other potential opportunities on the outer islands would include coconut bi-products (soap, charcoal, etc.) and other products that are currently not being grown or processed such as fetau, breadfruit, banana, fetau oil, breadfruit chips, etc.

Against the above background, the project will:

- support and promote home gardening for women and their households for growing native vegetables and edible ornamentals, along with chicken/egg production for improving household nutrition and food security, especially on Funafuti.
- Provide opportunities for women to generate income through small-scale vegetable and fruit production, food processing, and agro-ecosystem provisional services for fibre and plant materials for handicraft and plants with medicinal value.
- Install raised bed home gardening systems that will increase the likelihood of women, especially the older women, to participate in food production.
- Provide access to clean biogas for cooking, reducing the need for women to collect firewood given they are mostly responsible for cooking.

- Ensure in the development of IAEAPs to take into account gender differentiated impacts to avoid the development of gender blind plans, and will ensure the active inclusion and leadership of women, so as to create the planning process is adhered to and supported by women.
- Ensure that women and men have equal opportunities to participate in project activities, taking into consideration the specific conditions of both men and women (e.g. training workshops) and ensure that organizations representing women are included in project activities.
- Ensure that women and men have equal access to opportunities and benefits generated by project interventions, including technical knowledge and information, and access to productive resources, training and financial services.
- Ensure women will be key players on information dissemination, especially at the community levels and that local women?s groups will be used to share information.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?

Yes
Closing gender gaps in access to and control over natural resources; Yes

Improving women's participation and decision making Yes

Generating socio-economic benefits or services or women Yes

Does the project?s results framework or logical framework include gender-sensitive indicators?

Yes
4. Private sector engagement

Elaborate on the private sector's engagement in the project, if any.

One of the main activities of the project (under Output 2.1.2) is to strengthen the identified value chains, this will involve working closely with the service providers and market operators. During the project inception phase, the value chains will be identified, and the private sector actors and the level of engagement will be further defined. In Tuvalu, given the size of the country and the population size, the scale of private sector is limited, however, the number of private businesses, including a few investors, have entered the country. Tuvalu has about 200 registered businesses. The sectors of focus are spread out across construction, restaurants, agribusiness, etc.

During PPG, no individual Private Sector registered company was involved except the umbrella organization, Tuvalu National Private Sector Organization (TNPSO), who participated in all the three multi-stakeholder workshops. The TNPSO is the national arm of the regional Pacific Island Private Sector Organization (PIPSO), a technical institution under the auspice of the Pacific Islands Forum (PIFS), mandated to provide development and training services to support private sector across the region. As such, the TNPSO provided useful interventions during the consultations.

As mentioned above, the Tuvalu Cabinet endorsed and sanctioned a whole of government approach led by the MOF, MLGA and MTET with key stakeholders and the Private sector to spearhead the National Strategy on Food Security. A national Steering Committee comprising of relevant departments and stakeholders with established roles and responsibilities are key to the successful implementation of the strategy and its cross-cutting synergies. There is strong focus of the FSS on facilitating local trade between the outer islands and Funafuti and supporting the value-chain, which output 1.1.3 will contribute to. The key outputs of the FSS is investing in a Fresh Produce Market facility and coordinating shipping services with oversight by the Steering Committee.

As discussed above, the FSS and the National Food Systems Pathway submitted by Tuvalu to the United Nations Food Systems Summit in September 2021, did not cover the land-based natural capital upon which the food system relies. Their main focus is to facilitate support along the value chain to the small scale, including home-based enterprises. Consultations were carried out with the Business Unit of Ministry of Finance responsible for coordinating implementation of the Pathway and carries out secretarial roles to the FSS Steering Committee to agree on synergistic implementation in the establishment of Fresh Produce Markets that will also sell processed food products, as envisaged in the FSS to stimulate private sector activities.

In terms of private sector activities in the food system, there are currently no local fresh produce markets in any of the islands except for once a week outside the Friendship Garden demonstration farm in Funafuti. There are some limited ?gate sales? of some surplus vegetables. Some families make breadfruit chips, when in season, that they sell as snacks through the supermarkets.

The main interest expressed during the PPG was from Women Groups to create economic opportunities from coconut oil. Another is in toddy, the honey like nectar of the coconut palms, traditionally used to replace, or instead of sugar. The demand for toddy increases exponentially when the ships do not arrive and basic items like flour and sugar runs out. Output 2.1.4 responds to these potential opportunities.

5. Risks to Achieving Project Objectives

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.(table format acceptable):

Section A: Risks to the project

Description of risk	Impact[1]	Probability of occurance[2]	Mitigation actions	Responsible party

Lack of collaborative cooperation between key institutional stakeholders	**H**	**L**	Cooperation and coordination between relevant institutional stakeholders will be essential for the project to achieve its stated goal and objectives. This will be achieved through involvement of all stakeholders from the beginning of the project preparation process and through establishment of a NPD who is at Secretary level in either MPWIELMD or MLGA (to be decided at inception) to facilitate and coordinate multi-sectoral and multi-stakeholder participation in project implementation, and is a member of the PSC. A communication strategy will also be developed and regular meetings and presentation of project results in different phases of the project implementation will be organized	
Unclear responsibilities of project stakeholders at national and specifically at island level	**H**	**L**	Clearly defined and prescribed responsibilities of different institutions as well as involvement of all of responsible institutions will be clarified during the project inception. In addition, a formal technical working group will be established to support the PSC and the PMU.	
Reluctance of local population to involve and take ownership of the project activities	**H**	**L/M**	Local communities and their representatives effectively engaged from the onset of the project preparation process. Their perspectives and concerns were taken into account in the project design, and sensitization activities will be carried out during implementation to ensure the communities have full ownership of activities and the socio-economic benefits to be delivered through the project are realised.	

Changes in ecosystems and associated species due to gradual changes in climate and extreme weather events.	**M**	**H**	A mentioned in section 1, the total number of terrestrial vascular plants present, only about 16% are possibly indigenous. The remaining 83% of the flora are non-indigenous species that have been introduced by humans, some of which may have been at one time or another early aboriginal introductions by Pacific Islanders into Tuvalu. The crop and tree species to be used for restoration and agroforestry, may include new species and will be selected based on the local site suitability and their resilience to the most likely impacts of climate change (e.g. outbreak of pests and diseases, changes in rainfall, increased salt water intrusion, etc.).	

A. Climate Risk Analysis and Mitigation Plan

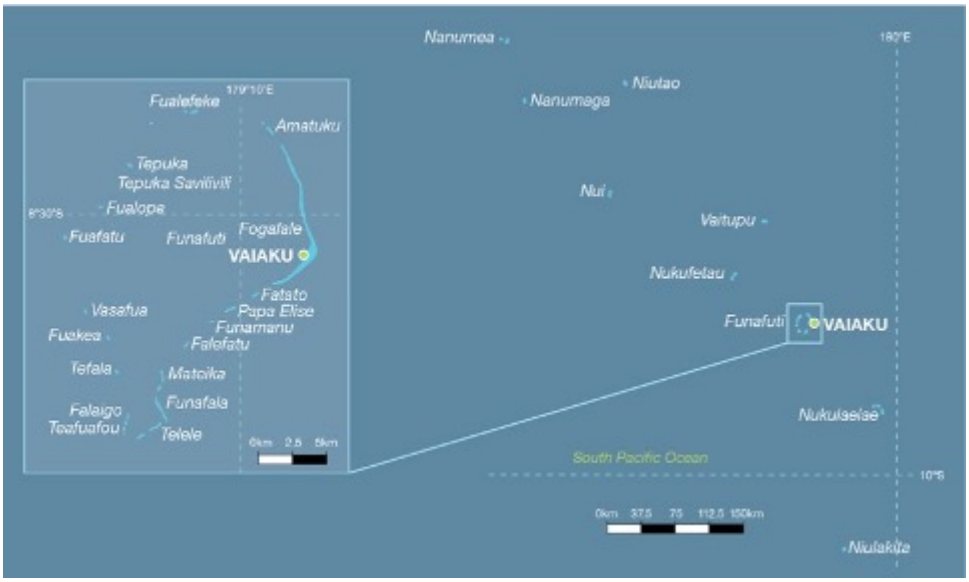
1) Introduction

1. Tuvalu is one of the world?s most vulnerable countries to the impacts of climate change. It is the fourth smallest country with a population of around 11,000 people living on a total land area of 26 km2. The country is comprised of three reef islands (Nanumaga, Niutao, Niulakita), five atoll islands (Nanumea, Nui, Nukufetau, Funafuti, Nukulaelae) and one composite island (coralline atoll/table reef) (Vaitupu). While small in land area, Tuvalu is relatively large in terms of ocean area, spreading over about 1.3 million km2, between 5o and 10.5oS latitude and 176o and 179.5oE longitude. Tuvalu?s Exclusive Economic Zone (EEZ) covers an oceanic area of approximately 900,000 km2.

2. Tuvalu is the second lowest low-lying country in the world with an average elevation of 1.83m and a maximum elevation of no more than 5m above sea level. It has very limited terrestrial natural resources base, including poor soils and scarcity of water resources, which makes Tuvalu?s agricultural ecosystem one of the most challenging for crop and livestock production with limited options to increase production. Tuvalu is a Small Island Developing State (SIDS) that belongs to the category of Least Developed Countries (LDC) and is one of the most environmentally fragile states with highest vulnerabilities in the Pacific region due to its low-lying land, its geographical isolation, lack of fertile land and inability to reap economies of scale that significantly limit provisions of goods and services. The biophysical constraints of low-lying atolls and coral islands, compounded by the social and economic limitations, negatively impact livelihoods and significantly reduce the resilience of communities. These vulnerabilities are exacerbated by the disproportionate impacts of climate change on the very vulnerable and fragile ecosystems of the nine coral islands that make up Tuvalu.

3. Tuvalu?s economy is dominated by subsistence farming and fishing activities. Commercial fishing is also expanding as an economic activity. The livelihoods of Tuvaluans are, thus, very vulnerable to the impacts of climate change including sea level rise, extreme weather events, and droughts.

Figure 1: Map of Tuvalu (Source: Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (CSIRO) 2011)[3



4. A climate risk analysis was conducted during the PIF stage, and the climate risk assigned to the project area was high. A more detailed analysis, including proposed project activities to mitigate climate risks, are proposed in this document.

2) Climate Risk Analysis

Climate

5. Tuvalu has a hot, humid tropical maritime climate, with an average annual temperate of 30?C, and little seasonal variation in temperatures. Tuvalu?s climate is characterised by two distinct seasons: a wet season from November to April and a dry season from May to October. Average annual rainfall is about 3,500mm. The strong seasonal cycle is driven by the strength of the South Pacific Convergence Zone, which is strongest during the wet season. The West Pacific Monsoon can also bring high rainfall to Tuvalu during the wet season.[4] Natural hazards in Tuvalu include tropical cyclones, storm surge, drought, inundation, coastal erosion, pest infestation and fire. Tuvalu often experiences droughts because of its location near the Pacific equatorial dry zone. Dry periods are more severe in the northern than the southern islands, notably in the months of August to October. Droughts are also associated with the occurrence of wildfires. It is a common practice in Tuvalu to clear the land for planting by burning undergrowth bushes and shrubs vegetation. Small bush fires often get started from these activities and they become more frequent in times of persistent drought.

6. Spring tides and tropical cyclones are the main extreme weather events. High winds, storm surges and swells caused by cyclones are of great threat to the population in Tuvalu as are spring tides which cause significant flooding and inundation. The impacts of cyclones and spring tides place people at serious predicament as these can result in significant loss and damage to houses, infrastructure and livelihoods.[5] Tropical cyclones mostly occur from November to April. Historical data indicate an average of eight cyclones per decade. Tropical cyclones occurred more frequently in El Nin?o years.[6] In March 2015, Tropical Cyclone Pam devastated the islands of Tuvalu. This category 5 cyclone generated strong winds and storm surge, causing substantial damage to houses, essential infrastructure and agricultural crops. Nearly half of the country?s population was temporarily displaced. The northern islands of Nanumaga and Nanumea, and the central islands of Nui and Vaitupu were the hardest hit, with 90% of agriculture being decimated on the island of Nui.[7] Several islets in Funafuti also disappeared as a result of the cyclone.[8]

Soil and water

7. Six of Tuvalu?s nine islands are low lying atolls made up of motus (islets) fringing the edges of lagoons. These are made up of young, poorly developed, infertile, sandy or gravel coralline soils.

Nanumaga, Niutao and Niulakita are raised limestone reef islands.[9] The atolls have very limited terrestrial natural resources base, including poor soils and scarcity of water resources, which makes Tuvalu?s agricultural ecosystem one of the most challenging for crop and livestock production with limited options to increase production. The substrates and soils of Tuvalu are among the poorest in the world. As in all atolls, soil development is minimal due to the recent establishment of sand deposits on reef platforms. What soil does exist is shallow, alkaline, coarse-textured, and lacks most nutrients required for plant growth, such as organic carbon, nitrogen, potassium, iron, and magnesium. The soils include exposed limestone rock, beach or reef rock, sand and gravel, loamy sands, acid peat soils, swamp or hydromorphic organic soils or muds created in excavated taro pits, and artificial soils. The natural soils are normally shallow, porous, alkaline, coarse-textured, and have carbonate mineralogy and high pH values of up to 8.2 to 8.9.[10]

8. The water holding capacity of these soils is very low, with plant nutrition dependent on the humus cycle and the retention of vegetation cover. Low rainfall and poor water holding capacity means that fresh water resources are very limited, with the only permanent supplies being groundwater lenses that are often brackish. Compared with volcanic islands, the permanent moisture stress found on atolls requires highly intensive application of labour if there is to be any arable cropping. As a result the return to labour effort from farming tends to be very low. Limited land and water resources and low returns to labour effort puts binding constraints on any form of agricultural development.

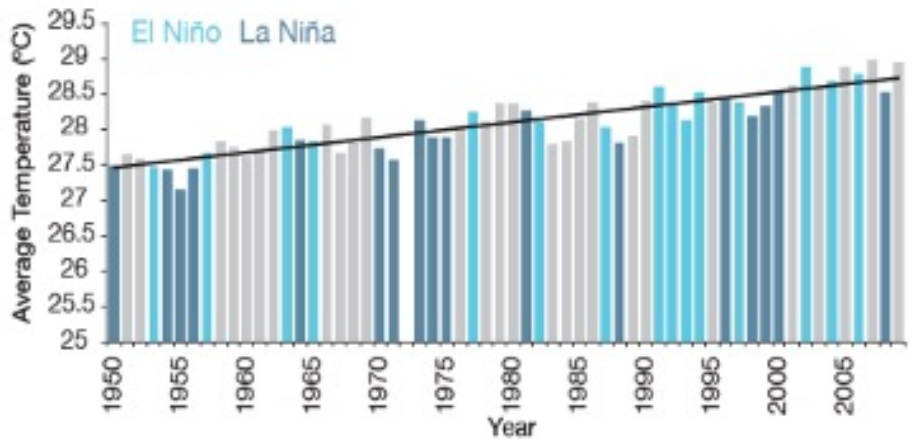
9. Land degradation in the forms of loss in vegetation cover in agroecosystems, and loss of soil and soil fertility (erosion and sea water incursion) are some of the most critical environmental problems faced by Tuvalu. Additionally, rapid increases in development, such as infrastructure to serve the needs of a growing population, have led to considerable pressure on water resources and a growing demand for earth material that has led to accelerated coastal erosion and considerable loss of land.[11] Land degradation and loss of agricultural ecosystems services are strongly interlinked in the fragile low-lying atolls. As land degradation increases and continues to be exacerbated by climate change, the provisional services in the form of food production capacity of the islands? ecosystems decreases, with severe impacts on food and nutrition security and loss of food sovereignty.

Climate projections

10. *Temperatures.* Tuvalu?s temperatures are strongly controlled by sea-surface temperatures in the vicinity of the islands. This provides stability in temperatures and means temperature rises in Tuvalu correlate well with sea-surface temperature rises. Tuvalu?s Second National Communication to the UNFCCC (2015) reports historical increases in both mean and seasonal air temperatures. Minimum air temperatures have risen 0.24?C per decade and maximums by 0.21?C per decade since 1950, while sea surface temperatures have risen 0.13?C per decade since 1970.[12] The Berkeley Earth Dataset on historical warming shows a significant increase in the rate of warming post-1980, suggesting that the over the subsequent 40-year period the climate in the vicinity of Tuvalu warmed by approximately 0.8?C.[13] Future trends in warming are obscured by the inability of climate models to accurately simulate trends at sufficiently small spatial scales. Warming is however likely to take place at a rate slightly lower than the global average. On the highest global emissions pathway, warming of around 1.4?C is projected by 2050 and 2.9?C by the 2090s. Under the lowest emissions pathway, an average temperature increase of approximately 0.8?C is projected by the 2050s, then for temperatures to remain constant at 0.8?C up to the 2090s.[14] Climate models also project an increase in the number of hot days and warm nights, and a decline in cooler weather.[15]

11. The present sea surface temperature of Tuvalu is 29?C, with a seasonal variation of +/-0.5?C. This temperature is at the upper limit of the tolerance range for most coral species (25?C to 29?C) and for most marine life. Sea surface temperature has risen at approximately 0.13?C per decade since the 1970s.[16] Projections find that future sea surface temperature will increase by 0.7?C by 2030 and 1.3?C by 2050, resulting in coral bleaching and extirpation of some marine species.

