



ADAPTATION FUND

## ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY Regular-sized Project Concept

**Country/Region:** Tuvalu

**Project Title:** Strengthening adaptation against climate variability through increasing clean water supply and sanitation at Motufoua Secondary School

**Thematic Focal Area:** Water Management

**Implementing Entity:** Ministry of Finance

**Executing Entities:** Department of Education

**AF Project ID:** AF00000311

**IE Project ID:**

**Reviewer and contact person:** Dirk Lamberts

**IE Contact Person:** Nuausala Nuausala

**Requested Financing from Adaptation Fund (US Dollars):** 2,000,000

**Co-reviewer(s):** Ming Yang

<b>Technical Summary</b>	<p>The project “Strengthening adaptation against climate variability through increasing clean water supply and sanitation at Motufoua Secondary School” aims to provide Motufoua Secondary School with reliable access to a safe and resilient water supply under a changing climate. This will be done through the single component below:</p> <p><u>Component 1:</u> Enhancement of water supply infrastructures for domestic use (USD 1,650,000).</p> <p><u>Requested financing overview:</u> Project/Programme Execution Cost: USD 171,300 Total Project/Programme Cost: USD 1,848,400 Implementing Fee: USD 155,400 Financing Requested: USD 2,000,000</p> <p>The proposal includes a request for a project formulation grant of USD 50,000.</p> <p>The initial technical review raises some issues, such as the arrangements for maintenance and demonstrating the full cost of adaptation reasoning as is discussed in the number of Clarification Requests (CRs) and Corrective Action Requests (CARs) raised in the review.</p>
<b>Date:</b>	21 August 2022

Review Criteria	Questions	Comments
Country Eligibility	1. Is the country party to the Kyoto Protocol?	<b>Yes.</b>
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	<b>Yes.</b> Tuvalu is particularly vulnerable to adverse effects of climate change due to its high exposure and low adaptive capacity to water related disasters.
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	<b>Yes.</b> As per Endorsement letter dated 8 August 2022.
	2. Does the length of the proposal amount to no more than Fifty pages for the project/programme concept, including its annexes?	<b>Yes.</b> The proposal comprises 48 pages.
	3. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	<b>Yes.</b> The project outputs will create concrete adaptation for a critical educational institute, providing adaptive capacity for some of the most urgent and pressing climate change impacts.
	4. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<b>Yes.</b> The relevant section of the proposal describes the economic, social and environmental benefits in a qualitative way. It does not show detailed information on the investment and operation costs and the effective water storage of the cisterns to be constructed or renovated at the Motufoua Secondary School. The <u>full proposal</u> should show this information so that economic, social, and environmental benefits can be fully presented.  Currently, attribution of project benefits are limited to staff and pupils of the school, as well as an allocation of water to its livestock and gardening activities. The proposal does not present information on the adaptation needs of other inhabitants of the Vaitupu atoll where the school is located.

		<p><b>CR 1:</b> Please clarify if and how the project investments and benefits could also be extended to other residents of the atoll to assist with their adaptation needs, in particular for marginalized and vulnerable persons.</p> <p>Project consultation in preparation for the full proposal will be extended to the communities to seek their views on the project and how the project can assist with their adaptation needs. It has been considered at this stage that training on water-smart practices and monitoring can be delivered to communities with the ultimate objective of maximizing water collection while preserving water quality.</p>
	5. Is the project / programme cost effective?	<p><b>Probably.</b></p> <p>The proposal provides a logical explanation of the selected scope and approach. The cost effectiveness is also described from a sustainability point of view by highlighting the sustainability benefits of the selected methods over others.</p> <p><b>CR 2:</b> The proposal should further clarify that the ratio of rainfall to rainwater collection area is sufficient to ensure that the envisaged goals of water collection and storage are met. Preliminary analysis has added to the concept paper to determine water supply under different scenarios.</p> <p>Please note that in the fully developed proposal, the description of the cost effectiveness would need to include a quantified comparison of the cost of rainwater collection by water cisterns systems with other techniques, including groundwater use and seawater desalination.</p>
	6. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and	<p><b>Yes.</b></p> <p>Section D on pages 27-29 demonstrates the consistence of the project with the national and sub-national sustainable development strategies in the areas of water production and conservation.</p>

	adaptation programs of action and other relevant instruments?	
	7. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	<p><b>Yes.</b></p> <p>Relevant national technical standards are identified, and compliance is stated. No standards on (drinking) water quality are mentioned though.</p> <p><b>CR 3:</b> Please clarify which national standards may apply with respect to (drinking) water quality, and how the project will comply.</p> <p>There is no clear guideline on a standard water quality assessment. Conventional practice is that rainwater would be collected and recommend be boiled before drinking. Hydrogen Sulphide (HO) test was available but rarely used. The school is currently used boiling practice for drinking water and recently filtration system to supplement drinking water supply. The project will ensure compliance with any local requirements on water quality preservation and assessment.</p>
	8. Is there duplication of project / programme with other funding sources?	<p><b>No.</b></p> <p>Potentially overlapping projects/programmes are identified, and the lack of overlap is stated in a logical manner. The New Zealand-funded Vaitupu Water Security project intends to build a network of tanks and pipes that convey groundwater from wells in the north of Vaitupu Island to the villages of Tumaseu.</p> <p><b>CR 4:</b> Please clarify or consider exploring during the development of a <u>full proposal</u>, the opportunity to link with this project which may provide additional resilience to the school community, e.g., by providing a back-up source of water.</p>

		Discussion with Vaitupu Water security project to identify opportunity that the school can benefit from. Ground water remain necessary to the school in drought conditions.
	9. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	<p><b>Yes.</b></p> <p>Overall, the learning and knowledge generating opportunities are rather limited, but those that exist are adequately captured.</p>
	10. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p><b>Yes.</b></p> <p>Key stakeholders were identified and consulted. It is unclear if the community in the immediate vicinity of the school was involved.</p> <p><b>CR 5:</b> Please clarify how neighbouring communities were consulted.  Proper consultation will be extended to the communities particularly those in the vicinity to seek their views and to find out how they would be impacted by the project.</p>
	11. Is the requested financing justified on the basis of full cost of adaptation reasoning?	<p><b>Probably.</b></p> <p>The requested financing will address most of the climate change resilience needs of the school in terms of secure drinking water supply without additional external funding. Two elements still need clarification.</p> <p>Table 7 of the proposal includes two water cisterns that are listed as “repurpose” and at the same time “Not covered by the project”.</p> <p><b>CR 6:</b> Please clarify what this means and if co-financing is involved.  Clarification have been provided. There is no co-financing. After earlier consultations, the school suggested to leave as they are.</p>

		<p>The proposal would benefit from a calculation of the current and anticipated drinking water needs and a comparison with the effective storage that will be the result of the project.</p> <p><b>CR 7:</b> Please clarify that the rainwater capture and storage capabilities post-project will be adequate to meet the drinking water needs of the school, also considering the changing climate.</p> <p>Preliminary analysis has provided on the concept paper which shows the significant increase in water supply available to the schools as a result of the project intervention.</p>
	12. Is the project / program aligned with AF's results framework?	<b>Yes.</b>
	13. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	<p><b>Unclear.</b></p> <p>The proposal mentions that government investments in up keeping of school buildings is insufficient and that deterioration rate of infrastructure is fairly high. Sustainability of the project also means that after the project implementation period is over, the project outputs will continue functioning. Without continued financial support, how will the newly constructed water cisterns continue operating? Please elaborate who will pay for the operation and maintenance costs of the project-installed water cisterns, after the project implementation period ends.</p> <p><b>CR 8:</b> Please clarify how the maintenance of the project investments will be adequate.</p> <p>The project will help links maintenance needs of the school with the government's Deferred Maintenance Policy where an allocation is appropriated each year to ensure government assets are well maintained their physical conditions and ensure their continued usefulness.</p>

		<p>Given the vital importance of the water storage facilities for the school, it seems necessary that both quantity and quality of the stored water is monitored, as well as its consumption. The <u>fully developed proposal</u> should include provisions for a simple, fail proof monitoring system. This may already be included under the 3rd output as “Develop a water management and monitoring framework and database” but the budget allocation is most likely inadequate.</p> <p><b>CR 9:</b> Please clarify the scope of the water management and monitoring framework and database.  <a href="#">Detail explanation have added to the text. Basically, the monitoring framework include water collection, storage, consumption rate which will link to a simple forecasting model that will inform decision-making on the level of supply remaining and how long the supply would last under different scenarios.</a></p>
	<p>14. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?</p>	<p><b>Yes.</b></p> <p>Environmental and social risks have been identified for each of the 15 subject areas of the ESP. Overall, the risk identification findings seem adequate and justified. However, further clarification is needed in the aspects below.</p> <p><b>CAR 1:</b> Please present the risk identification findings in the relevant table included in the proposal template.  <a href="#">These risk identification findings have been added and align with revised risk categorization of the Project from A to B.</a></p> <p>Indigenous peoples: the risk finding suggest the presence and involvement of indigenous peoples, but this is unclear.</p>

		<p><b>CR 10:</b> Please clarify the involvement of indigenous peoples, e.g., are they still owners of the land the school was built on?  <a href="#">Consultations will inform the Falekaupule, island council and landowners of these critical developments<sup>1</sup>.</a></p> <p>Public health: the information provided is limited to the expected positive project impacts, while there appear to be some potential public health risks as a result of construction materials used, management and monitoring of drinking water storage etc.</p> <p><b>CR 11:</b> Please clarify the risks to public health.  <a href="#">Agreed that could be risks to public health emanating from possible dust generation, heat, working long hours which can result in injuries.</a>  <a href="#">The project will incorporate safety measures and practices recommended by local authorities for prioritizing safety of workers.</a></p> <p>Pollution prevention: the project is likely to generate some localised pollution and waste. This is currently said to be managed through the Environmental Impact Assessment (EIA) that will be carried out to meet national regulations. This being an external requirement, the <u>fully developed proposal</u> should already include a concise waste management and pollution prevention plan, commensurate to the risks involved.</p> <p>The proposal states the ESP category in which the screening process has classified the project as A. This category is reserved for projects with significant adverse environmental or social impacts that are for example</p>
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<sup>1</sup> Fale-Kaupule is the local decision-making body of the community on each island or atoll. It comprises of any person above the age of 18 and each person has a say on any discussion or issue impacting them



		<p>diverse, widespread, and irreversible, and this is not consistent with the risks that have already been identified.</p> <p><b>CR 12:</b> Please clarify the ESP categorization of the project.  <a href="#">ESP categorization has been amended and aligned with 15 principles provided on the table.</a></p>
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	<b>Yes.</b>
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	<p><b>Yes.</b>  The IE Management Fee is at 8.2 per cent of the total project budget.</p>
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	<p><b>No.</b>  The Project Execution Costs are currently at 10.7 per cent of the total project budget.</p> <p><b>CAR 2:</b> Please revise the Project Execution Cost to be at or below 9.5 per cent of the total project budget.  <a href="#">The Execution cost has been revised now under 9.5%.</a></p>
Eligibility of IE	1. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	<p><b>Yes.</b>  The Ministry of Finance was accredited under the streamlined modality with a cap set for project and programme proposals to the Adaptation Fund at USD 2 million.</p>
Implementation Arrangements	1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	n/a at concept stage
	2. Are there measures for financial and project/programme risk management?	n/a at concept stage
	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	n/a at concept stage

	4. Is a budget on the Implementing Entity Management Fee use included?	n/a at concept stage
	5. Is an explanation and a breakdown of the execution costs included?	n/a at concept stage
	6. Is a detailed budget including budget notes included?	n/a at concept stage
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	n/a at concept stage
	8. Does the M&E Framework include a breakdown of how implementing entity IE fees will be utilized in the supervision of the M&E function?	n/a at concept stage
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	n/a at concept stage
	10. Is a disbursement schedule with time-bound milestones included?	n/a at concept stage



## ADAPTATION FUND

# PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

## PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category: Regular  
Country: Tuvalu  
Title of Project/Programme: Strengthening adaptation against climate variability through increasing clean water supply and sanitation at Motufoua Secondary School  
Type of Implementing Entity: National Implementing Entity  
Implementing Entity: Ministry of Finance  
Executing Entity: Department of Education  
Amount of Financing Requested: US\$2,000,000

### Project / Programme Background and Context:

#### A. Project Overview

Tuvalu is a small sovereign country of less than 12,000 people with a total land area of 26 square kilometres. It consists of nine low-lying coral atolls that are widely dispersed and surrounded by a relatively large economic exclusive zone (EEZ) of 900,000 square kilometres. The highest land elevation point is 5 metres above sea level which recognised among the lowest countries in the world by ground elevation<sup>1</sup>. A combination of geographical isolation, limited diversification, small population size, remoteness and susceptibility to natural disasters have lent considerable challenges on Tuvalu's self-dependency. Foreign Aid has substantially increased over the years for both budgetary supports and direct project management by donor partners, and imports have entrenched as main source for food supply and infrastructure developments. The closest market is Fiji which impose a distant of more than 1000 kilometres, follow by New Zealand and Australia of 3500 kilometres.

Tuvalu is particularly vulnerable to adverse effects of climate change due to its high exposure and low adaptive capacity to water related disasters. Besides measures taken at national level to raise adaptation measures against extreme events such as droughts and cyclones, it is recognised that additional concrete programs must be implemented at local level in order to build disaster resilient communities through more integrated climate inclusive policies and practices, including stakeholder perspectives and a participatory approach.

