FULLY DEVELOPED PROPOSAL FOR SINGLE COUNTRY

PART I: PROJECT/PROGRAMME INFORMATION

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

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

Thematic Focal Area: *Agriculture*

Type of Implementing Entity: *Regional Implementing Entity*

Implementing Entity: *The Pacific Community (SPC)*

Executing Entities: Government of Papua New Guinea

Amount of Financing Requested: *10,000,000* (in U.S Dollars Equivalent)

Letter of Endorsement (LOE) signed: Yes ☒ No ☐

NOTE: The LOE should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply-funding/designated-authorities

Stage of Submission:

☒ *This proposal has been submitted before including at a different stage (concept, fully-developed proposal)*

☐ This is the first submission ever of the proposal at any stage

In case of a resubmission, please indicate the last submission date: Click or tap to enter a date.

Please note that fully developed proposal documents should not exceed 100 pages for the main document, and 100 pages for the annexes.

Project/Programme Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

1.1 Context of Papua New Guinea

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^2 of the southwestern Pacific Ocean.

***Socioeconomic context**: In the 2020 UNDP Human Development Report, PNG was ranked 155th out of 189 countries assessed[1]. Approximately 60% of PNG's population is under the age of 25[2]. Many in PNG experience poverty due to lack of access to education and employment. The literacy rate for young men is 67%, and 79% for young women[3]. Roughly 28.4% of youth (15-24 years of age) are unemployed and are not participating in education or job training programs[4]. There is low labor force participation and a sizeable gender gap in employment. On the whole, PNG's population is highly dispersed and fragmented, with a limited level of urbanization, considerable gender disparities, high exposure to natural disasters, a severe degree of resource dependency, and inter-communal violence in some areas. It is estimated by the World Bank that PNG's economy will contract by 3.5 percent in 2020 before returning to positive economic growth of 1 percent in 2021[5].*

Currently, the country is undergoing an economic and social transformation and its population is widely sparse and remote, with 87% of Papua New Guineans living in rural areas. Poverty, poor infrastructure, inaccessibility to basic services, corruption, safety and security concerns, among other factors heighten the vulnerability of the local population[6].The latest nationally representative household survey from 2010 indicates that about 39 percent of the population lives below the poverty line of $2.15 per day (in 2017 PPP) and shows that 74.2 percent of the population may be multifariously poor. New investigations led by the World Bank in December 2021 and June 2022 disclosed that less than 5 percent of families reported an increase in their income and were able to make ends meet. Many households are resorting to coping measures such as spending their savings or receiving financial support from friends and family. Agriculture is a key contributor to economic growth, yet it faces increasing challenges. Over a quarter of households have experienced mild to severe food insecurity in the past 12 months. These factors warrant increased policy attention to stimulate economic growth.

***Development prospect**: According to the World Bank PNG Economic Updates (2022), PNG's long-term growth faces underlying challenges of low and volatile growth. The scanty headline economic growth in PNG has rendered in meagre per capita income growth in the past four decades, with the gap of per capita income level compared to peer countries has typically*

[1] *UNDP (2020). Human Development Reports: 2020 Statistical Update. United Nations Development Programme. URL: http://hdr.undp.org/en/countries/profiles/PNG*
[2] *Papua New Guinea Young People. (2018).*
[3] *[1] Education for All 2000 – 2015: Achievements and Challenges. (2015).*
[4] *International Labour Organization. Youth Labour Statistics. (2020).*
[5] *World Bank: Papua New Guinea Economic Update: Navigating a Fragile Recovery. Link*
[6] *World Bank: Climate Risk Country Profile, Papua New Guinea.*

widened and PNG's income level diverging away from the East Asia and Pacific (EAP) region. State debt has increased over the last decade, long before the onset of the COVID-19 pandemic, heightening the challenges to macroeconomic stability. The debt situation could detrimentally impact the capital accumulation and economic growth through elevated interest rates and lower investors' confidence. The economy has been and continues to be subject to significant upward and downward fluctuations, indicating an acute vulnerability to changes in international commodity prices. PNG is striving to harness its substantial natural resources to attain broad and sustainable productivity growth. In 2022, agricultural production, mostly from subsistence farming, contributes around one-third of the country's gross domestic product[7]. Agriculture, fishing, community forestry and small-scale mining are key livelihood activities in rural areas.