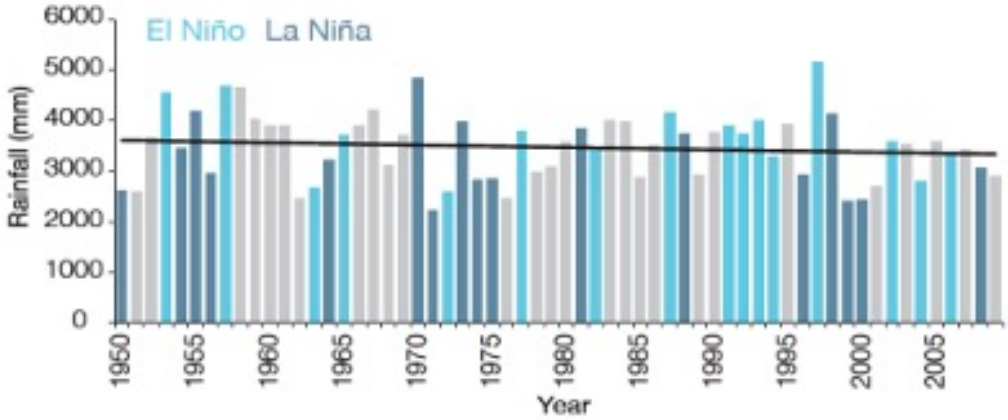
Figure 2: Annual Average Temperature: Funafuti, 1950-2005



Source: Australian Bureau of Meteorology and CSIRO, 2011. Note: Light blue bars indicate El Nin?o years; dark blue bars indicate La Nina years and Grey bars indicate neutral years.

12. *Precipitation.* In terms of precipitation, no statistically significant changes in annual and seasonal precipitation rates have been measured. Mean annual precipitation rates have tended to be around 500-600 mm lower in Tuvalu?s northern-most atoll, Nanumea, than in the capital Funafuti. Nanumea also experiences greater interannual variability with annual rates ranging from 1,000-4,000 mm between 2000-2010. El Ni?o Southern Oscillation (ENSO) has a strong influence on inter-annual variability.[17] Almost all the global climate models project an increase in average annual and seasonal rainfall around Tuvalu over the course of the 21st century. This is due to the expected intensification of the South Pacific Convergence Zone. Projections show extreme rainfall days are likely to occur more often.

Figure 3: Annual Average Rainfall ? Funafuti, 1950-2005



Source: Australian Bureau of Meteorology and CSIRO, 2011. Note: Light blue bars indicate El Nin?o years; dark blue bars indicate La Nina years and Grey bars indicate neutral years.

13. *Cyclones/extreme weather events.* The main extreme weather event affecting Tuvalu is tropical cyclones. Projections show an increase in the peak wind and precipitation intensities for tropical cyclones, however the future frequency is inconclusive (IPCC, 2007). According to the IPCC Fifth Assessment Report, the global frequency of tropical cyclones is generally likely to decrease or remain unchanged in the south-east Pacific Ocean basin, however there is medium confidence in region-specific projections that precipitation will intensify near the centre of cyclones passing over or near the Pacific Islands.[18] The number and relative intensity of tropical storms in the tropical Pacific is expected to increase.

14. *Sea level rise.* Since 1993, sea level near Tuvalu has risen by about 5mm per year. Rising sea levels and creeping tides routinely engulf the low-lying atolls, degrading its shoreline, eroding its natural ecosystems and threatening the country?s very existence. Mean sea level is projected to continue to rise over the course of the 21st century with a very high confidence. The models predict a rise of approximately 5-15cm by 2030, with increases of 20-60cm indicated by 2090 under high and medium emission scenarios.[19] The rise in sea level is greater in Tuvalu when compared to the global average of 3.2 ? 0.4 mm per year. The United Nations Intergovernmental Panel on Climate Change (IPCC) predicts a 0.9 metres increase in global sea levels by 2100 would degrade up to one meter of Tuvalu?s shoreline per year.[20] With the islands of Tuvalu being only a few metres above sea level, a slight increase in sea level will have very serious consequences on human health, food and water security, housing, infrastructure, land and marine biodiversity.[21] Sea level rise degrades coastal areas including nearby vegetation. In recent times land has become subject to inundation and saltwater intrusion during Spring tide events. Inland vegetation is also affected as the sea water percolates up through the ground and forms large pools of saltwater on the land.[22] The population of Fogafale, Funafuti, where nearly half of the country?s population is concentrated, is on average less than 100 metres wide, making it extremely vulnerable to inundation from sea level rise.

15. *Ocean acidification.* Ocean acidification has been slowly increasing in Tuvalu?s waters since the 18th century.[23] Under all three emissions scenarios (low, medium and high) the acidity level of sea waters in the Tuvalu region will continue to increase impacting the health of coral ecosystems.[24]

16. *Drought.* Climate projections suggest the most likely future involves fewer days being spent in drought conditions, but confidence in these projections is low.[25] It is predicted that mild drought will occur approximately eight to nine times every 20 years by 2030 under all emission scenarios, decreasing to six to seven times per 20 years by 2090. The frequency of moderate to severe drought is projected to remain approximately stable from 2030 through the 21st century at once or twice and once every 20 years, respectively.[26]

Climate change impacts

17. *Agriculture and food systems.* Climate change, in particular extreme weather events such as spring tides, tropical cyclones, heatwaves, and droughts, as well as sea level rise are forecasted to have severe consequences on agriculture and food systems in Tuvalu. FAO research suggests key issues affecting local food production and increasing vulnerability to degradation in agricultural systems in the Pacific include heat stress on plants, changes in soil moisture and temperature, loss of soil fertility due to soil erosion, and water stress due to salinization of soils and changes in the water table height. The prevalence of pests and diseases is also anticipated to increase.[27] Land degradation and extreme weather events are also putting the coconut-dominant agroforests and village household food gardens under threat, with the reported loss of breadfruit, pandanus and banana cultivars. Coastal flooding and erosion are expected to exacerbate the existing situation, with traditional crops such as *pulaka* already becoming difficult to grow as a result of saltwater intrusion into the *pulaka* pits. Fisheries and associated livelihoods are also expected to be impacted by climate change. Despite the increasing level of food imports, Tuvaluans still rely on fruit trees such as banana, breadfruits, pandanus, coconut trees, *pulaka* and taro, as well as fish, chicken and pigs, for subsistence. Domestically grown food remains the main source of nutrition for the people. With climate change likely to make climatic conditions more unpredictable, combined with the growth of the cash economy and access to global markets, the Tuvaluan diet will continue to shift from traditional and locally harvested food to one that is based on imported food products. This is a major concern to population health and nutrition, as well as food security, over the years to come.[28]

18. *Groundwater.* Sea level rise not only affects *pulaka* plantations and tree crops, it also affects groundwater. People use groundwater as a secondary source of water for consumption especially in times of drought, where rainwater collected in cisterns and tanks is extremely limited. Intrusion of saltwater into groundwater is a problem that has been identified on all islands of Tuvalu. Furthermore, groundwater is adversely affected by human and animal waste.[29]

19. *Coastal erosion and coastal hazards.* Coastal erosion is being compounded by coastal hazards and the impacts of climate change, with strong winds, storm surges and king tides further eroding Tuvalu?s coastal zones. Historical episodes of such coastal hazards have resulted in substantial damage to the government building, airport and utility infrastructure as evidenced during the King Tides of 2013. It is in this area that most of the country?s critical infrastructure is located, including the government building, hospital, wharf, hotel, church and primary school.[30]

20. *Impacts on biodiversity.* In addition to the loss of agricultural biodiversity within Tuvalu?s traditional agricultural ecosystems, other main ecosystems under threat are coastal forest and vegetation, mangroves, coral reefs, beaches and near-shore lagoon and oceanside marine ecosystems. Sea level rise, increased temperatures, coastal erosion and inundation are expected to have impacts on marine ecosystems such as coral reef, seagrass and mangroves. Increases in temperature may increase algae bloom and coral bleaching, which in turn have impacts on resources relying on these ecosystems for habitat. Ocean acidification will affect the growth and life cycle of corals, crustaceans and shellfish. Coral reefs provide key habitat for marine species, which Tuvaluans depend on as source of food. Corals are also used for coastal protection, sometimes used as a material for building sea walls to alleviate the impact of erosion.[31] Recent scientific studies also point out impacts of climate change on tuna migratory patterns.[32]

21. *Disaster Risks.* As highlighted in Tuvalu?s Second National Communication (SNC), Tuvalu is at extreme high risk of natural disasters including intense storms, tropical cyclones and associated damages to livelihoods, infrastructures, biodiversity, and erosion and inundation. Disaster risks also include droughts and associated health and economic impacts including damages to livelihoods and ecosystems, as well as extreme rainfall and associated flooding and health implications. Increases in temperatures and heatwaves are also expected to negatively impact human health. Vulnerable groups such as the elderly, children, persons with disabilities are disproportionately impacted by climate related disasters. Finally, increases in temperature and rainfall will likely increase the risks of vector- and water-borne diseases such as dengue fever and chikungunya.[33]

22. *Migration.* Tuvaluans are very aware of the concern that their country could be one of the first in the Pacific region to be inundated should there be an increase in sea level rise.[34] Migration patterns in Tuvalu follow two patterns: from outer islands to Funafuti, and from Tuvalu to Fiji and New Zealand. Currently about 3,000 Tuvaluans have migrated to Auckland, New Zealand.[35] Nevertheless, a study on climate change, migration and adaptation in Funafuti noted that the threat of global warming in Tuvalu is not a dominant motivation for migration as Tuvaluans appear to prefer to continue living on the islands for reasons of lifestyle, culture and identity.[36] Detailed data on climate migration is lacking. Generally, Tuvaluans migrate mostly for socio-economic reasons. Climate change migration is seen as a worst case scenario only, and Tuvalu?s Climate Change Policy aims to ensure that Tuvalu that continues to be inhabitable to current and future generation of its people.[37] The Climate Change Policy is currently under review.

Climate change and gender

23. As in other regions, climate change in the Pacific and in Tuvalu impacts women and men differently. Key factors that account for the differences between women?s and men?s vulnerability to climate change risks include gender-based differences in time use, access to assets and credit, treatment by formal institutions, which can constrain women?s opportunities, limited access to policy discussions and decision making, and a lack of sex-disaggregated data for policy change.[38] Women and men in Tuvalu are involved in different aspects of food production and preparation. Women are often responsible for food preparation and have traditional knowledge that can contribute to identifying successful adaptation strategies. Women and men also have differentiated roles in fisheries activities. Women are more likely to carry out near shore activities, whereas offshore fishing is usually undertaken by men. Women, children and persons with disabilities are particularly susceptible to vector- and water-borne diseases. A case study conducted in Tuvalu highlighted that men and women have different priorities regarding water use. Men are more likely to use and manage water for

agriculture and livestock production, while women are often responsible for household water usage and its management. Women?s workload needs to be taken into consideration when designing adaptation options.[39] Tuvalu?s Sustainable and Integrated Water and Sanitation Policy (2012-2021)[40] recognises the important role that women play in the management of water and sanitation and notes that there is a risk that women are excluded from decision-making about local water and sanitation issues.

Vulnerability and adaptive capacity

24. The vulnerability of communities in Tuvalu to the impacts of climate change, sea level rise and extreme weather events is high due to the lack of national economic resources, limited investment capacity, and the high dependency of communities on natural resources. The vulnerability of communities is unvarying across the islands due to the similar location of community villages, including important infrastructure on the coastal zone. Adaptation measures and strengthening the adaptive capacity to mitigate the threats of climate change and sea level rise is of paramount importance for continued survival of the nation and its people.

25. With regard to monitoring and climate early warning systems in Tuvalu, there are nine operational meteorological stations in Tuvalu at the present time and five single observation rainfall stations: Nanumaga, Niutao, Nukufetau, Vaitupu and Nukulaelae. In 2017, installation of Chatty Beetles and Barret High Frequency radio network secured the communication of weather, climate and other warning messages between islands to support local people with early warnings.[41] A Climate Change Policy Unit and a Disaster Coordination Unit were established under the Office of the Prime Minister. Additionally, the Tuvalu Red Cross Society plays a major role in disaster monitoring and response. A Tuvalu Climate Change Portal has also been developed (https://www.pacificclimatechange.net/country/tuvalu).

26. Ecosystem-based approach through coastal vegetation planting was piloted as part of the NAPA-1 project. Several projects have been implemented, including the Foram Sands Project and the Pilot Gravel Beach Nourishment against Coastal Disaster on Fongafale Island. Improving water resources, especially in the context of climate change, has been a focus of the UNDP/GEF NAPA-1 and UNDP/Aus-AID NAPA-1+. The UNDP/GCF Tuvalu Coastal Adaptation Project aims to reduce the impact of sea level rise through a range of coastal protection measures, including hard engineering and ecosystem-based approaches such as coastal vegetation, coral transplantation, etc. Through the Pacific Adaptation to Climate Change (PACC) and the Integrated Water Resources Management (IWRM) projects, the national water and sanitation policy was developed for Tuvalu.[42]

27. Additionally, several projects have been implemented in Tuvalu that directly address the impacts of climate change on agriculture. A collaborative project by European Union, Secretariat of the Pacific Community and Global Climate Change Alliance (GCCA) called ?Improving agroforestry systems to enhance food security and build resilience to climate change in Tuvalu? aimed to increase national food security by promoting integrated farming practices and better utilization of existing land for agricultural purposes.[43] The project developed three agroforestry demonstration sites that trialled crop varieties from around Tuvalu and from SPC?s Centre for Pacific Crops and Trees climate-resilient crop collection. The project also provided community level agroforestry training, capacity development of DOA/MLGA staff, and supported the process of holding stocks of national plant varieties.

28. In terms of food security, Live & Learn Environmental Education Tuvalu (LLEE Tuvalu) has been implementing the *Tuvalu Food Futures* project. The project supported the establishment of food gardens to improve long-term food security in Phase 1 (2019-2020). Phase 2 of the project (2020-2021) has been critical for supporting food security, especially during a global crisis such as COVID-19. Phase 2 expands the work to two outer islands; Nukufetau and Nukulaelae with additional food gardens for Funafala.

29. The Government of Tuvalu is currently developing Integrated Vulnerability Assessment Reports for all Islands of Tuvalu.[44] The GEF-7 project will build on the outcomes of these assessments once available.

National policies and plans

30. The *Te Kete ?* Tuvalu National Strategy for Sustainable Development (2021-2030)[45] includes Outcome 4 which aims to increase climate change and disaster resilience. The key strategic actions proposed under this outcome include: (i) Developing a long-term national adaptation strategy, including a staged land reclamation programme, that takes into account a worse-case scenario of sea level in Tuvalu rising by one meter by year 2100; (ii) Securing increased funding from global climate financing facilities; (iii) Strengthening access to labour mobility schemes; (iv) Developing effective frameworks for disaster risk and resilience management; and (v) Implementing a land rehabilitation and reclamation framework that is resilient to sea level rise and climate change impacts. Additionally, Outcome 17 focuses on resilient housing and upgrading national building facilities.

31. The Agriculture Sector Plan (2016 ? 2023)[46] includes actions to strengthen research in climate change adaptation and mitigation in agriculture and agroforestry activities, including plant breeding for climate-ready root crops and others at the Elisefou Agriculture Station. Tuvalu?s Agriculture Strategic Marketing Plan (TASMP) 2016-2025[47] also aims to strengthen the resilience of the Tuvalu people to climate change by increasing local food production and domestic and foreign trade through revival of traditional knowledge, skills and heritages.

32. Tuvalu?s National Action Plan to Combat Land Degradation and Drought aims to improve the monitoring and mitigation of the impacts of drought, to establish and improve early warning systems, to monitor climate change impacts, and to encourage and strengthen research activities in attaining drought-resistant (and salt resistant) crops.[48] Tuvalu?s National Biodiversity Strategy and Action Plan (NBSAP) proposes, as one of the actions under the theme of Climate Change and Disaster Risk Management, to identify options for ecosystem-based adaptation.[49]

33. The *Te Kaniva* ? Tuvalu Climate Change Policy 2012-2021 was developed to address Tuvalu?s climate change risks.[50] The document notes that adaptation to climate change hazards and their impact are absolutely necessary for Tuvaluans to survive in Tuvalu. On-the-ground adaptation now means that Tuvalu?s resiliency and capacity are being strengthened as the people of Tuvalu wish to continue living in their country and experience their unique culture and way of life. Among others, the policy proposes to improve food security and coastal protection through assessment and analysis of salt and/or heat tolerant food crops (e.g. *pulaka*) and tree species. It also proposes to strengthen water security and preparedness for droughts and other extreme events through integrated and coordinated water resources planning and management. Finally, it promotes the coordinated planning and management of marine, coastal and land resources and systems in a whole-Island Systems Management/ecosystem base management approach.

34. The Tuvalu National Strategic Action Plan for Climate Change and Disaster Risk Management 2012-2016 was developed as the operational implementation plan for Tuvalu?s Climate Change Policy.[51] Among others, it includes the following strategic actions relevant to the GEF-7 project and to which the GEF-7 project will contribute:

- ? Conduct research on current and other possible food crop and tree species on their salt and/or heat tolerance capability.
- ? Develop nurseries to nurture selected food crop and tree species that are salt and heat tolerant.
- ? Create awareness and distribute planting materials of the food crop and tree species that are salt and/or heat tolerant.
- ? Support organic vegetable and food crops gardening and the use of composting.
- ? Conduct applied research in collaboration with SPC and SPREP on pest management and control of invasive species.

35. Tuvalu?s National Gender Policy (2014-2019) aims to increase capacity within all sectors of Government to address key issues of concern in achieving gender equality and women?s empowerment within each sector. Among its key actions to achieve this outcome, it aims to (i) Monitor the implementation of commitments to gender equality and women?s empowerment in the National Strategic Action Plan for Climate Change and Disaster Risk Management; to (ii) Ensure women?s equitable access to capacity building initiatives in disaster risk management and adaptation to climate change and natural resources management; and to (iii) Support equitable participation of women, together with men, in decision-making in relation to disaster risk management, climate change adaptation and natural resources management at the community and national levels.[52]

36. Finally, all eight *Kaupule* and *Falekaupule* have 4-year Island Strategic Plans *(?Palani Atiake?*), which map out their key development priorities and outline their proposed developments. They also have respective Disaster Management Plans. Strengthening resilience to the impacts of climate change, land, ecosystems and food security feature strongly in the priorities.