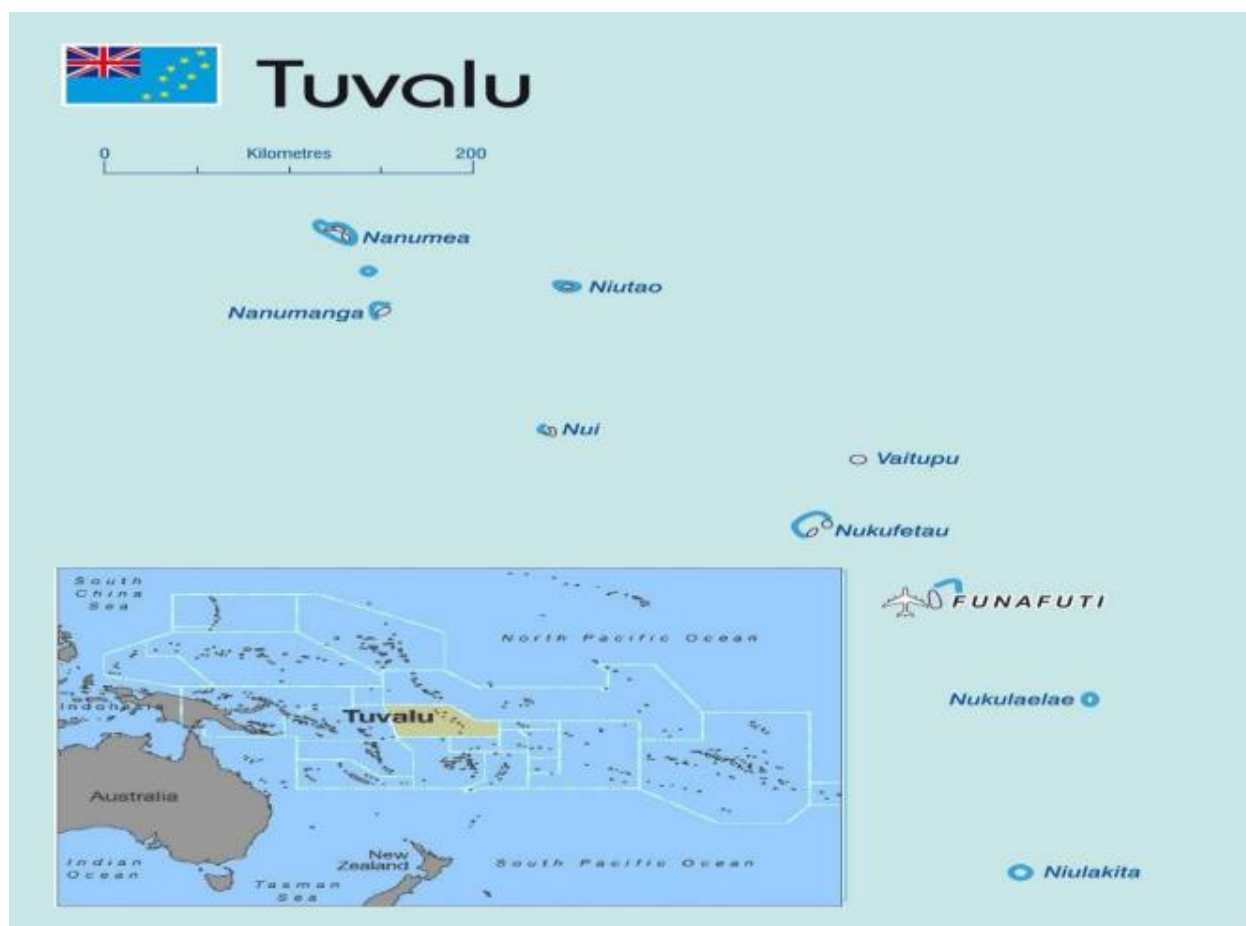
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<sup>1</sup> Mortreux, C., & Barnett, J. (2009). Climate change, migration, and adaptation in Funafuti, Tuvalu. *Global Environment Change*, 19, 105-112.

At the time this Concept Paper has finalized, dry spell has just begun to observe in the northern and central islands of Tuvalu. Water rationing measures have been putted in place allowing around 150 litres per household per day. Desalinated water becomes the main supply across the capital island as rainwater supply has reached low level. If the situation deteriorates, the rationing amount could be reduced. Kiribati has also reportedly declared a State of Disaster for severe drought across the country and immediate assistances are now flowing-in to support communities<sup>2</sup>.

## B. Social-economic Context

Facing isolation from major markets and exacerbated by impacts of extreme weather events, economic developments are largely constraint. Remoteness, small domestic markets and poor natural resources endowment are factors that do not lend themselves to quick and ease policy solutions.



Map of Tuvalu (Source SPC, 2020)

<sup>2</sup> Available at <https://reliefweb.int/report/kiribati/emergency-assistance-republic-kiribati-response-drought>

Tuvalu is classified as a least developing country with a per capita income of USD 4,059. The Tuvalu economy and the government revenues rely significantly on foreign aid, internet domain licensing fee, fishing license fee from foreign fishing vessels and remittances fees from seafaring, which is estimated to provide employment to 15% of the adult male population. Revenue from fishing license fees, internet domain and donor grants accounts for three quarter of domestic revenue<sup>3</sup>. Tuvalu is also dependent on income from the Tuvalu Trust Fund. Economic growth in Tuvalu is fragile given that most of its revenue sources are dependent on exogenous factors beyond government control.

Tuvalu's economy is highly reliant on imports due to its small land area and its scope for diversification including exports. Nearly everything in Tuvalu including skilled services is imported. Food and fuel constitute nearly half of the total imports' costs in Tuvalu.

Tuvalu's past trend of economic growth while highly volatile, has been declining steadily in the past 5 years<sup>4</sup>. The global increase in the costs of fuel and food in the past decade, coupled with the acute economic and environmental vulnerability of Tuvalu has been attributed as the contributing factors to the weak economic growth. Slow positive growth has been forecasted at around 2% for Tuvalu in the long run despite several large infrastructure investments, such as the Green Climate Fund, because of limited capacity, weak competitiveness, inefficient state-owned entities (SOEs) and the average annual costs of natural disasters (estimated to be around 1% of GDP per year)<sup>5</sup>.

Tuvalu is also highly dependent on external aid to cover its revenue shortfall. Development grants amount to between 20% and 50% of GDP from year to year, making Tuvalu the highest grant recipient Pacific Island country per percentage of GDP<sup>6</sup>. Bilateral donors are the primary source of grants, while multilateral institutions provide both concessional loans and grants to Tuvalu<sup>7</sup>.

Tuvalu debt profile is also increasing. The 2021 IMF Debt sustainability analysis for Tuvalu concluded that Tuvalu remains at a high risk of debt distress and that its still need to implement necessary reforms to lower external debt<sup>8</sup>. External debt was estimated to be at 5.5% of GDP in 2021<sup>9</sup>. Concessional borrowing for Tuvalu is projected to increase in the long run due to high import needs for infrastructure projects,

<sup>3</sup> World Bank (2020) Central Pacific Islands. Available at <http://pubdocs.worldbank.org/en/256961563917598074/mpo-cpi.pdf>

<sup>4</sup> Fitch Solutions (2020) Growth in Tuvalu to Remain Modest in 2021. Available at [https://www.fitchsolutions.com/country-risk-sovereigns/economics/growth-tuvalu-remain-modest-2021-14-10-2020?fsWebArticleValidation=true&mkt\\_tok=eyJpIjoiTm90aVl6WTJPR000WmpVeCIsInQiOiJsVDJzb1U1Y0pzV1haMVllK2gwQ3F2cEJDeDdONDFHbXM5ZnpmQXMzY2Y4VEx4UTFLbGtlQUd4eDlCNnRvVWwveWtCL1hISko0RDQyRDFwRmxlZDVzT3Y4QmN6a0VzWUQwd0dWVExCUVZYSDZhYm1tbm5ObVVtNWcrTHhmcDdaOXdxIn0%3D](https://www.fitchsolutions.com/country-risk-sovereigns/economics/growth-tuvalu-remain-modest-2021-14-10-2020?fsWebArticleValidation=true&mkt_tok=eyJpIjoiTm90aVl6WTJPR000WmpVeCIsInQiOiJsVDJzb1U1Y0pzV1haMVllK2gwQ3F2cEJDeDdONDFHbXM5ZnpmQXMzY2Y4VEx4UTFLbGtlQUd4eDlCNnRvVWwveWtCL1hISko0RDQyRDFwRmxlZDVzT3Y4QmN6a0VzWUQwd0dWVExCUVZYSDZhYm1tbm5ObVVtNWcrTHhmcDdaOXdxIn0%3D)

<sup>5</sup> IMF (2021) Tuvalu. Staff Report for the 2018 Article IV Consultation-Debt Sustainability Analysis. Pp 1-13

<sup>6</sup> IDA (2018) Tuvalu- Fourth Development Policy Operations: Program Document. IDA/R2018-0272/1.

<sup>7</sup> IMF (2021) Tuvalu. Staff Report for the 2018 Article IV Consultation-Debt Sustainability Analysis. Pp 1-13.

<sup>8</sup> *ibid*

<sup>9</sup> *ibid*

low revenue flows from fishing and a steady decline of grant inflows due to high uncertainty of donor commitments<sup>10</sup>.

The global COVID-19 pandemic has also impacted the growth trajectory of Tuvalu. Global lockdowns and border closures as a consequence of the pandemic have further exacerbated the fragility of the Tuvaluan economy. Given the high reliance of Tuvalu on imports, there is an increased risk of disruptions to the supply chain, affecting the transportation of essential goods including food, medicine and fuel. While shipping freight have continued in the midst of the pandemic, the frequency has reduced and wholesale trade and construction activities have declined<sup>11</sup>.

## Environmental Context

*“If we save Tuvalu, we save the world”*, this was the rallying cry during the climate change negotiation of the United Nations Framework Convention on Climate Change (UNFCCC) in the build up to the landmark 2015 Paris Agreement, underlying the unique vulnerability of Tuvalu to the impacts of climate change and the need for urgency of ramping up actions to support such particularly vulnerable countries.

Tuvalu’s geographical location and its topography makes it one of the most vulnerable countries in the world to climate change impacts. The UN has formally recognised Tuvalu’s special vulnerability status<sup>12</sup>. Seven major climate related risks have been identified as being critical to Tuvalu. These risks are as tabulated in Table 1 below.

**Table 1. Climate related risks for Tuvalu**<sup>13</sup>

Risk	Description
<b>Sea Level Rise</b>	Sea level rise in coastal areas means that the sea is increasingly encroaching higher ground on already eroded and vulnerable coastlines. This increases the extent of coastal area erosion and flooding.
<b>Salt water intrusion</b>	Sea level rise and the porous nature of soils (atoll islands) create ideal conditions for inland intrusion of salt water and increasing salinity of groundwater lenses.
<b>Inundation</b>	Sea level rise pushes water onto the land surface, thereby causing ups-welling in low-lying areas, i.e. in most parts of the islands. This results in high frequency of inundation at pulaka pits (pulaka is a root crop and an important source of carbohydrates for Tuvaluans; it is grown in pits dug into the limestone atoll, and fertilized by

<sup>10</sup> ibid

<sup>11</sup> Australian Government (2020) Tuvalu COVID 19 Development Response Plan. Available at <https://www.dfat.gov.au/sites/default/files/covid-response-plan-tuvalu.pdf>

<sup>12</sup> UNCTAD (2012) Vulnerability Profile of Tuvalu. Pp 1-18.

<sup>13</sup> Tuvalu National Biodiversity Strategy and Action Plan 2010-2015

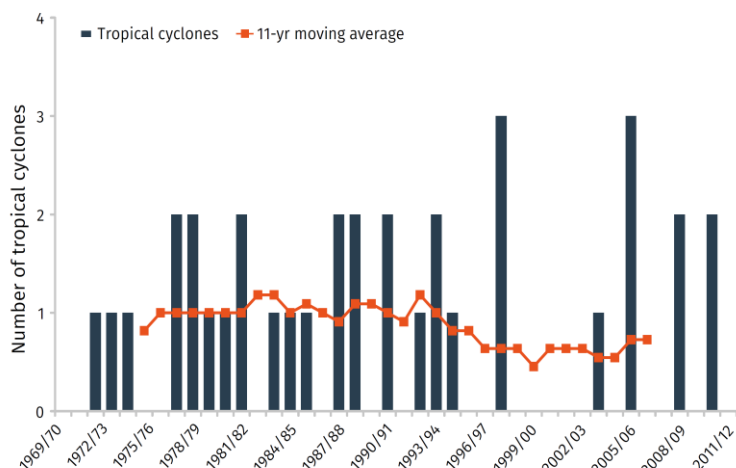
	adding leaves from different plants; the cultivation of pulaka is threatened by inundation: the plant does not thrive in the salt water which seeps into the pits).
<b>Drought</b>	2011 has dramatically reinforced the fear of an increasing frequency of rainfall deficits associated with the El Niño/La Niña southern oscillation phenomenon, a quasi-periodic climate pattern occurring across the tropical Pacific Ocean roughly every five years. In Tuvalu, drought quickly leads to household water shortages and stress on ground water lenses, which affects all biomes depending on ground water resources.
<b>Cyclones</b>	Tuvalu is not spared by cyclones, which can severely destroy coastal areas, crops, vegetation and vital infrastructure. Given the low-lying nature of the islands, cyclones lead to flooding, which increases breeding areas for vector-borne diseases in addition to inundation.
<b>Rising sea surface temperature</b>	Rise in sea surface temperatures has had (and will continue to have) coral bleaching effects. It decreases the productivity of near-shore coral reef ecosystems, thereby affecting communities.
<b>Coastal erosion</b>	Studies of land loss in Tuvalu have revealed that, while coastal erosion closely relates to sea level rise, it is also to a large extent human-induced. In a 2005 paper, Chunting Xue stated: "the land loss in Tuvalu is mainly caused by inappropriate human activities, including coastal engineering and aggregate mining, and partly caused by cyclones".

Considering the small size and fragility of the Tuvaluan community, in addition to its physical and environmental vulnerability, Tuvalu is expected to be severely affected by the impacts of climate change. The Pacific Climate Change Science Programme (PCCSP) study recently concluded that tropical cyclones are expected to decrease in number by the late 21<sup>st</sup> century but increase in proportion of more intense storms. These predictions are likely to have significant implications on future damages in terms of human lives, infrastructure and livelihood assets as research indicated that, globally, 10% of intense tropical cyclones are presently responsible for 93% of damages<sup>14</sup>. The study also points out that the sea level near Tuvalu has risen by 5mm per year since 1999 (a total of 9cm over this period). Under a high emission scenario, a 4-14cm rise is expected before 2030 and 19-58 cm before 2090. The combination of the two manifestations of climate change- continually intensifying cyclone events and sea level rise- will have dire impacts on Tuvalu. Wave overtopping events during king tides and

<sup>14</sup> Mendelsohn, R., Emanuel, K., Chonabayashi, S., & Bakkensen, L. (2012) The impacts of climate change on global tropical cyclone damages. *Nature Climate Change*. 2. 205-209

cyclones cause damage to natural assets such as Tuvalu's fragile groundwater lens and many other economic/social/cultural assets.

Impacts of climate change are already being felt in Tuvalu. From 2000 till 2016, 13 cyclones have already been recorded in Tuvalu<sup>15</sup>. Most recently during Tropical Cyclone Tina in January 2020 which caused widespread damage by strong winds, large waves and storm surges. Damages include seawater flooding, damage to public infrastructure including power,



Time series of the observed number of tropical cyclones developing within and crossing Tuvalu EEZ per year. The 11 year moving average is in orange (Source: WHO & UNFCCC (2020))

communication and water containment facilities, contaminations of water supplies, coastal erosions and threatened food security due to severe

damage caused to gardens and vegetation. Fifty percent of the population were severely affected by the cyclone<sup>16</sup>. While the total economic loss and damage of TC Tino is still yet to be determined, Tuvalu was forced to access AUD16.7 million (USD12.33m) in funding from the World Bank Deferred Drawdown Option Mechanism, and the ADB's emergency fund to respond to the disaster. In addition to TC Tino, Tuvalu was also hit by TC Pam in March 2015, a Category 5 cyclone and the third most intense storm recorded in the South Pacific Ocean. TC Pam also caused widespread damages to public infrastructure, threatened both the water and food security of Tuvaluans and internally displaced 45% of the Tuvaluans. The total economic loss and damage were AUD 13.95 million (USD10.34 million)<sup>17</sup>.

Cyclones, storm surges, king tides and droughts are other types of extreme events that threaten the water security of Tuvalu. In 2010, a storm surge affected 467 households which was nearly 30% of the total households in the country in 2012<sup>18</sup>. A study found that a total of 28 king tides events that have caused severe flooding in Tuvalu have occurred between 1994 and 2012, of which 5 have occurred since 2010<sup>19</sup>. All of these events are thought to have flooded Tuvalu based on the average elevation of the island. The same study estimated that warm water contributed to the king tide phenomena by

<sup>15</sup> WHO & UNFCCC (2020) Tuvalu, Health & Climate Change Country Profile 2020. Small Island Developing States Initiative, pp 1-16.