***Environment context**: PNG is predominantly mountainous, with large portions of its land area covered by tropical rainforest. The island of New Guinea, which includes PNG and the Indonesian province of West Papua, is classified as the third largest area of tropical forest in the world after the Amazon and Congo basins. Covering 93% of the land area in 2010, PNG's natural forest area was estimated at 79% of the land area in 2020[8,9]. The Island of New Guinea is the most floristically diverse island in the world[10]. Land habitats span from extensive lowlands with tropical forests, savannas, grasslands, and freshwater swamps to montane tropical forests and alpine meadows[11]. As well as its biological diversity, PNG is also a country of exceptional ethnic diversity. The population speaks over 800 distinct languages[12]. The indigenous population of PNG is one of the most heterogeneous in the world, comprising several thousand separate communities and tribal groups. Over 80% of the population of 8 million live a traditional rural livelihood based on the biological richness and diversity of the forests, inland waters and coastal seas[13].*

***Agriculture within a climate-vulnerable food production system**: Agriculture remains a vital driver for PNG's economic development with 25% of the GDP in 2019. It absorbs 85% of the country's labor force and contributes to 18% of foreign exchange earnings[14]. It also accounts for 83% of the dietary energy and 76% of the protein required for the population's nutritional needs[15]. Currently, the sector remains dependent on export revenues from key crops; this makes it vulnerable to changes in commodity prices and to climate impacts. Only 30% of the 46.9 million hectares of the total area is suitable for agriculture due to steep mountainous terrain, peatland, poor soils, low temperatures, high rainfall, a prolonged dry season and excessive cloud cover.[16] The sectoral goal of obtaining a self-sufficient food production system goes hand in hand with the need to develop self-sufficient food systems and address climate change concerns in PNG's major crop production systems (subsistence or semi-commercial production system and in plantation or estate-based production system)[17].*

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[7] *Britannica: Papua New Guinea.*
[8] *World Bank database available on https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=PG*
[9] *Government of PNG (2017). Papua New Guinea's National REDD+ Forest Reference Level. Modified Submission for UNFCCC Technical Assessment, 44 p.*
[10] *Cámara-Leret et al. (2020) New Guinea has the world's richest island flora. Nature 584, 579–583.*
[11] *World Bank, GFDRR and Climate Investment Funds (2011). "Climate risk and adaptation country profile for Papua New Guinea.".*
[12] *https://www.britannica.com/place/Papua-New-Guinea/Languages*
[13] *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*
[14] *Department of Agriculture and Livestock (2020). Agriculture medium-term development plan 2020 - 2022.*
[15] *Bourke R, Harwood T (2009) Food and agriculture in Papua New Guinea*
[16] *Government of Papua New Guinea (2018). Papua New Guinea's First Biennial Update Report to the UNFCCC.*
[17] *Oxford Business Group (2020). The report: Papua New Guinea 2020. Agriculture and Fisheries.*

In contrary to smallholders dominating the subsistence or semi-commercial production system, the estate-based production system is exclusively export-oriented and relies on cash-crops. At least half of the former grow staple crops under rain-fed conditions, and with low yields for consumption and they are comprised of sweet potato, taro, Irish potato, swamp taro, rice, banana, yam, cassava, beans and other vegetables, presenting a wide range of crops that are cultivated in PNG (Figure 1).

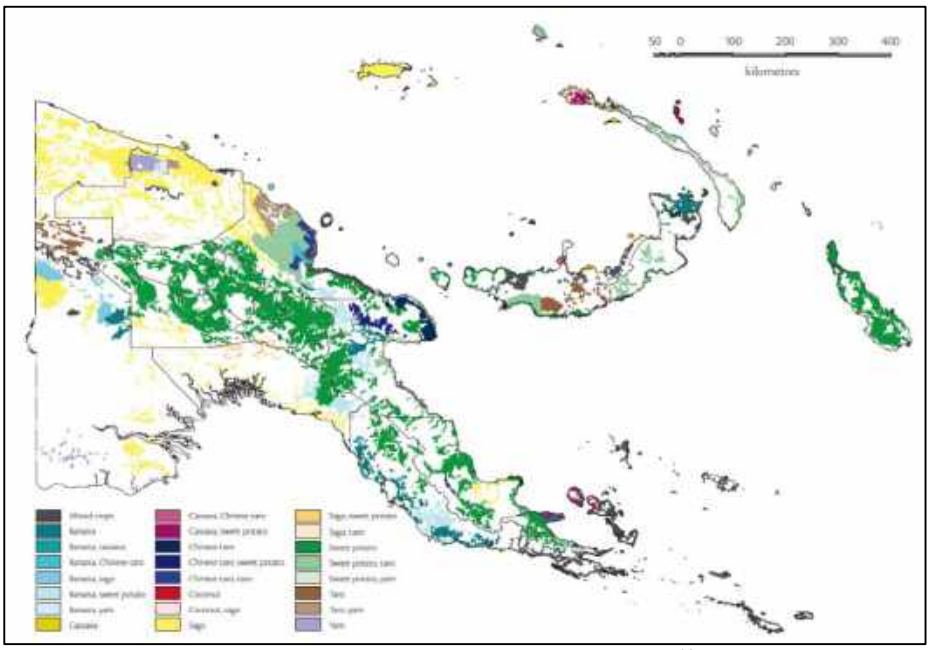

Figure 1: *Staple food crop distribution in PNG*[18]