3) Risk management plan

Project actions to strengthen resilience

37. The GEF-7 project?s objective to reverse land degradation, enhance local livelihoods and increase climate resilience through integrated agro-ecosystem approach in all the islands of Tuvalu. Its outcomes and outputs are aimed at increasing adaptive capacity and resilience of Tuvaluans in the face of climate change, in line with the national policies outlined above. First, through the integrated agro-ecosystem (IAE) approach, the project will introduce agroforestry, sustainable land management and restoration interventions and will diversify trees and crops grown for food and rehabilitation. The project builds on previous work on introducing salt-tolerant *pulaka* and taro varieties. It will strengthen ecosystem resilience through reduced soil erosion and land degradation. It also aims to increase soil fertility through interventions such as composting. The installation and improvements in Home Gardening Food Systems (HGFS) will lead to increased food and nutrition diversity. Strengthening local food production is an important element of resilience in Tuvalu, as has been highlighted during the recent COVID-19 pandemic. Finally, by strengthening traditional knowledge and customary governance systems as well as land tenure and land use, it will also contribute to the communities? resilience.

Measures to mitigate climate change impacts on project interventions

38. The following mitigation measures have been incorporated into the project design to address and mitigate climate risks:

- ? The project will climate-proof its interventions by ensuring that any of the small-scale structures put in place by the project can withstand storms and floods, such as by increasing the elevation of pulaka pits.
- ? Sea level rise and saltwater intrusion will be taken into consideration when selecting agricultural areas. The crop and tree species used for restoration and agroforestry will be selected based on the local site suitability and their resilience to the most likely impacts of climate change (e.g. outbreak of pests and diseases, changes in rainfall, increased salt water intrusion, etc.).
- ? Climate change impacts and resilience will be taken into account when developing the Food and Nutrition Policy, the updated UNCCD National Action Plan, and LDN voluntary targets. Disaster preparedness and integrated water management will also be integral part of the project risk management, in collaboration with other climate change projects implemented in Tuvalu.
- ? National institutions involved in climate data collection and assessment will be involved in the preparation of training and implementation of project interventions. Integrated pest management, including early detection, will also be promoted by the project. The project?s training activities will integrate topics related to climate driven impacts on the agro-ecosystem, including changes in pest and diseases, hazards and meteorological information.

B. COVID-19 Risk and Opportunity Analysis and Mitigation Plan

1) Analysis

39. At the time of writing of this report, Tuvalu is among the few nations that have not had any confirmed cases of COVID-19. As of 9 September 2021, a total of 10,861 vaccine doses have been administered.[53] In response to the threat posed by COVID-19, the Tuvalu Government imposed strict border restrictions in March 2020. This measure limited non-citizen arrivals significantly.[54] Movements of people between Islands were also controlled. This was initially done by the *Falekaupule* themselves whenever a plane arrived. To date, the economic impacts of COVID-19 have been less severe in Tuvalu relative to other Pacific nations. In September 2021, the Asian Development Bank forecasted that Tuvalu?s GDP would grow by 2.5% in 2021.[55] Since March 2020, the Finance and Food Security sector of Tuvalu?s COVID-19 Taskforce focused on ensuring the ready supply of food in Tuvalu, especially through voucher programs and price-control efforts, and prepared a financial relief package for Tuvaluan citizens and a COVID-19 budget for use in securing donor funding. The ?Tuvalu National COVID-19 Economic and Financial Relief Package? was issued in April 2020. Grants were issued to Outer Islands for the COVID-19 response. There was also a small grant scheme through the Development Bank of Tuvalu for people without employment to utilize for growing their food. The provision of sufficient food supply for Funafuti and the Outer Islands has been guaranteed through monitoring, coordination with shop owners, and coordination with the Transport, Repatriation and Relocation sector. The Government organized flexible shipping service to ensure the delivery of food supplies, fuel, and Government services to all Islands. Nevertheless, food prices in the Outer Islands and in Funafuti continue to be elevated and controlling prices is still an issue. A price control order was issued recently. The Education sector has implemented hand-washing programs in schools, among others.[56]

40. The government put in place measures to support businesses, such as flexible loans. In December 2020, free seedlings were provided for use in home gardens to strengthen the local food system, and awareness programs developed to promote agricultural projects. Landowners were encouraged to practise customary stockpiling techniques, such as drying fish and root crops, preserving breadfruit, and storing coconuts. The Tuvalu Food Futures project organized visits for youth to the *pulaka* pits for a demonstration of how to plant and compost *pulaka*, as well as demonstrations of collecting flower sap (toddy) from coconut trees. The relocations of people from Funafuti to their home islands helped to harness existing island-based social support systems and increase the labour supply for farming and fishing in rural areas. It has been noted that some of the effects of the COVID-19 pandemic could be positive for Tuvalu, as increased local food production and consumption could lead to a healthier population less reliant on nutrition-poor imported food. With youth spending more time at home on the outer islands, their participation in activities such as fishing, farming, and production of handicrafts has likely increased, thereby strengthening customary knowledge systems.[57]

41. As in other countries, the COVID-19 pandemic and related instructions to stay at home expose women and girls to increased risks of domestic violence. It has been recommended that ongoing awareness raising for the prevention and the elimination of domestic violence be supported, including through information about the COVID-19 pandemic.[58]

2) Risk management plan

42. The main risks and opportunities related to COVID-19, and proposed risk management measures, are presented below.

Risks and opportunities identified	Proposed mitigation/enhancement measures

1) *Risk 1:* Health and safety risks related to COVID-19 or potential future pandemics. The project activities could contribute to the spread of COVID-19 affecting local communities/indigenous peoples. Risk rating: ***low***	Relevant health and safety measures of the Government will be strictly followed. A precautionary approach will be taken by the project, avoiding any movement of persons that could present a risk of spreading COVID-19. Safety guidelines and Personal Protective Equipment (PPEs) will be provided to prevent the risks of transmission. If necessary, mobile devices could be provided to enable virtual consultations with local communities. Collaboration will be sought with other initiatives aimed at raising awareness on and eliminating domestic violence.
2) *Risk 2:* COVID-19 restrictions lead to significant delays in project start-up and implementation, and reduced capability of the project to engage with local stakeholders. Risk rating: ***moderate***	Due to COVID-19 travel restrictions, the PPG process was carried out mostly through virtual meetings, allowing the FAO international team to provide technical advisory services and representatives of outer-island Falekaupule to provide inputs into the project design. A digital platform was also developed in the form of a restricted access website where the stakeholders could access all the documents and provide feedback to the project PPG team. The project will build on this innovative approach during implementation. Also, the project will have 8 Project Field Officers (1 for each island). These will be based on the islands and will be able to engage with local stakeholders even if travel continues to be restricted.
3) *Risk 3:* The COVID-19 pandemic or other future crises lead to the reallocation of Government funding and limit the realization of co-financing. Risk rating: ***low***	This is unlikely, as investments in Tuvalu?s food security are expected to continue under the Post COVID-19 scenario, including as part of the climate change adaptation and resilience building initiatives in the country. This has been discussed with stakeholders during PPG and realistic co-financing amounts have been included in the letters.
4) *Risk 4:* COVID-19 will affect farmers and market actors? ability to implement effective agricultural value chains (local markets and international trade). Risk rating: ***low***	The project will work with related initiatives, including the *Tuvalu Food Futures* project and Government initiatives, to ensure that the proposed market value chains can be realized. The project will, in particular, focus on local value chains and markets, which have been strengthened as a consequence of the COVID-19 pandemic.
5) *Opportunity*: The project presents an opportunity to support the country?s food security goals and to foster engagement of youth in local food production, contributing to nutrition, health and resilience. Opportunity rating: ***high***	The project will build on the *Tuvalu Food Futures* project and will directly contribute to the Government priorities outlined in the above mentioned policy documents, including for COVID-19 recovery and climate resilience.

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[53] https://covid19.who.int/region/wpro/country/tv
[54] https://devpolicy.org/how-is-tuvalu-securing-against-covid-19-20200406/ (April 2020, retrieved October 2021)
[55] https://www.dfat.gov.au/sites/default/files/covid-response-plan-tuvalu.pdf and https://www.adb.org/countries/tuvalu/main
[56] Government of Tuvalu (April 2021). One-Year Report of the National COVID-19 Taskforce.
[57] https://devpolicy.org/how-is-tuvalu-securing-against-covid-19-20200406/ (April 2020, retrieved October 2021)
[58] https://pacificwomen.org/wp-content/uploads/2020/09/Tuvalu-COVID19-Rapid-Assessment-Report_Summary.pdf

6. Institutional Arrangement and Coordination

Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

6.a *Institutional and management arrangements*

FAO will be the GEF Implementing Agency for this project and will share project execution responsibilities with the Department of Agriculture of the Ministry of Local Government and Agriculture (DOA/MLGA), the national counterpart responsible for the overall national coordination and execution of the field project activities. The project execution responsibilities distributed between FAO and DOA/MLGA will commence with FAO handling most of the execution functions initially, and in conjunction with institutional capacity development and training on FAO operations processes and reporting requirements. After 18 months, most of the execution responsibilities will be handled by DOA/MLGA, the details of which are provided in the table below. This approach is followed, in response to the findings of an independent capacity assessment (CA) of the DOA/MLGA that was conducted during the PPG phase, which identified a number of capacity limitations, including inadequate evidence of oversight and monitoring controls and process, weaknesses in budget management, procurement procedures, insufficient risk management arrangements, etc., amongst others. In light of these findings, the Government of Tuvalu, through the GEF OFP requested FAO to provide execution and operational support services on an exceptional basis, with Tuvalu being a SIDS and an LDC, as mentioned below in last bullet under FAO responsibilities as GEF agency (pg 90 of prodoc).

To initiate project implementation after the Project Document is signed, FAO will be the main executing agency for the first 18 months, in particular, provisions for operations support services such as recruitment of international Consultants and PMU staff, management of signed Letter of Agreements (LOA) with executing partners, and procurement of goods and services, which have no private sector vendors/service providers in the country to supply, and with cost levels that would require competitive procurement processes, as shown in the Table below.

As also shown in the Table below, DOA/MLGA will, during the first 18 months, carry out some project execution responsibilities under a signed Letter of Agreement (LOA) with FAO for provisions of capacity development for LDN and for extension services in all 8 atolls in the area of integrated agro-ecosystems approach to agriculture, in particular, the coordination and management of national-level project institutional arrangements, such as hosting a Project Management Unit (PMU) and contracting of local staff (8 Project Field Officers, NTSP-LDN Coordinator, Policy&Legal Specialist; Communications & KM support).

During the first 18 months, FAO and DOA/MLGA will collaborate in carrying out institutional capacity development activities to address the issues highlighted in the CA findings mentioned above, as summarised in the last column of the Table below. The aim of these capacity development activities is to strengthen the institutional capacity of the PMU to facilitate and support the transfer of project execution functions and responsibilities to DOA/MLGA. The leadership and supervision of the FAO and DOA/MLGA collaboration and involving MOF in carrying out the capacity development plan summarised in the last column of the Table below, will be provided by the National Project Director (NPD) (see NPD functions below).

After the first 18 months, a revised (or new) LOA will be developed and signed based on the experiences of, and lessons learned from, the first 18 months LOA, and will include a Work Plan and Budget containing broader project execution functions to be under the responsibilities of DOA/MLGA. The aim is for DOA/MLGA to become fully responsible for the day-to-day management of project results entrusted to it in full compliance with all terms and conditions of the standard LOAs signed with FAO.

Under the above-mentioned LOAs, DOA/MLGA will be responsible and accountable to FAO for the timely and quality implementation of the agreed project results, operational oversight of implementation activities, timely reporting, and for effective use of GEF resources for intended purposes. The implementation of all agreed results and activities in full compliance with LOA provisions and due diligence with regard to FAO Social and Environmental Quality Standards will be ensured by DOA/MLGA as executing partner.

Capacity development plan for progressive transfer of project execution functions and responsibilities from FAO to DOA/MLGA.

Timeline	**FAO**	**MLGA**	**Plan / Capacity development for progressive hand-over of operations to MLGA as Executing Partner after 18 months.**

Yr1/Q1 - end of Yr2/Q2	? Procurement of services of international Consultants and PMU staff, namely the NPC and AFO, to be contracted to FAO. ? Procurement of goods and equipment, both expandable procurement and non-expendable procurement in the PSC approved AWP&B, which have no private sector vendors/service providers in the country to supply and with cost levels that would require competitive procurement processes, for setting up the PMU. ? Procurement of those goods required as expandable procurement in the PSC approved AWP&B, which have no private sector vendors/service providers in the country to supply, and with cost levels that would require competitive procurement processes, for implementation of Year 1 and first half of Year 2 work plan activities. ? LoAs to be signed with regional executing partners for provisions for: a) Technical advisory services and capacity development in: Protocols for LDN indicators and soil health, IAE toolkits. b) IAE Island Action Plans (IAE-IAP) development within context of ISPs and preparation and delivery of training on IAE toolkits.	Under a signed LOA for provisions of capacity development for LDN and for extension services in all 8 atolls in the area of integrated agro-ecosystems (IAE) approach to agriculture. The LOA work plan will include: ? building of IAE capacity at the local level through 8 Project Field Officers, linked to MLGA Extension Services on each island; ? building of LDN and IAE capacity at the national level through specialised local consultants: NTSP-LDN Coordinator; Policy & Legal Specialist; Communications & KM support. ? building LDN and IAE capacity of the project team, including setting up the PMU and the NTSP. ? deliverables related to the execution of some work plan activities aimed at strengthening institutional capacity for LDN and IAE related extension services.	? Led by the NPD with support of the FAO Operations Support Officer and the STA, synthesise and analyse the CA findings, to identify opportunities and training needs for harmonizing FAO procurement guidelines with policies and regulations of the Government of Tuvalu, involving both MLGA and MoF. ? Provide training to NPC, AFO/PMU and key Government staff, including those at MoF, on FAO procurement guidelines, processes and systems and reporting requirements.

Yr 2/Q3 ? end of project	? Continue management of contracts for key international Consultants, such as the STA and technical Specialists, and PMU staff, namely the NPC and AFO. ? LoA to be signed with regional executing partners for provisions for: c) Training and development of science analytical capacity through the NTSP-LDN and for implementation of key IAEAP priorities.	Based on experiences and lessons learned from the first 18months LOA and progress made in addressing institutional issues identified by the CA including training for harmonizing FAO procurement guidelines with policies and regulations of the Government of Tuvalu, develop and sign a revised or new LOA, with expanded work plan and budget to: ? continue building capacity at local level through the 8 Project Field Officers; ? continue building LDN and IAE capacity at the national level through specialised local consultants: NTSP-LDN Coordinator; Policy & Legal Specialist; Communications & KM support. ? expanded work plan activities and deliverables linked to the PSC approved AWP&B, including: management of provision for required goods and specialised services from local and international service providers in accordance with policies and regulations of the Government of Tuvalu.	Preparation of a revised or new LOA to be based on the synthesis and analyse of the CA findings, led by the NPD as mentioned above, and upon completion of training of PMU staff and key staff in relevant Government agencies involved in implementing Government procurement procedures on fulfilling LOA reporting requirements as outlined in the LOA terms and conditions, for full execution and management of the project budget by DOA/MLGA, in accordance with policies and regulations of the Government of Tuvalu

The DOA/MLGA will coordinate all efforts to implement the project?s components, aligning with other initiatives and assuring that all deadlines are achieved in a timely manner and that the project?s results are discussed with national and local institutions involved.

Other main institutions involved in the project are described in the stakeholder engagement table (cf Annex I1). FAO and the project partners will collaborate with the implementing agencies of other programs and projects to identify opportunities and facilitate synergies with other relevant GEF projects, as well as projects supported by other donors. This collaboration will include: (i) informal communications between GEF agencies and other partners in implementing programs and projects; and (ii) exchange of information and outreach materials between projects.

The government will designate a **National Project Director (NPD)**. The NPD will be a MLGA staff at Secretary level and will have the responsibility of supervising and guiding the National Project Coordinator (see below) on the government policies and priorities. He/she will also be responsible for the coordination among national stakeholders and the delivery of field activities to achieve the project goals, as well as requesting FAO the timely disbursement of GEF resources through contracts that will allow the execution of project activities, in strict accordance with the Project Results-Based Budget and the approved AWP&B .

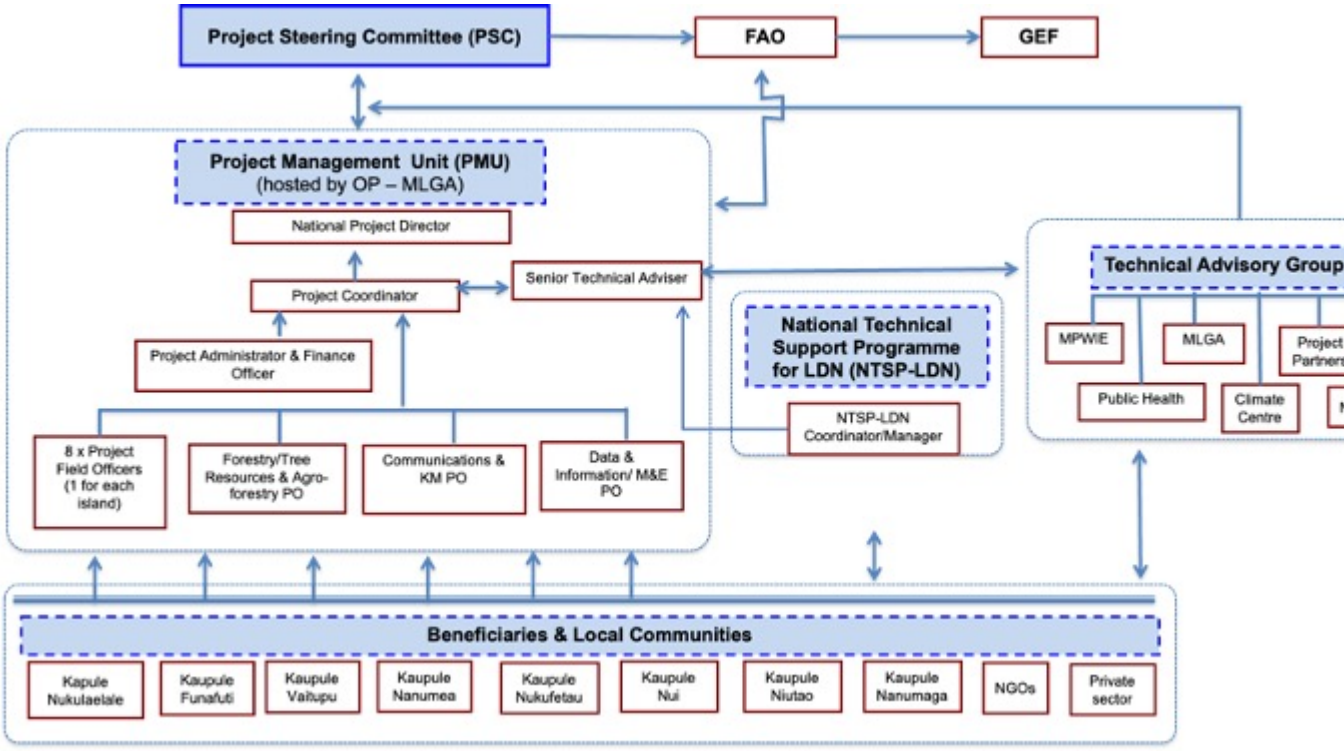
The NPD will be a member of the **Project Steering Committee** (PSC), which will be the main governing body of the project. The PSC will approve Annual Work Plans and Budgets on a yearly basis and will provide strategic guidance to the PMU and to all executing partners.