<sup>16</sup> ADB (2020) ADB Provides \$3 million for Tuvalu Cyclone Relief. Available at <https://www.adb.org/news/adb-provides-3-million-tuvalu-cyclone-relief>.

<sup>17</sup> Government of Tuvalu. (2015) Tuvalu Tropical Cyclone Pam Report: Recovery and Vulnerability Reduction Plan indicates damages and losses from TC Pam to be AUD\$13,954,076.

<sup>18</sup> Tuvalu National Population Housing Census: 2012.

<sup>19</sup> Lin, C.C., Ho, C.R., & Cheng Y.H. (2014). In



an average of 5.1% and a maximum of 7.8%. This indicates that the effects of king tides will be greater under a warming climate where warm waters will compound with a rising sea level.

**Table 2. Summary of Key environmental stresses<sup>20</sup>**

Climate change and vulnerabilities in critical sectors		
Sectors	Stresses	Climate change risks
Coastal zone	Vulnerable to exploitation	Vulnerable to sea level rise and temperature change
Soils	Vulnerable to increase waste dumping	Vulnerable to saltwater intrusion and salinization.
Water resources	Sewage and waste leachate contamination	Sea level rise and altering habitats.
Land and Marine	Over-harvesting	Sea level rise altering habitats
Agriculture	Water shortage	Sea level rise and intrusion
Health	Overpopulation	Sea level rise and changing temperature

In September 2011, the Government of Tuvalu declared a state of emergency with rationing of fresh water due to a severe drought that lasted for 6 months. The La Nina event caused severe water shortages in Tuvalu that the New Zealand Government was forced to airlift supplies and freshwater to the country after receiving reports it only had two days of water supply left in October 2011<sup>21</sup>. The Government of South Korea funded the shipment of 60,000 water bottles from Fiji<sup>22</sup> while Australia sent a desalination plant. While the frequency of droughts in Tuvalu is yet to be determined due to data availability, there is a high possibility that it is linked with the frequency of La Nina that normally occurs between 2-7 years<sup>23</sup>.

## Future Climate Change Impact Forecast for Tuvalu

The Pacific Climate Change Science Program (PCCSP) highlights the following climate change trends projections in Tuvalu:

<sup>20</sup> Government of Tuvalu (2007) Tuvalu's National Adaptation Programme of Action, pp 1-55.

<sup>21</sup> Radio New Zealand (2011). RNZAF delivers Water to Tuvalu. Available at <https://www.rnz.co.nz/news/national/87248/rnzaf-delivers-water-to-tuvalu>.

<sup>22</sup> Burese, I. (2011) Korea joins Tuvalu Aid. The Fiji Times. Available <https://web.archive.org/web/20130515100637/http://www.fijitimes.com/story.aspx?id=184465>

<sup>23</sup> Paeniu, L., Holland, E., Miller, C., & Anderson, G. (2017) Rainfall Trends, Drought Frequency and La Nina In Tuvalu: A Small Equatorial Island State in the Pacific Ocean. J Environment Anal Toxicol 7:501. doi: 10.4172/2161-0525.1000501

- Temperature has increased and will continue to increase with more very hot days in the future. Projections show that by 2030 under a high emission scenario temperature may increase in the range of 0.4-1.0°C.
- Rainfall is generally projected to increase over this century with more extreme rainfall days expected. Wet season and dry season increase are expected, mainly due to the projected intensification of the South Pacific Convergence Zone. However, there is some uncertainty in the rainfall projections and not all models show consistent results. Drought projections are inconsistent across Tuvalu. However, the frequency and intensity of extreme rainfall events are projected to increase.
- By the end of this century projections suggest decreasing numbers of tropical cyclones but a possible shift towards more intense categories. Projections in Tuvalu tend to show a decrease in the frequency of tropical cyclones by the late 21<sup>st</sup> century and increase in the proportion of the more intense storms. On a global basis, there is a growing level of consistency between models that the frequency of tropical cyclones is likely to decrease by the end of the 21<sup>st</sup> century by 6-35%. There is also a general agreement between models that the mean maximum wind cyclones will increase by 2-11% and that rainfall rates will increase in the order of 20% within 100km of the cyclone center<sup>24</sup>.
- Sea level near Tuvalu has risen and will continue to rise throughout this century (very high confidence). Since 1993, the sea level has risen by about 5mm per year (or a total of 9cm over this period), which is 28-44% higher than the global average. By 2030, under a high emission scenario, the rise is projected to be in the range of 7-18 cm and 39-87 cm before 2090. The sea level rise combined with natural year-to-year changes will increase the impact of storm surges and coastal flooding.
- As atmospheric CO<sub>2</sub> concentrations continue to rise, ocean will warm and continued to acidify. In all the three projections used in the PCCSP study, the aragonite saturation state, a proxy of coral reef growth rate, will continue to decrease as atmospheric CO<sub>2</sub> concentrations increase (very high confidence). This is consistent with a study carried out by the Pacific Community (SPC) in which ocean pH is projected to decline (i.e. increase in ocean acidification) by the end of the 21<sup>st</sup> century in two emission scenarios<sup>25</sup>. As the ocean warms, the risk of coral bleaching also increases (very high confidence). The projections of increasing ocean acidity and risk of coral bleaching, compounded by other stressors such as storm damage, are expected to further increase Tuvalu's

<sup>24</sup> See also Knutson, T.R., McBride, J.L., Chan, J., Emanuel, K., Holland, G., Landsea, C., Held, I., Kossin, J.P., Srivastava, A.K., and Sugi, M. (2010). Tropical cyclones and climate change: Nature Geoscience, v3, no.2, p157-163.

<sup>25</sup> Bell, J.D., Johnson, J.E., Ganachaud, A.S., Gehrke, P.C., Hobday, A.J., Hoegh-Guldberg, O., Le Borgne, R., Lehody, P., Lough, J.M., Pickering, T., Pratchett, M.S. and Waycott, M. (2011). Vulnerable of Tropical Pacific Fisheries and Aquaculture to Climate Change. Secretariat of the Pacific Community, Noumea, New Caledonia.

coastal vulnerability as coral reefs provide an important ecosystem function, among others, to attenuate wave energy reaching the foreshore

## General Climate Change impacts

- A sea level of 18cm will have far reaching impacts on coastal ecosystems such as accelerated coastal erosions, salt water intrusion into fresh water lens, increase sea flooding, loss of arable land and human settlements.
- The combination of sea level rise, high intensity rainfall and stronger tropical cyclones would further exacerbate the vulnerability of communities, which are exposed to more frequent coastal flooding, storm surges and strong winds.
- The combination of change in rainfall and increase in surface air temperature will have compounding effects on limited subsistence agriculture production and poses a threat to food security, water resources and human health.
- Increasing temperatures, sea level rise, and ocean acidification in Tuvalu pose significant health risks to Tuvaluans particularly the elderly, children and individual with pre-existing conditions. Health risks associated with climate change in Tuvalu include diarrhoeal disease (due to contaminated food and/or water), respiratory disease (infective and obstructive), compromised food security (with impacts on nutrition and non-communicable diseases, vector borne diseases, mental health/psychological problems, injuries and deaths from extreme weather events, fish poisoning (ciguatera) and skin infections/infestations<sup>26</sup>.
- Heat stress is also increasingly being recognised as a key health threat due to climate change in Tuvalu. Increase mean temperature, and the intensity and frequency of heat waves poses particular threat to human, animal and even plant health, resulting in loss of live, livelihoods. Socioeconomic output, reduced labour productivity, rising demand for and cost of cooling options, as well as contribute to the deterioration of environmental determinants of health (e.g. air quality, soil, water supply)<sup>27</sup>.
- Coral bleaching will have significant impact on the economy and the wellbeing/livelihood of Tuvaluans given their high dependence on their marine resources for nutrients and income.

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<sup>26</sup> WHO & UNFCCC (2020) Tuvalu. Health & Climate Change. Country Profile 2020. Small Island Developing State Initiative, pp 1-14.

<sup>27</sup> Ibid.

**Table 3. Trends and impacts of Projected Climate Hazards in Tuvalu<sup>28</sup>**

	<b>Sea level rise and coastal erosion</b>	<b>Saltwater intrusion</b>	<b>Inundation</b>	<b>Cyclone</b>	<b>Increased Sea surface temperature</b>
<b>Location</b>	Coastline and Settlements	Pulaka pits and groundwater pools	Internal lagoon and coastline and low-lying areas	West coastline and settlements	Near-shore coastline coral reef ecosystems of islands and islets
<b>Current likelihood</b>	Continuous	Continuous	Historically not annually	Continuous	Continuous
<b>Trend in likelihood</b>	More pronounced since 1980's. Loss of Tepukasavilivili islet on Funafuti and some other islet loss on other atoll islands.	Increasing occurrences of saltwater intrusions into: 1. tepela pulaka pit Niutao; 2. Motufoua pulaka pit, Vaitupu; and 3 Pulaka pit Nukulaelae; 4. Talo I Tokelau, Nanumaga	Every 6 month or annually	More pronounced since 1980	Becoming pronounced
<b>Trend in Magnitude</b>	Becoming more severe	Becoming more severe	More intense flooding. High water levels.	Becoming more severe.	Becoming more severe.
<b>Trend in Location</b>	More areas impacted	Localized to low lying areas and all pulaka pits	Localized to internal low-lying areas (including pulaka pits) and lagoon peripheral lens	More islands affected. Increasing severity on Southern islands	Currently localised to near-shore coastal ecosystems. Will expand to deeper waters.
<b>Other trend description</b>	-severe during cyclones -new ground level	Severely during drought. Increasing number if	Severe during high rainfall periods.	Severe during peak king-tide	-coral fish population

<sup>28</sup> Source from Government of Tuvalu (2007) Tuvalu's National Adaptation Program of Actions (page 31)

	reached -internal atoll lagoons becoming increasingly shallower due to coastal erosion. -1997 Tepukasavilivili islet submerged -erosion rate is 300cm per year.	pulaka pits affected.		levels (annually every February)	reducing to vulnerable levels. More time needed to catch coral fish.
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## Profile of Tuvalu Water Sector

As with all Pacific States, the sourcing and the provision of water to the population is a national priority and a challenge. The Government of Tuvalu has made clear commitments to providing a climate resilient potable water supply to its people. In 2013, the Government of Tuvalu adopted the *Sustainable and Integrated Water and Sanitation Policy 2012-2021* in the aftermath of the devastating drought in 2011 to demonstrate the importance of investing in this sector.

A number of water assessment of the Tuvalu water sector has been undertaken, all highlighting the need for critical investments in this particular sector by both government and development partners given the interlinkages of water security to all aspects of human wellbeing. Tuvalu is facing a hosts of risks related to water security which ranges from increase in populations- largely driven by opportunity seeking internal migrants from the outer islands; a high standard/cost of living that is driving increase water demand; an uncertain future climate but with the possibility of greater rainfall variability; and the threat of drought-inducing La Nina on the horizon.

In 2014, the Government of Tuvalu partnered with the Pacific Australia Climate Change Science and Adaptation Planning programme to conduct a cost and benefit analysis of water security projects in Tuvalu<sup>29</sup>. The purpose of this exercise was to identify potential water security interventions in Tuvalu particularly on the island of Funafuti and Vaitupu - the two major islands in Tuvalu. Importantly the exercise was also aim to support smart, data driven water security investments and act as a guide to inform donors and development partners decisions in prioritising and selection major infrastructure interventions as it contains a catalogue of vetted water security interventions for Tuvalu.

While the CBA identified a number of investment options for Tuvalu, it concluded that the most practical, cost-effective and climate resilient approach to meeting water security in Tuvalu as the immediate creation of a gutter cleaning and maintenance programme<sup>30</sup>. The report concluded that such program is cost effective (\$44<sup>2</sup>/household annually) while at the same time increasing total water supply by up to 47,000 kilolitres in a drought year. On its own, the gutter cleaning and maintenance program would meet the people of Funafuti's emergency water supply during droughts for the next 20 years<sup>31</sup>. A 2012 Rapid Drought Assessment undertaken by SOPAC also strongly recommended this approach<sup>32</sup>.

The CBA report concluded that desalination might be an expensive option for Tuvalu, however, if it is combined with a gutter cleaning and maintenance programme and additional cistern, a desalination could ensure 300 litres/day for every household in a

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<sup>29</sup> Kinrade, P., Nadja, A., Pickering., & Rookie, E. (2019) Water Security in Tuvalu. Assessing Costs and benefits, pp1-18.

<sup>30</sup> Ibid

<sup>31</sup> Ibid.

<sup>32</sup> Sinclair, P., Atumurirava, F., & Samuela, J. (2012) Rapid Drought Assessment Tuvalu. 13 October- 8 November 2011. SOPAC Technical Report (PR38), pp1-89.

drought year. Moreover, the annual cost to households will reduce the current expenditure on desalination from the current \$420/household per year to around \$307/household year<sup>33</sup>.

## **Types of Water Resources, Use, Major issues and Concerns in Tuvalu**

### **Rainwater**

Rainfall and rainwater harvesting is the primary source of water supply in Tuvalu but this was not always the case as is the following extract from a paper by Mr Filipo Taulima reveals.

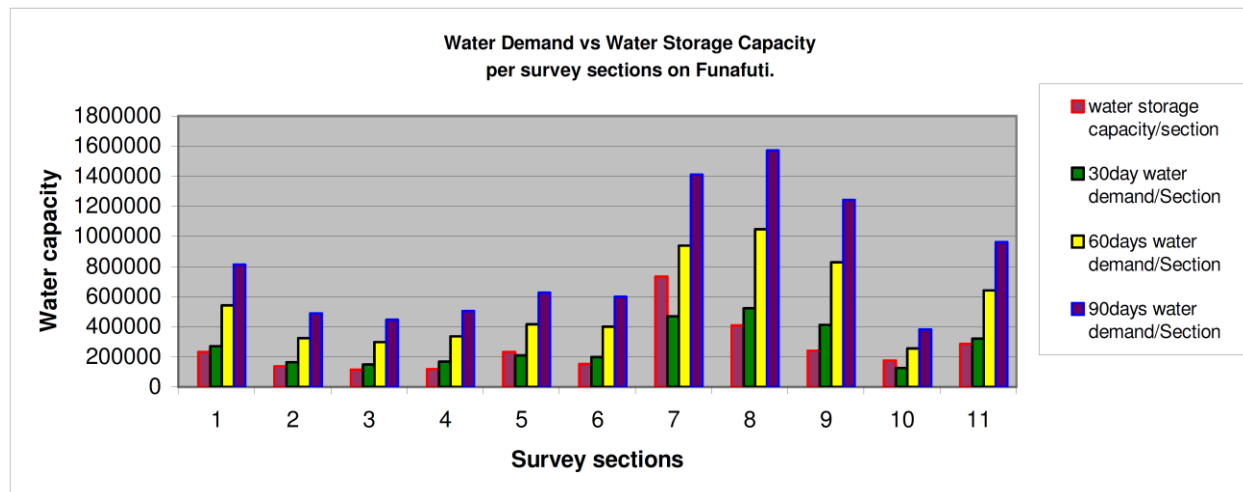
*“In the olden days, where there were very limited or few water storage catchments, people depended mostly on groundwater wells for drinking and cooking. Rainwater from thatched roof catchments and coconut tree trunks was used mainly for washing, bathing and other use. Drawing and transporting water from unprotected groundwater wells to houses can be unhygienic using traditional methods thus having high risks of consuming contaminated water. During a dry spell on an island, where green coconuts become unavailable for consumption, groundwater wells begin to dry up, the people depend mainly on the water drawn from holes dug in a Pulaka pit (traditional plant similar to a dalo). These practices were later changed by the arrival of western missionaries when churches were constructed together with their water storage catchments. The storage catchments slightly improved the standard of living in terms of health and sanitation. Moreover, the skill of western construction and western culture slowly influenced the local people who later adopted and relayed them from generation to generation”<sup>34</sup>.*

In the early 1980s, most families took advantage of an aid project for provision of ferro-cement storage tanks attached to small areas of roofing sheets providing the catchment and shelter for an external kitchen area. The tanks had an approximate capacity of 3.6 m<sup>3</sup> and were intended only to meet drinking water demands. However once supplied, usage increased and the available water quickly depleted. A contributory factor was the limited catchments supplying the tank at 9 -12 sq. m. The adjacent house at that time normally had a traditional roof of pandanus thatch and the run off was (and still is) not suitable for personal use.

