



ADAPTATION FUND

## **REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND**

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat  
1818 H Street NW  
MSN N7-700  
Washington, D.C., 20433  
U.S.A  
Fax: +1 (202) 522-3240/5  
Email: [afbsec@adaptation-fund.org](mailto:afbsec@adaptation-fund.org)



# PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

## PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category: *REGULAR PROJECT/PROGRAMME*

Country/ies: *Papua New Guinea (Enga, Milne Bay, and New Ireland)*

Title of Project/Programme: *Adaptation of Small-Scale Agriculture for improved food security of resilient communities in Papua New Guinea (ASSA)*

Type of Implementing Entity: *Regional Implementing Entity (RIE)*

Implementing Entity: *The Pacific Community (SPC)*

Executing Entity/ies: *Department of Agriculture and Livestock / SPC Land Resource Division*

Amount of Financing Requested: 9,998,879 (in U.S Dollars Equivalent)

### Project / Programme Background and Context:

*Provide brief information on the problem the proposed project/programme is aiming to solve. Outline relevant climate change scenarios according to best available scientific information. Outline the economic social, development and environmental context in which the project/programme would operate.*

#### 1.1. Context

*Located in the south-western Pacific, the Independent State of Papua New Guinea (hereafter PNG) covers the eastern part of the island of New Guinea, four large provincial islands and over 600 smaller islands expanding over 800,000 km<sup>2</sup> of the south-western Pacific Ocean. PNG is largely mountainous, and much of its land surface is covered with tropical rainforest. It is ranked as the third-largest tropical forest area in the world after the Amazon and Congo basins. The country harbors 13,634 species (68% endemic), 1,742 genera, and 264 families, —making New Guinea the most floristically diverse island in the world<sup>1</sup>. Terrestrial habitats range from extensive lowlands with rainforest, savanna, grassland, and freshwater swamps to upland montane rainforests and alpine grassland<sup>2</sup>. As well as its biological diversity, PNG is also*

<sup>1</sup> Cámara-Leret et al. (2020) New Guinea has the world's richest island flora. *Nature* 584, 579–583.

<sup>2</sup> World Bank, GFDRR and Climate Investment Funds. 2011. "Climate risk and adaptation country profile for Papua New Guinea."

a country of exceptional ethnic diversity. The population speaks nearly 850 distinct languages<sup>3</sup>. The indigenous population of PNG is one of the most heterogeneous in the world, comprising several thousand separate communities and tribal groups live spread out over the country. More than 80% of the population of 8 million people live a traditional rural subsistence lifestyle that is supported by the biological richness and diversity of the forests, inland waters and coastal seas<sup>4</sup>. The agriculture sector supplies 83% of food energy and 76% of protein to the population's nutritional needs<sup>5</sup>. An estimated 85% of the country's labor force is absorbed by the economically important agricultural sector, -In terms of economic importance, the agricultural sector which accounted for 28% of GDP in 2018<sup>6</sup>.

## 1.2. Exposure of agriculture to climate risks in the project area

Of the 46.9 million hectares of total land area, only 30% is suitable for agriculture due to mountainous land with steep slopes, poor soils, low temperatures, high rainfall pattern, a prolonged dry season, and excessive cloud cover in several areas<sup>7</sup>. Nevertheless, the PNG economy is dominated by two sectors: the agricultural, forestry, and fishing sector and the minerals and energy extraction sector<sup>8</sup>. Most of the rural population is involved in producing the majority of their staple foods s needs (sweet potato, taro, cocoyam, swamp taro, coconut and other vegetables) and is also engaged in as well as cash crops production (coffee, cocoa, oil palm) and other forms of income-earning activities to enable them to purchase foods that they do not produce themselves.

Enga, Milne Bay and New Ireland are among the provinces with the highest population growth rate in PNG with 3.1%, 2.5%, and 3.5% per year, respectively<sup>9</sup>. With limited options for expanding crop areas to meet the food demand of the growing population, the cultivated areas in the provinces are subject to high land-use intensity<sup>10-11-12</sup>. Increased soil nutrient deficiency due to the shortening of fallow periods, and slash and burn practices as well as and soil erosion where mounding is used on steep slopes has been noticed as constraints of PNG agricultural production e and can be seen in Enga, Milne Bay, and New Ireland these provinces<sup>13-14</sup>.

In Enga, the second most rugged province of the country, with an altitude up to 4,276 meters, the limit of cropping is at around 2,100 meters of altitude for the coffee, which is the main cash crop of the province<sup>15-16</sup>. In addition, continuous sweet potato cropping using drainage, composting, and mounding practices dominates the valley, plateau, and mountain areass of Enga province. Respectively located in the northeast and southeast of PNG, New Ireland, and Milne Bay have

<sup>3</sup> <https://www.economist.com/the-economist-explains/2017/07/20/papua-new-guineas-incredible-linguistic-diversity>

<sup>4</sup> UNDP, 2018. National Adaptation Plan process in focus: Lessons from Papua New Guinea; available on [https://www.undp.org/sites/g/files/zskgke326/files/publications/Papua\\_New\\_Guinea\\_NAP\\_country\\_briefing.pdf](https://www.undp.org/sites/g/files/zskgke326/files/publications/Papua_New_Guinea_NAP_country_briefing.pdf).

<sup>5</sup> Bourke R, Harwood T (2009) Food and agriculture in Papua New Guinea

<sup>6</sup> Department of Agriculture and Livestock (2020). Agriculture medium term development plan 2020 - 2022.

<http://www.agriculture.gov.pg/wp-content/uploads/2021/12/Agriculture-Medium-Term-Development-Plan-AMTDP-2020-2022-AMTDP.pdf>

<sup>7</sup> Government of Papua New Guinea (2018). Papua New Guinea's First Biennial Update Report to the UNFCCC.

<sup>8</sup> World Bank (2018) The World Bank in Papua New Guinea. Available at <http://www.worldbank.org/en/country/png/overview>.

<sup>9</sup> McMurray & Lavu (2020). Provincial estimates of key population groups 2018-2022.

<sup>10</sup> Asian Development Bank (2016). Papua New Guinea: Rural Primary Health Services Delivery Project. Due Diligence Report. Enga Province.

<sup>11</sup> Saunders J.C. (1993). Agricultural Land Use of Papua New Guinea, Explanatory Notes to Map. PNGRIS Publication No.1, November 1993. <https://publications.csiro.au/rpr/download?pid=legacy:2186&dsid=DS1>

<sup>12</sup> World Bank (2019). Environmental and Social Baseline Report and Impact Assessment for the PNG Agriculture Commercialization and Diversification Project (PACD).

<sup>13</sup> Bailey et al (2009). An evaluation of nutritional constraints on sweet potato (*Ipomoea batatas*) production in the central highlands of Papua New Guinea. *Plant Soil* 316, 97-105. <https://doi.org/10.1007/s11104-008-9762-6>

<sup>14</sup> Hanson et al. (2001). Papua New Guinea Rural Development Handbook. The Australian National University, Canberra.

<sup>15</sup> <https://en-us.topographic-map.com/maps/9ouf/Enga/>

<sup>16</sup> Hanson, L.W., Allen, B.J., Bourke, R.M. and McCarthy, T.J. (2001). Papua New Guinea Rural Development Handbook.

relatively diversified agriculture. There, coconut is an important crop. Sago with either sweet potato, yam, taro, or cassava ~~is co-are~~ dominant staple crops, cultivated with moderate to low intensity combined with ~~the~~ fallow periods. In New Ireland ~~province~~, limestone soils subjected to rapid fertility decline, steep slopes, and frequent cloud coverage are the main constraints to agricultural production, while flooding and steep slopes limit the land potential in Milne Bay province.

While 80–90% of households in Enga, Milne Bay, and New Ireland provinces remain dependent on subsistence agriculture<sup>17</sup>, ~~these~~ continuous cropping practices diminish the resilience of cropping systems and rural communities to changing climate. The vulnerability index of PNG's food systems significantly increased from 0.617 in the period 1995–2005 up to 0.666 between 2010–2019<sup>18</sup>. Indeed, preliminary assessments ~~conducted by the Global Green Growth Institute~~ showed that Enga, Milne Bay, and New Ireland provinces are highly exposed to rising temperatures, changes in rainfall patterns, the occurrence of drought, and sea-level rise with potentially adverse implications for agriculture<sup>19</sup>·20·21.

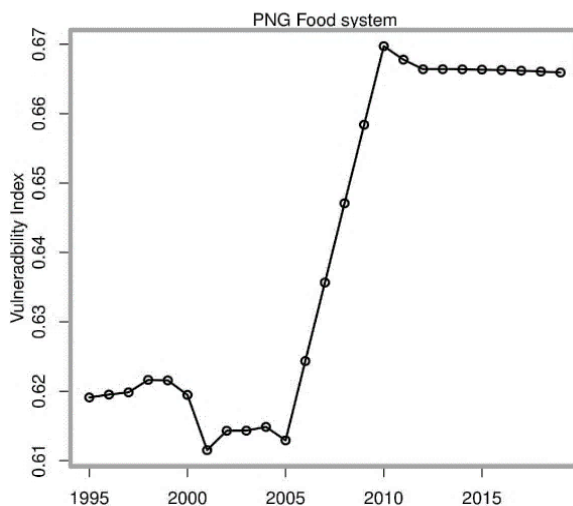


Figure 1: Vulnerability index of PNG's Food system from 2015 to 2019 (data from Notre Dame Global Adaptation Initiative)

### 1.2.1. Increasing temperature

Temperatures in PNG have increased during the 20<sup>th</sup> century, with ~~a 40 to 100-year database from PNG's coastal areas showing that~~ minimum and maximum air temperatures increased ~~ing~~ by an average of 0.2 °C per decade up to 1999<sup>22</sup>. Historical records for New Ireland show an increase in the annual temperature trend at the provincial capital Kavieng since 1962 with a more pronounced increase in minimum temperature (Figure 2)<sup>23</sup>.

<sup>17</sup> NSO and ICF. (2019). Papua New Guinea Demographic and Health Survey 2016–18.

<sup>18</sup> Notre Dame Global Adaptation Initiative. <https://gain.nd.edu/our-work/country-index/>

<sup>19</sup> Global Green Growth Institute (2021). Climate-Resilient Green Growth in Enga Province

<sup>20</sup> Global Green Growth Institute (2021). Climate-Resilient Green Growth in Milne Bay Province

<sup>21</sup> Global Green Growth Institute (2021). Climate-Resilient Green Growth in New Ireland Province

<sup>22</sup> Bourke, R.M., Humphreys, G. and Hart, M. (2002). Warming in Papua New Guinea: some implication for food productivity. Unpublished paper.

<sup>23</sup> Allen, Bryant and R. Michael Bourke (2009) "People, Land and Environment." In Food and Agriculture in Papua New Guinea, edited by R. Michael Bourke and Tracy Harwood, 28–127. Canberra: Australian National University (ANU) E Press, The Australian National University.

Average monthly temperatures in PNG are projected to increase by 0.9°C by 2030<sup>24,25</sup>. Using Climate Research Unit (CRU) datasets from 1968–2018, a recent investigation shows a significant increase in annual temperature, with up to 0.011°C/year was observed in the Eastern Enga province<sup>26</sup> (Figure 2). Broadly, temperatures are projected to continue to increase, with estimates suggesting a warming of 0.4–1°C by 2030 and 1.1–1.9°C by 2050 under a business-as-usual scenario in New Ireland, Enga province, and Milne Bay<sup>27,28</sup>. The projected rate of change in the maximum and minimum temperatures will be 0.2–1.4°C and 0.2–1.7°C in the western and eastern half of PNG per decade<sup>29</sup>.

---

<sup>24</sup> BoM and CSIRO. (2014). *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports*. Chapter 11: Papua New Guinea. Melbourne, Australia: Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report, BoM and CSIRO. —[https://www.pacificclimatechange.net/sites/default/files/documents/PACCSAP\\_CountryReports2014\\_Ch11PNG\\_WEB\\_140710.pdf](https://www.pacificclimatechange.net/sites/default/files/documents/PACCSAP_CountryReports2014_Ch11PNG_WEB_140710.pdf)

<sup>25</sup> Allen, Bryant and R. Michael Bourke (2009). "People, Land and Environment." In *Food and Agriculture in Papua New Guinea*, edited by R. Michael Bourke and Tracy Harwood, 28–127. Canberra: ANU E Press, The Australian National University

<sup>26</sup> Sekac et al. (2020). *Temperature Variability and Trends Assessments parts of Highland and Momase region of Papua New Guinea*. *International Journal of Advanced Science and Technology* Vol. 29, No. 7, pp. 323-341

<sup>27</sup> D'Haeyer et al. (2017). *Climate Risk, Vulnerability and Risk Assessment in the New Ireland Province in Papua New Guinea—Province and District Profile*. Antwerp, Belgium.

<sup>28</sup> World Bank (2020). *Papua New Guinea. Climate Data—Projections*. Climate Change Knowledge Portal. World Bank Group. <https://climateknowledgeportal.worldbank.org/country/papua-new-guinea/climatedata-projections>

<sup>29</sup> Michael P.S. (2019). Current evidence and future projections: a comparative analysis of the impacts of climate change on critical climate-sensitive areas of Papua New Guinea. *SAINS TANAH – Journal of Soil Science and Agroclimatology*, 16(2), 2019, 229-253. DOI: [10.20961/stjssa.v16i2.35712](https://doi.org/10.20961/stjssa.v16i2.35712)

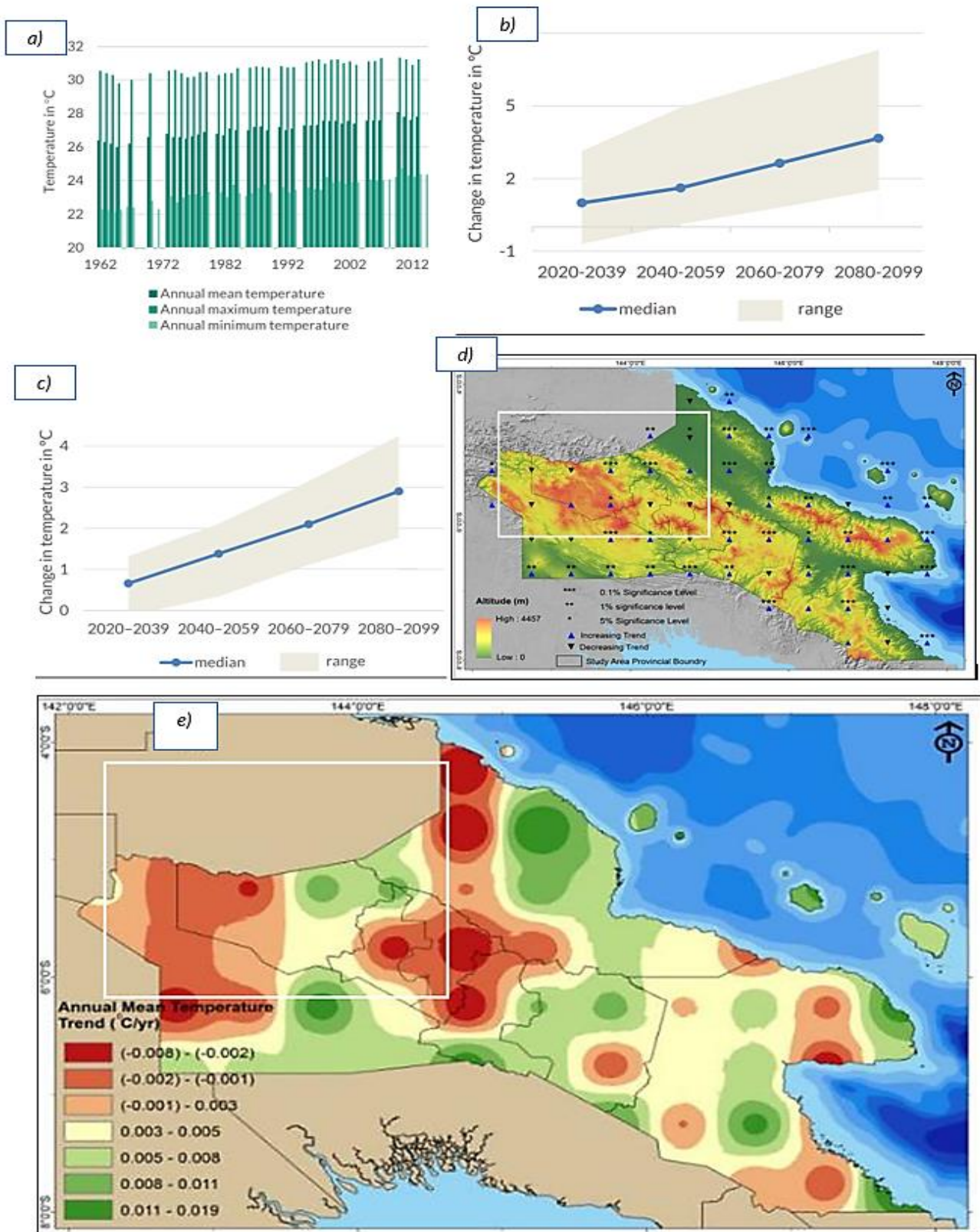


Figure 2: Historical annual temperatures in Kavieng, New Ireland Province (a); Projected change in maximum daily temperature in Enga Province (2020–2099) (b); Projected change in maximum daily temperature in Milne Bay Province (2020–2099) (c); Annual mean temperature trend (d) and spatial distribution of the magnitude of change in  $^{\circ}\text{C}/\text{year}$  at PNG' Highland including Enga province from 1968 to 2018 (e) (Allen et al. 2009; Sekac et al., 2020)

### 1.2.2. Changes in rainfall

The evidence of changes in rainfall patterns in PNG over the past 30 years is less clear. Between 1988 and 2018, Bourke (2018) conducted a survey about on changing rainfall in many rural communities of coastal and highland areas. Throughout the lowlands and showed that highlands, villagers translate changes in rainfall patterns into less predictable seasonal rainfall, more intense rain events able to that divert rivers, break riverbanks, and damage food gardens in the highlands, and an overall increase or decrease in rainfall in some locations<sup>30</sup>. Using CRU data, a significant decrease in annual rainfall ranging of between -0.3 mm/year and -2.0 mm/year was observed in western Enga while a significant increasing trend was observed in the total rainfall between November and April (wet season) from 1968 to 2018<sup>31</sup>.

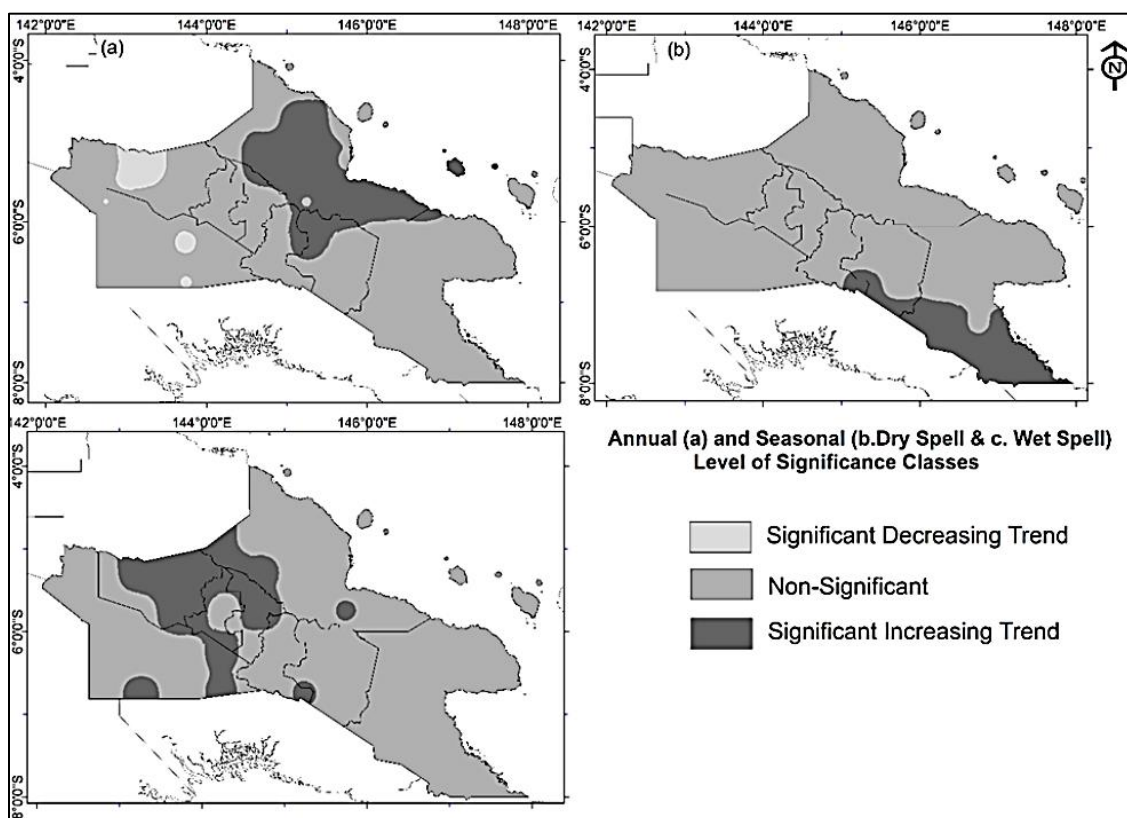


Figure 3: Spatial distribution of rainfall trend significance considering annual (January - December) (a), Dry season (November to Following year April) (b), Wet season (May - October) (Sekac et al. 2021).