This figure is low compared to the average of 3% and 4% of national spending on agriculture in Oceania (excluding Australia and New Zealand) and in the least developed countries (LDCs)[19]*. The agricultural, forestry, and the fishing sectors have a growth rate of 2.0%, trailing behind the country's population growth at 3.1%. Taking into account those statistics, in the next 25 years, the country's population will double, and the demands on agriculture will be overwhelming in the most populated provinces under climate change.*

Vulnerability to climate change: *PNG is ranked as the ninth (9*th*) most vulnerable country in the world to the risk of climate change*[20]*. The climate vulnerability index of PNG's food systems significantly increased from 0.617 in the period 1995–2005 up to 0.666 between 2010–2020*[21]*, while the country's capacity to acquire and deploy agriculture technologies including adaptation options, translated by the agriculture capacity index*[22]*, decreased from 0.971 in the period 1998–2002 to 0.967 between 2016–2020 (Figure 2).*

[18] *https:/tokpisin.info/common-staple-food-crops-Papua-new-guinea/*
[19] *FAO (2019) Government expenditure on agriculture*
[20] *World Risk Report (2021), 74p*
[21] *Notre Dame Global Adaptation Initiative. https://gain.nd.edu/our-work/country-index/*
[22] *Indicator built on a combination of four indicators of agricultural technology: capacity to equip agriculture areas with irrigation; nitrogen and phosphorus total fertilizer use on arable and permanent crop area use, pesticide use, and tractor use (Chen, 2015. University of Notre Dame Global Adaptation Index Country Index Technical Report)*

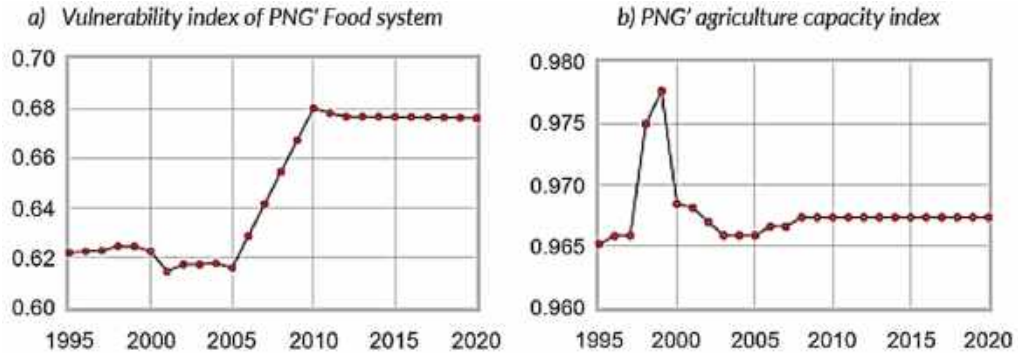

***Figure 2**: Vulnerability index of PNG' Food system (a) and agriculture capacity index from 2015 to 2020 (b) (Data source: Notre Dame Global Adaptation Initiative)*

*1.2 **PNG' Climate context***

Papua New Guinea has a hot, humid tropical climate experienced all year round[23]. The country experiences two distinctive seasons: rainy (December – March) and dry (June – September). The average monthly rainfall ranges between 250 – 350 mm and the average temperature is between 26 - 28°C. Humidity is relatively high, ranging between 70 – 90%. Papua New Guinea is home to one of the wettest climates of the world and annual rainfall in many areas of the country exceeds 2,500 mm, with the heaviest events occurring in the highlands. Temperatures are relatively steady across the country, and mean temperatures in Port Moresby range from 26°C to 28°C. Climate in this part of the Pacific is governed by a number of factors, including the trade winds and the movement of the South Pacific Convergence Zone (SPCZ), a zone of high-pressure rainfall zone that migrates across the Pacific south of the equator. Year-to-year variability in climate is also strongly influenced by the El Niño conditions in the southeast Pacific, which bring drought conditions to PNG, especially in the drier areas of the country.