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<sup>33</sup> Kinrade, P., Nadja, A., Pickering., & Rookie, E. (2019) Water Security in Tuvalu. Assessing Costs and benefits, pp1-18..

<sup>34</sup> Taulima, F. (1994) Social and Cultural Aspects of Water Supply and Sanitation: Tuvalu perspective. CES UN Water Project. PWD, Funafuti, Tuvalu.



The 2006 Funafuti water resource survey shows that only three section (5, 7 and 10) where water storage capacity is higher than 30day public water demand for that particular section, and no section could meet the 60 day water demand. This means that most section could not cope with a low monthly rainfall period. The water demand was calculated for the number of people residing at each section. *(Source from the PWD Water Resource Survey 2006 in the NAPA).*

Average family size in Tuvalu is 6 people but there is a considerable range. It is not unusual to find families of 8 or 9 people. With a standard size tank, it is the larger families that have a reduced supply. This is exacerbated on the more northerly islands by the reduced and more intermittent rainfall.

There are tanks of materials other than ferro-cement, such as hollow concrete blocks filled and rendered with cement mortar, or fiber glass. These are usually bigger than the ferro-cement tanks ranging from 9 to 18 m<sup>3</sup>. They are connected to houses with metal sheet roofs.

Public cisterns or communal water tanks are usually attached to public buildings such as offices, Falekaupule or Ahiga, churches, schools and hospitals. Usage is subject to control particularly during periods of low rainfall and consequent water shortage.

### Groundwater and wells

Groundwater is available on all islands, but the extent and quality are mainly dependent on factors such as size of the island, type of soil and its permeability, amount of infiltrated rainwater, and density of seawater.

Tuvalu has some of the smallest islands in the world, so therefore these lenses are assumed to be quite small compared to other countries in the Pacific. Preliminary



assessments have shown that significant groundwater occurs on the atolls of Nanumea, Nanumaga, Niutao, Vaitupu and Nukufetau. It was estimated that the thicknesses of freshwater lenses ranged from 3.2 to 7.9 m. Taking a conservative freshwater thickness of 2 m and assuming that 10% of this can be sustainably abstracted; there is potentially about 1.0 million m<sup>3</sup> of groundwater of variable quality available for extraction<sup>35</sup>.

However, it has to be stressed that comprehensive groundwater assessments are required. An immediate indicator is the presence of existing wells and pulaka pits which have been tested in the past. The groundwater that is available feeds the natural vegetation and crops grown in the pulaka pits and elsewhere. Abstraction for human and other uses varies from island to island and no accurate figures are available. The water is used for livestock, washing clothes and bathing, and has been used for drinking during drought.

The majority of islands have wells. Some wells are just holes dug down to the groundwater lens and are not protected from contamination and pollution. However, within the villages most wells are protected by coral stone walls, capped and provided with hand pumps (diaphragm type) with latrines often adjacent. Water quality is often poor.

Well water is now seldom used for drinking and it has been observed that during periods of low rainfall the quality can deteriorate, and becomes more saline. Groundwater is used for domestic needs in the outer islands as an emergency supply in times of drought. Over-extraction in 1999 and 2000 resulted in groundwater becoming brackish/salty, the water level dropped with serious consequences for the vegetation as witnessed in Vaitupu.

On many of the island's groundwater is available under the villages, which is probably why the villages were originally settled in that location. However, because of the extensive use of pit latrines and septic tanks the water is contaminated and its use can lead to disease. On Funafuti groundwater is only used for feeding pigs, washing pig pens and flushing toilets. During droughts its use extends to washing clothes, bathing and flushing toilets.

For human consumption, groundwater has to be treated which effectively means boiling the water for more than a minute after boiling point (WHO recommended period). It has been recommended that the safest solution is not to use the groundwater for food preparation and just to restrict use to toilet flushing which can be a major demand on water supply. Some landowners resist use of groundwater for flushing because they are concerned that salt levels will be raised on their land.

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<sup>35</sup> White, I. (2005) Pacific Vulnerability and Adaptation Project. Tuvalu Background Paper. Australia National University, AusAID, Canberra.

Groundwater can be polluted from livestock waste and indiscriminate dumping of refuse and particularly chemical wastes such as medical, batteries, oils and fertilizers. Since areas of groundwater have been identified, it has been recommended that refuse disposal has to be restricted to those areas which will not affect groundwater supplies. Similarly, the roaming of livestock should be controlled as should the use of agricultural chemicals.

## **Desalinated Water**

Originally for emergency use only it is now used as a main water supply especially on Funafuti. It is a very expensive way to acquire freshwater, so the Integrated Water Resources Management (IWRM) Plan aims to identify cheaper ways to meet public demand with minimal dependence on desalinated water.

The first desalination units were installed in Funafuti in the early 1980's and had the capacity to extract 27 m<sup>3</sup> of freshwater a day. The plant that was installed during the 1999 drought in Funafuti has the capacity to extract 65 m<sup>3</sup>/day. There are smaller plants in other parts of the group (Vaitupu (30 m<sup>3</sup>/d) and Nanumaga (30 m<sup>3</sup>/d). These plants were donated by the Japanese government as measures to counter the water shortage problem during the state of emergency proclaimed in August 1999.

In 2006 another plant was also donated by the government of Japan to help supply water in Funafuti but was intended for emergency purposes only. The plant on Funafuti produces water at a unit cost of AU\$3.50 per m<sup>3</sup>. The existing tariff used in Funafuti recovers less than half of the ongoing operation and maintenance costs. The Public Works Department (PWD) considers these costs unsustainable as it is not possible to recover any capital investment costs for replacement of the plant. On Funafuti the seawater is extracted from the lagoon and it has been reported that its quality is dubious due to its closeness to the village.

## **Burrow Pits**

'Burrow' pit is the name given to large holes excavated by the Americans during the WWII to build the airstrip, and other construction. They contain water and provide communities on Funafuti with a number of economic and social benefits, so the government and community advise that they need to be protected to sustain these activities.

Major use of these burrow pits are as follows:

- Dumping of rubbish
- Construction of pigpens
- Construction of houses
- Construction of two tennis courts

- Cleaning of pigpens
- Swimming and bathing of people especially children.

During the two assessments of water quality conducted by the government and AusAID in 2005, it was confirmed that water in all burrow pits on Funafuti is highly contaminated with faecal bacteria, and has low Dissolved Oxygen- not fit for human consumption.

## **Natural ponds**

These water bodies are known to be formed under natural conditions unlike the burrow pits. All the islands in Tuvalu have natural ponds, but they differ as some of them are more saline than others. There has been no testing of the water quality in the ponds in the outer Islands, but the public uses some of these ponds for swimming, and washing clothes as they are not very saline like the one in Funafuti. Some of these ponds are getting shallower and smaller from mud and runoff. Ponds closest to villages have been protected from human defecation and the construction of pig pens by their respective Kaupule.

On Funafuti the natural pond (Tafua pond) is highly contaminated as pig waste from the pigpens is released into the 'pond'. The water is also as salty as seawater, with low levels of dissolved oxygen towards the pigpen areas. The only fish in the water is Tilapia. People fish Tilapia to feed to the pigs as a source of protein.

Major uses of the natural pond on Funafuti include the; construction of pigpens; cleaning of pigpens and dumping of rubbish.

## **Bottled water**

Bottled water, usually from Fiji, is increasingly being used by those who can afford to buy it. It was reported that bottled water is becoming more popular because of the requirement to boil rainwater which can be inconvenient, or expensive due to the cost of fuel. Groundwater is no longer an option for human consumption. It is common for participants at meetings at the government hotel to be provided with bottled water, which is also generating large quantities of plastic bottles which require disposal. In 2003-2005, Tuvalu imported on average about 21,700 liters of water (unsweetened water), at an estimated retail value of AU\$43,000<sup>36</sup>.

## **Climate Change impacts on Tuvalu Water Sector**

### **Climate change will reduce the water supply**

This is the most significant impact on the water sector. Recent water assessments, and studies in Tuvalu have found that climate change pose a significant threat to temporarily

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<sup>36</sup> Lal, P., Saloa, S., & Uili, F. (2006) Economics of Liquid Waste Management in Funafuti, Tuvalu: Cost benefit analysis report. IWP/Forum Secretariat/SREP.

reduce even eliminate freshwater lens yields for longer time periods, through increase sea/wave overtopping inundating the lens and or/increase droughts<sup>37</sup>.

*Sea/wave overtopping:* Robust data and baseline evidence on the relationship between land height and sea level is yet to determine for Tuvalu<sup>38</sup>. However, evidences that are available in water related studies and assessment in Tuvalu indicates that sea overtopping as a significant risk to the contamination of existing water lens in Tuvalu.

There are several factors that contribute to this risk. These include (i) storm surges in which low atmospheric pressures lead to a temporary rise in sea level, possibly exacerbated by local winds; (ii) swells, or large, low frequency waves driven by winds from distant weather formations (including cyclones); (iii) tide level- with the possibility of very high tides in certain seasons; (iv) long-term sea level rise, such as that caused by climate change. At any given time, the risk of overtopping is a function of all these factors- if all four factors combined to drive a high sea there is a high risk of overtopping. Climate change will significantly affect (iv), sea level rise thereby progressively increasing the risk of overtopping. Due primarily to sea level rise, by the year 2030 should the business-as-usual level of emission continues, and most of the land over lenses should be considered vulnerable to overtopping and seawater flooding<sup>39</sup>.

**Drought:** Rainfall trends in Tuvalu as well as the drought trend in Tuvalu remains unclear given the lack of robust and detail study available. Existing data indicate with moderate confidence that wet season percentage rainfall will increase in 2030-2055 while the percentage rain fall increase in dry seasons was reported with low confidence<sup>40</sup>. Projected climate trend for Funafuti and northern islands (near to the equator) indicates increase number of low rainfall days, prolonged droughts, high extreme temperature and evaporation<sup>41</sup>. Droughts up to longer than 3 months and longer have occurred in Tuvalu in 1999 and 2011 where the Government of Tuvalu declared a state of emergency on the island of Nanumaga, Niutao and Funafuti. The Severity of droughts, including short and extended period of low rainfall on the different islands of Tuvalu will increase in the future<sup>42</sup>. Increase frequency of drought and longer period of low rainfall increases salinity of groundwater which adversely affects subsistence agriculture and increase health risks such as skin diseases and eye infections.

#### **Table 4. Likelihood, trend and impact of Drought in Tuvalu<sup>43</sup>**

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<sup>37</sup> Government of Tuvalu (2007) Tuvalu's National Adaptation Program of Actions.

<sup>38</sup> The Tuvalu Coastal Adaptation Project funded by the GCF and UNDP are currently undertaking a survey to determine such information.

<sup>39</sup> Pacific Climate Change Science Program Partners (2011) Current and future climate of Tuvalu, pp 1-8.

<sup>40</sup> GCCA. (2013) Climate Change Profile; Tuvalu, pp 1-13.

<sup>41</sup> Government of Tuvalu (2007) Tuvalu's National Adaptation Program of Actions.

<sup>42</sup> Ibid.

<sup>43</sup> ibid

<b>Vulnerable Location</b>	<b>All islands, especially the Northern islands</b>
<b>Current likelihood</b>	1 in 4 years common in El Nino years
<b>Trend in likelihood</b>	3 in 4 years
<b>Trend in Magnitude</b>	More intense and longer period of drought
<b>Trend in Location</b>	Increase severity on Northern islands with low annual rainfall. More low-income families affected
<b>Other trend description</b>	Severe on prolonged ENSO episode

Finally, it is important to note that the two extreme scenarios describe above-of sea overtopping and extreme drought-could occur simultaneously or in quick successions due to climate change. Such a catastrophic combination would reduce the freshwater yields from water lenses to close to zero for several years.

### **Climate Change will increase the demand for water**

The population of Tuvalu particularly on the island of Funafuti is growing due to natural growth and from internal population movements from other remote islands. Funafuti already has the highest population density rate in the region and population is projected to increase faster than the national average. Evidence indicate that climate change is one of the major factors that is contributing to the movement of Tuvaluans to Funafuti<sup>44</sup>.

There is a lack of data availability on the per capita water demand for Tuvalu, however research on domestic water use has long established a positive relationship between daily (or seasonal) temperature. Given that increase extreme hot days have been projected for Tuvalu, it is expected that demand for water will increase in the future and is exacerbated by increase population.

Tuvalu does not have a centralised piped water supply system. Each individual household on Funafuti has rainwater harvesting systems such as water tanks or cisterns. Water supply also comes from government reserves and communal reserves. The quantity of fresh water supply is subject to seasonality due to reliance on rainfall, low rain water storage capacity and poorly constructed communal and household rainwater harvesting systems. In addition, poor maintenance of water and wastewater management at the household level can contribute to low volume, scarcity and unsafe drinking water. When household supplies are depleted, the community depends on the government to transport water to their homes from national reserves and the government owned desalination plant.

Small households which make up 70% of all Funafuti households have an average 1.800 litres of storage capacity in rainfall tanks, and consume an average 350 litres per day<sup>45</sup>. Large households which consist of 30% of all Funafuti households, have an

<sup>44</sup> ibid

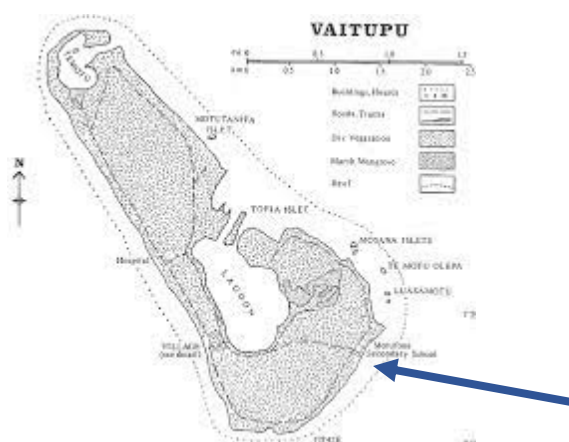
<sup>45</sup> Kinrade, P., Nadja, A., Pickering., & Rookie, E. (2019) Water Security in Tuvalu. Assessing Costs and benefits, pp1-18.

average of 3,850 litres of storage capacity in rainfall tanks, and consume an average of 550 litres per day<sup>46</sup>.