Between 1890 and 2009, PNG has experienced five major flooding events that occurred in 1894, 1907, 1921, 1943 and 1998<sup>32</sup>. Future rainfall patterns are uncertain as the range of projections is large and the direction is not clear<sup>33</sup>, but Lafale et al. (2018) suggest with there is high confidence that there will be in an increased frequency and intensity of intensive-extreme rainfall events in future<sup>34</sup>. The Climate Change Knowledge Portal mModel ensembles projects increases in both the

<sup>30</sup> Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea

<sup>31</sup> Sekac et al. 2021. Spatio-Temporal Assessments of Rainfall Variability and trends in the Highlands to Coastal Region of Papua New Guinea. International Journal of Geoinformatics, Volume 17, No. 3. <https://doi.org/10.52939/ijg.v17i3.1893>

<sup>32</sup> Cobon et al. (2016). Food shortages are associated with droughts, floods, frosts, and ENSO in Papua New Guinea. Agricultural Systems 145 (2016) 150-164

<sup>33</sup> Mimura et al. 2007. Small Islands. In Climate Change 2007. Impacts adaptation and Vulnerability, M; Parry et al. (Eds). Cambridge University Press, 687-716.

<sup>34</sup> Lafale et al. (2018). Effects of climate change on extreme events relevant to the Pacific Islands. Science Review 2018: 50-73.

intensity of high rainfall events and the frequency of wet days<sup>35,36</sup>. ~~In contrast, t~~There is medium confidence concerning ~~the~~ projected increases of annual precipitation<sup>37</sup>. ~~Therefore, g~~Greater variation in rainfall is expected between wet and dry months with more intense rainfall in the wettest periods. This can be dramatic for provinces such as Milne Bay where soil water surplus is preponderant and coexists with soil water deficit (figure 4).

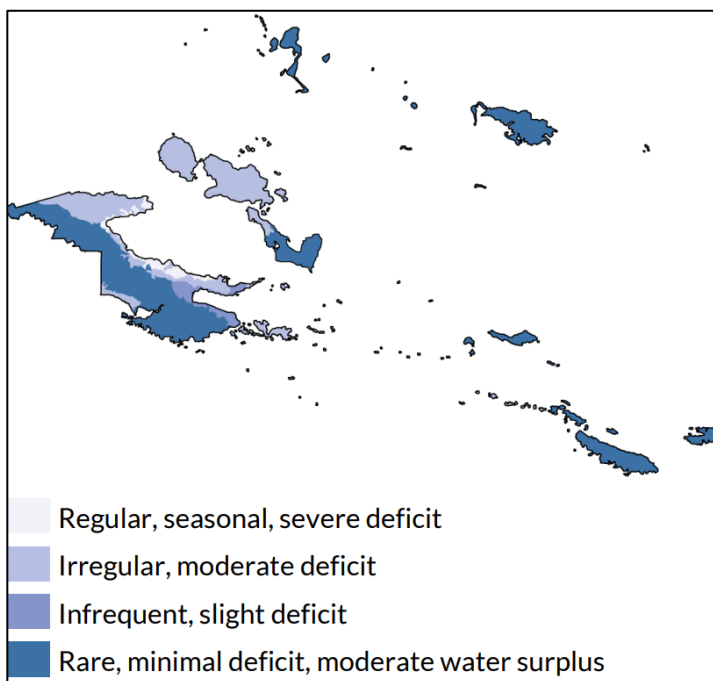


Figure 4: Soil water deficit and surplus in Milne Bay Province (Allen and Bourke, 200938; GGGI, 202139)

### 1.2.3. Occurrence of drought

Between 1890 and 2009, there ~~have been were~~ 15 widespread droughts in PNG with 13 of ~~these were them~~ associated with El Niño events<sup>40</sup>. While there is ~~some~~ uncertainty around the changes to the El Niño Southern Oscillation (ENSO) ~~phenomenon~~ under future climate change scenarios, projections suggest ~~an possible~~ increase in the intensity of droughts (particularly above 1,700 meters) in years impacted by ENSO. From 1876 to 2015, ~~the five most~~ widespread droughts occurred in 1902, 1914, 1941, 1982, 1997, all with severe impacts. In 1997 and 1941, more than 80% of PNG received less than 10<sup>th</sup> percentile rainfall and ~~these years therefore represent were~~ the worst droughts PNG has experienced since 1890 in terms of area affected. ~~The t~~Two ~~most~~ recent drought events in 1997 and 2015 (accompanied by frost at very high altitudes) ~~also~~ had significant impacts on agriculture<sup>41</sup>. The project area is prone to drought when considering historical and projected drought in New Ireland (Figure 5a) and drought severity in Enga during

<sup>35</sup> World Bank, (2016). Climate and Disaster resilience

<sup>36</sup> CCKP. (2021). Climate Data: Projections. URL: <https://climateknowledgeportal.worldbank.org/country/papua-new-guinea/climate-data-projections>.

<sup>37</sup> Lafale et al. (2018). Effects of climate change on extreme events relevant to the Pacific Islands. Science Review 2018: 50–73.

<sup>38</sup> Allen, Bryant and R. Michael Bourke (2009), "People, Land and Environment." In Food and Agriculture in Papua New Guinea, edited by R. Michael Bourke and Tracy Harwood, 28–127. Canberra: Australian National University (ANU) E Press, The Australian National University

<sup>39</sup> Global Green Growth Institute (2021). Climate-Resilient Green Growth in Milne Bay Province

<sup>40</sup> Cobon et al. (2016). Food shortages are associated with droughts, floods, frosts, and ENSO in Papua New Guinea. Agricultural Systems 145 (2016) 150–164

<sup>41</sup> Cobon et al. (2016). Food shortages are associated with droughts, floods, frosts, and ENSO in Papua New Guinea. Agricultural Systems 145 (2016) 150–164



2015 ENSO (figure 5 b).

#### 1.2.4. Sea-level rise

~~Sea levels surrounding in PNG has have~~ risen by approximately 7 mm per year since 1993, which is higher than the global average of 2.8–3.6 mm per year<sup>42</sup>. Under all GHG emissions scenarios, sea levels ~~that lead to coastal flooding, salinization, and land erosion~~ in PNG are expected to rise by 7–17 cm by 2030, 7–34 cm by 2050, and 41–87 cm by 2100<sup>43,44</sup>. ~~leading to coastal flooding, salinization, and land erosion~~ Under ~~the a~~ business-as-usual scenario, ~~the World Resources Institute's AQUEDUCT Global Flood Analyzer estimates that~~ the impacts associated with losses and damages induced by rising sea levels ~~might are estimated to cost on average~~ USD 225 million by 2023 and USD 642 million by 2050<sup>45</sup>, ~~with~~ Milne Bay and New Ireland ~~will be being~~ particularly affected<sup>46,47</sup>. ~~Their populations who~~ ~~Communities~~ depending on taro grown in pits dug in the freshwater lens are particularly vulnerable to intrusion by saltwater associated with sea-level rise. Some reports have indicated that this has already started to happen<sup>48,49,50</sup>.

---

<sup>42</sup> Pacific Climate Change Science Program. (2013). *Current and Future Climate of Papua New Guinea*.

<sup>43</sup> BoM and CSIRO, "Chapter 11: Papua New Guinea." In *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports*. Melbourne, Australia: Pacific Australia Climate Change Science and Adaptation Planning Program Technical Report, BoM and CSIRO, 2014.

<sup>44</sup> World Bank, Papua New Guinea. *Climate Data—Projections*. Climate Change Knowledge Portal. World Bank Group, 2020

<sup>45</sup> WRI. 2021. *AQUEDUCT Global Flood Analyzer*. <https://www.wri.org/data/aqueduct-global-flood-analyzer>.

<sup>46</sup> BoM. ~~Southern Hemisphere Tropical Cyclone Data Portal~~, 2020. ~~http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/history/tracks/~~ *Southern Hemisphere Tropical Cyclone Data Portal*.

<sup>47</sup> Tan, Chenyan and Weihua Fang, "Mapping the Wind Hazard of Global Tropical Cyclones with Parametric Wind Field Models by Considering the Effects of Local Factors." *International Journal of Disaster Risk Science*, 9 (2018): 86–99. <https://doi.org/10.1007/s13753-018-0161-1>

<sup>48</sup> Leo-Legra, Xingong Li and A. Townsend Peterson et al. (2008). Biodiversity consequences of sea level rise in New Guinea. *Pacific Conservation Biology* 14(3) 191 – 199. <https://doi.org/10.1071/PC080191>

<sup>49</sup> Sherif, M., & Singh, V. P. (1999). Effect of climate change on sea water intrusion in coastal aquifers. *Hydrological Processes*, 13(8), 1277–1287.

<sup>50</sup> Hussain, M. S., & Javadi, A. A. (2016). Assessing impacts of sea level rise on seawater intrusion in a coastal aquifer with sloped shoreline boundary. *Journal of HydroEnvironment Research*, 11, 29–41. <https://doi.org/10.1016/j.jher.2016.01.003>

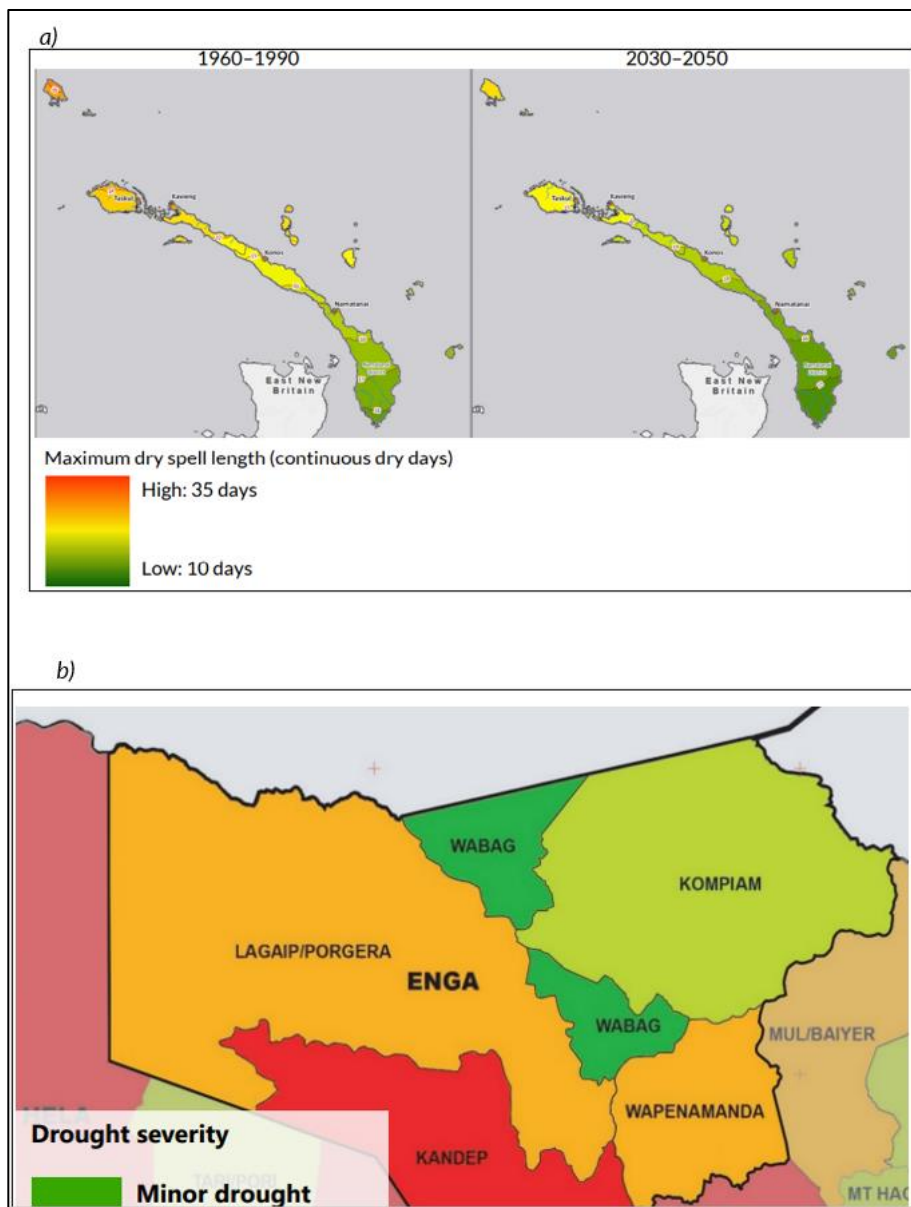


Figure 5: Historical and projected drought in New Ireland Province (a), Drought-affected districts in Enga Province during the 2015 ENSO (b) (D'Haeyer et al. 2017<sup>51</sup>; IOM 2016<sup>52</sup>).

The-s

### 1.3. Sensitivity of agricultural commodities to new climate conditions

Sweet potato, sago, cassava, taro, yam, and coconut are the important staple food crop while cocoa and coffee are cash crops across Enga, Milne Bay, and New Ireland (Figure 6). Most of these crops are grown in combinations of two or more, typical of village mixed-farming systems, and among them, sweet potato, coffee, and cocoa are examples of climate-sensitive crops.

<sup>51</sup> D'Haeyer et al. (2017) Climate Risk, Vulnerability and Risk Assessment in the New Ireland Province in Papua New Guinea—Province and District Profile. Antwerp, Belgium.

<sup>52</sup> IOM Papua New Guinea, Disaster Management Unit, 2016b. [https://www.iom.int/sites/default/files/situation\\_reports/file/IOM-Sitrep-6-PNG-Drought-Jan25-final.pdf](https://www.iom.int/sites/default/files/situation_reports/file/IOM-Sitrep-6-PNG-Drought-Jan25-final.pdf)

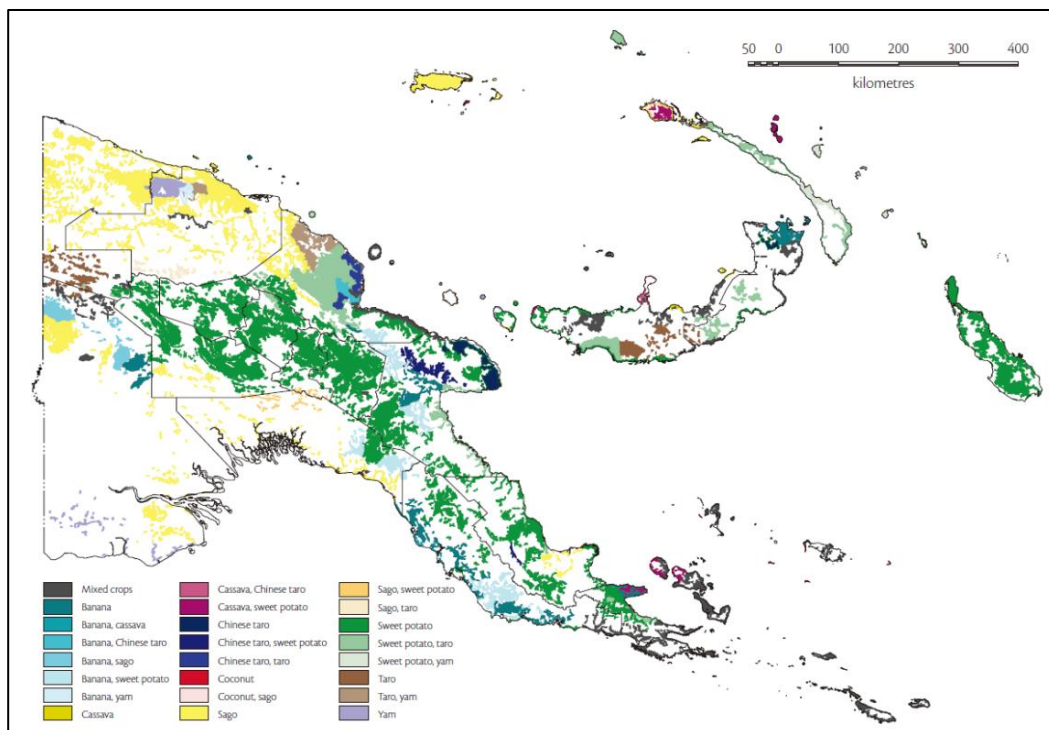


Figure 6: Staple food crop distribution in PNG (<https://tokpisin.info/common-staple-food-crops-papua-new-guinea/>)

As Sweet potato (*Ipomoea batatas* L.) is mainly cultivated by smallholders in the project area, the response of sweet potato to changes in climatic conditions is critically important. The increase in frequency and intensity of extreme rainfall (both frequency and intensity) will threaten sweet potato, which is crops sensitive to waterlogging, such as sweet potatoes<sup>53</sup>. An increased in rainfall between November and April is likely to result in yield reductions in the project area. Indeed, excessively high soil moisture reduces tuber yield and is a major cause of food shortages in the PNG highlands<sup>54</sup>. In addition, the increase in intensity and frequency of heatwaves represent a serious threaten to sweet potato production worldwide as. Hheatwaves could affect cause tuberization in sweet potatoes. Indeed, heat and drought stresses are among the most important climatic events aggravated by climate change that affect sweet potato productivity<sup>55</sup>. According to Bourke (2018), eUnder actual-current and future climate conditions, adoption of cultivars better adapted to high soil moisture conditions, as well as further soil amelioration, including drainage is needed.

Sago (*Metroxylon sagu* Rottb.) is grown in PNG from sea level to 1,150 m altitude, particularly. Some are grown in moist locations, with for example in gullies, with most sago grown in swamps in moving or still water. While understanding of sSago crop physiology is limited, it is a particularly hardy crop. Increases in predicted temperature or rainfall are unlikely to affect sago productivity<sup>56</sup>. Its production, however, depends on moisture availability, and an increase in

<sup>53</sup> Bourke et al. 2006. Solomon Islands Smallholder Agriculture Study. Canberra: Australian Agency for International Development (AusAID).

<sup>54</sup> Bourke, R.M. (1988). Taim hangre: variation in subsistence food supply in the Papua New Guinea highlands. Unpublished PhD thesis; Department of Human Geography, The Australian National University, Canberra.

<sup>55</sup> Heider et al. (2020). Intraspecific diversity as a reservoir for heat-stress tolerance in sweet potato. Nature Climate Change. <https://doi.org/10.1038/s41558-020-00924-4>

<sup>56</sup> Spencer, J. E. (1963). The migration of rice from mainland Southeast Asia into Indonesia. In J. Barrau (Ed.), Plants and the migrations of Pacific peoples; a symposium. (pp. 83–89). Honolulu: Bishop Museum Press.

drought events is a threat to its sustainable production and thus food security<sup>57</sup>.

Cassava (*Manihot esculenta* L.) is an important food crop in locations that experience a marked dry season each year. It is also an important crop in locations where rainfall is high most months of the year ~~such as, for example, on most islands~~ in Milne Bay province. Cassava is a particularly hardy crop. ~~Thus While,~~ neither an increase in temperature ~~of about~~ 1°C nor an increase in annual rainfall of ~~about~~ 8% is likely to result in a significant reduction in tuber yield. ~~It is possible that~~ an increase in annual rainfall of 25% may reduce yield<sup>58</sup>. ~~Its sensitivity is like that of Chinese taro (*Xanthosoma violaceum*).~~

While taro (*Colocasia esculenta* L.) has declined in importance over the past 80 years, it is well adapted to a wide range of growing conditions. A water-loving crop similar to sago, it is more vulnerable to drought than banana, yam or sweet potato, cassava, and Chinese taro. It is also ~~indirectly~~ susceptible to hot and wet conditions ~~because those conditions can that~~ trigger ~~an~~ outbreaks of taro blight, caused by the fungus *Phytophthora colocasiae*<sup>59</sup>, ~~which~~. Taro blight is ~~also~~ most severe near sea level. Therefore, ~~any an further~~ increase in temperature under wetness conditions ~~or near sea~~ would ~~result in a further~~ reduction in taro yields because of an increase in taro blight incidence. Taro is widely grown in PNG, but ~~it~~ is the most important staple food crop for only 6% of the rural population<sup>60</sup>. The overall impact of climate change on taro production is ~~thus~~ likely to be small given the ~~current low~~ significance of taro in PNG ~~and the locations where it is still important~~.

Yams (*Dioscorea spp.*) are adapted to relatively low rainfall (1,000–2,500 mm/year) and require well-drained soil to produce tubers. Yam is ~~thus~~ highly susceptible to increased rainfall ~~patterns~~ and extreme rainfall events. Therefore, an increase in annual rainfall or a reduction in the number of drier months may reduce tuber yield. ~~Studies also show that y~~am yield ~~also declines~~ dependings on soil type. Ferruginous soil without concretions seems to be the most sensitive to climate change followed by ferralitic soils and raw mineral soils which accounted for a decline in yam yield of about 48%, 36% and 33%, respectively<sup>61</sup>.

Coconut (*Cocos nucifera*) is likely to experience the greatest impact of climate change from sea-level rise. Already ~~some~~ palms growing in coastal areas are being destroyed by encroaching sea levels. Further rises in sea level are likely to ~~continue exacerbate~~ this ~~trend~~. Palms were planted ~~in coastal locations~~ decades ago when returns on copra were high, ~~with and many few~~ nuts ~~are now being not currently~~ harvested ~~due to because of lower~~ returns. Hence, ~~a losses of some palms is~~ ~~are~~ unlikely to have ~~a significant widespread~~ impacts on coconut production and consumption. The exception is ~~very~~ small islands and atolls where coconuts provide a significant proportion of food energy. Given the vulnerability of Milne Bay and New Ireland to sea-level rise, it is likely that loss of palms would negatively affect people's diets in these provinces.