Trends of key relevant climate parameters

***Current and future climate temperature:** PNG's climate is projected to change in the future. In recent times, surface temperatures have increased by about half a degree Celsius since the mid-70s. According to the Commonwealth Scientific and Industrial Research Organization (CSIRO), there is a high confidence level of different climate variables increasing over the course of the 21st century[24]. Base on the projections of IPCC using the RCP2.6 and RCP8.5, the low and high emissions pathways, the models show a trend of consistent warming that will be more significant for inland regions as compared to coastal areas[25].*

***Current and future rainfall:** While most models project an increase in the average annual precipitation in PNG uncertainty remains high[26]. Lafale et al. (2018)[27] suggested that mid-range confidence should be placed on the projected future trend of increasing annual precipitation. In contrast, projections that suggest the frequency and intensity of extreme rainfall events will be*

[23] *World Bank: Climate Change Knowledge Portal.*
[24] *Papua New Guinea's Enhanced Nationally Determined Contribution (NDC), (2020).*
[25] *World Bank: Climate Risk Country Profile, Papua New Guinea.*
[26] *World Bank: Climate Risk Country Profile, Papua New Guinea.*
[27] *Lafale et al. (2018). Effects of climate change on extreme events relevant to the Pacific Islands. Science Review 2018: 50–73.*

associated with high confidence in global trends. The intensity of sub-daily extreme rainfall events appears to be increasing with temperature, a finding supported by evidence from different regions of Asia and the Pacific. PNG's highlands region is susceptible to extreme weather such as heavy rainfall, which may increase the occurrence of landslides and inland flooding[28]. The coastal regions, the islands and the low-lying atoll areas are mostly vulnerable to extreme weather events, storm surge, sea-level rise, and coastal inundation.

Current and future sea-level rise: *Sea levels in PNG 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[29]. Under all GHG emissions scenario, sea levels in PNG are expected to rise by 7–17 cm by 2030, 7–34 cm by 2050, and 41–87 cm by 2100[30,31], leading to coastal flooding, salinization, and land erosion. The impacts associated with loss and damage due to sea level rise under a business-as-usual scenario are estimated to be $225 million by 2023 and $642 million by 2050[32], with Milne Bay and New Ireland being particularly affected[33,34]. Communities depending on tubers grown in pits dug in coastal area are particularly vulnerable to saltwater intrusion associated with sea-level rise. Some reports have indicated the occurrence of increased salinity[35,36,37].*

Occurrence of drought: *Between 1890 and 2009, there were 15 widespread droughts in PNG with 13 of them associated with El Niño events[38]. While there is uncertainty around the changes to the El Niño Southern Oscillation (ENSO) under future climate change scenarios, projections suggest an increase in the intensity of droughts (particularly above 1,700 meters) in years impacted by ENSO. From 1876 to 2015, five widespread droughts occurred in 1902, 1914, 1941, 1982 and 1997, all with severe impacts. In 1997 and 1941, more than 80% of PNG received less than 10th percentile rainfall and where the worst droughts PNG has experienced since 1890 in terms of area affected. Two recent drought events in 1997 and 2015 (accompanied by frost at very high altitudes) also had significant impacts on agriculture[39], resulting in critical food and water shortages[40].*

1.3 ***Context specific to the project areas (Enga, New Ireland, and Milne Bay)***

Based on statistics from 2017 to 2022, Enga, Milne Bay, and New Ireland are among the fastest growing provinces in PNG with 3.1%, 2.5%, and 3.5% per year respectively. With limited options for expanding crop areas to meet the food demand of the growing population, cultivated areas in these provinces are subject to high land-use[41,42,43]. Observations show that increased soil nutrient deficiency due to reduced fallow periods, slash-and-burn practices and soil erosion, is