The PSC will be chaired by a Government Official at Secretary level (to be decided at inception phase), and comprised of senior management level representatives from the 4 key Government ministries (MLGA, MPWIELMD, MOF, MHSWGA), Kaupule Funafuti as representative of islands? Falekaupule, TANGO as representative of NGOs, LLEE-Tuvalu as a key co-financing partner, and Tuvalu National Council of Women as representative of Women?s Groups. The members of the PSC will each assure the role of a Focal Point for the project in their respective agencies. Hence, the project will have a Focal Point in each concerned institution. As Focal Points in their agency, the concerned PSC members will: (i) technically oversee activities in their sector; (ii) ensure a fluid two-way exchange of information and knowledge between their agency and the project; (iii) facilitate coordination and links between the project activities and the work plan of their agency; and (iv) facilitate the provision of co-financing to the project.

The **National Project Coordinator** (NPC, see below) will be the Secretary to the PSC. The PSC will meet at least twice per year to ensure: i) Oversight and assurance of technical quality of outputs; ii) Close linkages between the project and other ongoing projects and programmes relevant to the project; iii) Timely availability and effectiveness of co-financing support; iv) Sustainability of key project outcomes, including up-scaling and replication; v) Effective coordination of governmental partners work under this project; vi) Approval of the six-monthly Project Progress and Financial Reports, the Annual Work Plan and Budget; vii) Making by consensus, management decisions when guidance is required by the National Project Coordinator of the PMU.

A **Project Management Unit** (PMU) will be co-funded by the GEF grant and will be hosted by DOA/MLGA. The main functions of the PMU, following the guidance of the PSC, are to ensure overall efficient management, coordination, implementation and monitoring of the project through the effective implementation of the AWP&B for each year. The PMU will be composed of a NPC who will work full-time for the project lifetime. In addition, the PMU will include an Administration and Finance Officer, 8 x Project Field Officers (1 for each island), and 3 part-time Project Officers (Forestry/Tree Resources & Agro-forestry PO, Communications & Knowledge Management support PO, Data & Information/M&E PO). The ToRs for the PMU staff are provided in Annex L.

The project organization structure is as follows:



The NPC will oversee daily implementation, management, administration and technical supervision of the project, on behalf of the OP and within the framework delineated by the PSC. S/he will be responsible, among others, for:

i) Supervise project work plan activities of the Project Field Officers in each of the outer islands

ii) Work in close collaboration with the NTSP-LDN Coordinator and UNCCD Focal Point to ensure alignment of work plan activities of the Project Field Officers, in particular in data collection, with the development and implementation of the LDN Strategy

iii) In close collaboration with the STA, ensure synergies are established between the project?s M&E and datasets collected for measuring locally relevant LDN indicators and metrics for land productivity dynamics (measured as net primary productivity, NPP) and carbon stocks (measured as soil organic carbon, SOC)

iv) Contribute to training of MLGA extensions staff in delivery of Farmer Field Schools

v) Provide technical support and guidance to international and national consultants and FAO Technical Officers as necessary and assess their outputs and deliverables

vi) Based on the capacity assessment findings, identify opportunities and training needs for strengthening capacity of the MLGA and MoF in project execution.

vii) Support and facilitate the handover of execution functions to MLGA after 18 months of project implementation.

viii) Organize and ensure timely project procurements of supplies and inputs for project activities and

ix) Liaise with FAO, PSC, relevant government agencies, and all project partners, including regional technical organizations and NGOs for effective synergistic implementation of all project activities at both community project sites and at national level

x) Ensure a high level of collaboration among participating institutions and organizations at the national and local levels;

xi) Ensure compliance with all LOA provisions during the implementation, including on timely reporting and financial management;

xii) Approve and manage requests for provision of financial resources as per the LOA Schedule of Payments; and monitor financial resources and accounting to ensure accuracy and reliability of financial reports;
xiii) Ensure timely preparation and submission of requests for funds, financial and progress reports to FAO as per LOA reporting requirements;
xiv) Maintain documentation and evidence that describes the proper use of project resources as per LOA provisions, including making available supporting documentation to FAO and designated auditors when requested;
xv) Implement and manage the project?s monitoring and communications plans;
xvi) Organize project workshops and meetings to monitor progress and preparing the Annual Budget and Work Plan;
xvii) Submit the six-monthly Project Progress Reports (PPRs) with the AWP/B to the PSC and FAO, incorporating the inputs/progresses from other partners/sub-partners;
xviii) Support and coordinate FAO field visit/supervision, spot check and audit missions (both virtual and physical);
xix) Support the organization of the mid-term and final evaluations in close coordination with the FAO Budget Holder and the FAO Independent Office of Evaluation (OED);
xx) Prepare the first draft of the Project Implementation Review (PIR); Prepare first draft of project terminal report 2 months before the actual project ending date;
xxi) Inform the PSC and FAO of any delays and difficulties as they arise during the implementation to ensure timely corrective measure and support.

The Food and Agriculture Organization (FAO) will be the GEF Implementing Agency (IA) for the Project, providing project cycle management and support services as established in the GEF Policy. As the GEF IA, FAO holds overall accountability and responsibility to the GEF for delivery of the results. In the IA role, FAO will utilize the GEF fees to deploy three different actors within the organization to support the project (see Annex J for details):

- ? The Budget Holder, BH, who is the FAO Sub-regional coordinator for the Pacific islands (SRCSAP) office, will provide oversight of day to day project execution;
- ? The Lead Technical Officer(s), LTO, drawn from across FAO will provide oversight/support to the projects technical work in coordination with government representatives participating in the Project Steering Committee;
- ? The Funding Liaison Officer(s), FLO, within FAO will monitor and support the project cycle to ensure that the project is being carried out and reporting done in accordance with agreed standards and requirements.

FAO responsibilities, as GEF agency, will include:

- ? Administrate funds from GEF in accordance with the rules and procedures of FAO;
- ? Oversee project implementation in accordance with the project document, work plans, budgets, agreements with co-financiers, Letter(s) of Agreement and other rules and procedures of FAO;
- ? Provide technical guidance to ensure that appropriate technical quality is applied to all activities concerned;
- ? Conduct at least one supervision mission per year; and
- ? Reporting to the GEF Secretariat and Evaluation Office, through the annual Project Implementation Review, the Mid Term Review, the Terminal Evaluation and the Project Closure Report on project progress;
- ? Financial reporting to the GEF Trustee.
- ? Providing limited support to the OP for the execution of some of project activities.
- ? Due to limited internal control management measures of the OP and of Tuvalu as a small SIDS and as LDC, the Government requested FAO to provide some operational execution services, on exceptional basis, including:

- Human Resource Management: Recruitment of Consultants to be assigned to the Project Management Unit and Contracting of International and Local Consultants, in close consultation with the OFP and OP.
- Procurement packages: procurement of goods and services based on project management decisions made by the PMU, in accordance with the Annual Work Plan and Budget (AWP&B) and as per FAO standard procedure and prevailing procurement policy, approved by the Project Steering Committee (PSC). The procurement packages include also managing the Service Contracts and Letters of Agreements as appropriate.

6.b Coordination with other relevant GEF-financed projects and other initiatives.

? The Board for the GCF funded Tuvalu Coastal Adaptation Project (TCAP) has approved a plan to transition the existing PMU into a Coastal Management Authority (CMA) in MLGA at the end of the TCAP lifetime, to fill a vital gap in existing Government capacities to provide dedicated ongoing support on coastal hazards management and adaptation. It is envisaged that the PMU for the project will work in close collaboration and in partnership with the TCAP PMU to support as much as possible, synergistic implementation. For example, TCAP has completed Light Detection and Ranging (LiDAR) survey of all 9 atolls in Tuvalu. The LiDAR data collected by TCAP can be shared with the project during implementation and used as a layer in the SOLA/OT mapping tool. Due to covid travel restrictions, the final delivery of the data under TCAP that was to be undertaken in conjunction with training and a data familiarisation workshop in Funafuti has been delayed. The TCAP also provided support to the ISPs at the Kaupule, Falekaupule and community levels on implementation processes, including monitoring and evaluation and reporting systems for the ISPs, as well as support to review processes and formulation of the new generation of ISPs. The proposed IAEAPs to be developed under the project (Output 2.1.1) emphasises the importance of being developed within the context, and to operationalise agricultural ecosystem aspects, of ISPs. The M&E and reporting processes and systems of IAEAPs will therefore be aligned and coordinated as part of the overall reporting processes and systems of the ISPs developed under TCAP.

? The UNDP/GEF project ?Implementing a Ridge to Reef (R2R) Approach to Protect Biodiversity and Ecosystem Functions? (GEF-5-R2R Project developed capacity in DOE in GIS skills, and established a database for ecosystem data including native and fruit trees using the mobile data collection app called EpiCollect (https://five.epicollect.net/project/ridge-to-reef-tools). Another key output was a resource inventory and soils characterized and hazards to land and water resources identified and incorporated into GIS area mapping. A MOU will be developed during implementation between MLGA hosting the PMU and MPWIELMD to support coordination and facilitate inter-departmental cooperation to build on these R2R outputs.

? The SPC as the main regional organization in agriculture, has a myriad of regional interventions with a range of capacity development and technical support activities in Tuvalu, such as Pacific Seeds for Life (PS4L), women economic empowerment through organic farming, sharing of climate resilient crops by the SPC Centre for Pacific Crops and Trees (CePaCT), A LOA will be developed with SPC to facilitate provisions of technical advisory services building on these existing technical support services. In addition, the LOA will outline SPC?s technical support to the National Technical Support Programme for LDN

including the LDN indicators and target setting process in support of the LDN Forum; and support to the development of IAE toolkits.

? The SPREP as the main organization in environmental issues also hosts the Pacific Climate Change Centre that carries out regular online training course on various CC topics. The project may support participation of Tuvalu practitioners on PCCC courses. The project may also provide case studies as content for future courses. Further discussions will be held during implementation when PCCC/SPREP has decided on course topics.

? The project?s PSC members are senior management levels (Secretary, Deputy Secretary, Assistant Secretary) of Government Ministries who are also members of Steering Committees for other GEF projects, which would allow for identifying of synergistic implementation opportunities. Placing the project in the context of *Te Kete* - Tuvalu National Sustainable Development Strategy and the Islands Strategic Plans will help with coordination.

The GEF-7 project will build on lessons learned of past and ongoing GEF projects and other initiatives, as summarized below.

GEF and other initiatives	Brief Summary and Focus	Potential linkages
UNDP/GEF-3 ?Building Capacity and Mainstreaming Sustainable Land Management (SLM) in Tuvalu? (2008-2012)	The objective of the project was to strengthen human, institutional and systemic capacity for SLM in Tuvalu. It aimed to increase the knowledge and awareness of land degradation and enhance capacities at the local, outer island and national level. Among others, the project organized training workshops and demonstration events on GIS and Land Use Planning. The project helped increase awareness at local and community levels on the concepts and purpose of SLM. The project established pulaka pit and composting demonstration sites. Mangrove restoration was also undertaken.	The GEF-7 project will build on the initial work done on SLM in the country, including the demonstration sites, with the aim to scale up good practices. It will also help further develop the policy framework on SLM/LDN, a recommendation that resulted from this project. It will integrate SLM as part of the wider environmental/ecosystem management approach, as was also recommended by the Terminal Evaluation of this project.[1]
UNDP/GEF-4 ?Increasing Resilience of Coastal Areas and Community Settlements to Climate Change? (NAPA 1 project) (2009-2016)	The main objective of the project was to increase the protection of livelihoods in coastal areas from the dynamic risks related to climate change and climate variability in all inhabited islands of Tuvalu. This to be achieved through three main outcomes: 1) Enhanced capacity to plan for and respond to climate change risks; 2) Implementation of practical community-based adaptation measures (relating to water security, coastal protection and food security); and 3) Capturing, analysing and disseminating project knowledge and lessons learned. Among the community-based adaptation measures were raised pulaka beds.	The GEF-7 project will build on the outcomes of this project, in particular lessons learned with regard to the raised pulaka beds.[2]

UNDP/GEF-5 ?R2R: Testing the Integration of Water, Land, Forest & Coastal Management to Preserve Ecosystem Services, Store Carbon, Improve Climate Resilience and Sustain Livelihoods in Pacific Island Countries? (2015-2020)	In Tuvalu, this regional GEF International Waters (IW) project focused on strengthening protected areas management, rehabilitation of degraded coastal and inland forests, demonstrate small scale low carbon energy and water technologies, and support integrated water resources management. In particular, it installed a demonstration site for piggery Dry Litter Technology (DLT) system for managing pig waste, incorporating the use of carbon materials, sloping pen floors, and requires no water for pen clean-up. The resulting carbon mix is composted, resulting in a rich, organic soil amendment for crop production.	The GEF-7 project will build on the lessons learned and experiences of this project, in particular with regard to DLT.
UNDP/GEF-5 ?R2R Implementing a Ridge to Reef Approach to Protect Biodiversity and Ecosystem Functions? (2015-2020)	This multi-focal area project aimed to preserve ecosystem services, sustain livelihoods and improve resilience in Tuvalu using a ?ridge-to-reef? approach. To achieve this objective, the project focused on: enhancing and strengthening conservation and protected areas; rehabilitating degraded coastal and inland forests and landscapes and supporting the delivery of integrated water resource management (IWRM) and integrated coastal management (ICM); enhancing governance and institutional capacities at the national, island, and community levels for enhanced inland and coastal natural resource management; and improving data and information systems that would enable improved evidence-based planning, decision-making, and management of natural resources in Tuvalu. The R2R project developed capacity in the Department of Environment (DoE) in GIS system, and established a database for ecosystem data including native and fruit trees using the mobile data collection app called EpiCollect (https://five.epicollect.net/project/ridge-to-reef-tools). Other key outputs include: the resource inventory performed (soils characterized and hazards to land and water resources identified and incorporated into GIS area mapping), and the SLM interventions in three islands of Funafuti, Nanumea and Nukufetau.	As explained in the alternative scenario section, the GEF-7 will build on the achievements of this project, in particular with regard to the information management systems established by this project and its ridge-to-reef approach.[3]

UNEP/GEF-6 ?Strengthening National and Regional Capacities to Reduce the Impact of Invasive Alien Species on Globally Significant Biodiversity in the Pacific? (under implementation, 2019-2024)	This regional project aims to reduce the threats from Invasive Alien Species (IAS) to terrestrial, freshwater, and marine biodiversity in the Pacific by developing and implementing comprehensive national and regional IAS management frameworks. The project is composed of four components including 1) Strengthening institutional frameworks and capacities for IAS management; 2) Establishing national systems for prioritizing IAS management; 3) Implementing programmes for IAS risk reduction, Early Detection and Rapid Response (EDRR), eradication, control and restoration; and 4) Establishing a Pacific islands regional support framework for IAS management. A National Invasive Species Strategy and Action Plan (NISSAP) will be developed for Tuvalu.	The GEF-7 project will closely coordinate with this project with regard to its agricultural activities including IAS management.
?Lean to Local Food (L2LF)? project by Fafine Nui i Funafuti Association (FNFA)	The project was approved by the GEF/Small Grants Programme (SGP) in early 2021, with oversight by the TANGO Board Committee. The L2LF project strengthens the linkages between Nui community in the outer islands with those living in Funafuti. It provides training by community elders who are experts in local food processing and preservation to reduce reliance on imported foods.	Synergistic implementation of project activities with the L2LF Project?, in particular training on traditional food preservation techniques.

[1] https://publicpartnershipdata.azureedge.net/gef/PMISGEFDocuments/MandE/TE/FY2016/UNDP/G003504/3407_Final%20Terminal%20Evaluation%20SLM%20Tuvalu%20Report%2011%20July%202012.pdf

[2] https://erc.undp.org/evaluation/documents/download/10280

[3] https://erc.undp.org/evaluation/documents/download/19314

7. Consistency with National Priorities

Describe the consistency of the project with national strategies and plans or reports and assesments under relevant conventions from below:

NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

The project is fully aligned with, and will contribute to key outcomes of:

●*Te Kete ?* Tuvalu National Strategy for Sustainable Development (2021-2030), which seeks greater degree of security from climate change and natural disasters by increasing adaptive capacity and

setting local food production, including crops, livestock and small agri-businesses, as key milestones for agriculture over the plan period. The key outcome results of *Te Kete* that the project are aligned with, and will contribute to, include: coconut replanting associated with a small scale production of coconut by-products for income and healthier diets have reached all the islands; Traditional food production increased including revival of traditional food preservation techniques (*faka Tuvalu* ? go local); and collection of agricultural quality data and analysis is up -to-date to ensure informed decisions are made.