<sup>57</sup> Toyoda, Y. (2018). Life and livelihood in sago growing areas. In H. Ehara, Y. Toyoda, & D. V. Johnson (Eds.), *Sago Palm: Multiple Contributions to Food Security and Sustainable Livelihoods* (pp. 31–42). Singapore: Springer. [https://doi.org/10.1007/978-981-10-5269-9\\_3](https://doi.org/10.1007/978-981-10-5269-9_3)

<sup>58</sup> Bourke, Richard Michael. (2018). Impact of climate change on agriculture in Papua New Guinea. In A. R. Quartermain (Ed.), *Climate Change: Our Environment, Livelihoods, and Sustainability* (pp. 35–50). Papua New Guinea: University of Goroka.

<sup>59</sup> Putter, C.A.J. (1976). The phenology and epidemiology of *Phytophthora colocasiae* on taro in the East New Britain Province, Papua New Guinea. Unpublished M Agric thesis, University of Papua New Guinea, Port Moresby.

<sup>60</sup> Allen, B.J. and Bourke, R.M. (2009). Part 1. People, land and environment. In *Food and Agriculture in Papua New Guinea*. R.M. Bourke and T. Harwood (eds). <http://press-files.anu.edu.au/downloads/press/p53311/pdf/part11.pdf>

<sup>61</sup> Sivrastava et al. (2012). The impact of climate change on Yam (*Dioscorea alata*) yield in the savanna zone of West Africa. *Agriculture, Ecosystems and Environment*

The projected negative and positive impacts of climate change on production of other staple food crops, export commodities, high-value horticultural crops and livestock in the tropical Pacific are summarized in Table 1.

Table 1: Summary of projected effects of climate change on crop production<sup>62</sup>

Commodities	Short Term (2030)	Medium-term (2050)	Long term (2090)
<b>Staple food crops</b>			
Sweet potato	Moderate	Moderate	Moderate to high
Cassava	Insignificant to low	Low to moderate	Low to moderate
Taro	Low to moderate	Moderate to high	High
Cocoyam	Insignificant to low	Low	Low to moderate
Swamp taro	Moderate to high	High	High
Giant taro	Insignificant to low	Low	Low
Domesticated yams	Moderate to high	High	High
Wild yams	Insignificant to high	Low	Low
Breadfruit	Insignificant to low	Low to moderate	Low to moderate
<b>Cash crops</b>			
Banana	Low	Low to moderate	Low to moderate
Bele (aibika)	Low	Low to moderate	Low to moderate
Coconut	Low	Low to moderate	Low to moderate
Coffee	Moderate	High	High
Cocoa	Low	Moderate	Moderate to high
Oil palm	Insignificant	Low	Low
Sugar	Low	Low to moderate	Moderate
<b>High-value horticulture crops</b>			
Papaya	Low to moderate	Moderate to high	High
Mango	Low to moderate	Moderate	Moderate to high
Citrus	Insignificant to low	Low	Low
Pineapple	Insignificant	Low to moderate	Low to moderate
Watermelon	Low to moderate	Low to moderate	Moderate
Tomato	Moderate	Moderate to high	Moderate to high
Vanilla	Insignificant	Low to moderate	Low to moderate
Ginger	Insignificant to low	Low to moderate	Low to moderate
Kava	Low	Moderate	Moderate
Betel nut	Insignificant to low	Low	Low

#### 1.4. Vulnerability to climate change in agriculture

Agriculture is most vulnerable to extreme weather conditions including excessive rainfall, drought and frost associated with drought in areas higher than 1,800 meters above sea level<sup>63</sup>. PNG experienced intense

<sup>62</sup> Bell J and Taylor M. (2015). Building climate-resilient food systems for Pacific Islands. Penang, Malaysia: WorldFish. Program Report: 2015-15.

<sup>63</sup> Government of Papua New Guinea. 2014. -PNG's Second National Communication submitted to the UNFCCC.

ENSO events in 1997/98 and 2015/16 that caused a prolonged drought that ~~seriously disrupted food production nationwide, and~~ led to food insecurity ~~of~~ nearly 1 million people<sup>64</sup>.

Projected changes in rainfall and temperature ~~based on general circulation models~~ suggest that PNG will face hotter days and drier dry seasons in 2000–2050. Higher temperatures resulting ~~from climate change~~ will likely result in more heat stress ~~and with~~ associated crop pests and post-harvest losses, ~~creating negative consequences for food security. Such changes may~~ significantly ~~impact the~~ reducing yields of important staples and ~~negatively impacting food security~~ engender food security. For sugarcane, the decline in yield due to climate change is projected to be relatively small. Nevertheless, planting improved sugarcane varieties is projected to increase yields by 5.5%. For rainfed taro, projected yield losses due to climate change in 2050 are expected to be 13%, compared to yields recorded in 2000. In comparison, projected sweet potato losses are expected to be 11% under similar scenarios. However, adaptation through planting of optimal cultivars cuts the expected losses by nearly half under projected climate change scenarios. ~~However, adaptation through planting optimal cultivars cuts these losses by nearly half. Other responses and mitigating actions include novel farming techniques such as mounding, terracing, mulching, ditching, draining, and irrigation systems.~~

While for most crops the addition of nitrogen results in substantial ~~positive impacts on~~ increases in yields under climate change conditions, the opposite is the case for rice. Increased nitrogen use in rice cultivation increases the sensitivity of rice to the impacts of climate change resulting in reduced yields. For example, ~~in considering the comparing~~ worst (pessimistic) and best (optimistic) climate change scenarios, rainfed rice yields ~~increases by 5.0–11.7% with the application of nitrogen at low rates, while under similar climate change scenario,~~ high rate of nitrogen application decreases corresponding projected yields ~~from by between~~ -2.5% to -0.4%. Projected yield losses of staple crops such as sweet potatoes and taro are in the range of 6–13% as compared with 2000 (Table 2). ~~Some of the responses and mitigating actions developed by agriculture researchers in PNG have resulted in the development of farming techniques, such as mounding, terracing, mulching, ditching, draining, and irrigation systems, many of which have developed independently of the major agricultural areas of the world. However, adaptation through planting of optimal cultivars cuts the expected losses by nearly half under projected climate change scenarios.~~

Table 2: Percentage change in crop yields projected in 2050 as compared with 2000 crop yields in PNG<sup>65</sup>

Crop	Optimal cultivar and planting <sup>66</sup>			
	Low rate of nitrogen application <sup>67</sup>		High rate of nitrogen application <sup>68</sup>	
	Worse <del>t</del> case	Best Case	Worse <del>t</del> case	Best Case
<b>Rice</b>				
Irrigated	5.5	12.4	-1.1	0.9
Rainfed	5.0	11.7	-2.5	-0.4
<b>Sweet potatoes</b>				
Rainfed	-4.7	-1.2	-9.0	-5.6
<b>Taro</b>				
Irrigated	-0.5	4.5	-2.3	0.3

<sup>64</sup> Allen and Bourke. 2009. The 1997-98 drought in Papua New Guinea failure of policy or triumph of the citizenry? Policy Making and Implementation. Studies from Papua New Guinea. ANU Press. Australian National University.

<sup>65</sup> Rosegrant M.W., Valmonte-Santos R., Thomas T., You L., Chiang C et al. (2015). Climate change, food security, and socioeconomic livelihood in pacific islands. Asian Development Bank ADB, International Food Policy Research Institute IFPRI.

<sup>66</sup> Cultivars and planting months were those that gave the highest yields for the indicated year. Sugarcane, and sweet potato have similar yields in rainfed and irrigated fields, so results for the irrigated crops were excluded from this table

<sup>67</sup> Low fertilizer application rate = 10 kilograms of nitrogen per hectare (kg N/ha).

<sup>68</sup> High fertilizer application rates varied from crop to crop. For taro, sweet potatoes, rice and sugarcane, the high nitrogen application rate was = 90 kg N/ha.

Rainfed	0.1	3.6	-4.5	-1.7
<b>Sugarcane</b>				
Rainfed	-2.1	3.4	-2.1	3.4

## 1.5. Barriers of the agricultural sector in PNG

The impacts of climate change are expected to exacerbate existing barriers currently hampering PNG's agricultural sector. Indeed, according to the Agriculture Medium Term Development Plan 2018–2022<sup>69</sup>, the agriculture sector is facing several challenges and issues, most of which have ~~been prevalent in the sector existed~~ since independence in 1975. This ~~proposed~~ project ~~aims to will~~ address ~~of those~~ challenges in the agricultural sector that are exacerbated under the changing climate and by doing so, create a favorable operating environment for increased productivity and income-generation within this sector.

### 1.5.1. Barriers related to food security

The ~~already observed existing~~ mismatch between ~~PNG's local national~~ food production and ~~national~~ food demand may be worsened by the yield decline induced by climate change. ~~In terms of food consumption~~ ~~At least 70% of smallholder farmers living in rural areas grow crops for their own personal~~ consumption and sell surplus for ~~an~~ income<sup>70</sup>. Therefore, food security is vulnerable to climate ~~conditions and agricultural~~ shocks ~~adversely~~ affecting local food production. ~~Around Between 800,000 to 1.2 million and 800,000~~ villagers ~~were undersuffered~~ food shortage after droughts (combined with frost at high altitudes) that occurred in 1997 and 2015, ~~respectively~~<sup>71</sup>. Although people generally ~~may~~ have access to ~~sufficient~~ food ~~in terms of quantity~~, there ~~are widespread nutritional~~ deficiencies ~~in the nutritional status of the population~~ due to ~~problems with constrained~~ access to ~~adequate~~ quality and diversified food; for a nutritionally balanced diet. ~~The Organization for Economic Co-operation and Development (OCDE) and Food and Agriculture Organization The global (FAO) recommendeds intake is a 2,250-~~ calories ~~intake~~ and 58 grams of protein ~~intake~~ per person per day<sup>72</sup>, but ~~the poor households in PNG consumes~~ between 1,370 and 1,790 calories ~~per person per day in PNG rural area~~. Food crops, vegetables, and fruits are available in reasonable quantities but rice, for instance, is imported and consumed by the non-poor household whose calorie intake is between 2,650 and 2,870<sup>73</sup>. ~~In addition, local food production is not competitive to with~~ food imports due to supply issues such as poor quality, inconsistent ~~ntney in~~ supply, poor road connectivity and high marketing costs. ~~Besides that, t~~ There are also critical value chain ~~issues challenges that need to be addressed like such as~~ post-harvest management, ~~such as~~ food contamination, food loss and waste, ~~and including cold food storage facilities~~. In 2012, post-harvest losses were estimated at 19%, 45%, 45% and 26% of the national production of grains, vegetables, fruits, roots and

<sup>69</sup> Department of Agriculture and Livestock (2020). Agriculture Medium Term Development Plan 2020 - 2022

<sup>70</sup> Schmidt et al. (2019). Papua New Guinea survey report: Rural household survey on food systems. International Food Policy Research Institute (IFPRI) Discussion Paper 1801. Washington, DC; <https://doi.org/10.2499/p15738coll2.133067>.

<sup>71</sup> Kanua et al. (2016). Assessing village food needs following a natural disaster in PNG. Australian National University.

<sup>72</sup> Organisation for Economic Co-operation and Development/OECD / Food and Agriculture Organization of the United Nations/FAO (OECD/FAO). 2015. OECD-FAO Agricultural Outlook. OECD Agriculture statistics (database).

<sup>73</sup> Schmidt et al. (2019). Papua New Guinea survey report: Rural household survey on food systems. International Food Policy Research Institute (IFPRI) Discussion Paper 1801. Washington, DC; <https://doi.org/10.2499/p15738coll2.133067>

tubers, respectively<sup>74</sup>. To date, these factors have not been addressed ~~in the target regions consistently across the target provinces~~ due to ~~a lack of insufficient~~ financial resources ~~availability to implement for~~ necessary infrastructural and technology updates ~~in the target regions~~; and ~~reduced-limited~~ capacities to propagate and distribute crop varieties widely, ~~to implement~~ climate sensitive practices and post-harvest techniques, or operate and maintain ~~climate-relevant resilient~~ value chain technologies ~~that are adapted to the changing climate~~.

In this context, this project ~~wants to will~~ support climate-~~resilient~~ agricultural production with climate-resilient, high-performance and high-yielding crop varieties provided to farming households (Output 1.1) ~~including adapted rice seeds and sugarcane plants~~. Combined with the dissemination of climate-resilient agriculture (CRA) practices through demonstrators, ~~and/or~~ farmer field schools and ~~provision of~~ extension services (Output 1.2), this will increase food security in ~~the vulnerable~~ communities. ~~The quality of p~~Post-harvest ~~products management~~, ~~challenges to constrained~~ market access ~~through poor road connectivity~~ and access to market information will be addressed through ~~the procurement of~~ eco-friendly ~~and climate-smart~~ processing and storage technologies (Output 2.3) combined with ~~hands-on~~ training sessions on ~~the operating, maint~~aining ~~enance~~, and ~~management managing of the these~~ technologies, ~~the upgrading to climate resilient~~ farm roads to ~~be more climate resilient maintain for enhanced~~ connectivity to ~~the main public~~ markets under projected climate conditions (Output 2.2), ~~and the while operationalization of~~ an integrated digital platform ~~will fostering~~ exchange and collaboration among coffee and coconut smallholder farmers, small-scale processors, traders, and buyers (Output 2.1).

### 1.5.2. Lack of agricultural services

Agricultural training, information and extension services are ~~some of the driving forces drivers~~ of agricultural development for rural poverty reduction. ~~Recent a~~Analysis of sweet potato value chains in PNG ~~pointed out identified~~ the need for advanced farmer trainings for at least 20% of farmers, especially ~~in the areas of for~~ improving harvesting techniques, sorting and grading, packing and transportation. ~~However, there are major issues limited services for with agricultural training, and extension, research, and development, biosecurity and quarantine services in PNG. seems obvious since~~ An effective extension system coupled with irregular farmer trainings and engagements in the areas of production, postharvest and agribusiness is missing<sup>75</sup>. ~~However, there are major issues with agricultural training and extension, research, and development, biosecurity and quarantine services in PNG.~~ Most PNG farmers cooperatives have limited access to extension and ~~other~~ related services ~~for many years~~, and public-sector agricultural extension ~~capacity of in~~ PNG has been declining ~~since independence~~. Farmer training and extension was the responsibility of the Department of Agriculture and Livestock (DAL) during pre-independence. After independence, the extension function was transferred to the provinciales and district ~~governments under the Organic Law on Provincial and Local Level Governments (OLPLLG)~~. ~~But~~ ~~However~~, agricultural training and extension centers have been neglected ~~by the public sector~~ and in ~~most of the many~~ provinces this function ~~may be non-existent or is~~ ineffective due to poor management and lack of funding. In this context, the project ~~wants to will~~ improve access to extension services in the project areas (Output 1.2) to showcase and train farmers on CRA practices, facilitate knowledge transfer, and initiate climate sensitive behavioral changes in agricultural systems.

### 1.5.3. Lack of agricultural statistics and Information

Agricultural data and information are ~~very~~ important tools for ~~agriculture~~ policy formulation, decision-making, ~~and to coordination~~ and tracking of progress ~~of the sector~~ for future planning. However, the PNG agriculture database is obsolete and ~~therefore~~, agriculture sector planning is ~~thus~~ done on ad hoc

<sup>74</sup> Gunasekera et al. (2017). Postharvest loss reduction in Asia-Pacific developing economies. *Journal of Agribusiness in Developing and Emerging Economies*, 7(3)303-317

<sup>75</sup> Okrupa et al. (2019). Identifying Value Chain Constraints for Sweetpotato, Irish potato and Bulb onion in the Highlands of Papua New Guinea



bases with insufficient data and information provided by sub-sector agencies. The lack of statistics and information, ~~therefore,~~ ~~has over the years~~ resulted in reduced efficiency of sectorial adaptation planning, ~~resulting in contributing to overall~~ reduced performance in the agricultural sector. In this context, the project ~~wants to will~~ improve the capacity of the actors involved in the agriculture sector on the monitoring, report and verification of the impacts of actions (Output 3.1).

#### 1.5.4. Agricultural marketing issues and processing

PNG's diverse setting with a heavily rural population (85%), over 850 ~~native different~~ languages ~~and culture~~, limited education, rugged terrain ~~and geography~~ and poor infrastructure create ~~major~~ constraints ~~and challenges~~ to developing marketing systems. Under projected climate scenarios, the increase in ~~intensive extreme~~ rainfall events will exacerbate the degradation of road networks and further reduce market access. Ultimately, this directly reduces local populations' abilities to actively participate in the ~~cash~~ economy. Currently, more than 75% of roads (30,000 km) become impassable at some time during the year and 32% rural population live two kilometres ~~or more far~~ from an all-season road<sup>76</sup>. In addition, downstream processing in PNG is still in its infancy concerning agro-industries. Therefore, the government is encouraging primary and secondary processing of agricultural produce, in addition to the export of raw materials. The project will contribute to overcoming ~~the~~ barriers through the distribution of eco-friendly technologies for processing and/or storage (Output 2.3) and improving physical access to markets through climate-resilient farm road networks (Output 2.2).

#### 1.5.5 Ecosystem degradation affecting agriculture productivity

Socio-economic growth ~~in PNG~~ has increased pressure on land and natural resources, contributing to ~~having the second highest rate of primary forest degradation~~ PNG having the second highest rate of primary forest degradation over ~~the 2002 to 2020 period~~, with 777 kha (51%) of total forest loss. The main drivers for deforestation and degradation are logging, agriculture and mining, with the agriculture drivers ~~being mainly comprising~~ land use shifts (63%) and palm oil production (30%). With ~~a large the~~ majority of forests ~~still~~ under community control, ~~significant~~ degradation is caused by deforestation to enhance agricultural production to meet the demands of high population growth ~~rates~~. Exacerbating these issues is ~~poor~~ agricultural management, with a transitional shift away from traditional practices. For example, in sweet potatoes cropping systems, the fallow periods decreased from 12.1 in 2005 to 6.3 years in 2014 and tree species ~~(such as Casuarina oligodon)~~ traditionally used as fallow species ~~(such as Casuarina oligodon)~~ have been replaced by food legumes. Consequently, there is a ~~clear~~ decline in soil nutrients<sup>77</sup>. Compared with the Amazon region (5.6 years of fallow<sup>78</sup>), this reduction in PNG's fallow period is alarming in terms of soil fertility decline and worsening land degradation. This results in improper soil management, overgrazing and extensive forest extraction for household use. Encroachment of subsistence farming away from flat lands onto steep sloping areas with mounding practices has increased soil degradation and a loss of fertile soils. In coastal areas, saltwater intrusion driven by factors such as the frequency and magnitude of storms and tides, the frequency and duration of drought, the position of sea-level relative to the land and water table is exacerbated by the degradation of mangroves which are natural coastal barriers. This has cascading ecological consequences such as upland forest retreat, conversion of freshwater wetlands, nutrient mobilization, and declines in agricultural productivity. Very

---

<sup>76</sup> Office of Development Effectiveness (2018). Road Management in Papua New Guinea: An Evaluation of a Decade of Australian Support 2007-2017, Department of Foreign Affairs and Trade, Canberra, 2018.

<sup>77</sup> Fujinuma et al. (2018). Intensified sweetpotato production in Papua New Guinea drives plant nutrient decline over the last decade. Agriculture, Ecosystems & Environment, 254, 10-19. doi:10.1016/j.agee.2017.11.012

<sup>78</sup> Jakovac et al. (2016). Swiddens under transition: Consequences of agricultural intensification in the Amazon. Agriculture, Ecosystems & Environment, 218, 116-125. doi:10.1016/j.agee.2015.11.013

few crops can grow in sustained conditions of greater than 2 parts per thousand salinities<sup>79</sup>, which is substantially below the salinity levels in many salt-intruded fields. For example, crops such as sweet potatoes and trice are highly sensitive to saltwater<sup>80,81</sup>. In addition, Salinized farmland, which has high nutrient levels, can be rapidly colonized by many agricultural weed species<sup>82</sup>.

Efforts to combat degradation are in place and driven by global pressures to combat biodiversity loss and environmental protection. The country is engaged in sustainable land management to address ecosystem degradation and build resilient communities with sustainable access to<sup>83</sup>. However, efforts are scattered across sectors and disjointed, with little attention provided to small scale farming that make up a sizable portion of land use in PNG. A major barrier to combating degradation in the agriculture sector is a lack technical capacity or access to knowledge on the latest sustainable land management and climate smart agricultural techniques that aim to preserve soils and utilize sustainable techniques. This project will implement nature-based solutions (NbS) to enhance ecosystem services (Output 1.3) to sustain agricultural production.

### 1.6. Gender assessment

While PNG ranked 155 out of 189 countries and territories in the 2020 Human Development Index, it was ranked 161 out of 162 countries in the Gender Inequality Index (Table -1). Reducing gender inequality and violence against women and girls in PNG is necessary for the economic and social future of the country; with climate change impacts making this even more challenging. For example, achieving gender parity in formal labour force participation is estimated to result in a 14% increase in economic output<sup>84</sup>.