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[28] *Papua New Guinea's Enhanced Nationally Determined Contribution (NDC), (2020).*
[29] *Pacific Climate Change Science Program. (2013). Current and Future Climate of Papua New Guinea.*
[30] *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.*
[31] *World Bank, Papua New Guinea. Climate Data—Projections. Climate Change Knowledge Portal. World Bank Group, 2020*
[32] *WRI. 2021. AQUEDUCT Global Flood Analyzer. https://www.wri.org/data/aqueduct-global-flood-analyzer.*
[33] *BoM. 2020. Southern Hemisphere Tropical Cyclone Data Portal.*
[34] *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*
[35] *Legra et al. (2008). Biodiversity consequences of sea level rise in New Guinea. Pacific Conservation Biology 14(3) 191 – 199.*
[36] *Sherif, M., & Singh, V. P. (1999). Effect of climate change on sea water intrusion in coastal aquifers. Hydrological Processes, 13(8).*
[37] *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*
[38] *Cobon et al. (2016). Food shortages are associated with droughts, floods, frosts, and ENSO in Papua New Guinea. Agricultural Systems 145*
[39] *Cobon et al. (2016). Food shortages are associated with droughts, floods, frosts, and ENSO in Papua New Guinea. Agricultural Systems 145*
[40] *Chua, Zhi-Weng, Yuriy Kuleshov, and Andrew B. Watkins 2020. "Drought Detection over Papua New Guinea Using Satellite-Derived Products" Remote Sensing 12, no. 23: 3859*
[41] *Asian Development Bank (2016). Papua New Guinea: Rural Primary Health Services Delivery Project. Due Diligence Report. Enga Province.*
[42] *Saunders J.C. (1993). Agricultural Land Use of Papua New Guinea, Explanatory Notes to Map. PNGRIS Publication No.1, November 1993.*
[43] *World Bank (2019). Environmental and Social Baseline Report and Impact Assessment for the PNG Agriculture Commercialization and Diversification Project (PACD).*

already limiting agricultural production in these provinces (Figure 3)[44,45,46]. The length of the fallow period decreased by 48%, from an average length of 12.1 months in 2005 to 6.3 months in 2014. In the same period, the time required to reach gardens from the family home increased by 60%, and traditional bush or tree fallow species, have been replaced by food legumes, e.g., beans and peanuts. These spontaneous adaptation actions point to the need to support a diversified rural food system and enhance the adoption of climate-smart agricultural practices to improve the tolerance of cropping systems to increased temperatures, changes in rainfall patterns, drought occurrence, and sea level rise, while maintaining soil fertility, as well as the nutrient content of agricultural staples of vital food crops.

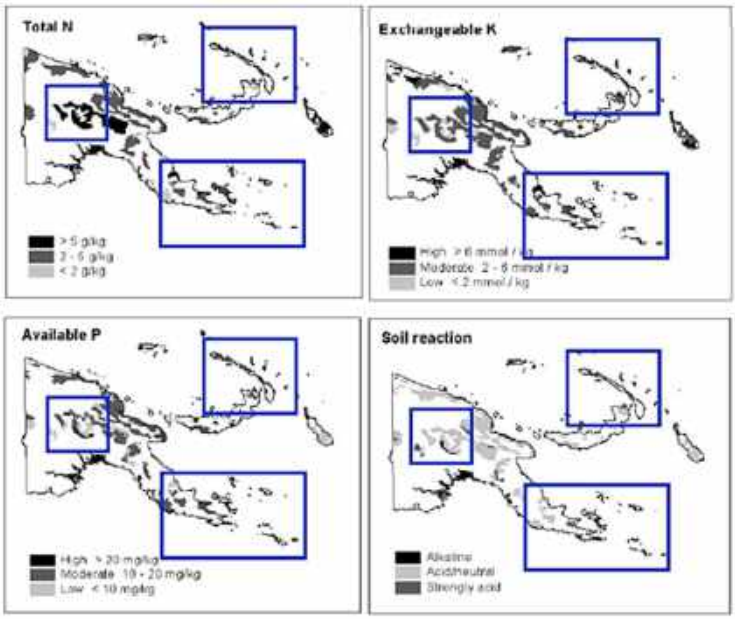

Figure 3: *Soil fertility status of agricultural soils in Papua New Guinea based on the Papua New Guinea Resource Information System (PNGRIS) (Hartemink and Bourke, 2000).*

Sweet potato, the main staple crop, is grown in rotation with fallow periods in the areas mentioned. Sweet potato cultivation, using dehydration, composting and ridging practices, dominates the valleys, plateaus and mountains of the Enga and the lands of New Ireland and Milne Bay provinces.

1.4 ***Climate change considerations for agriculture in the project areas***

While 80-90% of households in Enga, Milne Bay and New Ireland continue to rely on subsistence farming [47], assessments show that Enga, Milne Bay and New Ireland are at high risk of increased temperatures, changes in rainfall patterns droughts and sea level rise, which could

[44] *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*
[45] *Hanson et al. (2001). Papua New Guinea Rural Development Handbook. The Australian National University, Canberra.*
[46] *Hartemink, A. E., & Bourke, R. M. (2000). Nutrient Deficiencies of Agricultural Crops in Papua New Guinea. Outlook on Agriculture, 29(2), 97–108. https://doi.org/10.5367/000000000101293103*
[47] *NSO and ICF. (2019). Papua New Guinea Demographic and Health Survey 2016–18.*

have adverse consequences for agriculture[48,49,50], as continuous cropping practices reduce the resilience of cropping systems and rural communities to climate change.