- ? Tuvalu National Agriculture Sector Plan (2016-2023), which aims to systematically improve the most important aspects of the supporting environment for agriculture in Tuvalu. The project is aligned with the Agriculture Sector Plan in terms of support to the research & development unit in DOA, support the development of value adding to agriculture products, promotion of consumption of local foods and improving the capacity and effectiveness of the extension service.
- ? Tuvalu Agriculture Strategic Marketing Plan (TASMP 2016?2025), which aim to revive domestic and international trade of locally produced agricultural products through domestic activities and trade arrangements. The TASMP and the project both advocate for a revival of trading of local agricultural products and acknowledge the importance of traditional skills for the production and preparation of local food and handicrafts. Both the project and the TASMP encourage the people of Tuvalu to eat more local food and both support the increased sale and consumption of local food. The project will also support the call in the TASMP for a ?Go Local? campaign and production of local food through organic farming, including development of the ?pulaka? pit system. Futhermore, the project will respond to the call in the TASMP to ?strengthen the development of agriculture on each island through planning and formulation of island agriculture plans?.
- ? Tuvalu National Biodiversity Strategy and Action Plan ? 5th National Report to the Convention on Biological Diversity (NBSAP 2016), which outlined several interventions and actions relevant to integrated agro-ecosystems including: 1) under the theme of Climate Change and Disaster Risk Management to identify options for ecosystem based adaptation, 2) under the theme on Trade, Biosecurity and Food security, actions establishment of organic home-gardening, establishment of nurseries, raising awareness and understanding on the value of organic farming as opposed to inorganic farming for example the use of chemical fertilizers and pesticides, increase cultivation and preservation of traditional food crops, and review of the national food policy to strengthen those elements fostering biodiversity. The project is also aligned with the NBSAP 2016 in terms of the need to recognize the central role of Tuvaluan culture in biodiversity and ecosystem services conservation.
- ? Tuvalu National Strategic Plan for Non-Communicable Diseases (NSPNCD 2011-2015), with a goal to reduce the current and future burden of NCD and nutrition related disorder in Tuvalu. The project is aligned with the NSPNCD and will build on progress made under the NSPNCD 2011-2015 towards healthy eating and its strategy to increase availability of vegetables and reduce/prevent reliance on processed foods.
- ? *Palani Atiake* - Island Strategic Plans (ISP), which are four-year plans which map the key development priorities and outline proposed developments on each island. The project will align the development of IAEAPs (Output 2.1.1) with the ?Kaupule Integrated Planning and Reporting Framework? developed by MLGA to streamline and systematize development planning at Kaupule level. In addition, the proposed toolkits to support integrated agro-

ecosystem approaches (Outpit 2.1.2) will be developed to operationalise the agricultural-ecosystems and food security-related aspects of ISPs.

The Tuvalu NDC roadmap and implementation plan has recently been developed and finalised, with a focus on transport and energy efficiency sectors. The NDC Focal Point at the Ministry of Finance recognises the need to incorporate agriculture, including avoided emissions from livestock through better management of waste and introducing appropriate technologies to utilise waste as resources. This gap will be addressed in the NDC roadmap during the inception phase

The project will also update the Tuvalu National Action Plan to Combat Land Degradation and Drought (UNCCD NAP 2006) and the Tuvalu National Food and Nutrition Policy (NFNP 1996) into a National Food Systems and Nutrition Policy.

8. Knowledge Management

Elaborate the "Knowledge Management Approach" for the project, including a budget, key deliverables and a timeline, and explain how it will contribute to the project's overall impact.

Under Output 3.1.3, the project will design and prepare a Communications and Knowledge Management Strategy during the inception phase, aligned with, and supported by, the M&E strategy to ensure lessons learned and good practices are captured and disseminated at the national, regional and global level to support replication of results.

The Communications and Knowledge Management strategy will include the preparation of communication materials, socialization of activities and results, systematization of lessons learned and best practices, and dissemination through various media. A particular focus will be placed on youth as a target audience to increase their interest in local food production and traditional systems and educational establishments and other institutions could be important entry points The Strategy will also include a project website to share experiences, disseminate information, highlight project outcomes and progress, and facilitate the replication of results throughout the duration of the project.

The KM strategy will also take into account and document the traditional knowledge systems and the passing on of traditional knowledge from the elders to younger generations through different media.

Knowledge management activities are integral to the project and will be generated in the form of tools, plans and other important resources across different outputs, including
Output 1.1.4: Open-source community mapping tool (SOLA/OT) for crowd-sourcing and recording of customary land tenure and land use (agro-ecosystem) data developed and applied by users;
Output 2.1.2. IAE Toolkits/How-To-Manuals to support Integrated Agro-ecosystem approaches. Under this output, a series of at least six IAE toolkits will be generated;
Output 2.1.3: Farmer Field Schools (FFS) and Training on IAE approaches, under which training materials on IAE approach toolkits will be used to train farmers;
Output 2.1.7. Inventory of Tree Resources (native and introduced timber and fruit trees)
The project will develop a website to compile and disseminate results, good practices and experiences and these will be connected to relevant national and regional platforms to ensure wider coverage and sustainability. The SOLA/OT and M&E databases will consolidate results and form the basis for

knowledge products, including on native tree species and fruit tree crops in agroforestry systems. The databases will play a central part in planning and decision making to implement agro-ecosystem management practices across the islands through this project and beyond. As described under Output 3.1.3, the project will support exchange with other countries at the biome and ecoregion level, as well as regional/global exchange and sharing of IAE approach as experiences in SLM, and will support the development of a mechanism for dissemination and exchange of best practices and lessons for the replication of results in other similar atoll nations. The project will share information, data, lessons learned, etc. with donor funded projects in other atoll nations through the proposed project website. During the PPG, discussions were also held with PCCC/SPREP on the potential use of project results as case studies for future online courses offered by the Centre.

In addition to above, to ensure proper incorporation of lessons learnt and avoidance of any potential overlaps or duplication, documents under all relevant/related projects (both past and ongoing) will be collected and reviewed. The Communications and Knowledge Management support officer will work closely with the project management team and other partners in ensuring that the KM strategy is implemented and that related activities are undertaken to meet the project?s objectives.

The relevant KM budget and key deliverables are shown below.

Deliverable	Timeline	Budget
1. Development of Communications and KM Strategy by the Communications & KM Support Officer	Year 1	USD 48,000
2. Implementation of Strategy	Years 1-4	(covered by above)
3. Communications materials & Publications	Years 1-4	USD 10,000
Total Budget		**USD 58,000**

9. Monitoring and Evaluation

Describe the budgeted M and E plan

As described in Output 3.1.1, a detailed M&E strategy will be prepared during the inception phase as an adaptable and living document and will be reviewed periodically during the implementation phase. It will include clear methodologies and tools (including the use of the SOLA/OT mobile app) for data collection in the field by the communities and by Project Field Officers for tracking the indicators of the Result Framework. A M&E project officer will be recruited as a member of the PMU and will be responsible for putting in place mechanisms for data collection and information to ensure good quality, validity, and accuracy of data for tracking the Results Framework indicators and for work planning purposes.

Project oversight and supervision will be carried out by FAO?s Budget Holder (BH), supported by the FAO Project Task Force (PTF), including the Lead Technical Officer (LTO) and Funding Liaison Officer (FLO) and relevant technical units in FAO headquarters as needed. Oversight will ensure that: (i) project outputs are produced in accordance with the project results framework leading to the achievement of project outcomes; (ii) project outcomes are leading to the achievement of the project objective; (iii) risks are continuously identified and monitored and appropriate mitigation strategies are applied; and (iv) agreed upon project global environmental benefits/adaptation benefits are being

delivered. The FAO GEF Coordination Unit and HQ Technical Units will provide oversight of GEF financed activities, outputs and outcomes largely through the annual Project Implementation Reports (PIRs), periodic backstopping and supervision missions.

Project monitoring will be carried out by the PMU hosted by the OP. Project performance in terms of development impact will be monitored using the project Results Framework matrix (Annex A1), including indicators (baseline and targets) and AWP&B.

At project inception, the Results Framework matrix will be reviewed to finalize and revalidate the: i) outputs; ii) indicators; iii) any missing baseline information; and iv) targets at end of project. A detailed M&E plan, which builds on the results matrix and defines specific requirements for each indicator (data collection methodologies and tools, frequency, responsibilities for data collection and analysis, etc.) will also be developed during project inception by the M&E Officer appointed at the PMU.

Project Monitoring and Evaluation Plan

M&E Activity	**Responsible Parties**	**Timeframe**	**GEF Budget (USD)**
Inception Workshop	Project Management Unit (PMU), OP, BH	Within two months of project document signature	1,500
Project Progress Reports (PPRs)	PMU, OP, LTO/BH	Bi-annually	NPC & STA 9,550
Project Implementation Review reports (PIRs)	PMU, OP, BH/LTO	Annually in July	Covered by above
PSC meetings	PMU, PSC members	annually in 8 islands	2,000
Technical Advisory Group meetings	PMU	Bi-annually	2,000
LDN database related datasets integrated with M&E implementation	PMU	Annually, aligned with PIR	Coordinator ? NTSP-LDN
Mid-term Review	PMU and BH	In the 3rd quarter of the 3rd year of the project	50,000
Terminal Evaluation	The BH will be responsible to contact the Regional Evaluation Specialist (RES) within six months prior to the actual completion date (NTE date). The RES will manage the decentralized independent terminal evaluation of this project under the guidance and support of OED.	To be launched within six months prior to the actual project completion date	50,000
Terminal Report	PMU/OP, BH, LTO	Two months before the end date of the project	STA 6,550
Midterm and Final Evaluation workshop	PMU, BH, LTO	once	3,500
Total Budget			**125,100**

Specific reports that will be prepared under the M&E program are: (i) Project inception report; (ii) Annual Work Plan and Budget (AWP/B); (iii) six-monthly Project Progress Reports (PPRs); (iv) Annual Project Implementation Review (PIR); (v) Technical Reports; (vi) co-financing reports; and

(vii) Terminal Report. In addition, assessment of the relevant GEF-7 Core Indicators against the baselines will be required at mid-term and final project evaluation.

Project Inception Report. The PMU will prepare a draft project inception report in consultation with the LTO, BH and other project partners. Elements of this report should be discussed during the project Inception Workshop and the report subsequently finalized. The report will include a narrative on the institutional roles and responsibilities and coordinating action of project partners, progress to date on project establishment and start-up activities, and an update of any changed external conditions that may affect project implementation. It will also include a detailed first year AWP/B, and a detailed project monitoring plan. The draft inception report will be circulated via e-mail to the PSC for review and comments before its finalization, no later than one month after project start-up. The report should be cleared by the FAO BH, LTO and the FAO GEF Coordination Unit and uploaded in FAO?s Field Program Management Information System (FPMIS) by the BH.

Results-based Annual Work Plan and Budget (AWP/B). The draft of the first AWP/B will be prepared by the PMU in consultation with the FAO Project Task Force and reviewed at the project Inception Workshop. The Inception Workshop inputs will be incorporated and subsequently, the PMU will submit a final draft AWP/B to the BH within two weeks after the workshop. For subsequent AWP/B, the PMU will organize a project progress review and planning meeting for its progress review and adaptive management. Once PSC comments have been incorporated, the PMU will submit the AWP/B the LTO for technical clearance, to the BH for non-objection, and onto the FAO GEF Coordination Unit for comments prior to uploading in FPMIS by the BH. The AWP/B must be linked to the project?s Results Framework indicators to ensure that the project?s work and activities are contributing to the achievement of the indicators. The AWP/B should include detailed activities to be implemented to achieve the project outputs and output targets and divided into monthly timeframes and targets and milestone dates for output indicators to be achieved during the year. A detailed project budget for the activities to be implemented during the year should also be included together with all monitoring and supervision activities required during the year.

Project Progress Reports (PPR): PPRs will be prepared by the PMU based on the systematic monitoring of output and outcome indicators identified in the project?s Results Framework (Annex A1). The purpose of the PPR is to identify constraints, problems, or bottlenecks that impede timely implementation and to take appropriate remedial action in a timely manner. PPRs will also report on the project?s risks and implementation of the risk mitigation plan. The Budget Holder has the responsibility of coordinating the preparation and finalization of the PPR, in consultation with the PMU and the Project Task Force (PTF) members. After LTO, BH, and FLO clearance, the FLO will ensure that project progress reports are uploaded in FPMIS in a timely manner.

Annual Project Implementation Review (PIR): The PMU, in collaboration with the BH and the LTO, will prepare an annual PIR covering the period July of the previous year through June of the current year. The PIR needs to be submitted to the FAO GEF Coordination Unit Funding Liaison Officer (FLO) for review and approval no later than end of June/early July each year (the exact timelines for submission are communicated each year by the GEF Coordination Unit). The PMU will submit the first PIR draft to FAO BH/LTO, once finalized, the BH/LTO will submit it to the FAO GEF Coordination Unit as part of the Annual Monitoring Review report of the FAO-GEF portfolio. PIRs will be submitted to the GEF and uploaded on the FPMIS by the FAO GEF Coordination Unit.

Technical Reports: Technical reports will be prepared by national, international consultants (partner organizations under Letters of Agreement) as part of project outputs and to document and share project outcomes and lessons learned. The drafts of any technical reports must be submitted by the PMU to the BH who will share it with the LTO. The LTO will be responsible for ensuring appropriate technical review and clearance of said report. The BH will upload the final cleared reports onto the FPMIS. Copies of the technical reports will be distributed to project partners and the Project Steering Committee as appropriate.

Co-financing Reports: The BH, with support from the PMU, will be responsible for collecting the required information and reporting on co-financing as indicated in the Project Document/CEO Endorsement Request. The PMU will compile the information received from the executing partners and transmit it in a timely manner to the LTO and BH. The report, which covers the period 1 July through 30 June, is to be submitted on or before 31 July and will be incorporated into the annual PIR. The format and tables to report on co-financing can be found in the PIR.

Core Indicators worksheet. In compliance with GEF policies and procedures, at project mid-term and completion, the Project Coordinator will report results achieved against the core indicators and sub-indicators used at CEO Endorsement/ Approval.

Terminal Report: Within two months before the end date of the project or the ending date of the LOA, the PMU will submit to the BH and LTO a draft Terminal Report. The main purpose of the Terminal Report is to give guidance at ministerial or senior government level on the policy decisions required for the follow-up of the project, and to provide the donor with information on how the funds were utilized. The Terminal Report is accordingly a concise account of the main products, results, conclusions and recommendations of the project, without unnecessary background, narrative or technical details. The target readership consists of people who are not necessarily technical specialists but who need to understand the policy implications of technical findings and needs for ensuring sustainability of project results.

Evaluation Provisions

Two independent project evaluations, a Mid-Term Review (MTR) in the 3rd quarter of project year 3 and a Terminal Evaluation (TE), to be launched within six months prior to the actual project completion date, will be carried out. The BH will arrange an independent MTR in consultation with the PSC, the PMU, the LTO and the FAO-GEF Coordination Unit. The MTR will be conducted to review progress and effectiveness of implementation in terms of achieving project objective, outcomes and outputs. The MTR will allow mid-course corrective actions, if needed. The MTR will provide a systematic analysis of the information on project progress in the achievement of expected results against budget expenditures. It will refer to the Project Budget (see Annex A2) and the approved AWP/Bs. It will highlight replicable good practices and key issues faced during project implementation and will suggest mitigation actions to be discussed by the PSC, the LTO and FAO-GEF Coordination Unit.

The GEF evaluation policy foresees that all medium and large size projects require a separate **terminal evaluation**. Such evaluation provides: i) accountability on results, processes, and performance; ii) recommendations to improve the sustainability of the results achieved and iii) lessons learned as an evidence-base for decision-making to be shared with all stakeholders (government, execution agency, other national partners, the GEF and FAO) to improve the performance of future projects.

The BH will be responsible for contacting the Regional Evaluation Specialist (RES) six months prior to the actual completion date (NTE date). The RES will manage the decentralized independent terminal evaluation of this project under the guidance and support of OED and will be responsible for quality assurance. Independent external evaluators will conduct the terminal evaluation of the project taking into account the ?GEF Guidelines for GEF Agencies in Conducting Terminal Evaluation for Full-sized Projects?. The FAO Office of Evaluation (OED) will provide technical assistance throughout the evaluation process, through the OED Decentralized Evaluation Support team. In particular, it will also give quality assurance feedback on the selection of the external evaluators Terms of Reference of the evaluation, the draft and final reports. OED will be responsible for the quality assessment of the terminal evaluation report, including the GEF ratings.

After the completion of the terminal evaluation, the BH will be responsible for preparing the management response to the evaluation within four weeks and sharing it with national partners, GEF OFP, OED and the FAO-GEF Coordination Unit.

Disclosure

The project will ensure transparency in the preparation, conduct, reporting and evaluation of its activities. This includes full disclosure of all non-confidential information, and consultation with major groups and representatives of local communities. The disclosure of information shall be ensured through posting on websites and dissemination of findings through knowledge products and events. Project reports will be broadly and freely shared, and findings and lessons learned made available.

10. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels, as appropriate. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

The project will generate important socio-economic benefits, including benefits for COVID-19 recovery and climate resilience at the local level in Tuvalu. In particular, it will generate benefits to a total of 2,750 direct beneficiaries, of which 1,100 women and 1,650 men.

The SLM practices using IAE approach to be promoted will include improved management of pigs by promoting DLT and biodigesters for managing waste that will generate significant socioeconomic benefits, including: reduction in foul odour from current production systems; availability of biogas for cooking, reducing the pressure on the ecosystem for provisions of firewood; organic fertilizer for home gardens and growing crops; and availability of pigs to meet community and cultural obligations.

In addition, the expected improvements in local food production will provide socioeconomic benefits, including: availability of more nutritious local food, which improves health; reduce household expenditures on low nutritious imported foods; support domestic trading to provide income, especially for rural communities in outer island who supply most of the local foods to Funafuti. The project will also support opportunities for economic empowerment of women by supporting food processing methods and through provisional ecosystem services in fibre for handicrafts and plants with high medicinal value.

Furthermore, the project will revive traditional farming skills based on traditional ecological knowledge that are cultural heritage to be preserved and have been the foundation of Tuvaluan culture and resilience for many generations.

Thereby, the project interventions will also contribute to full and productive employment and decent work in rural areas, aiming at the progressive realization of local peoples? right to Decent Rural Employment.[1]

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[1] For more information on FAO?s work on decent rural employment and related guidance materials please consult the FAO thematic website at: http://www.fao.org/rural-employment/en/.

11. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
	Medium/Moderate		

Measures to address identified risks and impacts

Elaborate on the types and risk classifications/ratings of any identified environmental and social risks and impacts (considering the GEF ESS Minimum Standards) and any measures undertaken as well as planned management measures to address these risks during implementation.

Section B: Environmental and Social risks from the project.