Table 1: Aspects of PNG's Gender Inequality Index (GII value of 0.725, rank 161)<sup>85</sup>

<u>Component</u>	<u>Value</u>
<u>Maternal mortality ratio</u>	<u>145.0</u>
<u>Adolescent birth rate</u>	<u>52.7</u>
<u>Female seats in parliament (%)</u>	<u>0.0</u>
<u>Population with at least some secondary education (%)</u>	<u>Females: 10.0</u> <u>Males: 15.2</u>
<u>Labour force participation rate (%)</u>	<u>Females: 46.3</u> <u>Males: 48.0</u>

Note: Data from UN databases is not necessarily consistent with national sources. Maternal mortality is expressed in number of deaths per 100,000 live births and adolescent birth rate is expressed in number of births per 1,000 women aged 15-19.

#### 1.6.1 Context

PNG is extremely culturally diverse, with over 1,000 distinct ethnic groups and over 800 languages with a mix of patrilineal and matrilineal kinship social systems. Gender-based violence against women is recognised to be prevalent in PNG, 56% of women aged 15-49 have experienced physical violence since

<sup>79</sup> Tanji KK, Kielen NC. 2002. Agricultural drainage water management in arid and semi-arid areas. Pages 1–105. *Allex 1. Crop Salt Tolerance Data*. Food and Agriculture Organization of the United Nations.

<sup>80</sup> Paulino, Tristan and Marutani, PhD, Mari (2016) "Effects of Salinity on Plant Development of in vitro Sweet Potato (*Ipomoea batatas*) Explants and Growth of Pakchoi (*Brassica rapa* var. *chinensis*) Seedlings," *Journal of Health Disparities Research and Practice*: Vol. 9 : Iss. 5 , Article 51. Available at: <https://digitalscholarship.unlv.edu/jhdrp/vol9/iss5/51>

<sup>81</sup> Nguyen et al, (2019) Impact of saline intrusion and adaptation options on rice-and fish- farming households in the Mekong Delta of Vietnam. *Kasetsart Journal of social sciences*. 40(2)

<sup>82</sup> Voutsina N, Seliskar DM, Gallagher J et al. 2015. The facilitative role of *Kosteletzkya pentacarpos* in transitioning coastal agricultural land to wetland during sea level rise. *Estuaries and Coasts* 38: 35–44

<sup>83</sup> PNG Department of Lands and Physical Plannings (2021). National Sustainable Land use Policy for Papua New Guinea. <https://png-data.sprep.org/dataset/national-sustainable-landuse-policy-papua-new-guinea>

<sup>84</sup> Pacific Women Shaping Pacific Development. (2021). *What Works for Gender Transformative Approaches in Papua New Guinea*.

<sup>85</sup> UNDP. (2020). *Human Development Report*.

age 15, and 38% had experienced physical violence in the prior 12 months<sup>86</sup>. In addition, cultural practices in PNG are deemed to be harmful to women. This include practices, such as bride pricings that , resulting in the perception of women as property can be harmful and result in women being treated as property, while women are often victims of and sorcery-related violence against women resulting in social exclusions and harassment, these practices are traditionally more common in rural areas<sup>87</sup>.

Constraints such as culturally embedded patriarchal norms prevent women from participating in political life and holding office. Women are significantly under-represented in decision-making bodies at all levels including community leadership and national politics. There are no women representatives in the national parliament and women hold less than 2% of local government positions<sup>88</sup>. Other decision-making structures, including those in customary, religious and private spheres, are also male-dominated. To address this, PNG's Gender Equity and Social Inclusion policy includes targets to increase participation of women within the public sector and the number of women in public service leadership positions<sup>89</sup>. Women are increasingly recognised as leaders and are developing skills to move into elected office and other formal positions of authority<sup>90</sup>. Despite this progress, barriers such sociocultural attitudes of men (and women), low education attainment and limited access to financial resources continue to prevent women from playing a greater role in leadership and decision-making.<sup>91</sup>.

#### 1.6.2 Gender-specific climate risks in agriculture

PNG's 2020 SDG Voluntary National Review notes that between 75–80% of the population live in rural areas, and their livelihoods are dependent on farming and fishing in poorly serviced and difficult to access rural and remote areas where women do not routinely participate in agricultural extension training opportunities. Despite this largely agricultural rural population, food and nutrition security are serious concerns, with almost one-in-two children affected by stunting and 33% percent of hospital deaths of children under five being directly or indirectly caused by malnutrition.<sup>92</sup>

Although participation rates in the labour force are relatively even, men are almost twice more likely than women to hold a wage job in the formal sector and women are three times more likely than men to work in the informal sector<sup>93</sup>. Crops typically cultivated by women tend to be valued at only half as much as crops typically cultivated by men. Women usually cultivate food crops such as sweet potato, banana, taro, yam, edible greens, vegetables and fruits. ~~Women's work is also geared more towards other agricultural activities such as running their own businesses as possible, which provides them with a more direct gain, whereas~~ Traditionally, men tend to focus on cash crops production, particularly cocoa or coffee production. Men tend to work longer hours in economically profitable activities, (almost triple in cocoa- and coffee-related activities), whereas women are mainly responsible for domestic activities, restricting time allocation to working in the formal sector. Consequently, ~~G~~gender-differentiated domestic work burdens and societal norms directly affect the ability of women to allocate their labour to the cultivation, harvesting and processing of high value crops such as coffee and cocoa<sup>94</sup>. This disproportionate burden of domestic work limits women in substantively engaging in more value-added agricultural activities.

PNG's agricultural production is sensitive to environmental hazards such as climate risks. For instance, impact assessments show that ~~such~~ impact from hazards can directly result in food insecurity for rural

86 Papua New Guinea. (2019). Demographic and Health Survey 2016–18.

87 Department of National Planning and Monitoring. (2020). Papua New Guinea's Voluntary National Review 2020.

88 Pacific Women Shaping Pacific Development. (2021). What Works for Gender Transformative Approaches in Papua New Guinea.

89 Department of Personnel Management, 2011, Gender Equity and Social Policy, PNG.

90 USAID, 2013, Women's Economic Participation in Papua New Guinea: Achieving APEC Priorities for Gender Equality.

91 SPC, 2012, Stock-take of the Gender Mainstreaming Capacity of Pacific Island Governments, PNG.

92 Department of National Planning and Monitoring. (2020), Papua New Guinea's Voluntary National Review 2020.

93 Asian Development Bank, 2016, Country Partnership Strategy: Papua New Guinea, 2016–2020. Gender Analysis Summary.

94 World Bank, 2012, Papua New Guinea Country Gender Assessment 2011–2012. New York.

households<sup>95</sup>. The impacts of current and future climate trends are further likely to increase the burden falling on women who have caring responsibilities for children and ill family members. Before and during climate disasters women are more likely to be responsible for the practical preparation of the household, informing family members, storing food and water, and protecting family belongings<sup>96</sup>. By contrast, men are more likely to liaise with government officials, prepare buildings, make decisions about evacuation and timing, manage water resources, distribute emergency relief, and receive and disseminate early warnings to the community.

Consequently, wWomen have less access to essential resources for disaster preparedness, mitigation and rehabilitation, while their workloads ~~increase~~are comparatively higher than those of men. Exacerbated, as men are more likely to migrate ~~out of rural areas~~ to look for work and because ~~there is limited access to energy sources, clean water, safe sanitation, and health impacts~~<sup>97</sup>. Heavy workloads ~~imposed on women often result in girls dropping out of school reducing ability to gain technical expertise/knowledge in relation to cash cropping, or climate resilient practices.~~ Women's increased morbidity and insecurity following disasters is demonstrated in several studies including in the Pacific<sup>98</sup>.-It is demonstrated that in climate ~~In~~ vulnerable areas, ~~it has also been demonstrated that~~ women are more likely than men to be food insecure and living in poverty<sup>99,100</sup>.

Climate risks exacerbate persisting institutional and governance challenges to promoting and enhancing women's participation in food value chains. These challenges include persistent gender disparities in access to and control over productive resources in agriculture, energy, markets, forestry, fisheries and other sectors, yet women are the major contributors to the ~~agricultural~~ economy (on farms, at home and in the community). Women are systematically excluded from access to resources, essential services and decision making despite a conducive legal and policy framework.

The PNG National Food Security Policy outlines actions to support women empowerment in agriculture, highlighting challenges for gender and development with mitigation measures identified for both gender equality and climate change<sup>101</sup>. Although women generally have access to land, they have limited control compared to men, through traditional governance and organizational systems that determine decisions pertaining to its use. In some areas, land ownership follows matrilineal principles, but even then, male relatives of female landowners influence decisions made in allocating land. Household decisions are family-based and may not always recognize the power of women within a matrilineal society<sup>102</sup>.

Women's access to knowledge and skills is limited, as gaps in education, literacy, skills, safety and security issues and participation in extension and training activities persist<sup>103</sup>. It is therefore important to ensure equal access for women to training, productive resources and to climate-~~smart~~resilient and labour-saving technologies and practices to build up the resilience of rural households and communities ~~and enhance the climate resilience of PNG's stable crops.~~<sup>104</sup>

---

<sup>95</sup> Brun, Delphine (March 2018). CARE Rapid Gender Analysis, Papua New Guinea – Highlands earthquake.

<sup>96</sup> Lane R, McNaught R. Building gendered approaches to adaptation in the Pacific. *Gender Dev* 2009, 17:67–80 71–72.

<sup>97</sup> Dankelman I. Introduction: exploring gender, environment and climate change. In: Dankelman I, ed. *Gender and Climate Change: An Introduction*. London: Earthscan; 2010, 1–20

<sup>98</sup> Alston M, Vize S. *Gender and Climate Change in the Pacific*. Melbourne: Gender, Leadership and Social Sustainability (GLASS) Research Unit, Monash University; 2010.

<sup>99</sup> Lambrou Y, Nelson S. *Farmers in a Changing Climate: Food Security in Andhra Pradesh, India*. Rome: FAO; 2010.

<sup>100</sup> Alber G. *Gender, cities and climate change: thematic report prepared for cities and climate change global report on human settlements, 2011*.

<sup>101</sup> Papua New Guinea National Food Security Policy 2016-2025 Development.

<sup>102</sup> World Bank, 2012, Papua New Guinea Country Gender Assessment 2011–2012. New York.

<sup>103</sup> World Bank, 2012, Papua New Guinea Country Gender Assessment 2011–2012. New York.

<sup>104</sup> FAO, 2019, Country Gender Assessment of Agriculture and the Rural Sector in Papua New Guinea

## Gender-specific climate risks

Strongly dependent on subsistence fresh farm produces from rural areas, PNG's food security status is very low and sensitive to environmental hazards including climate risks. For instance, impact assessment conducted by Brun (2018)<sup>105</sup> after environmental hazards (such as earthquakes of 2015 and 2018) reported an increase in food insecurity conditions of rural households. The impacts of these current trends of climate conditions and expected future climate is that an increased burden falls on many women who have caring responsibilities for children and ill family members. Lane and McNaught<sup>106</sup> note that before and during climate disasters women are more likely to be responsible for the practical preparation of the household, informing family members, storing food and water, and protecting family belongings. In both developing and developed countries, men are more likely to liaise with government officials, prepare the outsides of buildings, make decisions about evacuation and timing, manage water resources, distribute emergency relief, and receive and disseminate early warnings to the community. Dankelman<sup>107</sup> argues that women have less access to resources that are essential to disaster preparedness, mitigation, and rehabilitation, and that their workloads increase not only because men are more likely to migrate to look for work but also because of a lack of energy sources, clean water, safe sanitation, and health impacts. Heavy workloads often result in girls dropping out of school. Women's increased morbidity and insecurity following disasters is demonstrated in several studies including in the Pacific<sup>108</sup>. In vulnerable areas, it has also been demonstrated that women are more likely to be food insecure and living in poverty<sup>109,110</sup>. Climate risks exacerbate persisting institutional and governance challenges to promoting and enhancing women's participation in food value chains (NARI, 2002). These challenges include persistent gender disparities in access to and control over productive resources in agriculture, energy, markets, forestry, fisheries and other sectors, yet women are the major contributors to the economy (on farms, at home and in the community). Women are systematically excluded from access to resources, essential services and decision making despite a conducive legal and policy framework.

---

<sup>105</sup> Brun, Delphine (March 2018). CARE Rapid Gender Analysis, Papua New Guinea – Highlands earthquake. Accessed on 10 February 2019 at [https://fscluster.org/sites/default/files/documents/care\\_rapid\\_gender\\_analysis\\_png\\_earthquake\\_28032018.pdf](https://fscluster.org/sites/default/files/documents/care_rapid_gender_analysis_png_earthquake_28032018.pdf)

<sup>106</sup> Lane R, McNaught R. Building gendered approaches to adaptation in the Pacific. *Gender Dev* 2009, 17:67–80 71–72.

<sup>107</sup> Dankelman I. Introduction: exploring gender, environment and climate change. In: Dankelman I, ed. *Gender and Climate Change: An Introduction*. London: Earthscan; 2010, 1–20

<sup>108</sup> Alston M, Vize S. *Gender and Climate Change in the Pacific*. Melbourne: Gender, Leadership and Social Sustainability (GLASS) Research Unit, Monash University; 2010.

<sup>109</sup> Lambrou Y, Nelson S. *Farmers in a Changing Climate: Food Security in Andhra Pradesh, India*. Rome: Food and Agricultural Organisation of the United Nations (FAO); 2010.

<sup>110</sup> Alber G. *Gender, cities and climate change: thematic report prepared for cities and climate change global report on human settlements, 2011*. Available at: [www.unhabitat.org/grhs/2011](http://www.unhabitat.org/grhs/2011)

## Project / Programme Objectives:

*List the main objectives of the project/programme.*

The project aims to enhance the sustainability of main agricultural value chains through the adoption of climate-smart practices, contributing to improving the produce's quality, increasing access to markets, and creating green jobs for women and youth in vulnerable communities. Specific objectives set are:

- to integrate climate-resilient agriculture practices into standard farming techniques in PNG for increasing productivity, resilience and food security of the most vulnerable smallholder farmers
- to boost the ability of vulnerable smallholder farming communities to access to postharvest processing, storage technologies, and profitable markets
- To foster the scale-up of climate-resilient cropping, processing, and storage practices through capacity building, and knowledge management.

The project will be implemented over a five-year period, considering the time required to implement the structural changes to be promoted in sweet potato, coffee, and coconut growing areas, the differences in the crop cycles, as well as institution-building needs in the sector.

## Project / Programme Components and Financing:

*Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term. For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well defined interventions / projects.*

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)
Component 1: Climate-proofed small-scale agricultural production	1.1. Dissemination of climate-resilient crop varieties  1.2. Extension services for climate-resilient agriculture  1.3. Nature-based solutions to protect agro-ecological systems from landslides and coastal erosion induced by flooding and heavy rain events	1. Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers	3,954,584
Component 2: Climate-resilient postharvest solutions and access to markets	2.1. Sustainable commercial relationships linking input suppliers, technology providers, vulnerable communities, small-scale processors, traders, and buyers.	2. Improved access to appropriate processing, storage technologies, and profitable markets	3,460,880

	<p>2.2. Improved connectivity between cooperatives and markets through climate-resilient farm road networks</p> <p>2.3. Distribution of eco-friendly technologies for processing, and storage in the project area for coffee, copra, and food crop processing</p>		
Component 3: Capacity building and knowledge management for scaling-up CRA practices	<p>3.1. Training-of-trainers to monitor, report and verify impacts of climate-resilient practices across agricultural value chains</p> <p>3.2. Capacity building programme on climate-resilient agricultural production for provincial authorities</p> <p>3.3. Knowledge management and dissemination to policy-makers, development partners, private sector including smallholder SMEs, and civil society organizations on scaling up climate-resilient agricultural practices</p>	3. Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.	849,100
<b>(A) Project activities cost</b>			8,2464,564
<b>(B) Project execution cost</b>			867,65568
<b>(A)+(B) Total Project cost</b>			9,132,222
<b>(C) Implementing Entity Fee (8.5%)</b>			776,239
<b>Amount of Funding Requested / Grant Amount</b>			<b>9,98,879908,46</b> <b><u>1</u></b>

## Projected Calendar:

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

Milestones	Expected Dates
Start of Project Implementation	January 2025
Mid-term Review (if planned)	June 2027
Project Closing	December 2029
Terminal Evaluation	October 2029

## PART II: PROJECT / PROGRAMME JUSTIFICATION

- A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

Climate change is already impacting on agricultural production ~~and~~ particularly ~~on~~ for smallholder farmers ~~in~~ PNG, and this is expected to increase in the coming decades. In this context, the overall objective of this project is to enhance the sustainability of the main agricultural value chains in the face of climate risks through the adoption of climate-smart practices, contributing to improving the quality of produce, increasing access to markets, and creating green jobs for women and youth in vulnerable communities. This will contribute to reducing the vulnerability of smallholder farmers to climate change impacts and increase their adaptive capacity, while protecting agro-ecological resources in rural areas.

The project ~~intends to will~~ provide integrated solutions to key barriers preventing adaptation in the agricultural sector in three provinces (Enga, New Ireland, and Milne Bay) identified by the Government of PNG under its Climate Resilient Green Growth (CRGG) project, ~~to meet the objectives highlighted above.~~ This will be achieved through the implementation of three components outlined below.

### **Component 1: Climate-proofed small-scale agricultural production**

#### **Outcome 1: Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers**

~~This component is focused on the dissemination of climate-resilient agriculture practices for small-scale farmers to improve farm productivity, resiliency, and ensure food security under changing climate.~~

#### Output 1.1. Dissemination of climate-resilient crop varieties

- Identify champion farmers (at least 30% women) in collaboration with research institutions and local authorities for seed multiplication sheds (Activity 1.1.1).
- Support construction of 30 multiplication sheds for improved and resilient varieties of crops (heat and excess water-tolerant sweet potato, heat-tolerant coffee, heat, and excess water-tolerant yams, and improved sugarcane and coconut) for distribution and sale (Activity 1.1.2).
- Provide technical training and support to selected champion farmers to run seed multiplication sheds including multiplication techniques, nucleus seeds, development of management and business plan (Activity 1.1.3).
- Distribute adapted rice seeds and replicate innovative planting techniques to 400 farm households in upland communities (Activity 1.1.4). The project will strengthen the Upland Rice Program initiative of Government and partners implemented since 2019, which promotes rice seed provision and adaptive techniques, and dissemination to selected farmers.

#### Output 1.2. Extension services for climate-resilient agriculture

- Identify and setup 30 demonstrators or climate field schools including recruitment of members (Activity 1.2.1).
- Design the training curriculum and manual on resilient agronomic packages for sweet potatoes, taro, coffee, and rice (e.g., potatoes cropping in irrigated systems, drainage systems) and translate into local languages as appropriate (Activity 1.2.2).
- Provide a series of technical training to member farmers of the field school on resilient agronomic



packages. and input support to lead farmers to pilot and implement improved techniques (Activity 1.2.3).

- Identify and map potential (non-public) extension services providers including well-functioning cooperatives, grassroot organizations, intermediaries, smallholder SMEs, and input suppliers for each province (Activity 1.2.4.).
- Support for 50 contracts related to extension services provision between local service providers and farmers organizations (Activity 1.2.5).

#### Output 1.3. Nature-based solutions to protect agro-ecological systems from landslides and coastal erosion induced by flooding and heavy rain events

- Carry out ground survey and map degraded areas for reforestation in project area (Activity 1.3.1)
- Implement a reforestation program of 3000 ha around croplands, mangroves and degraded forest, vegetation planting along riverbanks or unstable lands (Activity 1.3.2). The activity will promote the protection and rehabilitation of agroforestry systems on cropland/degraded forest and mangrove systems. It will look into setting up nurseries and procuring native plant saplings, seedlings from locally available sources (DAL and National Agriculture Research Institute (NARI) research stations within each of the provinces).
- Conduct awareness raising events with local communities on the importance of ecosystem services to enhance their participation in the protection and maintenance of reforested areas (Activity 1.3.3)

### **Component 2: Climate-resilient postharvest solutions and access to markets**

#### **Outcome 2: Improved access to appropriate processing, storage technologies, and profitable markets**

#### Output 2.1. Sustainable commercial relationships linking input suppliers, technology providers, vulnerable communities, small-scale processors, traders, and produce buyers

- Assess existing agricultural market information and flows in project areas to identify needs and gaps (Activity 2.1.1)
- Support the development of an integrated digital platform to link farmers, small-scale processors, traders, and buyers along the value chain (Activity 2.1.2). Information about the prices of commodities will also be available on this platform. Selection of operator(s) who will be responsible for development, support services provision, implementation, and operationalization of digital integrated platform will follow the Provincial Government Expression of Interest (EoI) process.

#### Output 2.2. Improved connectivity between cooperatives and markets through climate-resilient farm road networks

- Update Operation & Maintenance (O&M) Guidelines for farm roads to include climate-resilient road standards and codes (Activity 2.2.1). The Government is finalizing its Department of Works Climate Resilience Policy that promotes the mainstreaming of climate-resilient road and infrastructure standards and codes at the national level. The Policy is aligned to PNG's Enhanced NDC adaptation target on road and infrastructure. The project will look to review existing O&M guidelines of provincial governments to align with national climate-resilient road and infrastructure policy, standards, and codes. The project will target O&M Guidelines that focus on upgrading existing farm roads using low-tech, low-cost and low-impact techniques.
- Upgrade existing farm roads connecting farms to the main public market to climate resilient standards for farm roads and tracks of at least 45 km (in total), using appropriate resilient design standards and local construction materials in alignment with the updated O&M Guidelines (Activity 2.2.2).