1.4.1 Climate drivers

- *1.4.1.1. Increasing temperature*

Temperatures in PNG have increased during the 20th century, with minimum and maximum air temperatures increasing by an average of 0.2 °C per decade up to 1999[51]. Historical records for New Ireland show an increase in the annual temperature trend at Kavieng, the provincial capital, since 1962, with a more accentuated increase in the minimum temperature (Figure 4)[52]. Average monthly temperatures in PNG are expected to increase by 0.9°C by 2030[53,54]. Climate Research Unit (CRU) datasets from 1968–2018 show a significant increase in annual temperature, with up to 0.011°C/year observed in the Eastern Enga province[55] (Figure 4). A trend analysis of the annual mean temperature in the three provinces over the period 1900-2020 showed an increase in the annual mean of 0.2, 0.3, and 0.1°C in Enga, Milne Bay, and New Ireland provinces respectively. The tipping year for significant increase of mean temperature was observed in 1977 for both the Enga and New Ireland provinces, and in 1972 for the Milne Bay province (Figure 4). Temperatures are projected to continue to increase, with 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, and Milne Bay [56,57]. 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 (Figure 4)[58].

[48] *Global Green Growth Institute (2021). Climate-Resilient Green Growth in Enga Province*
[49] *Global Green Growth Institute (2021). Climate-Resilient Green Growth in Milne Bay Province*
[50] *Global Green Growth Institute (2021). Climate-Resilient Green Growth in New Ireland Province*
[51] *Bourke, R.M., Humphreys, G. and Hart, M. (2002). Warming in Papua New Guinea: some implication for food productivity. Unpublished paper.*
[52] *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.*
[53] *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.*
[54] *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*
[55] *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*
[56] *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.*
[57] *World Bank (2020). Papua New Guinea. Climate Data—Projections. Climate Change Knowledge Portal. World Bank Group.*
[58] *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.*

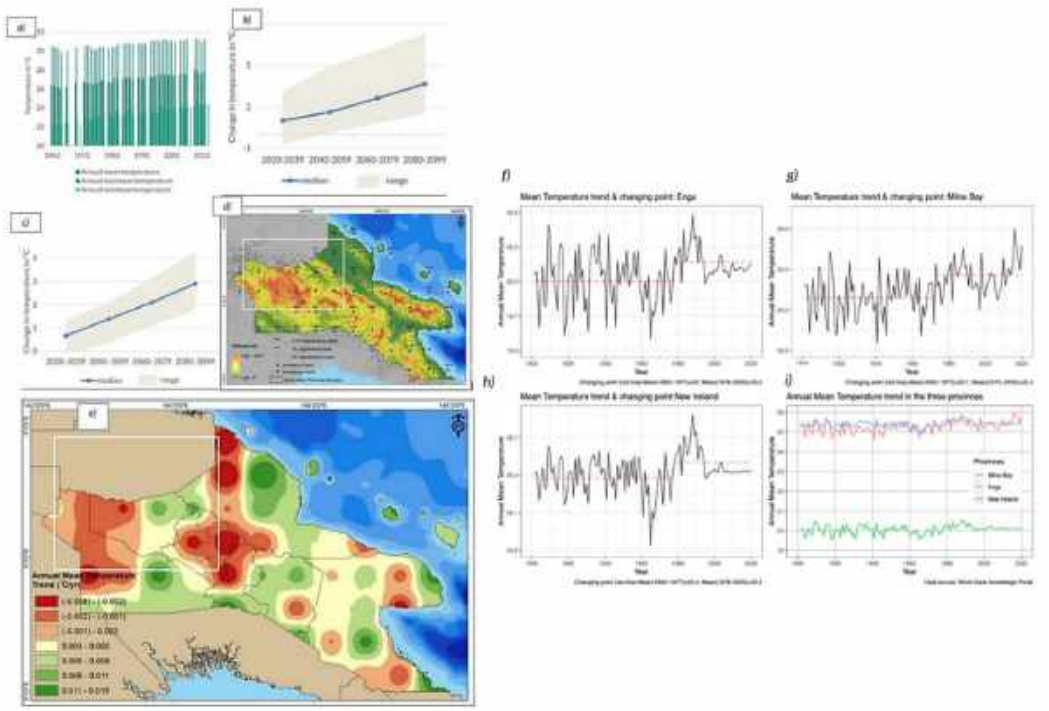

***Figure 4**: Historical annual temperatures in Kavieng, New Ireland Province (a); Projected change in maximum daily temperature in Enga Province (2020–2099) (b); Historical trend analysis and changing point of the annual mean temperature in Enga, Milne Bay and New Ireland provinces using the CRU data (f, g,h,i); 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 0C/year at PNG' Highland including Enga province from 1968 to 2018 (e) (Allen et al. 2009; Sekac et al., 2020)*