There are three distinct problems affecting the availability of water in Tuvalu<sup>47</sup>. First, the use of water exceeds the rate at which it is being replenished. Second, many human activities use water as an input, and when the water runs off to groundwater level, its quality is diminished. Third, many activities use groundwater and rain-water as means to dispose of waste, increasing demand for water.

## Project Location

This project will be implemented at Motufoua Secondary School (hereinafter referred to as “Motufoua”) which located at the southern end of Vaitupu atoll. Consultations made with the school’s management team earlier this year has confirmed the urgent need to increase clean water supply and sanitation for the school through the enhancement of water supply infrastructures. It is an immediate priority for the school after having recurring experiences of low water supply including a recent episode in which the school was forced to look for a desalination plant to support the decreasing potable water supply that has resulted from a dry spell.



Source (JICA, 2011)

Project Site:  
Motufoua

Motufoua is the largest and the only public boarding high school in Tuvalu apart from a single private high school located in the capital island. It was established in 1905 and administered under the local church before an expansion made in 1975 when the government took over the administration and subsequently broaden enrolment of both boys and girls ranging from Year 9 to Year 13 (14 to 18 year of age). From 2018-2022, the average population is around 650 people (accounted for students and staff) with varying percentage for boys and girls every year.

<sup>46</sup> ibid

<sup>47</sup> Office of the Auditor General (2011) Performance Audit Report on Access to Safe Drinking Water. Parliamentary Paper, pp 1-37.

Before the start of each school year, Motufoua students are required to travel by boat bounding for Vaitupu to attend high school education<sup>48</sup> – this includes new enrolled students who have completed 8-year primary school level at their domicile atoll. The school is fully funded by the government and has the most and majority of essential facilities designed for boarding school. Bulk of expenses for textbooks, food supplies, salary and wages (for staff), equipment and minor maintenance are all covered under the government annual budget. On this basis, the overall management of the school is placed at Motufoua and led by the school's Principal with the support from a number of staff summarized in the following table:

**Table 5. Motufoua Staff number**

Staff	Number
Administration	5
Teaching Staff	48
Librarians	2
Ancillary Staff	41

**Infrastructure Projects:** Majority of infrastructure facilities on the school were built under donor funding. Classrooms, dormitory, water cisterns, office administration, dining hall and other critical facilities were part of official development grants from Britain<sup>49</sup>, Australia and Japan<sup>50</sup> that had been provided over the years. The government's investments on the school have been limited to operational and minor routine maintenance despite the education sector being the highest recipient of the government annual budget allocation. With the absent of a scheduled upkeep, the deterioration rate of infrastructures is fairly high.

Assessment made by the Public Work Department in the wake of the dry spell this year reported a large-scale deterioration on roofing, piping system and water cisterns for which a significant cost for rehabilitation would be needed. Cracks, rusty on structural elements and extensive damages were identified in and around the unused water cisterns. The possibility of making temporary patching work have considered to be high risk, unreliable and costly to the school. Harsh climatic conditions, aging and environment challenges unique to the school area were the main contributing factors to deterioration. Currently, the school has 6 water cisterns built and their status are given below:

**Table 6. Assessment of Water Cisterns**

Cistern	Storage Capacity	Status	Year built	Donor
No.1	225 m <sup>3</sup>	Good	1997	Japan
No.2	225 m <sup>3</sup>	Good	1997	Japan
No.3	250 m <sup>3</sup>	damaged	1987	N/A

<sup>48</sup> Currently there is no domestic air service and the only mean of travel interisland is by boat.

<sup>49</sup> Available at [https://openjicareport.jica.go.jp/pdf/11289907\\_02.pdf](https://openjicareport.jica.go.jp/pdf/11289907_02.pdf)

<sup>50</sup> Available at [https://openjicareport.jica.go.jp/pdf/12031027\\_01.pdf](https://openjicareport.jica.go.jp/pdf/12031027_01.pdf)

No.4	250 m <sup>3</sup>	damaged	1987	N/A
No.5	90 m <sup>3</sup>	damaged	1979	N/A
No.6	90 m <sup>3</sup>	damaged	1979	N/A

Extensive damages of these water cisterns have led the school to abandon using them and instead brought in 18 water tanks in 2005 as temporary replacement for water storage of which supply is mainly for drinking and cooking. Each water tank holds 10,000 litres. Washing, toilet flushing and other water used activities have entirely turned to ground water. Sanitation, as a result, have been compromised. So far, there have been no funding secured for replacement of water cistern.

### **Project / Programme Objectives:**

The overall objective of the project is to provide Motufoua Secondary School with reliable access to a safe and resilient water supply under a changing climate.

This is considered under a single component which underscore the:

1. Enhancement of water supply infrastructures for domestic use with the following outputs.
  - Increased clean water supply for the school
  - Defective water harvesting and piping system repaired
  - Improved water awareness and monitoring system



## Project / Programme Components and Financing:

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Indicative Activities	Amount (US\$)
Enhancement of water supply infrastructures for domestic use.	Increased clean water supply for the school	<ol style="list-style-type: none"> <li>1. Increased availability of clean rainwater and groundwater supply to the school</li> <li>2. Reduced incidences of water related diseases.</li> </ol>	<ol style="list-style-type: none"> <li>1. Carry out a water-need assessment for the school.</li> <li>2. Site selection for construction of new water cisterns and piping system.</li> <li>3. Prepare technical designing.</li> <li>4. Procure materials and mobilize local labors</li> <li>5. Construction of new water cisterns</li> </ol>	<del>1,550,000</del> <u>1,553,330</u>
	Defective water harvesting and piping system repaired.	<ol style="list-style-type: none"> <li>1. Improved water harvesting channels to water cisterns</li> <li>2. Increased water dependency to over 2 months period</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify defective areas need to be replaced (roof catchment, gutters and piping)</li> <li>2. Replace and connect to water storage facilities</li> </ol>	<del>95,000</del> <u>100,000</u>
	Improved water awareness and monitoring system	<ol style="list-style-type: none"> <li>1. Increased awareness of water consumption</li> <li>2. Adaptation measures recognized and implemented sustainably</li> </ol>	<ol style="list-style-type: none"> <li>1. Raise awareness on climate and water-smart practices</li> <li>2. Develop a medium-term maintenance plan</li> <li>3. Develop a water management and monitoring framework and database</li> </ol>	<del>5,000</del> <u>20,000</u>
<b>Component 1 Sub-Total</b>				<del>1,650,000</del> <u>1,673,300</u>
Project executing cost				<del>198,400</del> <u>171,300</u>
Total project cost				<del>1,848,400</del> <u>1,844,600</u>
Project/Programme Cycle Management Fee charged by the Implementing Entity				<del>151,600</del> <u>155,400</u>
Amount of financing required				<b>2,000,000</b>



## Projected Calendar:

*Indicate the dates of the following milestones for the proposed project/programme*

Milestones	Expected Dates
Start of Project/Programme Implementation	2023
Mid-term Review (if planned)	2024
Project/Programme Closing	2025
Terminal Evaluation	2025/2026

## PART II: PROJECT / PROGRAMME JUSTIFICATION

### A. Project Components

With rigid level of national resources to support funding adaption measures and raise resilience in communities, there is a large recognition in the Tuvalu's Sustainable and Integrated Water and Sanitation Policy (2012-2021) and Tuvalu Priority Infrastructure Investment Plan 2020-2025 of external funding supports to create positive changes to livelihood and safety of small, distant and affected communities. It is the main goal of the project that the affected community impacted by climate variability without access to funding support is prioritised. On this basis, the project identified Motufoua and with an consulted approach one key component is putting forward:

#### **Component 1: Enhancement of water supply infrastructures for domestic use.**

In response to an urgent need to address the persistent challenge of deficient water supply on Motufoua, the project has been structured to present concrete adaptation interventions that will help solve inadequate water storage capacity and poor sanitation facilities. Through these interventions the project aspires to improve resilience of the school and engender an inclusiveness approach to support boys and girls and staff adapt to risks of changing climate.

Main Outputs under this component are described as:

- Increased clean water supply for the school
- Defective water harvesting and piping system repaired.
- Improved water awareness and monitoring system

These outputs recognise that achieving water security and resilience in Motufoua cannot be achieved with a single type of intervention alone and will need a portfolio of cost-effective interventions given the urgency of the issue and the array of intervention available. The identified activities are in line with the school's priority to increase water storage areas, harvesting infrastructures and piping networks as recommended by the assessment made by the Public Work Department.

**Project Site:** The site selection was determined with the assistance of the Public Work Department and in agreement with the management team of Motufoua. As described under the first output, increased clean water supply would be entailed building new and larger water cisterns than the current size and storage level using PWD building standard. Table below provides an overview of proposed storage capacity granting an additional of 4110 m<sup>3</sup>.

**Table 7. Proposed new Water Cisterns**

<b>Cistern</b>	<b>New Storage Capacity</b>	<b>Site</b>	<b>Funding</b>
No.3	repurpose		Not covered by the Project
No.4	2000 m <sup>3</sup>	Same site	Project
No.5	110 m <sup>3</sup>	Same site	Project
No.6	repurpose		Not covered by the Project
No.7	2000 m <sup>3</sup>	New site	Project

<b>Cistern</b>	<b>Collected from</b>	<b>New Storage Capacity</b>	<b>Supplied to</b>	<b>Funding</b>
<a href="#">No.1</a>	<a href="#">Boys' dorm A (1034m<sup>2</sup>)</a> <a href="#">New Dorm B (483m<sup>2</sup>)</a> <a href="#">Old Dorm C(232m<sup>2</sup>)</a> <a href="#">Total Roofing area 1749 m<sup>2</sup></a>	<a href="#">Leave as it is (225m<sup>2</sup>)</a>	<a href="#">Boys' dorm A shower, WC, laundry</a> <a href="#">New Dorm B shower, WC, laundry</a>	<a href="#">Not covered by the Project</a>
<a href="#">No.2</a>	<a href="#">Girls' dorm D (1034m<sup>2</sup>)</a> <a href="#">Girl's dorm E (588m<sup>2</sup>)</a> <a href="#">Shed F (208m<sup>2</sup>)</a> <a href="#">Total roofing area 2012m<sup>2</sup></a>	<a href="#">Leave as it is (225m<sup>2</sup>)</a>	<a href="#">Girls' dorm D and E' shower, WC, laundry</a>	<a href="#">Not covered by the Project</a>
<a href="#">No. 3</a>		<a href="#">Leave as it is<sup>51</sup></a>	-	<a href="#">Not covered by the Project</a>

<sup>51</sup> After consultation with the school, it was suggested that these old cisterns leave as they are. Cistern No. 3 is an elevated cistern less than one meter above the ground and its location present a good view to the sporting ground. The school often set up decoration on the top of the cistern for VIP spectator area. Cistern No.6 is less prioritized at this stage for use due to its size and deteriorating condition.

<a href="#"><u>No. 4</u></a>	<a href="#"><u>Science Building G (814 m<sup>2</sup>)</u></a> <a href="#"><u>Old boys No.1' dorm H (315m<sup>2</sup>)</u></a> <a href="#"><u>GC 1 (363 m<sup>2</sup>)*</u></a> <a href="#"><u>GC 2 (897 m<sup>2</sup>)</u></a> <a href="#"><u>GC 3 (1008 m<sup>2</sup>)</u></a> <a href="#"><u>GC 4 (390 m<sup>2</sup>)</u></a> <a href="#"><u>new building proposed I (800m<sup>2</sup>)</u></a> <a href="#"><u>Total roofing area 4587 m<sup>2</sup></u></a>	<a href="#"><u>2000 m<sup>3</sup></u></a>	<a href="#"><u>Boys shower/WC</u></a> <a href="#"><u>Boys laundry</u></a> <a href="#"><u>Gardening</u></a> <a href="#"><u>Livestock</u></a>	<a href="#"><u>Project</u></a>
<a href="#"><u>No. 5</u></a>	<a href="#"><u>Dining Hall roofing J (800m<sup>2</sup>)</u></a> <a href="#"><u>Old dining K(253m<sup>2</sup>)</u></a> <a href="#"><u>Old kitchen L(198m<sup>2</sup>)</u></a> <a href="#"><u>Storage Area M(216m<sup>2</sup>)</u></a> <a href="#"><u>new multi proposed building N (315m<sup>2</sup>)</u></a> <a href="#"><u>Administration building O (200m<sup>3</sup>)</u></a> <a href="#"><u>Total roofing area (1892m<sup>2</sup>)</u></a>	<a href="#"><u>110m<sup>3</sup> + 120m<sup>3</sup> of green tanks</u></a>	<a href="#"><u>Drinking and kitchen cooking</u></a>	<a href="#"><u>Project</u></a>
<a href="#"><u>No. 6</u></a>	-	<a href="#"><u>Leave as it is</u></a>	-	<a href="#"><u>Not covered by the Project</u></a>
<a href="#"><u>No. 7</u></a>	<a href="#"><u>Chapel P (703m<sup>2</sup>)</u></a> <a href="#"><u>New proposed girls study shed Q (315m<sup>2</sup>)</u></a> <a href="#"><u>2 new proposed girls dorms R (2068m<sup>2</sup>)</u></a> <a href="#"><u>Total roof area (3086m<sup>2</sup>)</u></a>	<a href="#"><u>2,000m<sup>3</sup></u></a>	<a href="#"><u>Girl's shower, WC, laundry, gardening, livestock</u></a>	<a href="#"><u>Project</u></a>

[\\*GC \(General Classroom\)](#)

**[Project Sustainability:](#)** Ensuring these water cisterns remain functions beyond the project period is critical. Output 3 will ensure effective maintenance schedules are prepared and that training is sufficiently provided on the school's responsible staff in managing maintenance works.

The challenge concerning the financial impediment to carry out maintenance will help the project in linking the school maintenance needs with the government's Deferred Maintenance Policy where an allocation is appropriated each year by the government to ensure that the physical conditions of all government assets are adequately maintained to ensure their continued usefulness.



### **Site Description**

- Cistern 2&7 are next to girls' dormitory.
- Cistern 1&4 are closer to boys' dormitory.
- Cistern 5 is closer to cooking facilities
- Cistern 6 is next to an old staff building

### **Managing water quality and consumption monitoring**

Water quality is recognized by the project to ensure clean water supply are available and accessible to anyone who needs it. Conventionally, water resources assessment and monitoring do not have local standard guidelines<sup>52</sup>. Rainwater collection are normally untreated but recommended be boiled before drinking.

The project's Output 3: Improved water awareness and monitoring system has three planned activities that not only raise awareness on water-smart practices in need to support the school water supply management, but also the project will help design a robust monitoring framework of water consumption data and the utilizing rate which would then incorporate to a forecasting model that would determine the remaining water supply.

Table 8.1 provides a snapshot of preliminary assessment of the school water supply comparing the existing water system and project intervention.

Major details used in the calculation of the table is given below:

<sup>52</sup> The Funafuti water and sanitation project has a component that focus on addressing water quality assessment which this project can benefit from.