#### Output 2.3. Distribution of eco-friendly technologies for processing and storage of coffee, copra, and food crops

- Undertake joint planning with women and youth farmers organizations to identify the specific needs and priorities of the beneficiaries (Activity 2.3.1).

- Procure and install processing and storage technologies (e.g., solar-powered dryers, solar-powered storage facilities) (Activity 2.3.2).
- Develop O&M guidelines in local languages and provide hand-on training sessions on the operation and maintenance, and management of the technologies to the beneficiary farmer organizations (Activity 2.3.3).

**Component 3: Capacity building and knowledge management for scaling-up CRA practices**

**Outcome 3: Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.**

**Output 3.1. Training-of-trainers to monitor, report and verify impacts of climate-resilient practices across agricultural value chains**

- Develop training curriculum and training manual on methods and tools to track changes in behaviors and environment and translate into local languages as appropriate (Activity 3.1.1).
- Conduct Training of Trainers (ToT) for the provincial stakeholders to establish Lead Trainer teams (at least 30% women) comprising of various actors involved in the agriculture value chain (Activity 3.1.2).
- Support Lead Trainers to conduct subsequent training sessions at the sub-provincial level (Activity 3.1.3).

**Output 3.2. Capacity building programme on climate-resilient agricultural production for provincial authorities**

- Develop gender-sensitive training programs on climate-resilient agriculture including curriculum and training materials, translated into local languages (Activity 3.2.1)
- Provide training sessions for national, provincial and local authorities involved in promoting climate-resilient agriculture in Milne Bay, Enga, and New Ireland (Activity 3.2.2)

**Output 3.3. Knowledge management and dissemination to policy-makers, development partners, private sector including smallholder SMEs, and civil society organizations on scaling up climate-resilient agricultural practices**

- Undertake participatory monitoring, evaluation and learning (MEL) of project activities to identify and document best practices and lessons learned as well as for adaptive management of the project results, milestones, and deliverables (Activity 3.3.1).
- Develop and publish knowledge products such as policy briefs, technical reports, social media posts, brief documentaries and news media mentions to highlight best practices and lessons learnt concerning CRA practices in each province and at the national level (Activity 3.3.2).
- Conduct targeted stakeholder awareness sessions for transparent communication of results in line with the stakeholder engagement plan (to be developed at full proposal elaboration) through MEL activities such as workshops, conferences and forums to share results, lessons and challenges (Activity 3.3.3).

**B.** Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.

Through its outputs, the project will deliver socioeconomic benefits (related to the e.g. protection of lives, economic activities, livelihoods, and assets) and create an enabling environment for resilience and mitigating the impacts of climate change. Implementation of nature-based solutions NBS (e.g. mangrove

conservation, vegetation planting along riverbanks or unstable lands) to restore agro-ecological systems and enhance ecosystem services will ~~contribute to the support~~ stabilization of essential croplands and forest assets, with ~~expected~~ positive co-benefits for livelihoods. ~~By p~~Promoting resilient crops, ~~and~~ improving the capacity of actors to monitor, report and verify impacts across agriculture value chains, ~~the implemented measures~~ will ~~also~~ enhance the effectiveness and benefits of other initiatives that target ~~the~~ improvement of livelihoods ~~of the for~~ vulnerable communities. Further, sustainable, and diversified crop production and improved connectivity between farmers and markets will also improve nutrition for the health of the rural population. The results will contribute to the NDC adaptation target on food security and health for PNG. The CRA measures to be introduced by the project are also designed to provide key environmental benefits that will further support livelihoods.

The ~~implementation of 3,000 ha of restoration of~~ reforested areas around degraded croplands, mangroves, and forests will reduce soil erosion, saline intrusion and prevent siltation damage to existing infrastructure such as farm roads. This ecosystem-based approach offers social, economic and environmental co-benefits including carbon sequestration. The restored forest ecosystems will contain many native plant species that provide fiber, medicine, fruit, firewood, timber, and habitat for animal species, ~~as the country has a conserving PNG's great biodiversity conservation assets and~~ ~~This small ecosystem will help~~ maintaining populations of migratory birds and fishes in the reforested areas ~~and reforested mangroves, respectively~~.

~~As a social benefit, t~~he improvement of ~~farm roads linking the farms to public markets~~ will facilitate ~~timely the~~ flow of products from farms to ~~public~~ markets ~~in a timely manner~~, maintaining quality of ~~the~~ fresh produce and minimizing postharvest losses. ~~The Other project's interventions will bring considerable~~ benefits to vulnerable communities ~~include, including the~~ creation of green jobs through ~~the~~ processing of coffee, copra, and staple food crops. ~~#The project~~ will also contribute to poverty reduction through reduced exposure to environmental and climatic risks such as flooding and landslides through ~~nature-based solutions NbS~~. In terms of gender benefits, at least 30% of farmers targeted by the project ~~are will~~ ~~be~~ women and youth, who will ~~be supported to~~ engage in climate-resilient agricultural production. ~~The project will~~ ~~This includes~~ support ~~their for~~ post-harvest handling through eco-friendly processing ~~or and~~ storage technologies, and ~~market access connect them directly to the market via the~~ integrated digital platform and climate-resilient roads. This will ~~in turn~~ support economic empowerment of women and youths ~~in their local communities~~ through income generation.

**C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.**

—The project is designed to ~~enable the improvement of maximise~~ the efficiencyes of ~~the~~ Adaptation Fund's investments. ~~Effectively, t~~he proposed activities ~~of the project are were~~ identified through a participatory ~~ive~~ approach ~~based on through~~ stakeholder consultations undertaken ~~by GGGI~~ in 2021 to ~~consider assess the collective~~ interests in project interventions<sup>111,112,113</sup>. This ~~process identified~~ ~~priorities as well as is translated by the inclusion of~~ proven mechanisms for community participation, field schools ~~or demonstrators~~ and other capacity-building ~~sessions opportunities~~ (for farmers, women, youth, and public staff), government involvement, and technology transfer, ~~that~~ will lead to ~~easily identifiable~~ ~~adaptation~~ benefits for local communities. The partnerships established during the project design and implementation will boost the cost-effectiveness of the project interventions. In addition, the project activities are designed to provide tangible results that are viable to replicate for scaling up.

In terms of project management, improved coordination and communication, the application of common

<sup>111</sup> Global Green Growth Institute (GGGI), 2021. Climate-Resilient Green Growth in New Ireland Province

<sup>112</sup> Global Green Growth Institute (GGGI), 2021. Climate-Resilient Green Growth in Enga Province

<sup>113</sup> Global Green Growth Institute (GGGI), 2021. Climate-Resilient Green Growth in Milne Bay Province

(streamlined) procurement and supervision procedures, the implementation of complementary project interventions in the project districts will generate cost savings. The project will work with existing community structures and will contribute to strengthening them.

The activities of the project are designed to obtain optimum results that are of benefit to direct and indirect project beneficiaries in tangible ways. These activities are based on ~~the experience of~~ past interventions implemented in similar contexts and adapted ~~so that they can be managed~~ to achieve the expected benefits for the local communities. ~~Based on income-generating activities,~~ ~~the project is cost-effective for smallholder farmers~~ ~~to improve their income-generation potential through providing them in the sense that it gives them means in the form of~~ knowledge, access to inputs and extension services, post-harvest handling and access to market to increase ~~their~~ ~~the efficiency of economic~~ activities. Indeed, the project's total investment of USD 9,998,879 will benefit 18,240 direct beneficiaries and 83,600 indirect beneficiaries<sup>114</sup>, at a cost of USD 548 per direct beneficiary. For comparison, the adaptation projects PNG Productive Partnerships in Agriculture Project funded by the World Bank and Smallholder Support Services Pilot Project co-funded by the Asia Development Bank cost USD 1,243 and USD 970 per beneficiary, respectively<sup>115,116</sup>.

- D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national adaptation plan (NAP), national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

~~PNG has established many national policies, legislation, and strategies related to agriculture.~~ The project is well aligned with the ~~national policies, legislation, strategies, priorities and objectives of the Government of PNG in relation to climate change and agriculture, resulting in the Climate Change and Development Authority issuing of a letter of endorsement for this project (see Annex 2).~~

- ~~Medium Term Development Plan III (2018 - 2022): Especially with its Key Result Area 1 focusing 'Increased Revenue and Wealth Creation'. The biggest A major~~ development challenge in PNG is insufficient internal revenue to fund the needs of the ~~large~~ population which ~~has quadrupled in size since Independence and~~ is projected to grow at 3.1% per annum during 2018-2022. To meet the ~~requirements-needs~~ of an expanding population while addressing environmental considerations, sustainable economic growth needs to occur. The outcomes of ~~Key Result Area 1 'Increased Revenue and Wealth Creation' KRA-1~~ will be ~~achieved-supported~~ through seven Economic Growth Goals such as: reduce imports of major food items like rice, dairy, fresh produce, and meat; create wealth by promoting SME growth and attracting direct investments; women's economic empowerment; and create more employment and economic opportunities for youth and build the capacity of productive workforce.
- ~~PNG Vision 2050: Its goal 2 is focused on Wealth Creation.~~ Vision 2050 will ensure that Papua New Guinea has a strong, dynamic and competitive economy by 2050. ~~Goal 2 Wealth Creation is focused on. The focus is to~~ developing manufacturing, agriculture, forestry, fisheries, and tourism ventures to generate 70% ~~percent~~ of GDP.
- ~~PNG Development Strategic Plan 2010-2030: under p~~Part 6; ~~(s~~Sections 6.2-6.8), clearly articulates

<sup>114</sup> ~~Based on considering~~ the ~~projected~~ number of persons per household in 2022 in the project area (~~Milne Bay, Enga and New Ireland~~) and ~~80%percentage~~ of the populations engaged in agricultural sector. McMurray and Lavu (2021). Provincial estimates of key populations group 2018-2022. The National Research Institute. Papua New Guinea.

~~For indirect beneficiaries, 5.6 persons per menage were considered based on~~ Mc Murray and Lavu (2011)

<sup>115</sup> <https://projects.worldbank.org/en/projects-operations/project-detail/P110959>

<sup>116</sup> <https://www.oecd.org/derec/adb/Papua-New-Guinea-Smallholder-Support-Project.pdf>

the strengthening of cross-sectoral policies on youth, gender, HIV/AIDS, Vulnerable and Disadvantaged, Environment, Climate Change and Natural Disaster Management as priority. The proposed AF project will be supportive of these sections through, having the objective of building climate change resilience in communities and at the same time fostering development leading to for more secure livelihoods. It is also aligned with policies such as the National Food Security Policy.

- PNG Enhanced NDC 2020--2030: The NDC has four key adaptation targets for 2022 and includes investment in agriculture, health, transport, and infrastructure. The project will contribute to the NDC target of 10% of the population (25% being female) with increased resilience of food and water security, health, and wellbeing in PNG. In terms of mitigation commitments, the enhanced NDC also sets a target of 25% of reduction in both the area of annual deforestation and annual degradation against 2015 levels.

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The project will be implemented in rural areas of Enga, Milne Bay, and New Ireland provinces of PNG, where staple food crops and cash crops are part of smallholder farming systems. The project will promote the adoption of resilient farming practices through: deployment of resilient crop varieties, improved extension services support, and enhanced ecosystem services (under Component 1); and improved post-harvest technologies and access to markets through integrated digital platform and upgraded farm roads including rehabilitation of existing infrastructure such as farm to market roads, pathways, footbridges (under Component 2); and build the increased capacity of stakeholders and foster greater knowledge sharing (under Component 3).

The potential adverse impacts associated with these activities are foreseen to be low in intensity, minor and site-specific, and lend themselves to readily available and already widely used mitigation measures. For these reasons, the ASSA project has been assigned an Environmental and Social Safeguards Category B (medium risk), consistent with the requirements and standards of the Pacific Community (SPC) Social and Environmental Responsibility Policy. The proposed project will be consistent with all relevant national legal frameworks and standards, such as: Lands and Physical Planning Act, Environment Act, Organic Law of Provincial and Local Level Government (provisions for District and local level approvals), and Disaster Management Act.

F. Describe if there is duplication of project / programme with other funding sources, if any.

This project will be implemented to create synergy and complementarity with initiatives outlined in the following table with some already completed. Further, these initiatives will serve as resources for valuable lessons learnt and, at the same time, be part of the audience for the knowledge management and dissemination activities under Component 3 of the proposed project. The National Project Management Unit (PMU) attend any externally hosted workshops on request and will coordinate annual reflection workshops with the below mentioned projects. Inviting project coordinators and monitoring, evaluation and learning (MEL) experts/officers, to discuss project progress, lessons learned on implementation efficacy, and areas for enhanced complementarity between projects to maximise impact. In addition to this, online community of practices (CoP) will be established between PMU's at the national-level and between provincial implementation teams at provincial-levels. Enhanced coordination will streamline inputs to national workshops hosted by the Climate Change and Development Authority (CCDA) and the at the provincial level into Provincial Climate Change Committee meetings to facilitate greater

coordination of climate action. This will enable real time updates and coordination between projects to ensure duplication is avoided and synergy maximised. At the national-level, the CoP will engage and encourage participation from stakeholders of projects operating outside of the target area, especially i) GEF ID -10239 Establishing System for Sustainable Integrated Land-use Planning Across New Britain Island in Papua New Guinea, and ii) GEF Project ID 10580- Integrated land management, restoration of degraded landscapes and natural capital assessment in the mountains of Papua New Guinea

The relevant projects or initiatives in the target area are summarized in the following table.

Initiative/Institution	Status	Complementarity
<b>Programs in the Provincial DAL in Enga Province</b>		
Enga Provincial Government, New Zealand Ministry of Foreign Affairs and Trade (NZMFAT), National Agriculture Research Institute (NARI), European Union (EU)	Following the 2015 droughts that affected <del>much of</del> the highlands regions and caused significant loss of food crops, the NZMFAT partnered with NARI and the EU on a disaster relief project <del>on for</del> drought and climate change adaptation, where experts <del>from New Zealand</del> <u>assessed damage and possible solutions were sent to in</u> Enga and Simbu Provinces <del>to investigate the damage caused by the drought and recommend possible solutions to the farmers and NARI. Most of the k</del> Key issues identified in the investigation are limited to the highland provinces that were affected by drought and frost. This project <del>however short-lived,</del> produced some <u>good valuable handbooks resources</u> (some translated into pidgin) on best agriculture practices to cope with drought and frosts.	The proposed project aims to promote a drought tolerant variety, thus could use results produced under this project.
<b>Upland Rice Program</b>		
Enga Provincial Government	This program <del>is currently a trial and</del> has been underway for three years <del>now</del> . The trials have proven to be successful in the warmer districts of Enga. <u>showing especially Kompiam, Wapenamanda and Wabag Districts. Results from these trials proved</u> that rice could yield up to 2-4 tonnes per hectare. <del>The only support t</del> This project <u>only</u> provides <del>is the</del> <u>supplies</u> of rice seeds from NARI, <del>but and</del> no other technical support. Given the success of the trials, the Enga Provincial DAL <u>is willing wishes</u> to commence <del>some</del> training and awareness programs to encourage farmers to grow upland rice. However, they lack the resources and technical knowledge to develop further from the trial stage.	Rice farming is promoted in the proposed project to increase farmer resilience.
<b>SMART Family Business Project</b>		
Division of Community Development with Enga Provincial Government, Enga Provincial DAL, Provincial Division for	<u>Begun in Since</u> 2011, the SMART Family Business Project <u>is an initiative led by Mrs. Dorothy Kukum, Director of the</u>	The proposed project is improving the resilience of the farmers and food

<p>Commerce, Culture &amp; Tourism (DCCT), NARI, UNFPA, National Youth Development Authority, Enga Provincial Youth Council, Churches (Lutheran, Catholic, Seventh Day Adventist, and Pentecostal) and Innovative Agro Industries Ltd.</p>	<p><del>Division for Community Development (DCD) at the EPG. This initiative aims to</del> <u>has developed</u> strategies for inclusive growth targeting family units at the household level, <del>but</del> focused on building resilience and economic growth for the entire community. The <del>target aim</del> is to improve law and order <del>situations in the</del> communities, ensure food security for households, improve farming methods, encourage healthy living and family nutrition and protect environmental and cultural values. <del>achieve this, the SMART Family Business project was designed to be completed in three phases.</del></p>	<p>security by enhancing food accessibility, production, and processing</p>
<p>Community Capacity Adaption to Flood (CCAF)</p>		
<p>Milne Bay Provincial Government: Environmental and Climate Change Unit in partnership with UNDP/CCDA</p>	<p><del>The Community Capacity Adaption to Flood (CCAF) project</del> was a joint initiative of UNDP and CCDA <del>that aimed at to</del> <u>enhancing</u> the adaptive capacity of communities to <del>the most pressing hazard with the largest potential for wide spread damage—</del> <u>cope with</u> flooding. Project outcomes: Adaptation to coastal flooding-related risks and hazards; Adaptation to inland flooding-related risks and hazards for river communities; Institutional strengthening to support climate and disaster-resilient policy frameworks; Awareness raising and knowledge management</p>	<p><u>Nature-based solution Nbs</u> will be promoted by the proposed project for the coastal agricultural system protection against saltwater intrusion</p>
<p>Coping with Climate Change in the Pacific Island Region (CCCPIR)</p>		
<p>Provincial Department of Agriculture and Livestock and Milne Bay Provincial Government in partnership with GIZ/CCCPIR (Fiji) &amp; CCDA (Adaptation and Projects Division)</p>	<p><del>The CCCPIR project</del> is implemented by <del>the GIZ (Fiji)</del> in partnership with CCDA. It is a food and water security project, implemented in two vulnerable communities in MBP. The project objectives are: 1) <del>To ensure improved the food security of the Wamira community by supporting the through</del> maintenance of <del>their unique</del> traditional irrigation systems; and <del>through</del> sustainable agricultural <u>development</u>; and 2) <del>To increase the resiliency of a highly-vulnerable communities in Kiriwina through the development improved of a local land-use planning; with a particular focus on food and water security.</del> Project outcomes: <del>The Wamira Doba</del> <u>Traditional irrigation systems is are</u> upgraded and functioning effectively; <del>An</del> <u>increased</u> diversity of crops, appropriate for <del>the site conditions, is</del> produced by <del>the local communities</del> for subsistence</p>	<p>Innovative irrigation system will be promoted by the proposed project</p>

	<p>and semi-commercial <del>utilization</del>use; Farmers are <del>utilizing</del>using new skills and knowledge on appropriate farming techniques and food processing technologies; Increased economic and entrepreneurial activities <del>are carried out</del> by women <del>in Wamira</del>; Suitable crop varieties and farming technologies <del>are</del> identified for <del>the Rabaraba type hot, dry</del> landscape <del>types</del>(very dry, rain shadow zone, high temperature); A <del>local village</del> land-use planning <del>for one village in Kiriwina is</del> endorsed by the local community and district and provincial offices; <del>A local village in Kiriwina has</del> improved water security; Lessons learnt and experiences <del>are</del> documented and disseminated; Increased awareness and understanding of climate change issues and adaptation responses amongst local communities and district officers.</p>	
--	---	--

**G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.**

Project monitoring, evaluation and learning will be under the oversight of the PMU and led by the M&E officer, ~~who will~~ working closely with the provincial implementation coordination teams and implementing partners. The M&E MEL system ~~should~~will: (i) produce, organize and disseminate ~~the~~ information ~~needed~~ for ~~the~~ strategic management of the project, (ii) document ~~the~~ results and lessons learned for internal use and ~~for~~ public dissemination on ~~the project~~ achievements (policy brief), and (iii) respond to ~~the~~ information needs ~~in term of on for reporting on the~~ activities, progress ~~report~~ and ~~project~~ impact ~~by to the~~ Adaptation Fund (AF), ~~The Pacific Community (SPC)~~ and ~~the~~ Government representatives.

An ~~monitoring and evaluation~~ M&E manual ~~that will describe outline~~ a simple and effective system for collecting, processing, analyzing, and disseminating data, ~~to will~~ be prepared in the first year of the Project. ~~As part of the CoPs mentioned above~~ a centralised and open access repository will be established, ~~in an appropriate online address, where project evaluation documentation can be stored~~ across the aforementioned projects in Section F. This will enhance ~~transparency and learning by and between projects~~. In conjunction with annual reflection workshops, relevant lessons learned across the projects can be captured and incorporated to the project in a timely manner. A computerized database will be developed ~~that will to~~ enable ~~the~~ generation of ~~project~~ dashboards for rapid data analysis. The system will be ~~regularly~~ fed ~~from~~ data collected ~~in from~~ the field by ~~the~~ implementing partners, provincial implementation ~~ng~~ coordination ~~teams and the as well as various~~ studies carried out as part of ~~the~~ projects' implementation. The ~~monitoring and evaluation~~ MEL system will be coupled with a geo-localized information system (GIS) ~~that to will~~ allow mapping and spatial-temporal analyses of ~~actions'~~ impacts. The computerized database will also be included into the online repository, accompanied by guidance on data formats and parameters to allow for aggregation and standardisation of data between projects. A function will be included to allow for segregation by project to enable functional project specific analysis and reporting but allow for more comprehensive streamlining data collection across the projects. The database will then feed into Pacific Data Hub and other regional platforms to further aggregate the data. Operationality and functionality of this system will be further defined at the full design stage and



inception. Information and knowledge from this repository will filter into the annual reflection workshops. Further, ad hoc workshops or presentations can be organised through the CoPs on request and organised between relevant stakeholders based on specific project findings of interest. Awareness raising on the use and application of the repository will widely disseminated through the PMUs to encourage widespread input.