Environmental and Social Risk Classification: moderate risk

Following FAO?s Environmental and Social Management Guidelines, the proposed project?s risk is classified as Moderate. Based on the project objective, outcomes and outputs, no adverse environmental or social impacts are likely. Minor risks identified are addressed in the following section. Please refer to Annex I1 and Annex J for a more detailed analysis. The risk certification is attached as part of Annex I1.

The actions proposed for the project to manage and effectively mitigate the identified environmental and social risks are summarized below. All identified risks are considered small in scale, localized and low risk. COVID-19 and climate risks are elaborated separately in Section 5.A of the Project Document. The Project Management Unit (PMU) established in the Ministry of Local Government and Agriculture (MLGA) will be responsible for ensuring implementation, monitoring, and reporting of these actions.

Social & Environmental Risks and Impacts	Mitigation measures	Responsible	Cost	Timeline
ESS 1: Natural Resource Management				
n/a				
ESS 2: Biodiversity, Ecosystems and Natural Habitats				

Introduced plants may become invasive under tropical atoll conditions	Generally, the project will use species and planting material already available in the country. However, given the limited planting material available in Tuvalu, the project may source additional plant varieties from other Pacific countries (such as new cultivars of coconut and other tree and crop species for the agroforestry systems). Existing biosecurity measures in the country will be applied and experiences from the region will be taken into account. DOA/MLGA will assess invasiveness in research facilities before release. All procurement of seeds and planting material will require prior clearance by FAO?s Lead Technical Officer or relevant HQ Technical Officer. Additionally, the requirements of ESS 3 on Plant Genetic Resources for Food and Agriculture (PGRFA) will be duly followed. Where the transfer of seeds or planting material occurs, the following have to be ensured: a. The transfer of PGRFA, including across national boundaries, are in line with agreed international norms for access and benefit sharing, especially as stipulated by the International Treaty on Plant Genetic Resources for Food and Agriculture and the Nagoya Protocol of the CBD; b. Only disease and pest-free seeds and planting materials are used and/or transferred according to agreed norms, especially as stipulated by the International Plant Protection Convention (IPPC); c. Intellectual property rights, especially of the plant breeders who develop new crop	PMU/ MLGA	USD 10,000 for environmental impact assessment	Years 1-4

Risk of minor impacts on local environment from small-scale structures/ facilities	No infrastructure work will be undertaken; only minor structures such as cement pits, piggery biodigesters, minor renovation works of the laboratory, or small facilities in existing market places (such as toilet/sink facilities for use by the vendors and farmers) will be financed by the GEF grant. The market infrastructure itself will be financed and implemented through separate funds. Additionally, the project will ensure that any waste generated by the project is properly disposed of, in line with national and island legislation and regulations. As noted above, the project is not expected to generate significant amount of waste. No hazardous materials will be used.			
ESS 3: Plant Genetic Resources for Food and Agriculture				
n/a				
ESS 4: Animal - Livestock and Aquatic - Genetic Resources for Food and Agriculture				
n/a				
ESS 5: Pest And Pesticide Management				
Imported topsoil has potential to bring pests and diseases	Some importing of topsoil may be required for the implementation of SLM activities. Quarantine Unit will ensure biosecurity treatment measures have been applied and all consignments are accompanied with the right certificates that meet biosecurity requirements. Budget has been added to conduct an environmental impact assessment before importing any topsoil plant material. Close collaboration will be sought with the Secretariat for the Pacific Community (SPC) and their Land Resources Division (LRD).	PMU/ MLGA	USD 10,000 for environmental impact assessment	Years 1-4

Pesticides	The project will not involve any procurement or handling of chemical pesticides. This will be ensured through the project?s procurement plan, which needs to be approved by FAO?s Lead Technical Officer.	PMU/ MLGA	No extra costs	Years 1-4
ESS 6: Involuntary Resettlement and Displacement				
n/a				
ESS 7: Decent Work				
Health and safety risks	Health and safety risks from the small-scale infrastructure above are considered minor. Tools and equipment provided will also be small scale. The project will ensure that adequate measures will be taken to ensure safety of workers and farmers during these activities.	PMU/ MLGA	No extra costs	Years 1-4
ESS 8: Gender Equality				
Gender equality	The project already incorporates a Gender Analysis and Action Plan, with specific gender-targeted activities built into the project design.	PMU/ MLGA	See Gender Action Plan	Years 1-4
ESS 9: Indigenous Peoples and Cultural Heritage				
The project has indigenous peoples living in the project areas where activities will take place.	Please refer to Annex J for details. A Free, Prior and Informed Consent (FPIC) process will be applied during project implementation.	PMU/ MLGA	See Annex J for details.	Year 1

Health and safety risks related to COVID-19 or potential future pandemics. The project activities could contribute to the spread of COVID-19 affecting local communities/indigenous peoples.	Relevant health and safety measures of the Government will be strictly followed. A precautionary approach will be taken by the project, avoiding any movement of persons that could present a risk of spreading COVID-19. Safety guidelines and Personal Protective Equipment (PPEs) will be provided to prevent the risks of transmission. If necessary, mobile devices could be provided to enable virtual consultations with local communities. Further details related to COVID-19 recovery and mitigation measures are provided in the Project Document.	PMU/ MLGA	No extra costs	Years 1-4

Potential conflicts arise from the use of FAO?s Solutions for Open Land Administration/Open Tenure (SOLA/OT) tools (Output 1.1.4)	SOLA/OT was developed as a tool for communities to assess and clarify their tenure regimes so to protect the individual and collective rights of their members.[2] It provides a system for communities to jointly map their claims to tenure and includes checks on claims by the communities themselves.[3] The tool thereby contributes to the implementation of FAO?s *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests*.[4] The use of SOLA/OT is, thus, not anticipated to create conflicts, but rather can contribute to resolving potential conflicts or land disputes. Nevertheless, to mitigate the risk of potential conflicts, the project will apply a participatory, locally owned process. It will also ensure proper communication and engagement of stakeholders, as described in the Stakeholder Engagement Plan. Traditional dispute-solving mechanisms will be used. Finally, experiences from other countries in using SOLA/OT will also be taken into account (such as Samoa and Tonga).	PMU/ MLGA	No extra costs	Years 1-4

Cultural heritage	As noted in Annex J, it is not anticipated that the project will have any negative impacts on tangible or intangible cultural heritage. As explained above, no infrastructure work will be undertaken; only minor structures such as cement pits or small facilities in existing market places will be financed by the GEF grant.	PMU/ MLGA	No extra costs	Years 1-4

[1] Ridge to Reef Project (R2R), Department of Environment (2017). Rapid Biodiversity Assessment of the Conservation Status of Biodiversity and Ecosystem Services (BES) In Tuvalu. https://www.sprep.org/attachments/VirLib/Tuvalu/r2r-biorap.pdf

[2] https://www.fao.org/tenure/sola-suite/about/en/

[3] https://www.fao.org/documents/card/en/c/cb0422en/

[4] https://www.fao.org/tenure/voluntary-guidelines/en/

Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
ESS Tuvalu	**CEO Endorsement ESS**	

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Annex A1: Project Results Framework

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
OBJECTIVE: To reverse land degradation, enhance local livelihoods and increase climate resilience through integrated agro-ecosystem approach in all the islands of Tuvalu							
Component 1: Strengthening enabling framework for implementation of integrated agro-ecosystem approach.							

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Outcome 1.1: Strengthened policies and planning mechanism for the agro-ecosystem approach throughout the country	1. Implementation of key priorities of cabinet approved National Food System and Nutrition Policy and UNCCD NAP through multi-stakeholder institutional arrangements and cross-sectoral coordination.	No overarching policy to support mainstreaming of the agroecosystem health in food production and to guide coordination across institutions and sectors. A National Food Security Strategy (2021-2031) is in draft form and a National Food Systems Pathway was submitted to the UN Food Systems Summit in 2021. Both the Strategy and Pathway do not address the importance of ecosystem services in agricultural units.	Drafts of NFSNP and UNCCD NAP developed through multi-sectoral participation.	Both NFSNP and UNCCD NAP approved by Cabinet with key priorities implemented.	NFSNP and UNCCD NAP documents. Project M&E.	Political leadership is secured to support multi-sectoral mechanisms and coordination.	PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
	2. Multi-sectoral Land Degradation Neutrality (LDN) Forum established.	No coordination mechanism in place for LDN.	LDN Forum established and held at least 2 meetings.	LDN Forum established and held at least 6 meetings.	LDN Forum Minutes	LDN Forum open to regional expertise in technical advisory roles.	DOE/MPWIELMD
	3. Each island has a Island SOLA/OT Land Tenure Committee established under the auspice of its Falekaupule to approve or not SOLA/OT land user rights and land use recordings.	The formal land tenure system is governed by the Lands Division of MLGA. There are no mapping tools used by Falekaupule for community planning and decision making.	Terms of Reference for Island SOA/OT Land Tenure Committees finalised, members identified, and received training on their roles.	Island SOA/OT Land Tenure Committees well trained and able to approve recordings.	Approved recordings in the SOLA/OT database	There is absolute clarity and understanding that the proposed Island SOLA/OT Land Tenure Committees ARE NOT the 6 member Lands Court. The Falekaupule has full ownership and oversight.	PMU, DOA/MLGA, Falekaupule

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
	4. Spatial geo-referenced data recordings of land user rights and land use, approved by the 8 Island SOLA/OT Land Tenure Committees in databases cover 100% of the country land area of 26km2 (2,600ha). [*Note: The SOLA/OT recordings of land users is an ?informal? system, aligned with, but not a replacement of, the ?formal/legal? land registry.*]	Each island has a 6 member Lands Court established under Article 6 of the Lands Act (2008 Revised Edition). A registry of native lands is established in each island under the provisions of the Native Lands Commission Act.	25% of land user and land use recordings completed.	100% of land user and land use recordings completed and approved by the 8 Island SOLA/OT Land Tenure Committees.	SOLA/OT digital platform.	There is absolute clarity and understanding that the SOLA/OT recordings of land users is an ?informal? system, aligned with, but not a replacement of, the ?formal/legal? land registry.	Communities, Project Field Officers, DOA/MLGA, DOE/MPWIELMD

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 1.1.1. National Food System and Nutrition Policy (NFSNP) developed.	5. National Food System and Nutrition Policy (NFSNP) approved by Cabinet.	The 1996 National Food and Nutrition Policy is 25 years old and outdated. Many projects exist to address food and nutrition security but no overarching policy to guide coordination across institutions and sectors.	Draft National Food System and Nutrition Policy	National Food System and Nutrition Policy approved by Cabinet	National Food System and Nutrition Policy publication	Multi-sector participation in the process is guaranteed.	PMU
Output 1.1.2: Updated UNCCD National Action Plan (NAP) and National Land Degradation Neutrality (LDN) Strategy and a LDN target setting process.	6. UNCCD NAP updated and aligned with the new Convention Strategic Framework.	The UNCCD NAP developed in 2006 is outdated and does not include the concepts of LDN.	UNCCD NAP updated	UNCCD NAP updated	UNCCD NAP publication	UNCCD Focal Point will remain in the role during project implementation.	DOE/MPWI ELMD
	7. Land Degradation Neutrality (LDN) Strategy developed with clear Tuvalu-specific LDN indicators and targets.	The LDN concept, as per the 2030 Sustainable Development Agenda (SDGs) and new Convention Strategic Framework has not been introduced in Tuvalu.	LDN Strategy drafted.	LDN indicators and targets identified in the 3 LDN indicator categories of Land Productivity, Land Cover, Soil Organic Carbon Stock.	LDN Strategy publication.	UNCCD Focal Point will remain in the role during project implementation.	DOE/MPWI ELMD

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 1.1.3: National Technical Support Programme for LDN and agro-ecosystem health (NTSP-LDN)	8. Number of sites with georeferenced soil and plant datasets generated by NTSP-LDN uploaded in a database for assessing soil health and for purposes of LDN indicators ? LPD/NPP and SOC	No scientific and analytical capacity to assess soil health and to implement the LDN Strategy in terms of identifying and collating datasets for locally relevant and Tuvalu-specific LDN indicators: LPD/NPP and SOC	NTSP-LDN established. Protocols developed to assess soil health and collect datasets for Tuvalu-specific LDN indicators: LDN/NPP and SOC. At least four georeferenced sites on each island has soils nutrients and plant nutrients content in databases.	NTSP-LDN institutionalised in MLGA and offering technical support across sectors and to the LDN indicators and target setting process. At least six georeferenced sites on each island has significant soils nutrients and plant nutrients content in databases.	Project M&E	Enough science graduates to run the NTSP-LDN and to be trained in collaboration with SPC and USP.	DOA/MLGA

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 1.1.4: Open-source community mapping tool (SOLA/OT) for crowd-sourcing and recording of customary land tenure and land use (agro-ecosystem) data.	9. SOLA/OT Community Servers installed within each Falekaupule, with SOLA database populated with data of geo-referenced boundaries of land parcels tagged to land user (household, communal, or public) together with land use and agricultural ecosystem data within those boundaries.	The formal land cadastral data are held by the Lands Division. The SOLA/OT has not been customized for Tuvalu. Agro-ecosystems data collected under the GEF R2R project using EpiCollect mobile app are stored in a database at the Department of Environment.	SOLA/OT Manuals customized for Tuvalu. 50% of survey maps uploaded to the database. First set of trainings on the use of OT mobile app caried out. First set of trainings on Community Server Administrators carried out.	SOLA/OT database populated. Compatibility with q-GIS established. 100% survey maps uploaded. Trainings on the use of OT mobile app caried out. Trainings on Community Server Administrators carried out. Trainings on installation and maintenance of Community Server completed.	SOLA website linked to the Project website for visualization.	A local IT person is available to be trained on installation and maintenance of a Community Server. Internet connections adequate for training and regular maintenance.	PMU/Project Field Officers, Community members
COMPONENT 2. Implementation of integrated agro-ecosystem approach in the islands.							

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Outcome 2.1 Local communities are applying integrated agroecosystem approach in the target areas	10. Area of landscapes under SLM in production systems - where IAE approach have been adopted.	Agro-forestry systems piloted; No integrated livestock-crop farming systems; Pulaka pits modified to use modern materials like cement	350ha comprising of: ? 230ha agro-forestry areas ? 40ha Home Gardens ? 70ha of integrated livestock/piggery-crop farming systems ? 10ha pulaka pit areas rehabilitated	650 ha comprising of: ? 400 ha agro-forestry areas ? 100ha Home Gardens ? 150ha of integrated livestock/piggery-crop farming systems	M&E database, SOLA/OT database, Project Progress Reports (PPR, PIR).	Project Field Officers equipped with the right tools to support data collection.	PMU
	11. Area of land restored, including land area of abandoned pulaka pits rehabilitated	About 70% of pulaka pit areas (~1.4ha) in Funafuti have been abandoned. Several pulaka pits in outer islands have also been abandoned. Several coastal lands have eroded due to sea-level rise and invasive species dominate.	10ha pulaka pit areas return to productivity	150 hectares comprising: - 20 ha pulaka pit areas return to productivity - 130ha eroded coastal land rehabilitated into agro-forestry systems and where invasive species removed	SOLA/OT database, M&E database	No land tenure disputes restricting access and use.	PMU, DOA/MLGA

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
	12. Percentage of households with a piggery waste management technology contributing to Greenhouse gas mitigation.	The 2017 Agricultural Census found 1,242 households raising pigs, and average pig holding of 8.8. There are currently no biodigesters used to manage piggery waste	5% of total number of HHs (62) raising pigs has DLT or biodigester technology to manage waste.	25% of total number of HHs (310) raising pigs has DLT or biodigester technology to manage waste.			
	13. Greenhouse Gas Emissions Mitigated (metric tons of CO2e):	The Tuvalu UNFCCC 2nd National Communication reported 267 metric tons CO2eq of CH4 from livestock waste and no accounting for carbon sequestration	25 metric tons of CO2eq from land use change to agro-forestry and improved crop management	100,694 metric tons of CO2eq: - 100,274 metric tons of CO2eq from direct land use change & crop management; 420 metric tons of CO2eq from avoided CH4 emission from piggeries	PIR	Capacity to use tools such as FAO?s Ex-Ante Carbon-balance tool (EX-ACT)	PMU
	14. Number of direct beneficiaries disaggregated by gender	n/a	1,100 people (~10% of population): - 650 men; 500 women	2,750 people (~25% of population): - 1,650 men; 1,100 women	PIR, M&E plan	M&E plan linked to the GAP developed during inception phase	PMU, MHSWGA