- *1.4.1.2. Changes in rainfall*

Changes in rainfall patterns in PNG over the past 30 years are not as clear. Between 1988 and 2018, a review of rainfall changes in rural communities in the coastal and highland regions found that villagers translate changes in rainfall patterns into reduced predictability of seasonal rainfall, more intense rainfall events that divert rivers, break banks, and damage food gardens in the highlands, and an overall increase or decrease in rainfall in some locations. A significant decrease in annual rainfall 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 (Figure 5)[59].

[59] *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*

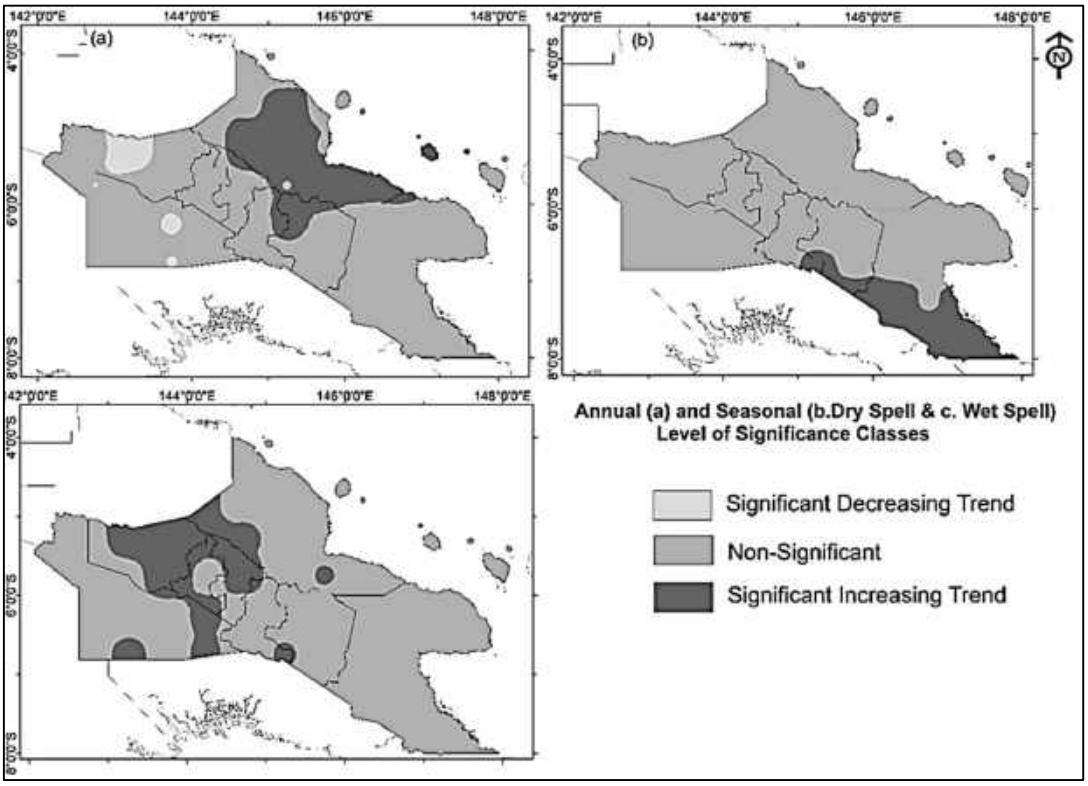

Figure 5: *Spatial distribution of rainfall trend significance considering annual (January – December) (a), Dry season (November to Following year April) (b), Wet season (May – October) (Sekac et al. 2021).*

There have been five major floods in PNG in 1894, 1907, 1921, 1943 and 1998[60], causing significant crop damage and shortages of staple foods. Future rainfall patterns are uncertain because projections are widely divergent and their direction is unclear[61]. Moreover, there is high confidence in increased frequency and intensity of extreme rainfall[62]. Model ensembles project increases in both the intensity of high rainfall events and the frequency of wet days[63]. There is moderate assurance regarding forecasted rises in annual precipitation[64]. 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 6).