~~The~~ Training will ~~be organized to~~ strengthen the capacities of ~~the~~ various stakeholders on methods and tools to track changes in behavior and environmental conditions at community level. Project M&E activities will be guided by ~~the following some~~ key considerations: ~~a(i) D~~ data will be disaggregated by poverty, livelihood group and gender; ~~(iib) Each~~ implementing partners will have clear M&E responsibilities with specific reporting deadlines and a forum for presenting ~~and discussing the findings of the monitoring exercise~~; and ~~€(iii) M&E MEL~~ will be linked to the project rationale, logical frame, ~~and~~ annual work plans and budgets. M&E findings will ~~be used to take inform~~ corrective or enhancing measures ~~at the level of for improved~~ project management. Stakeholder awareness sessions and publication of policy briefs, reports and press releases on social media will facilitate the communication of results and consistent stakeholders' engagement.

- H. Describe 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 and Gender Policy of the Adaptation Fund.

The project idea was identified in October 2020 as a ~~project~~ priority and investment case for the three provinces under the Government of PNG Climate Resilient Green Growth (CRGG) project (2019-2022), funded by ~~the Government of Australia's through~~ the Department of Foreign Affairs & Trade (DFAT), executed by the Global Green Growth Institute (GGGI) and implemented by GGGI, CCDA, DPLGA, and DNPM. ~~The p~~ Provincial stakeholders consulted to identify the priorities include members from various sectors, communities and the private sector, in areas such as. ~~They include~~ agriculture, ~~civil and~~ construction, community development, disaster management, energy, fisheries, forestry, information and communication, landowner associations, lands and physical planning, mining, provincial government administration, and tourism. ~~The most v~~ Vulnerable and gender groups were represented by faith-based organizations, women in agriculture associations, and small medium enterprises. Consultations were held in Enga, Milne Bay and New Ireland (see Annex 3-5 for the list of stakeholders consulted).

During ~~May--~~ December 2021, the CRGG project conducted provincial ~~administration\_~~ and provincial sector-level consultations and assessments in ~~each of the three provinces~~ to compare it to in which the project was further consulted amongst other investment cases<sup>117,118,119</sup>. This led to a formal letter of support being issued by DAL, requesting that GGGI move ahead in the development of an Adaptation Fund concept note ~~for submission to the Adaptation Fund~~ (see Annex 6 for the letter from DAL). Consequently, GGGI and CCDA transferred the project idea to the AF Concept Note template in December 2021, which ~~and~~ was validated by the NDA in January 2022. The NDA confirmed that the proposed AF project responds to PNG national needs and priorities for climate change adaptation and mitigation. Following consultations with potential implementing entities, the NDA approached SPC in January 2022 to request that it act as the regional implementing entity (RIE) to the Adaptation Fund for this project (see Annex 7 for the letter to this effect from PNG's NDA). SPC reviewed the concept note and ensured the project complied with environment and social policies, including gender policies of both SPC and AF, before finalizing and

<sup>117</sup> GGGI (2021). Climate-Resilient Green Growth in New Ireland Province

<sup>118</sup> GGGI (2021). Climate-Resilient Green Growth in New Ireland Province

<sup>119</sup> GGGI (2021). Climate-Resilient Green Growth in Milne Bay province

submitting it to the AF.

Indigenous peoples were represented across the women in agriculture groups, NGOs, CBOs, Faith based Organisations, SMEs, political associations and locally lead governments and councils (see Annex 10 for list of positions and organisations consulted). The key findings of these consultations were:

#### Milne Bay,

Society is largely matrilineal and land is owned by women. However decisions on land use are usually made by men (e.g. husband or brother). This leads to men controlling benefits and may result in food security and increased poverty in communities. Land mediation and consultation is thus key to agricultural development. Indigenous communities called for local customary land processes to be followed and respected. Eco-tourism requires agriculture supply and value chains and resilience of small-holder farmers to sustain the sector.

#### Enga

Use of land is best achieved through consultation with representatives of vulnerable groups such as registered women-owned agri-business groups and faith-based organizations. There is lack of communication between women farm groups due to poor communication and transport infrastructure.

#### New Ireland

Transportation of goods and services from farm to market, via land and sea is a key challenge. Lack of road and transport infrastructure (jetties and functioning roads) to enable market accessibility hampers income generation. On the other hand, downstream processing of agricultural products has potential for improving incomes.

#### Shared observations across target areas

Integrated farming was identified as a priority, including diversified farming such as livestock and vegetable farming. This was identified by indigenous groups as preferable over labour intensive copra production that generates little income for the indigenous communities. Solar solutions (e.g., solar dried copra) was suggested to help reduce labour intensity and increase quality of the copra (white copra, A-grade), which pays premium market price.

Through close consultations with landowners during implementation, in tandem with users and user groups, the project will address the issues of land tenure rights and increase implementation of relevant customary land practices at farm level. The project will develop and enhance communication and knowledge management functions and directly implement climate resilient infrastructure works to improve market access. Further through direct inclusion of renewable processing equipment and implementation of agroforestry and integrated climate resilient agriculture practices the project will diversify agricultural systems and increase livelihoods. These approaches and those fully detailed in the activities section will address the key concerns voiced by indigenous representatives.

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

Due to the risks ~~posed~~ by climate change to the PNG agricultural sector ~~as a result of climate change~~, ~~actions for~~ strengthening the resilience of smallholders' farmers ~~are is~~ needed. ~~The objectives of t~~This AF project ~~are includes~~ aligned with actions/activities that have with clear potential to improve the resilience of agriculture in PNG. But, the expected results, outcomes ~~as well as and~~ impact of this project, will not be achieved without funding from the Adaptation Fund. Indeed, the contribution of the Adaptation Fund is crucial for the implementation of the project, as the country is not able to mobilize the required financial resources. According to World Bank, PNG is a low middle-income country with a GDP per capita estimated at USD 4,285 in 2020. Despite efforts between 2002 and 2011 to reduce the country's debts ~~experienced between 2002 and 2011~~, the country PNG's public debt increased from 19.12% of GDP in 2012 to 40.04% of GDP in 2019. This increasing debt is due to ~~the overly~~ optimistic revenue expectations ~~conducted t~~expected from tax credits and benefits granted under Project Development Agreements, which ~~have~~ led to a threefold increase in credit and debt underwritten by domestic banks, which are now exposed to sovereign risk. To address ~~the situation this~~, the country is trying to increase the share of its external financing, to reduce ~~the~~ exposure of domestic players on the one hand, and ~~also~~ to attract foreign currency. The failure to reach the forecasts expected by domestic actors is ~~generally~~ explained by (i) the fluctuation of international prices, (ii) the country's sensitivity to natural disasters, and (iii) ~~and~~ the reduction in external demand from Australia and China. The country's economy is still dominated by two sectors: agriculture, forestry, and fishing, which employs the majority of the working population; and ~~the~~ minerals and energy sector, which provides the bulk of export earnings and GDP. The agricultural, forestry and fishing sectors are influenced by natural disasters, ~~to which the country is sensitive~~, and while the minerals and energy sector is influenced by international price levels. Additional challenges were posed by the COVID-19 crisis. ~~The use of s~~Subsidies thus represent is the best ~~way to address effective solutions means to of~~ protecting the agricultural sector from ~~the risk of the~~ adverse impacts of climate change without compromising the country's financial capacity to address other issues.

Therefore, PNG seeks maximum grants from the AF for urgent adaptation actions. Without AF funding, maladaptive coping strategies instead of strong resilient adaptations actions will continue to increase the vulnerability of PNG's rural communities (Figure 1). As a result, ecosystem degradation will persist, reducing agricultural production and increasing exposure to food insecurity.

The paradigm shift promoted by this project is to move from a vulnerable to a climate-resilient agricultural sector. Th Among three possible different scenarios are presented, with and without Adaptation Fund support below, the third one seems suitable for changing the paradigm:

- Alternative without any project: The current situation is marked by adverse effects of climate change. Without ~~the any~~ project, ~~the~~ damage and losses ~~induced by adverse effects of caused by~~ climate change will increase and will lock farmers in extreme vulnerability and poverty. Agricultural production will decline and exacerbate the exposure of risks and impacts associated with smallholder farmers to food insecurity, climate migration, environmental degradation, and high unemployment.
- Alternative with a development of a classic project (i.e. no resilience-building without resilient actions on climate change): With ~~the development of a classic traditional development project that doesn't include without resilience-building actions resilient actions on climate change~~, current maladaptive and coping and agricultural practices (e.g. slash and burn, rainfed agriculture, deforestation, logging) will be exacerbated by climatic stresses. This will lead to food insecurity, malnutrition, and conflicts for over natural resources, a high greater unemployment rate, climate migration in the absence of job opportunities, and the inability to adapt ongoing vulnerability to climate change.

- Alternative with an adaptation project: development of a climate change adaptation project focused on the sustainability of main agricultural value chains through the (adoption of climate-smart practices, green jobs creation for vulnerable women and youth). This will lead to food security, improved nutrition, and protection for natural resources, a high employment rate and job opportunities, and resilience to climate shocks.

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

The preliminary technical and financial analyses show that the project is financially sustainable, and this sustainability will be improved by the AF funding. Indeed, the sustainability strategy for the overall project, is based on the integrated value-chain approach to be adopted in the project. It considers interlinked interventions designed to reshape the way staple and cash crops are produced, processed, and sold on the market in the project provinces, taking into consideration climate issues. The integrated approach will create enabling conditions to allow local farmers to derive increased and lasting economic benefit from resilient agriculture. Increased income generation from the resilient practices and increased market access will enhance beneficiary incomes and livelihoods. With the improved economic outcomes at farm and community levels, in conjunction with increased awareness and knowledge of climate related issues and resilient approaches and benefits, a behavioural shift towards conserving natural resources for enhanced livelihoods will be fostered.

Further, lessons learned and successful demonstration of the project climate resilient practices will create a knowledge base for further replication and scaling up project interventions across the country. Increased evidence related to the successful interventions will build a business case and enhanced climate rationale for engagement with multilateral and bilateral donors such as the Green Climate Fund (GCF), who have a specific remit for impact at scale and paradigm shift.

Beyond the financial and economic sustainability of the project, implemented activities will take on participatory and inclusive approaches at beneficiary levels. This will boost community buy in to interventions and increase likelihood of sustained adoption of implemented practices in the long term. Nature based solutions under output 1.3 that include regenerative and rehabilitation process for local ecosystems will be coordinated through community based participatory approaches, fostering a greater sense of ownership in project interventions. Gender equality, indigenous representation and youth engagement will be ensured in participatory decision-making processes to encompass full resource user representation and ensure wider community buy in. The same participatory approaches will be used for the identification and selection of the most suitable sites for multiplication sheds under output 1.1, climate field schools under output 1.2, improved access connectivity under output 2.2 and processing facilities under output 2.3. Ultimately, social inclusivity in decision-making processes at community levels will increase beneficiary ownership of interventions, maintaining engagement in activities beyond the lifespan of the project.

Supporting this, operations manuals and guidance documentation for maintenance of physical assets, as well as guidance on how to utilise cheap and locally accessible resources to maintain these assets will be established to ensure longevity of introduced assets beyond project completion. In the case of assets within value chain operations, increased productivity and profitability will provide financial resources for maintenance post project and will be built into guidance documentation. In the case of community assets, such as climate resilient roads and infrastructure or community-based processing facilities, project specific agreements will be developed prior to implementation that spell out (i) ownership arrangements; (ii) management arrangements; and (iii) monitoring and maintenance action plans, to ensure operationality in the long term. In the case of digital platform maintenance under output 2.1, operationalization and

maintenance will follow the Provincial Government Expression process, selectin suitable operator(s) who will be responsible for platform development, support services provision, implementation, and maintenance of the platform.

At the institutional level, establishment of extension services through the development of climate field schools, training of trainer's programmes and incorporation of training on climate resilient approaches within local authority offices will greatly enhance capacity across implementation structures. Development of policy briefs and enhanced engagement with CSOs, local, regional and national authorities will create enabling conditions for policy and regulatory shifts that will entrench climate resilient practices as normative and ensure that gained technical capacities are retained and utilised beyond project completion.

Overall, the sustainability of the projects climate adaptation outcomes will be ensured by: i) the increased financial and economic profitability of proposed climate resilient production methods; (ii) socially inclusive and participatory decision making; (iii) increased community sense of ownership; (iv) clear operation and maintenance arrangements and capacities; (v) strengthened public institutions and technical capacity in extension; and (vi) an enhanced enabling environment for policy and regulatory shifts.~~The preliminary technical and financial analyses show that the project is financially sustainable, and this sustainability will be improved by the AF funding. Indeed, the sustainability strategy for the overall project, including the AF contribution, is based on the integrated value chain approach adopted in the project. It considers interlinked interventions designed to reshape the way staple and cash crops are produced, processed, and sold on the market in the project provinces, taking into consideration climate issues. The integrated approach will create enabling conditions to allow local farmers to derive increased and lasting economic benefit from resilient agriculture while conserving natural resources under changing climate. The project with its strong links to the agriculture sector policies will also contribute to creating conditions for sustainability. The project builds on institutions that managed and implemented previous environmentally friendly projects, contributing to an iterative approach to resilience building. In addition, this project is innovative in certain ways and ensures long-term sustainability. For example, the project intends to deploy climate-resilient crop varieties and create an enabling environment for resilient technologies scale-up.~~

**K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.**

The project, ~~as planned, aims to~~ will strengthen the resilience of vulnerable populations to the adverse effects of climate change. The project ~~does not~~ will not involve the conversion of natural habitats to other uses and, in fact, ~~some~~ activities such as small-scale climate-resilient agricultural production will enable farmers to improve ~~their~~ productivity and resilience of food systems on existing agricultural land, which is expected to reduce rates of deforestation and forest degradation through decreased conversion of forest to agriculture, especially through capacity building of these actors in agricultural value chains. Enhancing nNbS ature-based solution through such as restoration of degraded areas to protect croplands, mangroves and forests from landslides induced by floods and heavy rains will improve soil conservation and fertility, reduce erosion, and soil nutrient depletion, and improve carbon sequestration. ~~Through the~~ Such restoration of ~~degraded forests, the project~~ will enhance biodiversity in agricultural systems as a means to improve the resilience of agro-ecosystems to climate change and climate variability.

Despite the positive impacts that may improve project outcomes, the project ~~will~~ may generate limited negative impacts and potential risks, in particular the rehabilitation and development of 45 km of farm road linking farms to public markets. Thus, the environmental and social principles and policy of SPC and PNG will be triggered to limit negative impacts and environmental and social risks. Specific risks and mitigation measures for these have been outlined in Table 3.

Table 3. Specific risks and mitigation measures for negative impacts of project activities

<u>Project activity</u>	<u>Risks and impacts</u>	<u>Mitigation measures</u>
<u>Construction of climate-resilient roads</u>	<u>Extraction of raw materials for road building damages environment</u>	<u>Construction materials will be acquired sustainably from sources that are in line with government environmental laws and standards</u>
	<u>Poor design results in negative environmental impacts (e.g. erosion)</u>	<u>All roads will be designed within a framework of environmental and social safeguards (ESS) that will include consideration of the specific site where construction is to take place and mitigation of potential environmental impacts to that area</u>
	<u>Pollution of waterways and land during construction</u>	<u>Where a risk of pollution is identified, construction activities will take place within an ESS framework, with environmental impact assessments and management plans to reduce pollution risks, as needed.</u>
<u>Agricultural production using climate-resilient varieties and technologies</u>	<u>Extraction of surface or groundwater leads to depletion of local water supplies</u>	<u>Most activities proposed would lead to a reduction in water extraction. Nonetheless, extraction of water for agricultural production will use sustainable pumping rates considering demand and the recharge rates of water sources.</u>
	<u>Low productivity owing to poor engagement of farmers and insufficient knowledge of innovative techniques and varieties introduced by the project</u>	<u>Community surveys, sensitisation and farmer training will ensure that participating farmers understand and are able to implement the project activities.</u>
<u>Nature-based solutions</u>	<u>Restoration locations, techniques and species used are inappropriate for local environmental conditions, reducing survival of re-planted vegetation and disrupting ecosystem integrity</u>	<u>The type, approach, techniques and species used in ecological restoration will ensure that net positive benefits to the local ecosystems result, in turn providing climate-resilient ecosystem goods and services. Only non-invasive species will be used.</u>

<b>Checklist of environmental and social principles</b>	<b>No further assessment required for compliance</b>	<b>Potential impacts and risks – further assessment and management required for compliance</b>
Compliance with the Law	<del>There are no</del> All components of the project <del>that are not</del> aligned with the texts, laws and decrees currently applied in PNG. The project complies with the legal framework for agriculture, water and environmental protection	Minor.  Once <del>the final project</del> sites are selected, an environmental and social impact assessment will be developed <u>considering all in line with the AFAdaptation Fund's ESP principles</u>
Access and Equity	The project <del>logic</del> intervention logic is to provide <del>potential</del> beneficiaries in the target area with fair and	–Minor.  The project from its design

	<p><i>equitable access to project activities and facilities throughout the planning and implementation phases.</i></p> <p><i>Criteria will be provided to ensure the effective participation of less empowered groups, including women, minorities and highly vulnerable groups.</i></p> <p><i>The people-centred approach adopted by SPC for all its activities ensures that peoples' and communities' rights are always protected.</i></p>	<p><i>phase has provided access and equity for women and youth groups. The activities are designed to engage and benefit vulnerable people. In addition, the Environmental and Social Management Plan provides guidance on implementation of this measure</i></p>
<i>Marginalized and Vulnerable Groups</i>	<p><i>The project respects the fundamental rights of people in the areas of intervention and <del>therefore does will</del> not infringe on their freedom. The project does not have any activities that are unacceptable to the habits and customs of the beneficiaries</i></p> <p><i>Further, the project will maintain strictly non-discriminatory approaches for all activities and is not expected to result in any risks to people with disabilities, or children and vulnerable adults.</i></p>	<p><i>Minor.</i></p> <p><i>All parties will be consulted to avoid human rights risks</i></p>
<i>Human Rights</i>	<p><i>The project respects the fundamental rights of people in the areas of intervention and therefore does not infringe on their freedom.</i></p> <p><i>Project activities are not expected to have any negative human rights impacts, but rather enhance rights to water and health.</i></p>	<p><i>Minor.</i></p> <p><i>All parties will be consulted to avoid human rights risks</i></p>
<i>Gender Equality and Women's Empowerment</i>	<p><i>The project pays special attention to women and youth and United Nation Women is part of the implementing partners.</i></p> <p><i>The project will specifically ensure that gender-sensitivity is mainstreamed throughout project activities.</i></p>	<p><i>Minor.</i></p> <p><i>Women and youth will be the biggest beneficiaries of the project. Gender-sensitive indicators and activities will ensure that the priorities of women and other vulnerable groups are included.</i></p>
<i>Core Labour Rights</i>	<p><i>The project will ensure that minors do not work on the sites and that national health and safety legislation is applied.</i></p> <p><i>There are no activities planned under the project that would entail</i></p>	<p><i>Minor.</i></p> <p><i>The monitoring of the basic labor rights will be carried out throughout the project</i></p>

	<i>unsafe, indecent or unhealthy working conditions.</i>	
<i>Indigenous Peoples</i>	<p><i>There is a potential for Indigenous people to be affected.</i></p> <p><i>The people-centred approach adopted by SPC for all of its activities ensures that peoples' and communities' rights are always protected.</i></p>	<p><i>Medium.</i></p> <p><i>The project will comply with (i) all adaptation fund requirements, and (ii) national laws.</i></p> <p><i>Broad community support will be obtained. Serious documentation of stakeholder engagement will be done</i></p>
<i>Involuntary Resettlement</i>	<i>None of the project activities are envisaged to lead to relocation or displacement.</i>	<p><i>Minor.</i></p> <p><i>No expropriation, relocation of farmers or disruption of producers' livelihood activities will be undertaken. However, if this occurs, a provision will be made for compensation.</i></p>
<i>Protection of Natural Habitats</i>	<i>The project includes a capacity building component for farmers to equip them with good agricultural practices that will reduce the risk of deforestation and slash and burn practices. However, the project may have negative impacts on the biophysical environment, including natural habitats, if project activities are not properly monitored.</i>	<p><i>Medium.</i></p> <p><i>Measures will be proposed in the environmental and social management plan and will ensure that there is no large-scale deforestation or forest degradation.</i></p>
<i>Conservation of Biological Diversity</i>	<p><i>The project includes reforestation action in various ecosystems to boost biodiversity.</i></p> <p><i>Project activities will be undertaken outside of protected areas. No invasive alien species are likely to be introduced by project activities.</i></p> <p><i>However, there is a possibility that some activities may lead to minor and localised impacts on biodiversity or natural habitat in agricultural settings and on road margins.</i></p>	<p><i>Medium.</i></p> <p><i>The ESIA will demonstrate that the risks and impacts of road and runway development on biodiversity will be avoided, mitigated or compensated for in accordance with the Adaptation Fund's environmental and social policies and national environmental and social regulations</i></p>
<i>Climate Change</i>	<p><i>The project includes adaptation and mitigation actions and is inherently designed to enhance resilience to climate change.</i></p> <p><i>Small GHG emissions may arise from agricultural activities, e.g., use of vehicles running on fossil fuels. However, these are likely to be negligible.</i></p>	<p><i>Minor.</i></p> <p><i>The project design will ensure that there is no large-scale deforestation or forest degradation, and that all GHG emissions are minimised.</i></p>
<i>Pollution Prevention and Resource</i>	<i>Water resources are currently</i>	<i>Medium.</i>