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 2.1.1 Particpatory integrated and whole Island Agro-ecosystem Action Plans (IAEAP) prepared, in the context of Islands Strategic Plans (ISP)	15. Eight (8) IAEPs developed and approved by each island Falekaupule.	Recommendation #6 of the TASMP is to ?Strengthen the development of agriculture on each island through planning and formulation of island agriculture plans?. No action has been made on this recommendation.	Synthesis of the ISPs completed, consultations carried out in all 8 islands, 1st drafts of all 8 IAEPs drafted	8 IAEPs developed and approved by each island Falekaupule	Publications of the IAEAPs.	Falekaupule have complete ownership of the IAEAP process. DOA/MLGA oversight secured in the context of the ?Kaupule Integrated Planning and Reporting Framework? for the ISPs	DOA/MLGA, PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 2.1.2: IAE Toolkits/ How-To-Manuals to support Integrated Agro-ecosystem approaches.	16. A series of at least six (6) IAE toolkits including, but not limited to: installation of piggery biodigesters; home gardening systems; composting; seed saving methods and seedlings; food processing; homemade production of biochar and liquid organic fertiliser, made available on a digital platform.	A Biogas Toolkit was prepared under the EU/GIZ funded Tuvalu Biogas project as hard copy. A SLM Training Manual for local farmers in Tuvalu was prepared under the Ridge to Reef (R2R) UNDP/GEF project as hard copy. There are no toolkits available as videos and made available on a digital platform.	At least 4 IAE toolkits developed	At least 6 IAE toolkits developed including ?how to? manuals and videos made available on the project website	Project website.	Efficient procurement of services of Technical Specialists (local and international).	PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 2.1.3: Farmer Field Schools (FFS) and Training on IAE approaches.	17. Number Trainers trained in FFS methodology and on the use of IAE approach toolkits.	DOA/MLGA has 10 staff in the Extension Services Unit, 10 in the Agro-forestry & Research Unit, and 5 in the Livestock Unit who have received various trainings in the areas covered in the IAE toolkits, under the baseline projects listed in section 1 of this Prodoc.	33 FFS & IAE Trainers trained: 25 MLGA staff + 8 Project Field Officers.	33 FFS & IAE Trainers trained: 25 MLGA staff + 8 Project Field Officers.	Project Progress Reports: 6th monthly PPR and annual PIR.	FFS and IAE Trainers can plan and accommodate the project activities within their workloads.	PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
	18. Number of FFS & IAE training events conducted, plus number of community members who participated disaggregated by gender.	Of the 1 626 total households 1 464 (90 percent) reported some type of agricultural activity, including livestock raising (reported by 84 percent of all households), crop growing (69 percent), buying or selling fish (60 percent) and handicrafts (35 percent)	At least 8 total of FFS and IAE training sessions on each island (1 per island) attended by 240 community members, including at least 80 women.	32 total of FFS and IAE training sessions on each island (4 per island), attended by 240 community members, including at least 80 women.	Project Progress Reports: 6th monthly PPR and annual PIR.	FFS and IAE Trainers can plan and accommodate the project activities within their workloads. Strong community interest in local food production.	PMU/Project Field Officers
Output 2.1.4: Island Agro-ecosystem Action Plans implemented, in synergy with, and in support of Islands Strategic Plans	19. Percentage increase in population involved in local food production, based on percentage increase in population 15years and older reporting main activity in the last 7 days as ?Producing Good for their own Consumption?.	The 2016 HIES Survey Report found 12.1% of the population 15years and older reported their main activities in the last 7days at the time of the survey, as ?Producing Good for their own Consumption?.	15% of the population 15years and older reported their main activities in the last 7days at the time of the survey, as ?Producing Good for their own Consumption?.	30% of the population 15years and older reported their main activities in the last 7days at the time of the survey, as ?Producing Good for their own Consumption?.	M&E Plan will include a questionnaire to be conducted prior to annual PIR that include a question on main activity in previous 7 days.	Strong community interest in local food production. Project Field Officers well equipped with tools for data collection.	PMU/Project Field Officers

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
	20. Number of Home Gardens established at homes, schools and Women Groups.	The Friendship Garden initiative in Funafuti helped established 20 home gardens in Funafuti. The Hope Garden initiative in Vaitupu helped established 10 home gardens.	33 Home Gardens of various systems (wicking, raised bed, keyhole, water-ponding) established : 5 in Funafuti plus 28 (4 in each outer island)	52 Home Gardens of various systems (wicking, raised bed, keyhole, water-ponding) established : 10 in Funafuti plus 42 (6 in each outer island)	Project Progress Reports: 6th monthly PPR and annual PIR.	Strong community interest in various home gardening systems	PMU/Project Field Officers
	21. Domestic trading of locally produced foods and other provisional services (handicrafts, building materials, etc.).	A market space is available at the Ulukai building next to the Funafuti Kaupule Building, where local produce used to be sold.	Market infrastructure completed	Market infrastructure completed and local trading sustained.	Communication products. Project Progress Reports (PPR, PIR).	An effective Market management structure is in place to ensure operations and maintenance of the facilities.	PMU
Output 2.1.5: Improved productivity of pulaka pit areas through revival of applied traditional ecological knowledge and modern production techniques.	22. Number of cement pulaka pits established at homes and pulaka pit areas.	Several cement pulaka pits were established under NAPA.	26 cement pulaka pits established : 5 in Funafuti plus 21 (3 in each outer island)	45 cement pulaka pits established : 10 in Funafuti plus 35 (5 in each outer island)	M&E database, Project Progress Reports: 6th monthly PPR and annual PIR.	Adequate labour to establish and maintain the cement pulaka pits.	PMU/Project Field Officers

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 2.1.6. Nurseries (for both native trees, introduced trees and crops) installed and/or upgraded.	23. Number of nurseries installed or upgraded.	A total of 10 nurseries have been installed: 3 in Funafuti and 1 in each outer island except in Niulakita.	At least 8 nurseries installed or upgraded	At least 8 nurseries installed or upgraded	M&E database, Project Progress Reports (PPR, PIR)	There is adequate labour and community participation to maintain the nurseries.	PMU
	24. Number of timber trees, fruit trees and vegetable seedlings produced	920,000 fruits and vegetable seedlings produced under the TTMT Friendship Garden initiative.	250,000 timber trees, fruit trees and vegetable seedlings produced	1,000,000 timber trees, fruit trees and vegetable seedlings produced	M&E database, Project Progress Reports (PPR, PIR)	Project Field Officers well equipped with the tools to support the collection of data.	PMU
Output 2.1.7: Inventory of Tree Resources (native and introduced timber and fruit trees)	25. Land area with completed inventories	The R2R GEF project caried out preliminary work collecting tree resources data, using EpiCollect mobile app.	650ha (25% of total land area)	2,600ha (100% of total land area).	SOLA/OT database and GIS maps	The 10 staff at Agroforestry & Research Unit of DOA/MLGA will work cooperatively with staff at DOE/MPWIELMD.	DOE/MPWIELMD, DOA/MLGA, Project Field Officers
COMPONENT 3. Project coordination, monitoring and evaluation							
Outcome 3.1 Project implementation is supported by an M&E strategy	26. A Project M&E Strategy developed and implemented.	n/a	Draft M&E Strategy designed and some key priorities implemented	M&E Strategy successfully implemented and inform the Exit Strategy	M&E Strategy database	Project Field Officers well equipped with the tools to support the collection of data.	PMU, M&E Specialist.

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
based on measurable and verifiable outcomes and adaptive management principles	27. LDN target monitoring and reporting mechanism established to support the LDN Forum.	No LDN targeting setting in place.	Terms of Reference for LDN target monitoring and reporting mechanism approved by the LDN Forum	At least 3 technical reports on the 3 LDN categories (Land Productivity, Land Cover, Soil Organic Carbon Stock) presented to the LDN Forum.	Technical Reports presented to the LDN Forum	Technical support to the LDN target monitoring and reporting mechanism will be supplemented by a network of regional scientists and agencies.	PMU, DOA/MLGA
	28. A Communications and Knowledge Management Strategy developed and implemented.	n/a	A Communications and Knowledge Management Strategy developed with some key priorities implemented: ? A website designed and live online. ? Comms products to provide brief overview of the project (e.g., video, brochure, factsheets) At least 6 videos documenting activities in the field.	A Communications and Knowledge Management Strategy developed and implemented with results, good practices and lessons learned made available on a project website.	A well populated project website.	A qualified, competent and skilled Communications Specialist is available throughout the project.	PMU
Output 3.1.1. Project Monitoring and Evaluation Strategy **Output 3.1.2**. Food security and LDN target monitoring and reporting mechanisms established **Output 3.1.3.** Communications and Knowledge Management Strategy							

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Reviewer/Agency Response	Review/Response issues for PPG to address	How review issue is addressed
GEF Secretariat and STAP at PIF		
GEF Sec Review: Agency Response (4/14/20)	The number of beneficiaries were derived using the national census and correlation with the indicative locations to be targeted by the project. **This estimation will be clarified and confirmed during the PPG phas**e.	Revised totals based on PPG consultations and proposed Work Plan activities in the Results Framework. The 2017 Population and Housing Census, reported 1,3178 (90%) of households participate in some type of agricultural activity, including livestock raising (84%), crop growing (69 %), buying or selling fish (60%) and handicrafts (35 %t). The Results Framework targets 310 (25%) out of 1,242 households raising pigs to install either a DLT or biodigester technology for managing piggery waste. Overall, around 25% of total population are expected to participate in training in, and establishment of, food gardening systems. Final estimates of beneficiaries are: Men: 1,650 Women: 1,100 Total: 2,750 (roughly 25% of the population)

GEF Sec 4/14/20)	At PPG please provide addition details in the project document on the challenges related to value chain development that the project is in turn seeking to address.	The project will ensure synergistic implementation with the FAO Technical Cooperation Programme (TCP) aimed at supporting and strengthening smallholder value chains and align activities with those carried out by the Government in support of the TASMP 2016-2025. One of the major challenges identified during PPG consultations in terms of developing value chains is limited understanding and information along the value chains, including quantification of supply from primary production to meet market demand. The value chains that exist require further strengthening, especially in understanding market access and access to finance, and value-addition (primary and secondary processing). In this regard, the project will establish synergistic implementation with the implementation of the new Food Security Strategy led by the Business Unit of the Ministry of Finance, in particular the opportunities to sell local foods and food products at local Produce Markets the government is investing in. In addition, there is a lack of adequate understanding of the natural capital utilized along the value chain, to identify and recognize income opportunities and support sustainable use of the natural resources base by local populations. Output 1.1.3 will address this issue by providing scientific datasets to better understand the land based natural capital. Furthermore, training will be provided on various parts of the value chain to promote trading of local food and food products.
GEFSec 3/24/20	Baseline GEF Projects: R2R Project). Others missing (GEF ID 3694- ; GEF ID 9512- Climate Resilience in the Outer Islands of Tuvalu) could also serve as useful baselines in terms of resilience. Please include brief information in the PIF and **ensure more detailed plans for coordination are outlined during the PPG phase to avoid duplication**.	Other GEF projects including those in the LDCF portfolio have been added. The project supports a strategy approach to ensure synergistic implementation and to optimize addressing projects? sustainability challenges. The project strategy in this regard, revolves around Output 1.1.3 ? National Technical Support Programme that will develop LDN and assessing health of agro-ecosystems.

STAP Review 4/17/20	We note that a risk certification for the project has been attached, however in line with the GEF policy on Environmental and Social Safeguards, we expect further information on any measures to address identified risk during project design/development. In addition, please provide further information on additional assessments to be carried out during PPG.	A ESS strategy developed during PPG provide details of risks identified and measures proposed to address those risks.
STAP Review: Agency Response 4/17/20	During PPG phase, a Free Prior and Informed Consent will be conducted to ensure the project activities should outline actions to address and mitigate any potential impact. In addition, a Indigenous People?s Plan may be developed.	See Annex J which shows the Free Prior Informed Consent

Additional comments by STAP

STAP Assessment	Response
To support Tuvalu?s LDN efforts, STAP recommends for the project developers to assess the land potential in the target sites.	Output 1.1.3 establishes the NTSP-LDN and will build technical capacity at the national level to assess land potentials at project sites.
STAP highly recommends, therefore, for a systems-based theory of change to be a critical component of this project. Relying on a systems analysis-theory of change to design and implement the project, will provide valuable support to Tuvalu in managing the complexity of land degradation. STAP recommends developing a theory of change that describes the causal links between outputs and outcomes; and that identifies relevant stakeholders for engagement in different activities designed for achieving the expected outcomes. STAP recommends developing a systems-based theory of change with adaptation pathways. STAP encourages the project team to use the theory of change to monitor short- term outcomes, which are linked to the long-term outcomes the project will achieve. Because of the strong focus on capacity building, STAP suggests attention be paid to cultural aspects and values (related to scaling deep) to effect sustainable change.	A systems-based TOC has been developed and elaborated upon. The project?s TOC illustrates the various inter-related components of the agri-food system that relies on both the land based natural capital and the decisions made to improve local food production and food security (supported by policies, strategies and action plans) and that revolves around the science-policy interface in ensuring land degradation neutrality (LDN). The inter-related components of the TOC represent the various project outputs to be delivered. It illustrates the causal links between the outputs and their contributions towards ensuring LDN while supporting and driving community adoption of IAE approaches through integrated livestock ? crop/trees farming systems (Output 2.1.4). The TOC in this regard is; when LDN is secured while IAE approaches and integrated livestock ? crop/trees farming systems increase local production and improve climate adaptation, the project outcomes monitored using the indicators in the Results Framework will be achieved. The importance of customs and culture is emphasised and highlighted in the project?s TOC, which recognize: (i) both modern and traditional science knowledge (see Science box); and (ii)the importance of culture and customs in Te Kete (the National Sustainable Development Strategy).
Bilateral cooperation has provided expert knowledge to Tuvalu over the years in support of improved livelihoods and sustainable agriculture (e.g. through ACIAR). STAP recommends the project team to familiarize with the knowledge and learning from these projects, and to build proposed activities that are complementary to work already done.	The project baseline elaborates on the technical outputs and activities carried out under bilateral cooperation programmes and projects, in particular through ACIAR. The project design ensures inclusiveness of these ongoing bilateral projects, including cooperation with Live&Learn as an executing partner of these projects.

Responses to Comments from Council at work program inclusion

St?phanie BOUZIGES-ESCHMANN, Secretary General, Secr?tariat du Fonds Fran?ais pour l?environnement Mondial, Agence Francause De Development, Council, France *on 6/24/2020*	Favourable opinion, integrated/systemic approach, from the soil to the value chain, with a monitoring and evaluation system. What is the training/advisory mechanism in place to leverage implementation/dissemination?	Output 1.1.3 establishes a National Technical Support Programme, to be hosted by DOA/MLGA and provides scientific analytical services to all sectors, with a capacity development aspect, supported by USP and SPC. The NTSP will provide much needed quantitative data to better understand each of the steps in the value chain, including on the amount and health of land based natural capital. There are several university graduates with science degrees in agriculture or environmental related areas, and at PhD level.
St?phanie BOUZIGES-ESCHMANN, Secretary General, Secr?tariat du Fonds Fran?ais pour l?environnement Mondial, Agence Francause De Development, Council, **France** 6/24/2020	Favourable opinion, integrated/systemic approach, from the soil to the value chain, with a monitoring and evaluation system. What is the training/advisory mechanism in place to leverage implementation/dissemination?	Output 1.1.3 establishes a National Technical Support Programme (NTSP), to be hosted by DOA/MLGA and provides scientific analytical services to all sectors, with a capacity development aspect, supported by USP and SPC. The NTSP will provide much needed quantitative data to better understand each of the steps in the value chain, including on the amount and health of land based natural capital.

Kordula Mehlhart, GEF Council Member, Head of Division on Climate Finance, BMZ, Council, **Germany** 6/18/2020	Germany acknowledges the realistic and gender-inclusive focus of the proposal which covers previously neglected islands as well as due diligence and cultural heritage aspects. <u>Suggestions for improvements to be made during the drafting of the final project proposal:</u> ? Regarding private sector involvement, Germany recommends coordinating with the NDC Hub which is working on an NDC roadmap and investment planning in Tuvalu, including an investment forum (possibly in August 2020). ? Germany welcomes the envisaged technical cooperation with SPC and SPREP into consideration. It would be beneficial to ensure this includes cooperation with SPC?s Land and Resources Division (LRD), who have extensive knowledge of agriculture in the Pacific and can share their experience on Climate Smart Agriculture in Nauru. ? Furthermore, Germany would like to ask for details on the assumptions which were used to estimate the envisaged carbon sequestration by the project.	The project designers liaised with the NDC Hub Focal Point on linkages and potential contributions the project can provide to the NDC roadmap and investment plan. The NDC roadmap and implementation plan focuses on transport and energy efficiency sectors. The Focal Point and key stakeholders recognise the need to incorporate agriculture, including avoided emissions from livestock through better management of waste and introducing appropriate technologies to utilise those waste as resources. It was decided to address this gap in the roadmap during the inception phase. LRD/SPC will play a key part in providing scientific technical analysis and capacity development aspects of Output 1.1.3 on the NTSP mentioned above. There are several university graduates with science degrees in agriculture or environmental related areas, with some at PhD level. The Stakeholder Engagement Plan include a need to liaise with SPREP during implementation to facilitate participation in and contribute to the online training course offered by the PCCC/SPREP.
Colette O?Neil, Senior Programme Manager, Climate and Environment Division, Council, **United Kingdom** on 6/9/2020	Is there full Government support and commitment for this project?	The Government of Tuvalu fully supports this project and has been involved throughout the project development phase. The increase in co-financing amount at PPG phase (USD 6,772,995) from the amount committed during the PIF (6,265,000), as well as the increase in the number of government departments providing the co-financing support, (from 2 ministries during PIF to 5 ministries at PPG stage) reflects the commitment and support of the Government of Tuvalu.

Comment by Elizabeth Nichols, U.S. Department of State | Bureau of Oceans, International Environmental and Scientific Affairs (OES), Office of Environmental Equality and Transboundary Issues (EQT), Council, **United States**: 7/2/2020	? Why is Tuvalu pursuing this project under the GEF and not availing itself of the technical support available via the UNCCD?s Target Setting Programme?	Because of the opportunity to focus on the land degradation aspects of its vulnerabilities, of which there are many. The capacity development aspects through the GEF-7 LD-Focal Area was considered very important, including to start a LDN process under the UNCCD.
	? Although much of the work here is relevant to the UNCCD, the convention is only mentioned in the theory of change section. This proposal would benefit from leveraging the synergies of the UNCCD work.	Outputs 1.1.2 and 1.1.3 are now solely focused on the LDN Strategy and the UNCCD NAP.
	? We do not see the UNCCD focal point ministry listed for engagement engaged. This oversight should be remedied, to ensure that the project?s outcome is maximized and UNCCD implementation is furthered. Similarly, the Ministries of Foreign Affairs, of Trade, Tourism and Commerce, and of Natural Resources, Energy and Environment should be added as a stakeholders.	All stakeholder mentioned participated in the PPG consultations and are now all specifically listed with specific roles articulated in the Stakeholder Engagement Plan for the project (Annex I2).