**Table 8.0 Details for water supply analysis**

	<u>Existing system</u>	<u>Project Intervention</u>
<u>Water storage capacity: Of which</u>		
<u>Boys</u>	<u>225 m<sup>3</sup></u>	<u>2225 m<sup>3</sup></u>
<u>Girls</u>	<u>225 m<sup>3</sup></u>	<u>2225 m<sup>3</sup></u>
<u>Kitchen and Drinking</u>	<u>120 m<sup>3</sup></u>	<u>230 m<sup>3</sup></u>
<u>Roof area: Of which</u>		
<u>Boys</u>	<u>1749 m<sup>2</sup></u>	<u>6336 m<sup>2</sup></u>
<u>Girls</u>	<u>2012 m<sup>2</sup></u>	<u>5098 m<sup>2</sup></u>
<u>Kitchen and Drinking</u>	<u>700 m<sup>2</sup></u>	<u>1892 m<sup>2</sup></u>
<u>Population: Of which</u>		
<u>Boys</u>	<u>300</u>	<u>300</u>
<u>Girls</u>	<u>300</u>	<u>300</u>
<u>Kitchen and Drinking</u>	<u>600</u>	<u>600</u>
<u>Consumption assumption per student: of which</u>		
<u>Boys</u>	<u>50 litres/day</u>	<u>90 litres/day</u>
<u>Girls</u>	<u>50 litres/day</u>	<u>80 litres/day</u>
<u>Kitchen and Drinking</u>	<u>10 litres/day</u>	<u>10 litres/day</u>

The water storage and water supply capacities were estimated based on the average annual of Vaitupu (approx.. 3100mm) and the rainfall data (Funafuti) in 2011 when the country was hit by severe drought. As a result, it was found that each scenario for existing cisterns would be supplied with an insufficient volume of water, as the water consumption exceeds the water supply capacity under average precipitation conditions. It gets severe when under drought conditions recording months of clean water deficiency.

With the project intervention, water storage facilities will be increased, eaves gutters repaired and piping systems established which will significantly raise level of clean water collection and water supply. Under drought conditions, water consumption increases significantly per student from 50 litres per day to more than 80 litres per day both for boys and girls<sup>53</sup>. Drinking water and kitchen supply will be achieved 10 litres/day for 600 students without impacting clean water supply.

Under this Project, potential water shortage will be supplemented by using well water for non-drinking purposes if water demands increase. Since the quality of well water is not good due to high salt content (and worse when drought last over a month), the well-water will be used only for flushing toilets in the Dormitories, reserving it as a backup water source under normal conditions.

<sup>53</sup> Roof area is major determining factor for water storage and water supply between boys and girls.

**Table 8.1 Analysis on water supply<sup>54</sup>**

Month			1	2	3	4	5	6	7	8	9	10	11	12
2011- Funafuti Precipitation			431.4	152.6	129.4	64.3	101.3	106.6	42.5	101	38	131.7	423.6	332.5
Average-Vaitupu Precipitation			362.1	368.6	261.5	230.3	215.1	201.7	206.3	245.3	191.5	220.4	296.3	331.6
Exiting Cistern (Boys)	Years of drought	Supplied m3	754.5	266.9	226.3	112.5	177.2	186.4	74.3	176.6	66.5	230.3	740.9	581.5
		Balance m3	304.5	-183.1	-223.7	-337.5	-272.8	-263.6	-375.7	-273.4	-383.5	-219.7	290.9	131.5
		Remained m3	225.0	41.9	-181.8	-519.3	-792.1	-1055.7	-1431.4	-1704.7	-2088.3	-2307.9	-2017.0	-1885.5
	Normal Year	Supplied m3	633.3	644.7	457.4	402.8	376.2	352.8	360.8	429.0	334.9	385.5	518.2	580.0
		Balance m3	183.3	194.7	7.4	-47.2	-73.8	-97.2	-89.2	-21.0	-115.1	-64.5	68.2	130.0
		Remained m3	225.0	225.0	225.0	177.8	104.0	6.8	-82.4	-103.4	-218.4	-283.0	-214.7	-84.8
Project interventions (Boys)	Years of drought	Supplied m3	2733.4	966.9	819.9	407.4	641.8	675.4	269.3	639.9	240.8	834.5	2683.9	2106.7
		Balance m3	1923.4	156.9	9.9	-402.6	-168.2	-134.6	-540.7	-170.1	-569.2	24.5	1873.9	1296.7
		Remained m3	2225.0	2225.0	2225.0	1822.4	1654.2	1519.7	978.9	808.9	239.6	264.1	2138.0	2225.0
	Normal Year	Supplied m3	2294.3	2335.4	1656.9	1459.2	1362.9	1278.0	1307.1	1554.2	1213.3	1396.5	1877.4	2101.0
		Balance m3	1484.3	1525.4	846.9	649.2	552.9	468.0	497.1	744.2	403.3	586.5	1067.4	1291.0
Exiting Cistern (Girls)	Years of drought	Supplied m3	868.0	307.0	260.4	129.4	203.8	214.5	85.5	203.2	76.5	265.0	852.3	669.0
		Balance m3	418.0	-143.0	-189.6	-320.6	-246.2	-235.5	-364.5	-246.8	-373.5	-185.0	402.3	219.0
		Remained m3	225.0	82.0	-107.6	-428.2	-674.4	-909.9	-1274.4	-1521.2	-1894.8	-2079.8	-1677.5	-1458.5
	Normal Year	Supplied m3	728.5	741.6	526.1	463.4	432.8	405.8	415.1	493.5	385.3	443.4	596.2	667.2
		Balance m3	278.5	291.6	76.1	13.4	-17.2	-44.2	-34.9	43.5	-64.7	-6.6	146.2	217.2
		Remained m3	225.0	225.0	225.0	225.0	207.8	163.6	128.7	172.2	107.5	101.0	225.0	225.0
Project interventions (Girls)	Years of drought	Supplied m3	2199.3	778.0	659.7	327.8	516.4	543.4	216.7	514.9	193.7	671.4	2159.5	1695.1
		Balance m3	1479.3	58.0	-60.3	-392.2	-203.6	-176.6	-503.3	-205.1	-526.3	-48.6	1439.5	975.1
		Remained m3	2225.0	2225.0	2164.7	1772.5	1568.9	1392.4	889.0	683.9	157.6	109.1	1548.6	2225.0
	Normal Year	Supplied m3	1846.0	1879.1	1333.1	1174.1	1096.6	1028.3	1051.7	1250.5	976.3	1123.6	1510.5	1690.5
		Balance m3	1126.0	1159.1	613.1	454.1	376.6	308.3	331.7	530.5	256.3	403.6	790.5	970.5

<sup>54</sup> [Roof area from new buildings planned to build shortly after the project were incorporated](#)



Drinking and Kitchen use (existing storage)	Years of drought	Supplied m3	302.0	106.8	90.6	45.0	70.9	74.6	29.8	70.7	26.6	92.2	296.5	232.8
		Balance m3	122.0	-73.2	-89.4	-135.0	-109.1	-105.4	-150.3	-109.3	-153.4	-87.8	116.5	52.8
		Remained m3	120.0	46.8	-42.6	-177.6	-286.7	-392.1	-542.3	-651.6	-805.0	-892.8	-776.3	-723.6
	Normal Year	Supplied m3	253.5	258.0	183.1	161.2	150.6	141.2	144.4	171.7	134.1	154.3	207.4	232.1
		Balance m3	73.5	78.0	3.0	-18.8	-29.4	-38.8	-35.6	-8.3	-46.0	-25.7	27.4	52.1
		Remained m3	120.0	120.0	120.0	101.2	71.8	33.0	-2.6	-10.9	-56.9	-82.6	-55.2	-3.1
Drinking and Kitchen use (project interventions)	Years of drought	Supplied m3	816.2	288.7	244.8	121.7	191.7	201.7	80.4	191.1	71.9	249.2	801.5	629.1
		Balance m3	636.2	108.7	64.8	-58.3	11.7	21.7	-99.6	11.1	-108.1	69.2	621.5	449.1
		Remained m3	230.0	230.0	230.0	171.7	183.3	205.0	105.4	116.5	8.4	77.6	230.0	230.0
	Normal Year	Supplied m3	685.1	697.4	494.8	435.7	407.0	381.6	390.3	464.1	362.3	417.0	560.6	627.4
		Balance m3	505.1	517.4	314.8	255.7	227.0	201.6	210.3	284.1	182.3	237.0	380.6	447.4

## B. Economic, social and environmental Benefits

Implementing this project will provide many benefits in terms of the economy, social and environmental both in the short and long term. Essentially, the benefits will be earned by students and staff.

**Table 98. Project's economic, social and environmental benefits**

Benefits	Current Problem	With the Project
Economic benefits	<p>One of the main economic benefits this project can provide is the future return on investment in human capital. The main problem with using the underground well water is the time and effort taken to source, apart from sanitation and health issues associated with the practice. It is not unusual to observe exposure to harmful bacteria, viruses and chemicals found in these underground water sources. This puts risk on the health of students, staff and the community.</p> <p>In addition, the school has been recently using a desalination plant to supplement the water supply needed. The problem with the use of the desalination plant is that it is costly in terms of maintenance and fuel use.</p>	<p>With the project, new water cisterns and improved harvesting infrastructures will allow students to access clean water supply and good sanitation facilities. It helps anchor confidence of students and parents on health preventative measures and the existing study environment, thus improving the passing rate of the school.</p> <p>In addition, with the project, less reliant on a costly desalination plant both in operation and maintenance. The cost of fuel it foregoes from replacing the desalination plant is the opportunity cost for the government to utilize funds to meet other public programs.</p>
Social benefits	<p>The use of water from underground well has several serious health threats arising from being exposed to pollution, sewage systems, chemicals that could easily pass through and contaminate underground water. The chance of causing a disease outbreak is highly likely.</p> <p>The second problem with sourcing water from the underground well is that it requires fetching physically and it is time consuming.</p>	<p>With the project, it will reduce the risk of diseases exposure to the community, and also help students to refocus on study, and give confidence and trust on parents about the care students receive.</p> <p><a href="#">Even though the project focuses mainly on addressing water adaptive capacity of the school, the importance to the community living in the vicinity is widely considered to boost resilience through training provided under the project on water-smart</a></p>

		<a href="#">practices and water supply monitoring and optimization. Community accessibility to clean water supply has been critically considered by the project particularly addressing the needs of marginalized and vulnerable persons.</a>
Environmental benefits	The using of the desalination plant has a risk to the environment given the fuel that is used to operate the machinery which eventually produce greenhouse gases that has impacts to the atmosphere.	With the project, the replacement of the desalination plant will reduce the risk exposure of the greenhouse gases to the environment through the fuel it used to operate the desalination plant.

### C. Analysis of the cost-effectiveness of the proposed/programme

It is a daunting scenario if delays and inactions are prolonged which clearly impacting students and staff. The fact that Motufoua elevates improved clean water storage capacity as a priority reflects an immediate concern that warrant attention. Resilience is at high risk of compromising when the water problem persists. The alternative of relying on a desalinated water supply has proven to be cost [ineffectively due to its enegy consumption. PWD estimated that it around AUD\\$3.50 per m³ exclude maintenance costs that are expensive, and it is a shorter-term solution. Supply of desalination plants are limited in the country and donor funded. When available they are constantly mobilized around communities. The current desalination plant yield around 8 m³ per day \(equivalent to 240 m³ a month\) and would not entirely solve water problems of the school. Well water is contaminated and not recommended for drinking but it regularly used for toilet flushing.](#)

-As shared by the school's management team, funding availability is the main factor behind these delays. Government's funding is not highly anticipated to secure easily particularly amidst new challenges of inflation emerged from Covid and Ukraine war.

**Project Component:** Developing cost-effective solutions are consider necessary and critical to strengthen resilience and adaptation to changing climate.

**Table 109. Cost-effective solutions to be provided under the Project**

Business as Usual	Cost-effective solution
Low water supply will be a recurring experience for students going forward. Contaminated water would increasingly perfuse potable storage areas and the whole school becomes vulnerable.	As prioritized by the school, new water cisterns will alleviate a lot of pressures on staff and students in a way that they are able to access clean rain water supply for months. It assured their sole focus on

Normally, livestock and gardening are the first to get impacted as water become rationing.	improving education quality in classroom. New water cisterns will assure abundance of water reserves that will be sufficient also for livestock and gardening for months.
Clean water harvesting infrastructures remain defective and useless for collecting channeling rainwater to water cisterns	Maximize water collection from iron roofing of buildings and through improved piping networks before storage in water reservoirs.
Ambiguity on commitments to improving clean water supply affect morale and determination of students and staff	Assurance that improved water storage capacity will be delivered and education on water infrastructure maintenance and monitoring is forthcoming.

**D. Consistence with national and sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, sector strategies, national communications, or national adaptation programme of action, or other relevant instruments, where they exist.**

The project proposal is aligned with both the national and international strategies and plans. Tuvalu ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, assented the Kyoto Protocol in 1998, accepted the Doha Amendment in 2014, and signed and ratified the Paris Agreement in 2016. The project aligned with some national key documents includes Te Kete (National Strategy Sustainable Development), Te Kaniva (Tuvalu Climate Change Policy), Tuvalu National Strategic Action Plan for Climate Change and Disaster Risk Management (NSAP), Tuvalu's National Adaptation Programme of Action (NAPA), Tuvalu National Environment Management Strategy. The project also aligned with some regional frameworks such as the Pacific Islands Framework for Action on Climate Change (PIFACC) and the Pacific Adaptation to Climate Change (PACC), and the international framework on Sustainable Development Goals (SDGs) 2030.

**Table 110. Consistency with Te Kete and other government policies**

<b>National/Sub-national strategic plans</b>	<b>Descriptions and linkages to climate change and disaster</b>
Te Kete	This is the national strategic plan that headed all development plans of the Government and Non-Government organizations. It was developed in 2020 and has a lifetime of 10 years (2021 – 2030). In this strategic plan, the first Strategic Priority Area (SPA) focus on 'Enabling Environment', which under its outcome 4 stressed the greater degree of security in Tuvalu not only from climate change but also disaster.
Te Kaniva	This is the national climate change policy that was developed to stress the aspirations of the people of Tuvalu on how best

	to address the impacts and consequences of climate change. It encompasses mitigation and adaptation strategies that endeavor to address seven thematic goals both in the short term and long term. Out of seven thematic goals, the first goal is focusing on strengthening adaptation actions to address current and future vulnerabilities. A few key issues identified under this thematic goal includes the food crops affected by storms and salt water intrusion, health and socio-economic cost and implications of climate change and droughts.
Tuvalu National Strategic Action for Climate Change and Disaster Risk Management (NSAP)	As the name suggest, this document was developed to outline clear strategic actions and implementation arrangements to be taken to address the issues flagged in the Te Kaniva, the Tuvalu Climate Change Policy.
Tuvalu's National Adaptation Programme of Action (NAPA)	The Tuvalu NAPA was developed to support the National Strategy for Sustainable Development in synergy with other action plans and development aspirations of the government of Tuvalu. The goal of the Tuvalu NAPA is to provide a framework that will guide the coordination and implementation of adaptation activities in the country. The main objectives of the NAPA are (i) to develop a country-wide programme that encompass urgent and immediate needs of communities; (ii) to implement immediate and urgent adaptation activities to climate change and variability; (iii) to enhance communities' awareness and livelihood; and (iv) to mainstream adaptation measures into national and sectoral planning.
Pacific Islands Framework for Action on Climate Change (PIFACC)	The PIFACC document was developed to ensure Pacific Island people build their capacity to be resilient to risks and impacts of climate change with the key objective to deliver on the expected outcomes includes the governance and decision making, improving understanding of climate change, education, training and awareness, contributing to global greenhouse gas reduction and partnerships and cooperation.
Pacific Adaptation to Climate Change (PACC)	The PACC document was developed to assist with the implementation of adaptation measures in 11 countries of the region in order to implement adaptation measures to enhance its resilience to the adverse impacts of climate change in the longer term. The principal objective of the PACC is to facilitate the implementation of long-term adaptation measures to increase the resilience of a number of key development sectors in the Pacific Island countries to the adverse impacts of climate change.
Tuvalu's Sustainable and Integrated Water and Sanitation Policy	This policy aims for a safe, reliable, affordable access to water and sanitation. Part of its strategic targets are the improvement and regular maintenance of water harvesting

	systems, sustainable operations and maintenance of desalination plants, cleaning and maintenance of gutters and water conservation.
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**E. How the project/programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc.**

The Environment Internal Assessment (EIA) will be carried out once fund is approved for the implementation of the project. As the project is focusing on the renovation of water cisterns and systems, there is a small possibility to incur environmental issues as the environmental assessment for the construction of the water cisterns in the first place has been carried out.