<p><i>Efficiency</i></p>	<p><i>exposed to various forms of pollution from the use of fertilizers, pesticides and manure.</i></p> <p><i>The project is only expected to lead to minor and negligible release of pollutants, largely from emissions from agricultural and processing equipment. Some pesticides may be used during the project for agricultural activities.</i></p>	<p><i>Measures will be proposed in the ESIA to avoid the risks and impacts of water and soil pollution. All pollution and use of chemicals will be strictly monitored and managed to ensure that it remains within relevant regulations and in compliance with environmental and social safeguard standards.</i></p>
<p><i>Public Health</i></p>	<p><i>The project is not envisioned to have any negative impacts on public health.</i></p>	<p><i>Minor.</i></p> <p><i>Measures will be proposed in the ESIA to avoid contamination with COVID19</i></p>
<p><i>Physical and Cultural Heritage</i></p>	<p><i>No impacts on cultural heritage are anticipated.</i></p>	<p><i>Minor.</i></p> <p><i>Sites to be selected will not be located in a known or suspected cultural heritage area</i></p>
<p><i>Lands and Soil Conservation</i></p>	<p><i>The project will have positive effects on the landscape of the intervention areas and on conservation agriculture. Soil conservation and fertility restoration are key activities of the project through the planned smart agriculture</i></p>	<p><i>Minor.</i></p> <p><i>Project actions will improve soil fertility and sustainable land management</i></p>

## PART III: IMPLEMENTATION ARRANGEMENTS

### A. Describe the arrangements for project / programme implementation.

The arrangement for project implementation will revolve around the following units:

Project Board (PB): The Project Board (PB) will provide strategic direction and guidance to the project; provide high-level quality assurance for project results; oversee the project implementation by and monitoring the progressive achievement of project objectives; approve work plans, progress reports, and other project deliverables submitted by the Project Manager; help resolve issues and policy decisions; approve scope changes and help ensure that the project is responsive to the interests of PNG national priorities. The national Project Management Unit (PMU) will be the secretariat for the PB and will help in convening meetings of the PB at least twice a year, or as decided by the PB. The Project Board (PB) will consist of high-level representatives from the implementing entity (SPC's Climate Change and Environmental Sustainability (CCES) programme), the executing entities (SPC Land Resources Division (SPC LRD) and Government of Papua New Guinea's Department of Agriculture and Livestock (DAL)) and key stakeholders from government agencies, civil society organizations and other development partners. The PB will be co-chaired by the Head of DAL and by SPC. In addition, the membership of the Board PB will include key stakeholders such as the National Disaster Centre, CCDA, Conservation & Environment Protection Authority (CEPA), Department of Land and Physical Planning (DLPP), Department of National Planning and Monitoring (DNPM), and the Department of Provincial and Local level Government Authority (DPLGA) and representatives of the Provincial Administrations of Enga, Milne Bay and New Ireland Provinces. The representatives from NGOs & and CSOs representatives will have an observer status. The composition of the PB will be refined further at the inception stage of the project.

#### AF Implementing Entity

SPC, through the Climate Finance Unit (CFU) within its CCES programme, is the regional implementing entity (RIE) for the project. The CFU will be responsible for oversight and supervisory support on financial management and reporting for the project, as well as the implementation, monitoring and evaluation of project interventions.

SPC serves as the principal scientific and technical organization supporting development in the Pacific region. It was established by the Agreement establishing the South Pacific Commission in 1947 and is owned and governed by its 27~~6~~ members, including all 22 Pacific Island countries and territories (of which PNG is one). With its vision for a region of peace, harmony, security, social inclusion and prosperity and for all Pacific people to lead free, healthy and productive lives, SPC has been works focused on sustainable economic development, empowered and resilient Pacific communities and enhanced health and livelihoods of Pacific people with a view to achieving its members' development goals. This role as a leading development organization in the region led to the request from PNG's NDA for SPC to act as the RIE for this project (see Annex 7).

#### Executing Entities

SPC LRD will be a key Executing Entity (EE) for the project, and will be responsible for the implementation of project activities under the project and in close coordination with DAL as the National Executing Partner. SPC LRD will ensure that all project activities are implemented in accordance with AF and SPC policies and standards, as well as in line with the policies and priorities of the Government of PNG. This includes the use of the SPC grievance redress mechanism and anti-money laundering/counter-terrorism financing (AML/CTF) provisions, as well as adhering to procedures for efficient use of resources, financial

management and procurement. SPC LRD will contract and manage staff under the PMU, who will report to the Director of SPC LRD. The PMU will be housed within DAL to enable closer coordination and communication with the National Executing Partner to ensure effective implementation of the project. SPC LRD will report to SPC CCES, the RIE for the Adaptation Fund.

DAL will lead the EE team in implementing on-the ground interventions across the target project areas. DAL will lead ~~the~~ engagement with the DPLGA, the Department for Community Development and Religion ~~(DfCDR)~~, and the Provincial Government administrations to ensure ownership of project activities on the ground with select Districts, Local level Government, Wards, and communities in the project areas. DAL will also engage the project with agriculture extension and research stations operating in the provinces under the National Agriculture Research Institute (NARI), and the Fresh Produce Development Agency (FPDA).

#### Project Management Unit ~~(PMU)~~

The national PMU consists of three (3) core staff: a National Project Manager (NPM), Finance & Procurement Manager (FPM) and Finance & Administration Associate (FAA), along with a Gender and Youth Specialist (GYS). The PMU will be further supported by provincial project officers, i.e. an Enga Project Officer (EPO), Milne Bay Project Officer (MBPO), and New Ireland Project Officer (NIPO). Additional specialists supporting implementation of project activities include a Communications and Media Specialist (CMS) for Component 3 and an Agriculture & Environment specialist (AES) for Component 1. The three core staff of the PMU (NPM, FPM, FAA) will be based in the DAL office in Waigani, Port Moresby, PNG. The three specialists (CMS, AES, GYS) will primarily provide support to the ~~PMU~~, while the provincial project officers (EPO, MBPO, NIPO) will be based in the Provincial Government Administration or DAL offices in each of the respective provinces but can travel to Port Moresby for supporting the implementation in project. The NPM will reports to the Director of SPC LRD; ~~Noumea New Caledonia~~. Further details of the roles and responsibilities of the respective positions will be detailed at the full proposal stage.

#### Provincial Implementation Coordination

At the provincial level, the primary role of the project officers based in each of the three provinces (EPO for Enga, MBPO for Milne Bay and NIPO for New Ireland province) is to lead the coordination and implementation of the project activities, including monitoring and reporting on a timely basis. The project officers will also represent the AF project at Provincial Climate Change Committee (PCCC) meetings. The PCCCs are an established coordinating body of the Provincial Government within each province and are chaired by the Provincial Administrator. ~~The role of t~~The PCCC ~~is to oversee~~ the processes of integration and coordination of climate change-related activities in the provinces, including monitoring the progress of mitigation and adaptation projects within the province. ~~One of the Another~~ key functions of the PCCC is to ensure that the necessary coordination is provided and that cooperation within and among provincial agencies and communities are maximized to deliver climate change projects effectively and efficiently. ~~The Provincial~~ project officers will promote and update the progress of the project and seek assistance for effective coordination of project activities with the PCCC, and local stakeholders.

#### Collaborating Partners

- UN Women Papua New Guinea, ~~grounded in the vision of equality enshrined in the Charter of the United Nations~~, works for the elimination of discrimination against women and girls; the empowerment of women; and the achievement of equality between women and men as partners and beneficiaries of development, human rights, humanitarian action and peace and security, ~~enshrined in the Charter of the United Nations~~. UN Women ~~carries out supports~~ a 'Markets for Change' program through ~~the implementation of~~ two projects (PNG Markets, Economic Recovery and Inclusion and Safe and Prosperous Districts Program) funded by the Australian Government and New Zealand's

Ministry of Foreign Affairs and Trade respectively. This program empowers women to pursue entrepreneurial activities and improve their livelihoods in market environments that also promote ~~their~~ safety and productivity. The program ~~targets~~ covers 11 provinces including Enga and Milne Bay and benefits market management ~~in each market~~ and over 10,000 market vendors in the targeted markets as well as family members of these vendors. ~~The~~ improved market conditions ~~will~~ also benefit the local users of the markets and improve circulation of ~~the~~ income and revenue within the local economy. The alignment of this project with UN Women's work led to a letter being issued by the Country Representative in PNG expressing interest in being involved in the implementation of the project (see Annex 8).

- The Department of Works (DoW) is the ~~Papua New Guinea PNG~~ Government's implementing agency for infrastructure in the country. It is the biggest and one of the oldest government organizations in the country ~~starting as the Office of Works and Supply during the pre-independence era. DoW\_~~ is responsible for maintaining ~~approximately over~~ 8,738.4600 kms of roads throughout the country. Of this total, ~~5,755.20~~ km are graveled, ~~2,779.48~~ km are sealed and the remaining ~~523.35~~ km are inaccessible due to factors such as weather conditions ~~etc.~~
- National Agriculture Research Institute (NARI) is a research organization set up by the PNG Government to foster applied and adaptive research in agriculture. NARI has regional research extension centers in provinces around PNG to provide technical, analytical, diagnostic and advisory services and up-to-date information to the agricultural sector. NARI, SPC LRD and DAL have worked closely in previous projects to promote climate-resilient agricultural research programs. The project will engage with NARI to source technical advisory support and resource materials (e.g. seedlings and saplings for resilient crops varieties for Component 1, post-harvest activities for Component 2).
- The Fresh Produce Development Agency (FPDA) is a national government agency responsible for the development of the horticulture and fresh produce industry in PNG. From production to marketing, FPDA's primary function relates to commercial horticultural activities across the country. The project aims to work with FPDA to support the implementation of its activities under Components 1 and 2.
- The PNG Forest Authority (PNGFA) is the government body responsible for monitoring and controlling the wood- and forest-based industries and the management of PNG's Forest resources. The project will engage PNGFA's advisory support in implementing ~~the nature-based solutions NbS of the project~~ under Component 1.

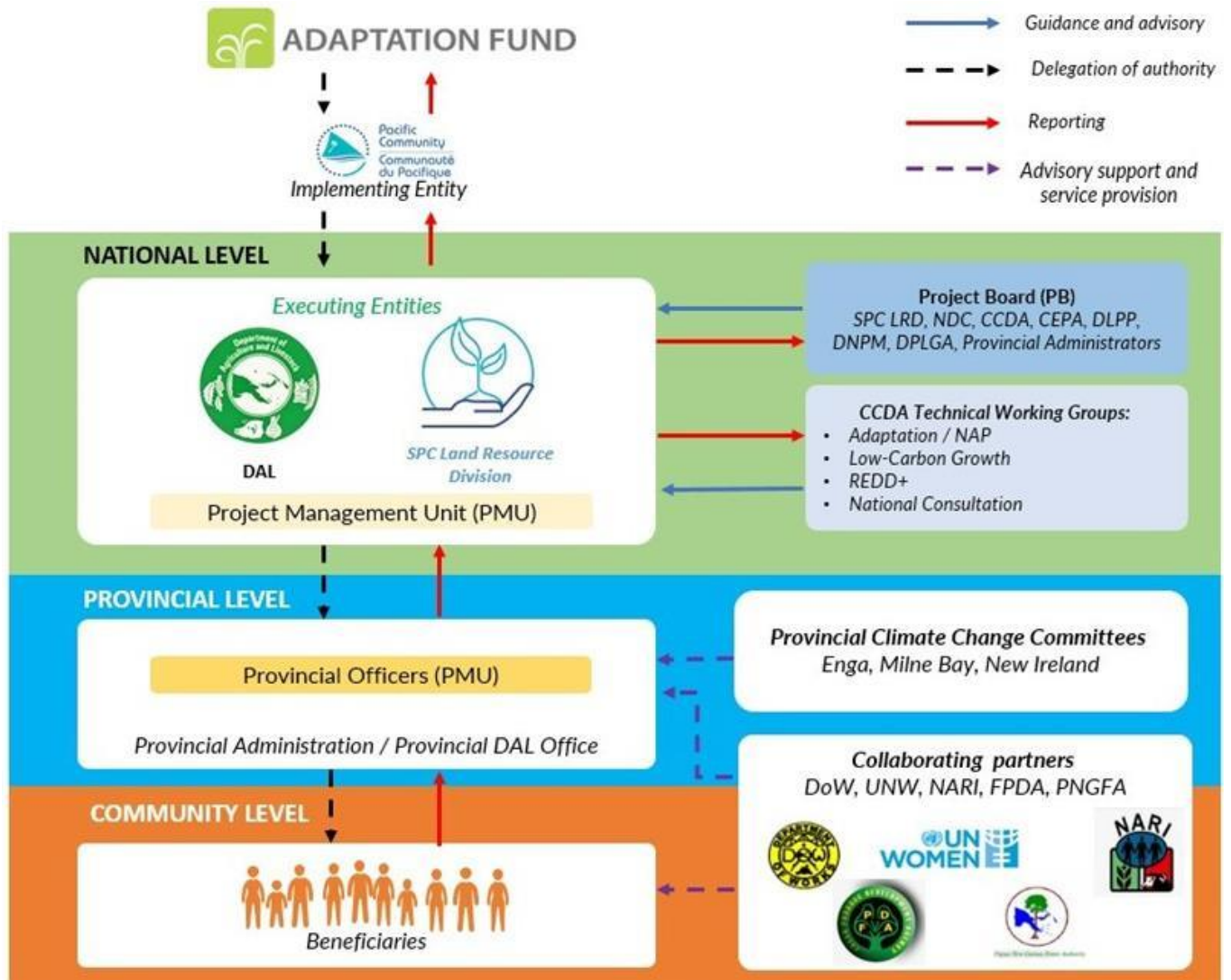


Figure 7: Implementation arrangement scheme

**B. Describe the measures for financial and project / programme risk management.**

Risk	Initial risk assessment (H = high, M = moderate, L = low)	Proposed mitigation measure	Final risk assessment (H = high, M = moderate, L = low)
Inadequate capacities to appropriately manage the day-to-day implementation of the project	M	<ul style="list-style-type: none"> <li>-Project Board including National Entity DAL with administrative and financial management autonomy that assumes the fiduciary management functions of the project</li> <li>- Recruitment of experts with specific experiences in development project management and financial management procedures and mastery of project resources planning software</li> <li>- The Pacific Community will be involved in all stages of the recruitment process based on their procurement policies</li> </ul>	L

<b>Risk</b>	<b>Initial risk assessment (H = high, M = moderate, L = low)</b>	<b>Proposed mitigation measure</b>	<b>Final risk assessment (H = high, M = moderate, L = low)</b>
		<ul style="list-style-type: none"> <li>- The staff of the PMU will be linked to the project by renewable annual contracts based on a performance evaluation,</li> <li>- Start-up support considers training in financial management</li> </ul>	
<p><b>The budgetary process does not follow the appropriate procedures, thus does not allow for a good implementation of project activities</b></p>	M	<ul style="list-style-type: none"> <li>- The budget preparation process will be carried out by the PMU staff which will then be submitted to the Project Board for approval. The Budget will include details of activities, their unit and overall costs, expected outputs and monitoring indicators, and their implementation modalities including procurement procedures</li> <li>- The budgeting process will be defined in the project procedures manual</li> <li>- The approved Budget must be entered into the accounting and financial management software to monitor its implementation</li> <li>- Quarterly financial reports including information on budget monitoring should be submitted to the Project Board</li> </ul>	L
<p><b>Project financial flows and disbursement processes are not timely and compromise the implementation of activities on the ground</b></p>	M	<ul style="list-style-type: none"> <li>- Availability of funds will be made through the standard circuit planned. This includes replenishment of the designated account, direct payment and reimbursement</li> <li>- The use of Certified Statement of Expenditures in support of expenses incurred by the Project is also planned</li> <li>- As regards the implementing partners and public services, the resources will be transferred in accordance with the signed agreements and service contracts, which will have to provide mechanisms for the provision of funds based on the work plan and budget of the convention/contract, and disbursements based on a quarterly and semi-annual report of the activities carried out by the provider/partner</li> </ul>	L
<p><b>Project implementation and financial management procedures do not guarantee sufficient transparency and accountability</b></p>	H	<ul style="list-style-type: none"> <li>- Three (3) levels of security ensure transparency and control of operations and also mitigate the risk of distortion and dysfunction related to management: (i) The fact that only one person cannot conduct an operation in its entirety (from beginning to end, from execution to final control); (ii) the implementation of accounting self-audits by the PMU; (iii) Audit performed by an independent auditor procured by the PB to ensure true and fair view of the project activities</li> </ul>	L

Risk	Initial risk assessment (H = high, M = moderate, L = low)	Proposed mitigation measure	Final risk assessment (H = high, M = moderate, L = low)
<b>The project accounting system and financial procedures are not sufficiently formalized</b>	H	<ul style="list-style-type: none"> <li>- The Project will be equipped with management software covering all financial aspects: accounting, commitment, financial statements, budget monitoring, contracts, etc. The staff will have to master the software in order to be able to correctly structure it to meet the needs of management</li> <li>- The monitoring of financial commitments and financial achievements will be based on the use of accounting and financial management software as well as the production of financial dashboards for use by the Project Board and the Pacific Community</li> <li>-The financial statements of the Project will be drafted according to the applicable standards &amp; principles required</li> <li>-The annual financial statements of the Project for the year N will be established no later than the end of February of the year N + 1. The unaudited annual financial statements will be submitted to the Pacific Community and the Project Steering Community for review</li> <li>-The Procedures Manual will provide a detailed phasing of all the stages leading to the closing of the accounts (monthly / quarterly / annual) and the preparation of the financial statements</li> <li>- The accounting system used in the framework of the Project should allow the registration of tax exemptions obtained from the government</li> </ul>	L
<b>The project financial procedures do not allow for proper and regular monitoring</b>	M	<p>Financial monitoring based on:</p> <ul style="list-style-type: none"> <li>a) regular preparation of withdrawal requests, based on rolling quarterly cash plans, and bank monitoring of the designated account and the account of operations</li> <li>Budget monitoring; accounting monitoring; technical and economic monitoring provided by the PAFA</li> <li>b) The PAFA will prepare quarterly financial and accounting reports (interim financial reports) which will be submitted to the NPD for signature and sent for review to the Pacific Community and the Project Board</li> </ul>	L
<b>Fluctuations in foreign exchange rates result in unpredictability in the availability of funds for project interventions</b>	L	Financial monitoring and adaptive management of the project budget will be undertaken to re-programme funds as necessary to ensure that any fluctuation in foreign exchange rates has a minimal impact on project activities	L
<b>Beneficiaries and other stakeholders are not satisfied</b>	L	All project stakeholders, beneficiaries and interested parties will have access to a	L

Risk	Initial risk assessment (H = high, M = moderate, L = low)	Proposed mitigation measure	Final risk assessment (H = high, M = moderate, L = low)
with or raise concerns and complaints about project implementation		grievance redress mechanism through which they can lodge grievances and complaints. This will be addressed by SPC in its role a RIE for the project	

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

*Based on a review of any potential adverse impacts of project activities and in alignment with the principles of the Adaptation Fund, the project is classified into Category B. This was determined through a screening of the project activities using SPC's Social and Environmental risk assessment questionnaire (see Annex 9). Potential adverse impacts resulting from this project are small-scale in scope, limited to the project area, reversible, and can be avoided, minimized or addressed using recognized good environmental and social management practices. To ensure that the project minimizes the risk of adverse environmental and social impacts from the project, an environmental impact assessment will be conducted, and an environmental and social risk management plan will be developed at the outset of the project to ensure that risks are avoided and, where they are not, detected in a timely manner and mitigated properly.*

**D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan, in compliance with the ESP and the Gender Policy of the Adaptation Fund.**

*The monitoring, evaluation and learning (MEL) system of the proposed project will follow guidance from the AF and will be undertaken in line with the MEL approaches outlined in SPC's Planning, Evaluation, Accountability, Reflection and Learning Policy. Consistent with national procedures and international good practice, the MEL system comprises six components: (1) strategy and objectives, (2) performance indicators, (3) monitoring & reporting, (4) evaluation, (5) roles and responsibilities and (6) maintaining the MEL system. This MEL system generates information to: assist with planning of project activities at various levels of operations; assess the relevance, effectiveness, efficiency, sustainability and likely impact of interventions funded by the project; identify improvements to the relevance, effectiveness, efficiency, sustainability and likely impact of interventions; communicate to decision makers, the public and other stakeholders; contribute to sectoral reporting for policy-makers and planners; and contribute to global learning to support climate-resilient green growth of the project areas and the country.*

**E. Include a results framework for the project proposal, including milestones, targets and indicators, including one or more core outcome indicators of the Adaptation Fund Results Framework, and in compliance with the Gender Policy of the Adaptation Fund.**

(to be added at full proposal elaboration)

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

*A preliminary mapping of the project level objectives and outcomes against the AF strategic*



results framework has been provided below. This is based on consultations and analysis to date and may be revised at full proposal stage dependent on more in depth consultation and analysis.