ANNEX C: Status of Utilization of Project Preparation Grant (PPG). (Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: **100,000**			
Project Preparation Activities Implemented	***GETF/LDCF/SCCF Amount ($)***		
	Budgeted Amount	***Amount Spent to date***	***Amount Committed***
Salaries	4,762		4,762
Consultants	69,000	57,073	11,927
Contracts	7,340		7,340
Travel	8,000		8,000
Training	10,898	8,724	2,174
Expendable Procurement		5,225	

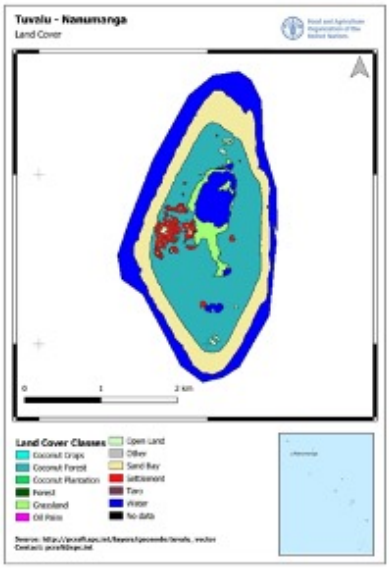
Total	100,000	71,022	28,978

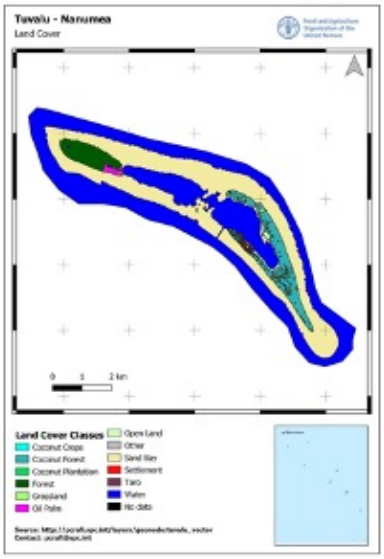
If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue to undertake exclusively preparation activities (including workshops and finalization of baseline, when needed) up to one year of CEO Endorsement/approval date. No later than one year from CEO endorsement/approval date. Agencies should report closing of PPG to Trustee in its Quarterly Report.

ANNEX D: Project Map(s) and Coordinates

Please attach the geographical location of the project area, if possible.

Land Cover maps of the 9 islands




Tuvalu - Nanumea
Land Cover
0 1 2 km
Land Cover Classes
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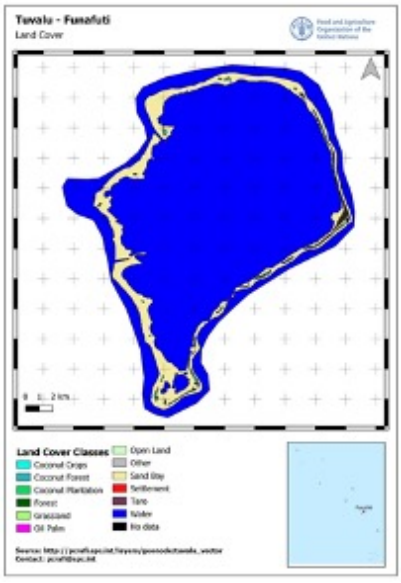
Coconut Forest
Coconut Plantation
Forest
Grassland
Oil Palm
Open Land
Other
Sand Bay
Settlement
Taro
Water
No data


Tuvalu - Funafuti
Land Cover
Land Cover Classes
Coconut Crops
Coconut Forest
Coconut Plantation
Forest
Grassland
Oil Palm
Open Land
Other
Sand Bay
Settlement
Taro
Water
No data


Tuvalu - Niutao
Land Cover
0 1 2 km
Land Cover Classes
Coconut Crops
Coconut Forest
Coconut Plantation
Forest
Grassland
Oil Palm
Open Land
Other
Sand Bay
Settlement
Taro
Water
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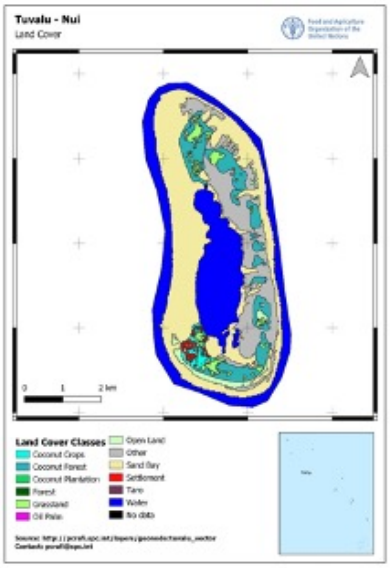
Tuvalu - Nui
Land Cover
0 1 2 km
Land Cover Classes
Coconut Crops
Coconut Forest
Coconut Plantation
Forest
Grassland
Oil Palm
Open Land
Other
Sand Bay
Settlement
Taro
Water
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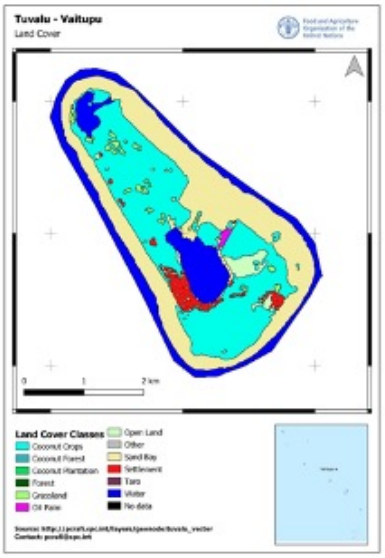
Tuvalu - Vaitupu
Land Cover
0 1 2 km
Land Cover Classes
Coconut Crops
Coconut Forest
Coconut Plantation
Forest
Grassland
Oil Palm
Open Land
Other
Sand Bay
Settlement
Taro
Water
No data


Tuvalu - Nukufetau
Land Cover
0 1 2 km
Land Cover Classes
Coconut Crops
Coconut Forest
Coconut Plantation
Forest
Grassland
Oil Palm
Open Land
Other
Sand Bay
Settlement
Taro
Water
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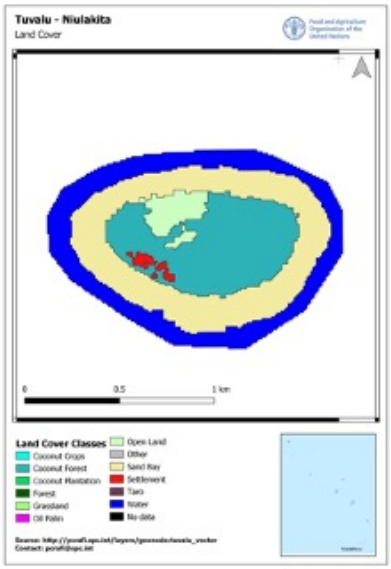

ANNEX E: Project Budget Table

Please attach a project budget table.

FAO Cost Categories	Unit	No. of units	Unit cost		Component 1		Component 2		Component 3		M&E	PMC	Executing Entity Budget	FAO Support Services	Total GEF
					1.1	Total	2.1	Total	3.1	Total					
5011 Salaries professionals															
Operations Support Officer	Month	1	$9,500	$9,500		**$0**	$0	**$0**		**$0**		$9,500	$0	$9,500	$9,500
Procurement Associate	Month	3	$3,000	$9,000		**$0**	$0	**$0**		**$0**		$9,000	$0	$9,000	$9,000
5011 Sub-total salaries professionals				**$18,500**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$18,500**	**$0**	**$18,500**	**$18,500**
5013 Consultants															
International Consultants															
Policy & Community Specialist: Review of Policies, Strategies and Action Plans.	months	1.5	$8,500	$12,750	$12,750	**$12,750**		**$0**		**$0**				$12,750	$12,750
UNCCD Land Degradation Neutrality (LDN) Specialist	months	1.5	$8,500	$12,750	$12,750	**$12,750**		**$0**		**$0**				$12,750	$12,750
Forestry &Tree Resources Specialist	months	10	$8,500	$85,000		**$0**	$85,000	**$85,000**		**$0**				$85,000	$85,000
SOLA/OT: Digitization of land administration system(s)	months	10	$8,500	$85,000	$70,000	**$70,000**		**$0**	$15,000	**$15,000**				$85,000	$85,000
Senior Technical Adviser	months	24	$9,500	$228,000	$61,048	**$61,048**	$129,402	**$129,402**	$28,000	**$28,000**	$9,550			$228,000	$228,000
Sub-total international Consultants:				**$423,500**	**$156,548**	**$156,548**	**$214,402**	**$214,402**	**$43,000**	**$43,000**	**$9,550**	**$0**	**$0**	**$423,500**	$423,500
National Consultants				$0											$0
National Project Coordinator (NPC)	month	48	$2,400	$115,200	$11,314	**$11,314**	$48,400	**$48,400**	$19,200	**$19,200**		$36,286		$115,200	$115,200
Administration and Finance Offi	month	48	$1,400	$67,200		**$0**	$0	**$0**	$0	**$0**		$67,200		$67,200	$67,200
8 x Project Field Officers	month	400	$1,100	$440,000		**$0**	$440,000	**$440,000**		**$0**			$440,000		$440,000
Coordinator - National Technical Support Programme	month	48	$2,400	$115,200	$90,000	**$90,000**	$10,000	**$10,000**	$15,200	**$15,200**				$115,200	$115,200
Policy&Legal Specialist	month	1.5	$4,000	$6,000	$6,000	**$6,000**		**$0**		**$0**			$6,000		$6,000
M&E Officer: Data & Information Management Officer	month	24	$2,000	$48,000		**$0**	$16,000	**$16,000**	$32,000	**$32,000**			$48,000		$48,000
GIS Specialist	month	24	$2,500	$60,000	$15,000	**$15,000**	$30,000	**$30,000**	$15,000	**$15,000**			$60,000		$60,000
Communications & KM support	month	24	$2,000	$48,000		**$0**	$20,000	**$20,000**	$28,000	**$28,000**			$48,000		$48,000
Sub-total national Consultants:				**$899,600**	**$122,314**	**$122,314**	**$564,400**	**$564,400**	**$109,400**	**$109,400**	**$0**	**$103,486**	**$602,000**	**$297,600**	$899,600
5013 Sub-total consultants				**$1,323,100**	**$278,862**	**$278,862**	**$778,802**	**$778,802**	**$152,400**	**$152,400**	**$9,550**	**$103,486**	**$602,000**	**$721,100**	**$1,323,100**
5650 Contracts															
Small-scale Piggery Biogas system design and installation	Lump sum	1	$35,000	$35,000		**$0**	$35,000	**$35,000**		**$0**				$35,000	$35,000
Environmental Impact Assessment	Lump sum	1	$10,000	$10,000		**$0**	$10,000	**$10,000**					$10,000		$10,000
LOA - Provision for technical advisory services and capacity development in: Protocols for LDN indicators and soil health, IAE toolkits	Lump sum	1	$75,000	$75,000		**$0**	$75,000	**$75,000**		**$0**				$75,000	$75,000
LOA - Provisions for: (i) IAE Island Action Plans (IAE-IAP) development within context of ISPs; (ii) Preparation and delivery of training on IAE toolkits	Lump sum	1	$75,000	$75,000		**$0**	$75,000	**$75,000**		**$0**				$75,000	$75,000
LOA - Provision for IAE demonstrations and Farmer Field Schools at	Lump Sum	1	$75,000	$75,000		**$0**	$75,000	**$75,000**		**$0**			$75,000		$75,000
LOA - Provisions for training and development of science analytical capacity through the NTSP-LDN and for implementation of key IAEAP	Lump sum	1	$60,000	$60,000		**$0**	$60,000	**$60,000**		**$0**				$60,000	$60,000
Midterm evaluation	study	1	$50,000	$50,000		**$0**		**$0**	$0	**$0**	$50,000			$50,000	$50,000
Final evaluation	study	1	$50,000	$50,000		**$0**		**$0**	$0	**$0**	$50,000			$50,000	$50,000
Final Project Report	study	1	$6,550	$6,550		**$0**		**$0**			$6,550			$6,550	$6,550
5650 Sub-total Contracts				**$436,550**	**$0**	**$0**	**$330,000**	**$330,000**	**$0**	**$0**	**$106,550**	**$0**	**$85,000**	**$351,550**	**$436,550**
5021 Travel															
Airfare - International	trips	20	$1,000	$20,000		**$0**	$20,000	**$20,000**		**$0**				$20,000	$20,000
Boat trips - national	trips	120	$300	$36,000		**$0**	$36,000	**$36,000**		**$0**			$24,000	$12,000	$36,000
DSA - Consultant	lump sum	140	$300	$42,000		**$0**	$42,000	**$42,000**		**$0**			$12,000	$30,000	$42,000
DSA - National Counterpart	lump sum	200	$175	$35,000		**$0**	$35,000	**$35,000**		**$0**			$25,000	$10,000	$35,000
5021 Sub-total travel				**$133,000**	**$0**	**$0**	**$133,000**	**$133,000**	**$0**	**$0**	**$0**	**$0**	**$61,000**	**$72,000**	**$133,000**
5023 Training/Workshop and/or meeting															
Training in nursery management and in seedlings production techniques/practices	# training events	8	$450	$3,600		**$0**	$3,600	**$3,600**		**$0**			$3,600		$3,600
IAE Island Action Plan Consultations	#meetings	12	$450	$5,400		**$0**	$5,400	**$5,400**		**$0**			$5,400		$5,400
Land Adminuistration Digitization - SOLA/OT Training Workshop	workshop	8	$450	$3,600		**$0**	$3,600	**$3,600**		**$0**			$3,600		$3,600
Workshop/Meetings - Indigenous Food Systems	workshop	16	$450	$7,200		**$0**	$7,200	**$7,200**		**$0**			$7,200		$7,200
Workshops/Training - Integrated livestock - crop/trees farming systems	Training/orientation	8	$450	$3,600		**$0**	$3,600	**$3,600**		**$0**			$3,600		$3,600
IAE Farmer Field Schools (FFS)	Training/orientation	16	$660	$10,560			$10,560	**$10,560**					$10,560		$10,560
Training - installation of biodigesters	Training/orientation	16	$450	$7,200		**$0**	$7,200	**$7,200**		**$0**			$7,200		$7,200
Project Inception workshop	workshop	1	$2,500	$2,500		**$0**	$0	**$0**	**$1,000**	**$1,000**	$1,500		$2,500		$2,500
Project Steering Committee (PSC) meetings	meetings	8	$250	$2,000		**$0**	$0	**$0**	**$0**	**$0**	$2,000		$2,000		$2,000
Technical Advisory Group (TAG) Meetings	meetings	8	$250	$2,000		**$0**	$0	**$0**	**$0**	**$0**	$2,000		$2,000		$2,000
Mid-term evaluation workshop	workshop	1	$1,000	$1,000		**$0**	$0	**$0**		**$0**	$1,000		$1,000		$1,000
Final evaluation workshop	workshop	1	$2,500	$2,500		**$0**	$0	**$0**		**$0**	$2,500		$2,500		$2,500
5023 Sub-total training				**$51,160**	**$0**	**$0**	**$41,160**	**$41,160**	**$1,000**	**$1,000**	**$9,000**	**$0**	**$51,160**	**$0**	**$51,160**
5024 Expendable procurement															
Communications materials & Publications	global	1	$10,000	$10,000		**$0**	$10,000	**$10,000**		**$0**			$5,000	$5,000	$10,000
Local transport costs	global	1	$29,500	$29,500	10000	**$10,000**	$10,000	**$10,000**	$9,500	**$9,500**			$29,500		$29,500
Shipping, frieght transport, fuel	global	8	$8,000	$64,000		**$0**	$64,000	**$64,000**		**$0**			$44,000	$20,000	$64,000
Biogas digesters frame, equipment and supplies)	global	60	$1,200	$72,000		**$0**	$72,000	**$72,000**		**$0**			$36,000	$36,000	$72,000
Piggery shelter, fencing, construction materials	global	30	$2,500	$75,000		**$0**	$75,000	**$75,000**		**$0**			$50,000	$25,000	$75,000
Farm hand tools	global	1	$30,000	$30,000		**$0**	$30,000	**$30,000**		**$0**			$15,000	$15,000	$30,000
Rainwater harvesting (pond layers, pumps, gutter, pipes,	global	1	$20,450	$20,450		**$0**	$20,450	**$20,450**		**$0**			$10,450	$10,000	$20,450
Produce Markets (construction materials)	global	1	$39,500	$39,500		**$0**	$39,500	**$39,500**		**$0**			$39,500	$0	$39,500
Home Gardening Food Systems and Pulaka Pits: Materials (cement, raised-bed structures, topsoil, composting, etc.)	global	1	$83,514	$83,514		**$0**	$83,514	**$83,514**		**$0**			$53,514	$30,000	$83,514
Livestock veterinarian care	global	1	$15,000	$15,000		**$0**	$15,000	**$15,000**		**$0**			$15,000		$15,000
Seeds and planting materials	global	1	$24,800	$24,800		**$0**	$24,800	**$24,800**		**$0**			$12,400	$12,400	$24,800
NTSP-LDN facility (materials, safety gear, soils and plant sampling equipment and tools)	global	1	$75,000	$75,000		**$0**	$75,000	**$75,000**		**$0**			$45,000	$30,000	$75,000

ANNEX F: (For NGI only) Termsheet

Instructions. Please submit an finalized termsheet in this section. The NGI Program Call for Proposals provided a template in Annex A of the Call for Proposals that can be used by the Agency. Agencies can use their own termsheets but must add sections on Currency Risk, Co-financing Ratio and Financial Additionality as defined in the template provided in Annex A of the Call for proposals. Termsheets submitted at CEO endorsement stage should include final terms and conditions of the financing.

ANNEX G: (For NGI only) Reflows

Instructions. Please submit a reflows table as provided in Annex B of the NGI Program Call for Proposals and the Trustee excel sheet for reflows (as provided by the Secretariat or the Trustee) in the Document Section of the CEO endorsement. The Agencys is required to quantify any expected financial return/gains/interests earned on non-grant instruments that will be transferred to the GEF Trust Fund as noted in the Guidelines on the Project and Program Cycle Policy. Partner Agencies will be required to comply with the reflows procedures established in their respective Financial Procedures Agreement with the GEF Trustee. Agencies are welcomed to provide assumptions that explain expected financial reflow schedules.

ANNEX H: (For NGI only) Agency Capacity to generate reflows

Instructions. The GEF Agency submitting the CEO endorsement request is required to respond to any questions raised as part of the PIF review process that required clarifications on the Agency Capacity to manage reflows. This Annex seeks to demonstrate Agencies? capacity and eligibility to administer NGI resources as established in the Guidelines on the Project and Program Cycle Policy, GEF/C.52/Inf.06/Rev.01, June 9, 2017 (Annex 5).