In terms of the construction standards, the Government of Tuvalu is currently developing the building codes and is targeting to complete soon. This building code will be used to guide and set the national technical standards on construction of infrastructures. From the past years, the Public Works Department (PWD) has been using the NZS 3604:1999 Timber framed buildings to guide the construction of infrastructures.

**F. Duplication of project / programme with other funding sources, if any.**

Tuvalu, with its geographical location and high vulnerabilities to climate change have implemented a number of projects that target to provide mitigation, adaptation and resilience to the people of Tuvalu. A number of water infrastructure projects have implemented in the country, however, there is no project focus on improving clean water supply and sanitation facilities on Motufoua. Below is the list of current active water infrastructure projects in Tuvalu.

**Table 124. Identified projects and programmes**

<b>Project Title</b>	<b>Descriptions</b>	<b>Duplication</b>	<b>Donor and Implementing Entity</b>
Water Scarcity	This project focuses on all islands of Tuvalu with the objectives of improving water systems and maintaining water cisterns in the communities.	The project focuses on the communities of all islands of Tuvalu with the exception of Motufoua Secondary School.	The donor is the Ministry of Foreign Affairs and Trade, New Zealand and implemented by the Secretariat of the Pacific Community (SPC)
Funafuti Water and Sanitation Project	This project focuses on Funafuti only by improving access to safe water and	No duplication with the Motufoua Secondary School proposed project as	Asian Development Bank (ADB) is the donor and implemented by Project Readiness Financing

	improved sanitation.	the Funafuti Water and Sanitation focus only on Funafuti.	(PRF)
Managing Coastal Aquifers in the Pacific	<p>This project focuses only on Nanumea, Nui and Nukufetau islands. Find below the intention of the project:</p> <ul style="list-style-type: none"> <li>- Identifying the extent, threats and the development potential of fresh groundwater resources</li> <li>- Increasing the awareness of groundwater as a water security supply source</li> <li>- Providing options for improved access to groundwater</li> <li>- Improving groundwater protection and management</li> </ul>	No linkage to the Motufoua Secondary School (MSS) project as the project focuses on Nanumea, Nui and Nukufetau islands.	Global Environment Fund (GEF) is the donor and implemented by United Nations Development Programme (UNDP) and Secretariat of the Pacific Community (SPC)
Vaitupu Water Security	As the name of the project suggests, this project focuses only in Vaitupu. The intention of this project is to build a network of tanks and pipes that convey groundwater from wells in the north Vaitupu Island to the villages of Tumaseu.	This project focuses only on the village communities but not Motufoua Secondary School (MSS). <a href="#">However, it is an opportunity the project can explore how it can best support supplying Motufoua as a back-up source in the long term.</a>	The donor is the Ministry of Foreign Affairs and Trade, New Zealand and implemented by Ministry of Local Government and Agriculture (MLGA), Government of Tuvalu
Global Alliance on Climate Change (GCCA) plus project	The purpose of the project is to contribute towards a more coherent, coordinated, efficient and mainstream way of	No duplication to the Motufoua Secondary School (MSS) project as this project only focuses on FSS,	European Union (EU) is the donor and implemented by Secretariat of the Pacific Community

	<p>delivering climate change adaptation support at national and regional level.</p> <p>The project focuses only on Funafuti, the main island. It improves water cisterns and systems of the Fetuvalu Secondary School (FSS), Seventh Day Adevntist (SDA), and all pre-schools in the main island.</p>	SDA and pre-schools on Funafuti the main island.	
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#### **G. Learning and knowledge management component to capture and disseminate lessons learned.**

Building upon national priorities outlined in Te Kete (2021-2030), existing frameworks and current policy arrangements on accessing clean water supply and improving food security, the project component encapsulate learning and knowledge-sharing activities. The Project has a transformative aim of supporting Motufoua becomes more climate adaptive, resilient and exceedingly sustainable.

The project will devise tailored training programs and awareness-raising movements for the success and sustainability of the intervention. Under the Project's Component, several activities are designed to enhance and improve the community water management through awareness and monitoring.

The project successes and lessons will be made available and accessible by national and international stakeholders through documented reports to be produced by the implementing agency, radio and TV programs, conferences, outreach programs and workshops. Knowledge transferred between stakeholders during the project execution process will elevate water-smart practices nationally, especially the critical human and technical capacity necessary for sustainable financing and delivery of strategic results.

**Table 132. Project Component related to learning objectives & indicators, and products**

Learning objectives and indicators	Knowledge products
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LO 1 Local professionals' hands-on training in objectively assessing water needs.  Indicator: Number of local professionals trained	Pre-assessment training for local experts
LO 2 Raising awareness for locals (boys and girls and staff) on climate and water-smart practices  Indicator: Number of beneficiaries	-Workshops, online social media, radio and TV programs -Awareness promotions -Graphic signboards -Videos and documentaries
LO 3 To enhance the capacities of locals in managing and maintaining the water system.  Indicator: The number of participants with increased knowledge	-Develop a proper maintenance plan -Develop a sketch of a pipeline network
LO 4 Train locals in developing and using a water monitoring framework and database  Indicator: Number of locals trained	-Workshop and training -Develop a monitoring framework and database -Produce templates -Training report

**H. The consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.**

The erratic onset of the recent dry spell and recurring experiences of low water supply in Motufoua has triggered a series of consultations between several government departments and the school. Consultations were set out by the government to make a thorough assessment on water problems faced by Motufoua and to draw an effective response plan to address the problem. A team from the Public Works Department was the first to carry out a thorough assessment on structural defectives of water storage spaces and harvesting infrastructures. The report was then used to facilitate the water need assessment, analysis, cost estimates and site areas selection.

Coordinated consultations were followed between the Ministry of Finance (NIE), Ministry of Education, Department of Public Works, Climate Change Department and Motufoua on setting a workplan that outline an agreement on the implementation plan and that includes arrangement for technical aspect and the financing source. On the whole, each institution has been made aware of the works involved and the alignment with environmental and social policy of the Adaptation Fund. Among these consultations, it was confirmed that several active water projects in the country are not covering Motufoua, thus no funding anticipated to address water problems in Motufoua.

Several subsequent consultations (includes emails and zoom calls) convened by the Ministry of Finance (NIE) during the preparation of this concept paper to gather more detail information on Motufoua particularly consumption and water management. Through these consultations critical details were able to shed lights on monitoring gaps that could partly attribute to the water problem. Such critical information was then agreed to translate to project activities.

More consultations have pre-arranged with other institutions such as the Environment Department, and Gender Department to discuss needed assessment on environment impacts and gender implications contributing to the preparation of the full proposal.

Consultation will extent to the neighbouring community particularly those living in the vicinity as part of the full proposal preparation to capture their views on the project and how they would be impacted during the implementation phase and post-project intervention. Importantly, the consultation will inform the formulation of an effective risk management approach the project should considered.

**Table 143. Summary of pre-concept note consultation**

<b>Stakeholder</b>	<b>Objective of Consultations</b>	<b>Conclusion</b>
<b>Motufoua Secondary School</b>	To identify the school's immediate priorities that require intervention. To confirm project implementation process in alignment with AF policies	Priorities confirmed and site selected
<b>Public Works Department</b>	Confirm potential project site after discussion with Motufoua and cost estimates for the needed infrastructures. Verify defectives identified in their report assessment and recommendation on their availability for design and building.	Critical assessment report and recommendations provided to the NIE. Willing to participate in the preparation of the full proposal in terms of design drawing, site surveying and cost quantifying.
<b>Ministry of Finance (NIE)</b>	Preparation of Adaptation Fund concept paper is well informed of issues affecting communities who are unable to access funding support and understand cost-effective solutions to their water problems	Detail information collected, consultations hosted and added to the preparation of the Concept Paper
<b>Ministry of Education, Youth and Sports</b>	To seek the Ministry's support and approval of the school's proposed project and ultimately to become an executing entity	Obtained the Ministry support and approval

**I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.**

Lack of funding has been a major issue and a cause for the delay of water infrastructure needs at Motufoua. This has raised the vulnerability of the school to drought and could also constrain the ability of the schools to increase its annual intakes. The availability of the AF funding will conveniently cover the financial need requires to aid the response plan that focus on restoring the resilience and adaptation of Motufoua against droughts and deficient rainfall. This will be achieved through the outputs and activities outlined in this project component.

**Component 1: Enhancement of water supply infrastructures for domestic use**

**Baseline**

The school lacks the financial capacity to address water problems that are attributed to damaged water cisterns and defective harvesting infrastructures. This means that the school will continue to rely on reduced rainwater supply and supplement by the unreliable and risky ground water supply. Exposure to health issues is highly probable and could affect morale of students and staff. Class suspension could also happen as they had been observed in the past years. The most affected groups will be students particularly girls at age between 14 and 18 that have to face the reality of fetching ground water for shower and toilet flushing every day.

**Additionality**

AF funding will ensure water cisterns are built, water harvesting infrastructures are properly installed and piping networks are checked and replaced the defectives. Awareness and water management consultations will be facilitated. The completion and achievement of these outputs will raise resilience level of the school and greatly dispel concerns of young boys and girls and staff on water issues. It eliminates any chances of school disruptions and allow the school to fully focus on education.

**J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.**

**Table 154. Aspects of sustainability of the project**

<b>Sustainability Aspect</b>	<b>Narrative</b>
<b>Institutional sustainability</b>	Initial consultations with key stakeholders early in the process have demonstrated a strong agreement to progressing the necessary actions to address pressing issues with water at Motufoua. Major stakeholders are optimistic on the chances to be involved again in the full proposal preparation. Roles and responsibilities are much anticipated to be finalized when the concept paper received approval.

	In fact, stakeholders were given the chance to review the concept paper before sending to the Adaption Fund Secretariat.
<b>Social sustainability</b>	The project situates within the school premises, which is a government leased land. Strong cultural and community values demonstrated how well the school is looked after, with non-discriminatory practices afforded to each student and staff. The project recognised the important of strengthening community sharing, equal opportunity and reciprocal that will allow the project to be successfully implemented.
<b>Economic sustainability</b>	AF funding will ascertain the project implementation in a way that relieve pressures on limited national resources. The school existing resources will not be negatively impacted. As a matter of fact, it will be increased from savings that could have gone to ongoing maintenance. Materials and labours cost will be borne by the project.
<b>Environmental sustainability</b>	An EIA assessment is a key requirement to be covered in the full proposal preparation as required by Tuvaluan laws. It identifies and evaluates the potential impacts of the intervention. Preliminary consultation with the Environment Department signals a positive sign for the project implementation. It is because project sites will be the same area as old water cisterns except one where the new site is favourable for construction development.
<b>Financial sustainability</b>	The government has in place reliable measures to safeguard financial transactions and strengthen accountability and transparency. Financial assistance flows from partner-funded developments will be managed under the Tuvalu Development Fund where the project designated account be established. Any transactions from the project account will be strictly adhered to the government financial instructions and processes and made easy by the IFMIS (Integrated Financial Management Information System). These mechanisms further contribute to the overall sustainability of the project.

<b>Technical sustainability</b>	Public Works Department will play a huge part in preparing technical design and drawing and a suitable schedule for implementation. The Department has also shown its willingness to provide supervision to ensure progress follows schedule and planning.
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K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

**a) Compliance with the Law**

According to Tuvalu Environment Protection Act 2008 and Regulation 2014, constructing a water cistern requires an Environment Impact Assessment. The development of the entire proposal phase will be accompanied by an EIA report from the Department of Environment detailing both the social and environmental impacts of implementing the project.

**b) Access and Equity**

The proposed projects will ensure all boarding students in Motufoua have equal access to sufficient cleaner water. The project upholds the access of any community members and the beneficiaries to all essential services and rights.

**c) Marginalized and Vulnerable Groups**

The project will ensure equal access is exercised and both boys and girls are benefitted from the project and adapted to adverse impacts of climate change.

**d) Human Rights**

The government of Tuvalu has committed to ensuring human rights are respected by integrating a statement of rights in its constitution. Therefore, the proposed project complies with Tuvalu supreme laws and respects human rights.

**e) Gender Equality and Women's Empowerment**

The participatory approach in the concept phase of the proposed intervention addresses gender equity and women empowerment related issues in the community.

The selection of the school for the project reflects the social practice of prioritising children in the community.

**f) Core Labour Rights**

The government of Tuvalu has labour legislations and policies safeguarding the welfare of labours. Therefore, the proposed project will adhere to these regulations.

**g) Indigenous Peoples**

The indigenous people on the Island willingly offered and fully dedicated their land and ownership more than a century ago to the government -and to help established eded the

only national boarding secondary school. In return, the government agreed to compensate land owners with an annual rent at the government's standard land rental rate arrangement. However, the school staff respects the native people by consulting and informing them of the proposed project and the more significant benefit derived for the students

Any infrastructure development carry out in the school recognises indigenous contribution and normally consulted through the island council and the 'Fale-Kaupule' as the rightfully representative of the communities<sup>55</sup>. Risk on the project implementation is rated as low risk.

#### **h) Involuntary Resettlement**

The construction site of new water cisterns is within the school boundary. Therefore, there will be no re-settlement activities to be implemented by the project. Project activities will allow safety clearance from student activities and therefore no major disruptions are anticipated

#### **i) Protection of Natural Habitats**

The project aims at improving water storage facilities. Increased water supply will provide sufficient water for irrigation purpose which will not only strengthen food security but will also help reduce carbon footprint, stabilise the soils and ensure cleaner groundwater.

The EIA assessment when developing the full proposal will report on the benefits and potential drawbacks of the intervention.

#### **j) Conservation of Biological Diversity**

The project will promote the conservation of environmental diversity to preserve the continuity of food chains for a sustainable and secure ecosystem. The full project design will accompany by an EIA assessment report detailing measures to address potential biological diversity risks.

#### **k) Climate Change**

The project component enhances and strengthen Tuvalu's climate resilience by increasing water capacity and promoting food security.

#### **l) Pollution Prevention and Resource Efficiency**

The proposed project will generate pollution (solid waste, air and noise pollution) and also use a significant amount of energy resource supplies. However, the EIA assessment should break out in detail how the project will manage and minimise the risks from pollution and resource inefficiency through recycling (if possible) and maximisation of energy efficiency (use solar energy supplied by the school to power electrical tools).