<b><u>Project Objective(s)</u></b>	<b><u>Project Objective Indicator(s)*</u></b>	<b><u>Fund Outcome</u></b>	<b><u>Fund Outcome Indicator</u></b>	<b><u>Grant Amount (USD)**</u></b>
<u>Integrate climate-resilient agriculture practices into standard farming techniques in PNG for increasing productivity, resilience and food security of the most vulnerable smallholder farmers</u>		<u>Outcome 5: Increased ecosystem resilience in response to climate change and variability induced stress</u>	<u>5. Ecosystem services and natural resource assets maintained or improved under climate change and variability-induced stress</u>	<u>3,954,584</u>
		<u>Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas</u>	<u>6.1 Percentage of households and communities having more secure access to livelihood assets</u>	
<u>Boost the ability of vulnerable smallholder farming communities to access to postharvest processing, storage technologies, and profitable markets</u>		<u>Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets</u>	<u>4.1. Responsiveness of development sector services to evolving needs from changing and variable climate</u>	<u>3,460,880</u>
			<u>4.2. Physical infrastructure improved to withstand climate change and variability-induced stress</u>	
<u>Foster the scale-up of climate-resilient cropping, processing, and storage practices through capacity building, and knowledge management.</u>		<u>Outcome 8: Support the development and diffusion of innovative adaptation practices, tools and technologies</u>	<u>8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level.</u>	<u>849,100</u>
<b><u>Project Outcome(s)</u></b>	<b><u>Project Outcome Indicator(s)*</u></b>	<b><u>Fund Output</u></b>	<b><u>Fund Output Indicator</u></b>	<b><u>Grant Amount (USD)**</u></b>
<u>Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers</u>		<u>Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability</u>	<u>6.1.1.No. and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies</u>	
			<u>6.2.1. Type of income sources for households generated under climate change scenario</u>	
		<u>Output 5: Vulnerable ecosystem services</u>	<u>5.1. No. of natural resource assets created, maintained or</u>	

		<u>and natural resource assets strengthened in response to climate change impacts, including variability</u>	<u>improved to withstand conditions resulting from climate variability and change (by type and scale)</u>	
<u>Improved access to appropriate processing, storage technologies, and profitable markets</u>		<u>Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability</u>	<u>4.1.1. No. and type of development sector services modified to respond to new conditions resulting from climate variability and change (by sector and scale)</u>  <u>4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector and scale)</u>	
<u>Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.</u>		<u>Output 8: Viable innovations are rolled out, scaled up, encouraged and/or accelerated.</u>	<u>8.1. No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated</u>  <u>8.2. No. of key findings on effective, efficient adaptation practices, products and technologies generated</u>	

\* Please note that project specific indicators will be developed at full proposal stage after further analysis and project level consultations have taken place. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

\*\* Budget allocations per outcome/output will be further refined at full proposal stage.

<b>Project Objective(s)</b>	<b>Project Objective Indicator(s)</b>	<b>Fund Outcome</b>	<b>Fund Outcome Indicator</b>	<b>Grant Amount (USD)</b>

Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)

**F.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.

*See Annex 10.*

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

*(to be added at full proposal elaboration)*

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

**A. Record of endorsement on behalf of the government**<sup>24+20</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 be attached as an Appendix 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>William Lakain</i> Acting Managing Director Climate Change & Development Authority, Papua New Guinea	Date: 10 January 2022
---	-----------------------

**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, the PNG Vision 2050, the PNG Development Strategic Plan 2010 - 2030, the Medium-Term Development Plan III 2018-2022, the National Strategy for Responsible Sustainable Development (StaRS), PNG's Enhanced National Determined Contributions, and the PNG Sustainable Development Goal Roadmap of 30 Actions by 2030, the Climate Change (Management) Act 2015 and relevant regulations, 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.	
<i>Stuart Minchin</i> Director General SPC Implementing Entity Coordinator	
Date: 10 January 2022	Tel. and email: +687 262000; spc@spc.int
Project Contact Person: Dirk Snyman	
Tel. and Email: +687 262000, dirks@spc.int	

(Signed and scanned version included as Annex 1)

Annex 10. Indicative budget

Annex 5 to OPG Amended in October 2017

Component	Output	Activity	Budget Account Description	Notes and Assumptions	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	
Component 1: Small-Scale Climate-proofed agricultural production	Output 1.1. Deploying climate-resilient varieties	Activity 1.1.1: Identify Champion farmers for seed multiplication sheds	workshop	In collaboration with research institutions and local authorities, conduct the identification process and will organize three workshops with Champions farmers selected to present the project (1st WS) and organize the collaboration for seed multiplication sheds (2nd and 3rd WS) @ US\$ 5000 per workshop	15,000					15,000	
		Activity 1.1.2: construct 30 multiplication sheds for improved and resilient varieties of crops	construction	Construction of 30 multiplication sheds @ US\$ 10000 per shed / 15 sheds per year	150,000	150,000					300,000
			equipment	Agricultural production equipment and irrigation systems in the multiplication shed @ lump sum of US \$5000 / 15 sheds per year	75,000	75,000					150,000
			crops	Annual lump sum to purchase the improved and resilient crops / US\$1000 per shed	15,000	30,000	30,000	30,000	30,000		135,000
		Activity 1.1.3: support Champion farmers with technical trainings	training	annual trainings (x2) and recycling of champions farmers @ US\$ 3000 / 30 participants per training - The PMU will lead the training in collaboration with research institutions		6,000	6,000	6,000			18,000
		Activity 1.1.4: distribute adapted rice seeds and replicate innovative planting techniques to 400 farm households in upland communities	training	The PMU in collaboration with research institutions and the Upland Rice Program initiative of Government will elaborate the distribution action plan and train 400 farm households on replicate innovative planting techniques Training @ US\$ 3000 / 10 trainings of 40 participants per year (Y1, to Y4)	30,000	30,000	30,000	30,000			120,000
			crops	Annual lump sum to purchase the improved and resilient crops / US\$500 per farm household	50,000	50,000	50,000	50,000			200,000

	<b>Total output 1.1</b>				<b>335,000</b>	<b>341,000</b>	<b>116,000</b>	<b>116,000</b>	<b>30,000</b>	<b>938,000</b>	
	Output 1.2. Support agriculture extension services	Activity 1.2.1: Identify and setup 30 demonstrators or climate field schools	workshop	organize two workshops to setup 30 demonstrators or climate field schools / one WS @ US\$ 3000 will serve to conduct reflection, setup and organize 15 demonstrators or climate field schools	6,000					6,000	
		Activity 1.2.2: Design the training curriculum and manual on resilient agronomic packages for sweet potatoes, taro, coffee, and rice (e.g., potatoes cropping in irrigated systems, drainage systems) and translate into local languages as appropriate	national consultant	specialist in Agronomy and Climate change to develop the curriculum and manual during 40 days @ US\$ 400	16,000					16,000	
		Activity 1.2.3: Provide a series of technical training to member farmers of the field school on resilient agronomic packages and input support to lead farmers to pilot and implement improved techniques	translation	Translations of curriculum and manual in 2 local languages (Tok Pisin, Hiri Motu) @ US\$ 0.1 per word for a document of max 20000 words	4,000						4,000
		Activity 1.2.4: Identify and map potential (non-public) extension services providers including well-functioning cooperatives, grassroot organizations, intermediaries, smallholder SMEs, and input suppliers for each province	n/a	This activity will be conducted by Provincial Officers and cost under the Project Executive Cost	-	-	-	-	-	-	-
		Activity 1.2.5: support for 50 contracts related to extension services provision between local service providers and farmers organizations	grant	Annual technical support - @lump so USD 1500 per contract	75,000	75,000	75,000	75,000	75,000	75,000	375,000
		<b>Total output 1.2</b>				<b>161,000</b>	<b>135,000</b>	<b>135,000</b>	<b>135,000</b>	<b>135,000</b>	<b>701,000</b>
	Output 1.3. Enhancement of ecosystem services through	Activity 1.3.1: carry out ground survey and map degraded areas for reforestation in project area	professional firm	A firm to conduct the survey and map degraded area for reforestation @ US\$ 25000		25,000				25,000	

	nature-based solutions to protect croplands, grasslands, mangroves and forests from landslides and coastal erosion induced by flooding and heavy rain events	Activity 1.3.2: implement a reforestation program of 3000 ha around croplands, grasslands, mangroves and degraded forest, vegetation planting along riverbanks or unstable lands	setup	Implementation 3000 ha of reforested areas @ US\$ 650 per ha (including procurement and transport of saplings)		650,000	650,000	650,000			1,950,000
		Activity 1.3.3: conduct awareness raising events with local communities on the importance of ecosystem services to get their participation in the protection and maintenance of reforested areas	workshop	Annual awareness workshops @ US\$ 5000 per province with local authorities in each province and local communities where reforestation program will take place		15,000	15,000	15,000	15,000		60,000
			media	communication local radio and TV @ a lumpsum of 10000 per year (from Y2)		10,000	10,000	10,000	10,000		40,000
			Support to the implementation of project	personnel cost	Provincial Officers (1/3 of the time) for project implementation, coordination, and day to day management at provincial level (Enga, Milne Bay, and New Ireland) @ US\$ 2500 per month/person considering annual inflation of 4.9%	30,000	31,470	33,012	34,630	36,326	
		personnel cost		Agriculture and Environment Specialist @USD2500 per month considering annual inflation of 4.9% - 1/3 part time	10,000	10,490	11,004	11,543	12,109		55,146
		Local travel	travel	Lumpsum of US\$ 4000 per year for project coordination travel and field visit	4,000	4,000	4,000	4,000	4,000		20,000
	<b>Total output 1.3</b>				<b>44,000</b>	<b>745,960</b>	<b>723,016</b>	<b>725,173</b>	<b>77,435</b>		<b>2,315,584</b>
	<b>Total Component 1</b>				<b>540,000</b>	<b>1,221,960</b>	<b>974,016</b>	<b>976,173</b>	<b>242,435</b>		<b>3,954,584</b>
Component 2: Climate-resilient postharvest solutions and access to market	Output 2.1: Establish sustainable commercial relationships linking input suppliers, technology providers, vulnerable communities, small-scale processors, traders, and	Activity 2.1.1: Assess existing agricultural market information and flows in project areas to identify needs and gaps	professional firm	Agricultural market specialized firm to conduct the assessment @ USD 25000	25,000						25,000
		Activity 2.1.2: Support the development of an integrated digital platform to link farmers, small-scale processors, traders, and	professional firm	Setup of digital integrated platform (@ US\$ 50000: Y1) and annual maintenance support to update data (@ US\$ 8000) - considering annual inflation of 4.9%		50,000	8,000	8,392	8,803		75,195

	produce buyers	buyers along the value chain		Annex 5 to OPG Amended in October 2017						
	Total output 2.				25,000	50,000	8,000	8,392	8,803	100,195
	Output 2.2. Improving connectivity between cooperatives and markets through climate-resilient farm road networks	Activity 2.2.1: update Operation & Maintenance (O&M) Guidelines for farm roads to include climate-resilient road standards and codes	professional firm	A firm specialized in O&M for road to update the Guidelines for farm roads @ US\$ 20000	20,000					20,000
		Activity 2.2.2: upgrade farm roads connecting farms to the main public market to climate resilience farm roads and tracks at least 45 km	rehabilitation	Rehabilitation of at least 45 km farm roads @ US\$ 20000 the km - considering annual inflation of 4.9%		400,000	314,700	220,080		934,780
	Total output 2.				20,000	400,000	314,700	220,080	-	954,780
	Output 2.3. Distribution of eco-friendly technologies for processing, and storage in the project area for coffee, copra, and food crop processing	Activity 2.3.1: identify women and youth farmers organizations that will be the beneficiaries and their specific need	n/a	To be conducted by Provincial Officers whose times have already been costed						-
		Activity 2.3.2: procure and install the processing and storage technologies	equipment	solar-powered dryers, solar powered storage facilities @ lump sum of USD 210000 per organization (x10) - including procurement, transport, taxes and installation		2,100,000				2,100,000
		Activity 2.3.3: develop O & M guidelines in local languages and provide hand-on training sessions on the operation and maintenance, and management of the technologies to the beneficiary farmer organizations	International consultant	International consultant specialized in solar equipment to develop O&M guidelines and provide hand-on training session to beneficiaries @ US\$ 650 for 50 days		32,500				32,500
			National consultant	National consultant specialized in solar equipment to support in the development of O&M guidelines and provide hand-on training session to beneficiaries @ US\$ 400 for 60 days		24,000				24,000
			international travel	International travel of the international consultant @ US\$ 3820 (e-ticket @ US\$2000 and DSA @ US\$ 182) (x 10days)		3,820				3,820
			training	Training of organization members @ US\$ 5000		5,000				5,000
	Support to the implementation of project	personnel cost	Provincial Officers (1/3 of the time) for project implementation, coordination,	30,000	31,470	33,012	34,630	36,326	165,438	



				and day to day management at provincial level (Enga, Milne Bay, and New Ireland) @ US\$ 2500 per month/person considering annual inflation of 4.9%	ended in October 2017							
			personnel cost	Agriculture and Environment Specialist @USD2500 per month considering annual inflation of 4.9% - 1/3 part time		10,000	10,490	11,004	11,543	12,109	55,146	
		Local travel	travel	Lumpsum of US\$ 4000 per year for project coordination travel and field visit		4,000	4,000	4,000	4,000	4,000	20,000	
	Total output 2.3					44,000	2,211,280	48,016	50,173	52,435	2,405,904	
	Total Component 2					89,000	2,661,280	370,716	278,645	61,239	3,460,880	
Component 3: Capacity building and knowledge management for scaling-up CRA practices	Output 3.1. Training of actors to monitor, report and verify impacts across agriculture value chains	Activity 3.1.1: develop training curriculum and training manual on methods and tools to track changes in behaviors and environment and translate into local languages as appropriate	national consultant	national consultant specialized in methods and tools to track changes in the behavior and environment of local communities to develop the training curriculum and manual @ US\$ 400 per day during 60 days				16,000			16,000	
			translation	Translations of curriculum and manual in 2 local languages (Tok Pisin, Hiri Motu) @ US\$ 0.1 per word for a document of max 20000 words				4,000			4,000	
		Activity 3.1.2: conduct Training of Trainers (ToT) for the provincial stakeholders to establish Lead Trainer teams	national consultant	national consultant specialized in methods and tools to track changes in the behavior and environment of local communities to conduct the training @ US\$ 400 per day during 5 days					2,000			2,000
			training	Training of trainers @ US\$ 7000					7,000			7,000
		Activity 3.1.3: support Lead Trainers to conduct subsequent training sessions at the sub-provincial level	training	Three subsequent trainings per province @ US\$ 5000					45,000			45,000
	Total output 3.1					-	-	74,000	-	-	74,000	
	Output 3.2. Technical assistance for implementing climate resilient capacity building	Activity 3.2.1: develop climate and gender-sensitized curriculum and training manual and translate into local languages as appropriate for CRA training programs	national consultant	national consultant specialized in climate and gender-sensitized to develop curriculum and training manual @ US\$ 400 per day (x 40 days)					16,000		16,000	
			translation	Translations of curriculum and manual in 2 local					4,000		4,000	

Annex 5 to OPG Amended in October 2017									
			language (to be used in Motu) @ US\$ 0.1 per word for a document of max 20000 words						
program in agricultural sector at provincial level	Activity 3.2.2: provide training sessions for national and provincial authorities involved in promoting climate resilient agriculture in Milne Bay, Enga, and New Ireland	national consultant	national consultant specialized in climate and gender-sensitized to training @ US\$ 400 per day (x 15 days)				6,000		6,000
		training	training session for national and provincial authorities @ US\$ 5000 per province				15,000		15,000
Total output 3.2				-	-	-	<b>41,000</b>	-	<b>41,000</b>
Output 3.3. Knowledge management and sharing with policymakers, development partners, private sector including smallholder SMEs, and civil society organizations to enable scaling up of CRA practices in Papua New Guinea	Activity 3.3.1: monitor, evaluate and learn the project in a participatory manner with input from all relevant stakeholders and communicate to showcase outputs and outcomes	national consultant	M&E specialist to recruit under the project @ US\$ 2500 per month	30,000	31,470	33,012	34,630	36,326	165,438
		evaluation	Conduct mid-term and terminal evaluation for the project (end of Y3 and Y5)			24,000		36,000	60,000
		travel	Travel for international consultant for evaluation (@ US\$ 3820 (e-ticket @ US\$2000 and DSA @ US\$ 182) (x 10days)			3,820		3,820	7,640
	Activity 3.3.1: develop and publish knowledge products such as policy briefs, technical and experience series of reports, social media, brief documentaries, and news media mentions	national consultant	Climate policy analyst for development of policy briefs, report and press release and stakeholder awareness session (activity 3.3.2) @ US\$ 400 per day (x100 days per year during the last 3 years)			40,000		40,000	80,000
		personnel cost	Communications and Media Specialist @US\$ 2500 per month considering annual inflation of 4.9%	30,000	31,470	33,012	34,630	36,326	165,438
	Activity 3.3.2: organize targeted stakeholder awareness sessions through transparent communication of results and consistent stakeholders' engagement plan	workshop	3-day session per year to aware stakeholders on result and engage them @ US\$ 15000 in year 3 - broader stakeholders to this event (including stakeholders from the neighboring provinces)					15,000	15,000
	Support to the implementation of project	personnel cost	Provincial Officers (1/3 of the time) for project implementation, coordination, and day to day management at provincial level (Enga, Milne Bay, and New Ireland) @ US\$ 2500 per month/person considering annual inflation of 4.9%	30,000	31,470	33,012	34,630	36,326	165,438

			personnel cost	Agriculture and Environment Specialist @USD2500 per month considering annual inflation of 4.9% - 1/3 part time	10,000	10,490	11,004	11,543	12,109	55,146
		Local travel	travel	Lumpsum of US\$ 4000 per year for project coordination travel and field visit	4,000	4,000	4,000	4,000	4,000	20,000
	Total output 3.3				104,000	108,900	181,860	119,432	219,908	734,100
	Total Component 3				104,000	108,900	255,860	160,432	219,908	849,100
<b>(A) Project activities cost</b>					<b>733,000</b>	<b>3,992,140</b>	<b>1,600,592</b>	<b>1,415,250</b>	<b>523,582</b>	<b>8,264,564</b>
Project Executive Costs		National Project Manager (NPM)	personnel cost	National Project Manager to coordinate the project implementation @ US\$ 3500 per month - considering annual inflation of 4.9%	42,000	44,058	46,217	48,481	50,857	231,613
		Gender and Youth Specialist (GYS)	personnel cost	Gender and Youth Specialist @USD2500 per month considering annual inflation of 4.9%	30,000	31,470	33,012	34,630	36,326	165,438
		Finance & Procurement Manager (FPM)	personnel cost	Project Finance and Procurement Manager @ US\$ 2500 per month - considering annual inflation of 4.9%	30,000	31,470	33,012	34,630	36,326	165,438
		Finance & Administration Associate (FAA)	personnel cost	Project Administrative & Finance Assistant @ US\$ 1500 per month - considering annual inflation of 4.9%	18,000	18,882	19,807	20,778	21,796	99,263
		Office supplies	supplies cost	Lumpsum of US\$ 500 per month - considering annual inflation of 4.9%	6,000	6,294	6,602	6,926	7,265	33,088
		Office equipment	Furniture cost	Office Equipment (laptops @ US\$ 1500 per unit, desks and chair @ US\$ 800 per unit, and other equipment @ lumpsum of US\$ 500) (x8)	22,400					22,400
		Communication costs	communications	Lump-sum of US\$2000 per month for data, voice and internet)	2,000	2,000	2,000	2,000	2,000	10,000
		Security	security costs	Lumpsum of US\$ 5000 per year for security escorts	5,000	5,000	5,000	5,000	5,000	25,000
		Annual Financial Audit	financial audit	Conduct annual financial audit	5,000	5,000	5,000	5,000	5,000	25,000
		Contingency (1%)	contingency	Miscellaneous (bank fees, mail couriers, etc)	8,934	41,363	17,512	15,727	6,882	90,418
<b>(B) Project Execution Cost</b>					<b>169,334</b>	<b>185,537</b>	<b>168,163</b>	<b>173,171</b>	<b>171,453</b>	<b>867,658</b>
<b>(A)+(B) Total Project Cost</b>					<b>902,334</b>	<b>4,177,677</b>	<b>1,768,755</b>	<b>1,588,421</b>	<b>695,035</b>	<b>9,132,222</b>
<b>(C) Implementing Entity Fee (8,5%)</b>										<b>776,239</b>
<b>AMOUNT OF FUNDING REQUESTED / GRANT AMOUNT</b>										<b>9,908,461</b>

*\* Notes:*

*Inflation based on the most recent data of the Worldbank in PNG for 2020 (<https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=PG>)*

*Audit cost based on proposed cost by GCF with is min US\$4000 per year*

*Workshop cost will cover venue, catering, participants per diem and local transport, kit of participant*

*The Provincial Officers under different component will lead the implementation of project in Province. Each Provincial Officer will lead activities in one of the three provinces (Enga, Milne Bay, and New Ireland)*

*Personnel cost based on UN National Officer Categories - Annual salaries and allowances in PNG ([https://www.un.org/Depts/OHRM/salaries\\_allowances/salaries/png.htm](https://www.un.org/Depts/OHRM/salaries_allowances/salaries/png.htm))*