#### **m) Public Health**

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<sup>55</sup> Fale-Kaupule is the local decision-making body of the community on each island or atoll. It comprises of any person above the age of 18 and each person has a say on any discussion or issue impacting them.

The project will promote a safe and healthy environment for the school community. Sufficient water supply for the school community avoids health impacts (airborne and waterborne diseases, malnutrition from shortage of food supplies) and ensure sustainable food supply.

#### **n) Physical and Cultural Heritage**

The selected site of the proposed intervention will not affect any physical and cultural heritage in the target community.

#### **o) Lands and Soil Conservation**

The project will further contribute to the improvement of the land and soil moisturisation, structure and retention of nutrients through the practice of traditional compost gardening practices and composts.

**Table 16: The Adaptation Fund's Risk Categorization.**

<b><u>Environmental and Social principles</u></b>	<b><u>Compliance requirements</u></b>	<b><u>Potential impacts and risk</u></b>	<b><u>Details of potential risks</u></b>	<b><u>Measures to address risks</u></b>
<u>Compliance with the Law</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: High</u>	<u>Possible workplace accident during construction.</u> <u>Failure to remedy EIA requirements</u>	<u>Detail responses will be provided in the full proposals</u>
<u>Access and Equity</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>The project will ensure equal access to clean water supply.</u>
<u>Marginalized and Vulnerable groups</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>More consultations will arrange with marginalized groups to inform the full proposal preparation.</u>
<u>Human Rights</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>The project will follow national requirement on human rights awareness.</u>
<u>Gender Equity and Women's Empowerment</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>Gender compliance will be incorporated to the project component.</u>
<u>Core Labour Rights</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Possible workplace hazard and accidents.</u> <u>Possible working hours limitation.</u> <u>Child labour.</u>	<u>National core labour rights will be followed by the project.</u>
<u>Indigenous Peoples</u>	<u>No observed risks</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>Consultations will inform the Falekaupule, island council and landowners of these critical developments</u>
<u>Involuntary Resettlement</u>	<u>No observed risks</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>Consultations with community living in the vicinity will inform them of these critical</u>

				<u>developments.</u>
<u>Protection of Natural Habitats</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>The project will observe any requirements when forthcoming.</u>
<u>Conservation of Biological Diversity</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>The project will observe any requirements when forthcoming.</u>
<u>Climate Change</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: High</u>	<u>Not anticipated</u>	<u>The project is an adaptation response against adverse impacts of climate change.</u>
<u>Pollution Prevention and Resource efficiency</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: High</u>	<u>Possible solid waste generation during construction</u>	<u>The project will follow guidance from the Environment department, School and Island council on proper dumping areas and practices.</u>
<u>Public Health</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: High</u>	<u>Possible dust generation, heat, working long hours</u>	<u>The project will incorporate safety measures and practices prioritizing safety of workers.</u>
<u>Physical and Cultural Heritage</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>Consultation with the school and community will inform the project of the important areas.</u>
<u>Land and Soil Conservation</u>	<u>x</u>	<u>Risk: Low</u> <u>Potential impact: Low</u>	<u>Not anticipated</u>	<u>The project will promote conservation of soil and land resources.</u>

The project will be considered as Category B due to its environmental and social impacts and risks. The construction of water cisterns likely causes some environmental impacts such as loss of biodiversity due to the soils and gravel need for construction, possible oil spill from plants leading to soil contamination, dumping, dust generation, and the day heat during construction.

Proper consultations and awareness training will be incorporated in the full proposal consultation preparation with right authorities to identify requirements and best possible solutions commensurate to the risks to address environment and social impacts and risks in line with local and AF overall ESP requirements. These will inform the Environment and Social Management System (ESMS) formulation where the process for identifying environment and social impacts and risks from the project would be described. Mitigation measures will also be incorporated as part of the management system.

## **PART III: IMPLEMENTATION ARRANGEMENTS**

### **A. Arrangements for project / programme implementation.**

The project will be implemented by the AF-accredited NIE (Ministry of Finance) and will be executed by the Government of Tuvalu through the Department of Education (DOE)



under the Ministry of Education, Youth and Sports (MEYS). The Designated National Authority (DNA) for the AF, GCF and GEF and all climate change projects in Tuvalu is the Minister of Finance which oversees and coordinates ongoing and pipeline climate change mitigation and adaption projects and communicate every progress to the Cabinet, stakeholders and the public at large. DOE will work closely with the Motufoua Secondary School, the Kaupule Vaitupu and the Public Works Department on the project execution plan.

The Project Management Unit will be established to focus on the execution of outputs activities and it will be comprised of the Project Coordinator and the Finance Officer. The PMU will be responsible in managing the recruitment of necessary labours and a technical team of qualified engineers with the assistance of the Public Works Department. The PMU will be guided by the National Advisory Climate Change Committee (NACCC) which chaired by the Minister of Finance and the committee comprises of Directors of relevant Head of Departments within the Government and from the non-government organizations such as Tuvalu Climate Action Network (TuCAN), Tuvalu National Council of Women (TNCW), Tuvalu Association of Non-Government Organization (TANGO), Tuvalu National Private Sector Organization (TNPSO), Red Cross and Kaupule Funafuti.

The Project Coordinator will also handle the administrative tasks for the project to keep the project running smoothly. These include the procurement, managing deadlines, workflows and scheduling meetings. The Finance Officer will be responsible for the management of funds for the project, monitoring and reporting of the project progress through indicators.

**B. Measures for financial and project / programme risk management.**

**Table 175. Summary of Risks**

Risk Type	Risk Category	Risk Level	Risk Probability	Mitigation Measures
Political risk	Acceptance of the program	Low	Low	Timely submission of the program through the different approval levels will be carried out to ensure there are no delays.
	Restructuring of government officials	Low	Low	Proper documentation, communication and handing over will be implemented to ensure the same capacity is available if there are changes in government officials
	Interference from political parties and Kaupules	Medium	Low	Consultations

Financial risk	Timely disbursement of funds	Medium	Low	Fund request and project progress reports will be timely prepared, communicated and submitted to the Adaptation Fund and relevant stakeholders to ensure adequate feedback is provided to speed up fund's disbursement.
	Financial control risk	Low	Low	Appropriate structures at the ministerial level exists for proper management and control of public funds.
Project risk	Project performance	Low	Low	Project Team will be carefully constituted based on skills and capacity to manage the project. Detailed work plans will be developed and approved the NACCC and monitoring tools will be used to track the progress of the project.
	Delays in shipment of materials	Medium	Medium	Materials will try to be sourced firstly from local suppliers. If there are materials not locally available then timely procurement of materials from reliable overseas suppliers

**C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.**

The environmental and social risks which will result from the Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) (in line with the Environmental and Social Policy of the AF) will be conducted before the formulation of the final project document (full proposal). The project proposal will also include the environmental and social risk management plan which will be utilised during the project implementation phase.

~~The following proposed project will be considered as Category A due to its environmental and social impacts. The construction of water cisterns likely causes some environmental impacts such as loss of biodiversity due to land clearing, potential oil spill from plants and equipment leading to soil contamination and dust pollution due to excavation. Awareness programs on Health risks will be carried out on the school, local community and workers.~~

Project activities will be analysed according to the Government's Environment Protection Regulations 2014 and the AF's Environmental and Social Policy. A preliminary environmental assessment report will be prepared before the formulation of the final project proposal and will seek a development consent approval from the Department of Environment prior to the commencement of the project. The project proposal will also include the environmental and social risk management plan which will be utilised during the project implementation phase.

#### **Grievance Management Mechanism (GMM)**

The Grievance Management Mechanism will set up in line with AF and national requirements to ensure any public issues and complains raised during the project implementation are attended to and follow upon action required. Full proposal will provide a clear and detail process on this GMM.

#### **D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.**

Monitoring and Evaluation (M&E) measure the overall progress and impact of the project activities through Key Performance Indicators (KPI). They will be monitored regularly to identify the achievements or insufficiencies, therefore supporting the development of additional strategies to achieve the targets. M&E tool will be made available for project activities, as well as project management.

#### **Monitoring and evaluation arrangements for the project activities<sup>3</sup>**

A monitoring and evaluation system will be developed to support the project management and decision-makers team in designing, implementing and adjusting the project activities. The overall (short, medium and long term) impact of the planned activities will also be assessed using the resources, methodologies or tools etc.

**Table 186. Monitoring and Evaluation Plan**

	Indicators	Baseline	Target	Source	Frequency	Responsibility
<b>Goal</b>						
<b>Objectives</b>						
<b>Outcomes</b>						
<b>Outcomes</b>						
<b>Activities</b>						

#### **Monitoring and evaluation arrangement for Programme Management**

The Project Management Unit (PMU) will be made available with monitoring and evaluation tools of project activities and resources. The PMU under the

implementing agencies will ensure that the executing agencies have adequate resources and capacity to measure and monitor results at the local, national and transboundary level. The quarterly monitoring and annual evaluation reports of the executing agencies along with the financial statements and resource management will be submitted to the implementing agencies and further to the Adaptation Fund Secretariat for the review.

**Table 197. Monitoring and Evaluation Reports**

<b>Quarterly Report</b>	Monitoring will be carried out after each quarter and reports will be prepared with key results achieved, issues encountered or potential problems and proposed solutions.
<b>Annual Report</b>	Annual report will be prepared to monitor the progress in the time period of twelve months. This will be useful to monitor progress made in different activities. The annual report will be presented by the programme leader to the programme steering committee to assess the overall progress and provide their suggestions or feedbacks.
<b>Mid-term Assessment Report</b>	The programme will conduct the mid-term review after XX years of kick-off to get the feedback of external experts.
<b>Final Evaluation or Programme Termination Report</b>	Two months prior to the completion of the programme, an Independent evaluation will be conducted to check the overall impact of the programme. The final evaluation report will be developed and presented to the Adaptation Fund secretariat, programme steering committee and other stakeholders.

**Table 2048. M&E Activities with their respective budgets**

Monitoring and Evaluation Activity List	Person Responsible	Timeline												Budget (USD)
		20XX				20XX				20XX				
		Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	
Total cost of M&E														

- E. Include a results framework for the project proposal, including milestones, targets and indicators.

The results framework of the project defines the key performance indicators (KPI) and means of verification for every component and its activities. The KPI will be used during the monitoring and evaluation to assess the progress and divulge any scope for improvements.

The detailed project result framework will be developed in the final proposal.

**Table 2149. Result Framework Summary**

Objectives	Components related Activities	Overall Baseline situation	Key performance indicator	Targets to be achieved	Methods of verification

- F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

The project will be in coordination with the Strategic Results Framework of AF and this part will be developed in the full proposal development.

[To fill the table, you can access the SRF of the AF here: <https://www.adaptation-fund.org/wp-content/uploads/2019/10/Adaptation-Fund-Strategic-Results-Framework-Amended-in-March-2019-2.pdf>]

Project Objective(s) <sup>56</sup>	Project Indicator(s)	Object Outcome	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Project Outcome(s)	Project Indicator(s)	Outcome	Fund Output	Fund Output Indicator	Grant Amount (USD)

<sup>56</sup> The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply


- G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

[insert budget calculations]

- H. Include a disbursement schedule with time-bound milestones.

The disbursement schedule for ~~the each~~each ~~outputs~~output of the components proposed in the proposed project will be developed and presented in the final project proposal.

**Table 220. Disbursement Schedule**

COMPONENT/ UTPUT/ACTIVITI ES	DESCRIP TION	TIMELINE												TIME OF BUDG ET DISBU RSEM ENT (USD)	BUDG ET DISPE RSED (USD)
		20XX				20XX				20XX					
		Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4		
Component 1															
Activity 1.1															
Activity 1.2...															
Component 2															
Activity 2.1															
Activity 2.2...															

## PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

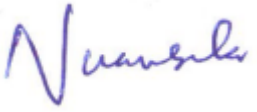
- A. Record of endorsement on behalf of the government<sup>57</sup>** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should*

<sup>6</sup> Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

*be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

<i>Honourable Seve Paeniu, Minister of Finance, Ministry of Finance</i>	<i>Date: 08<sup>th</sup> August 2022</i>
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**B. Implementing Entity certification** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (Te Kete) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
	
<b>Nuausala Nuausala</b> Implementing Entity Coordinator	
Date: 08 <sup>th</sup> August 2022	Tel. and email: nnuausala@gov.tv
Project Contact Person: Nuausala Nuausala	
Tel. And Email: nnuausala@gov.tv	



ADAPTATION FUND



**Letter of Endorsement by Government**

August 08<sup>th</sup>, 2022

To: The Adaptation Fund Board  
c/o Adaptation Fund Board Secretariat  
Email: [afbsec@adaptation-fund.org](mailto:afbsec@adaptation-fund.org)  
Fax: 202 522 3240/5

**Subject: Endorsement for Strengthening Adaptation Against Climate Variability through Increasing Clean Water Supply & Sanitation at Motufoua Secondary School.**

In my capacity as designated authority for the Adaptation Fund in Tuvalu, I confirm that the above project concept proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Tuvalu.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by the Ministry of Finance and executed by the Department of Education.

Sincerely,

A handwritten signature in black ink, appearing to be 'Seve Paeniu'.

Hon Seve Paeniu  
Minister of Finance,  
Designated Authority for the Government of Tuvalu to the Adaptation Fund





## Project Formulation Grant (PFG)

Submission Date: 08<sup>th</sup> August, 2022

Adaptation Fund Project ID:

Country/ies: **Tuvalu**

Title of Project/Programme: **Strengthening Adaptation Against Climate Variability through Increasing Clean Water Supply & Sanitation at Motufoua Secondary School**

Type of IE (NIE/MIE): **National Implementing Entity**

Implementing Entity: **Ministry of Finance**

Executing Entity/ies: **Department of Education**

### A. Project Preparation Timeframe

Start date of PFG	October 2022
Completion date of PFG	December 2022

### B. Proposed Project Preparation Activities (\$)


Describe the PFG activities and justifications:

List of Proposed Project Preparation Activities	Output of the PFG Activities	USD Amount
Development of a work plan and logical framework	Work plan and log frame developed	1,850
First stakeholders workshop to collect data and information needed to write the proposal	Information and data obtained from stakeholders	16,739
Technical Officers site visits to obtain further technical information	Technical information obtained	3,241
Write-up of the first draft of the project proposal	First draft of the proposal developed	4,810
Second stakeholders workshop to present and validate data collected	Inputs from the first stakeholders workshop validated and presented	5,195
Write-up of the second draft of the project proposal	Second draft of the proposal developed	4,810
Write-up of the final project proposal	Full project proposal developed	7,030
Consultant Contingency	Contingency to meet boat fares and per diem.	2,590
Implementing Entity's fee	Government officials' capacity development	497
	Office stationeries and expenses procured	299
	Allowances	497
	Contingency	2,442

<b>Total Project Formulation Grant</b>		<b>\$50,000</b>
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### C. Implementing Entity

This request has been prepared in accordance with the Adaptation Fund Board's procedures and meets the Adaptation Fund's criteria for project identification and formulation

Implementing Entity Coordinator, IE Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Nuausala Nuausala		July 19, 2022	Nuausala Nuausala	00 688 20408	nuausala@gov.tv