[60] *Cobon et al. (2016). Food shortages are associated with droughts, floods, frosts, and ENSO in Papua New Guinea. Agricultural Systems 145*
[61] *Lafale et al. (2018). Effects of climate change on extreme events relevant to the Pacific Islands. Science Review 2018: 50–73.*
[62] *World Bank, (2016). Climate and Disaster Resilience*
[63] *CCKP. (2021). Climate Data: Projections.*
[64] *Lafale et al. (2018). Effects of climate change on extreme events relevant to the Pacific Islands. Science Review 2018: 50–73.*

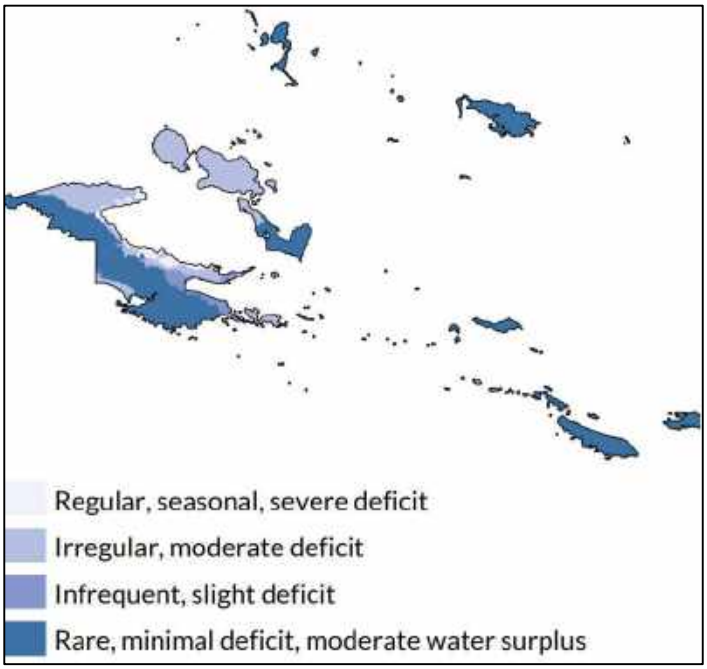

Figure 6: *Soil water deficit and surplus in Milne Bay Province (Allen and Bourke, 2009; GGGI, 2021[65])*

Additionally, the project area is prone to drought when considering historical and projected drought in New Ireland (Figure 7a) and drought severity in Enga during 2015 ENSO (Figure 7b).

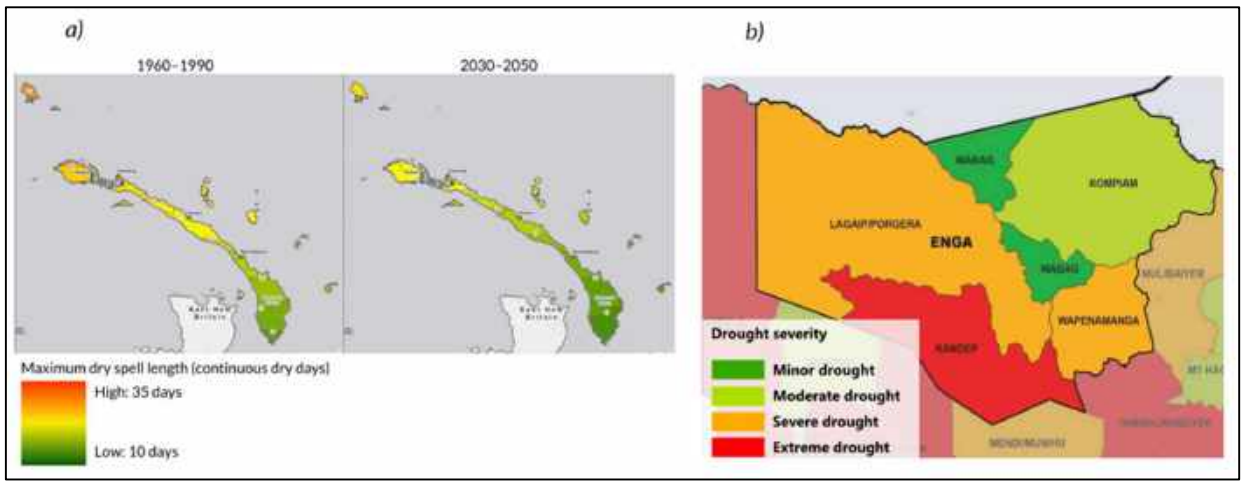

Figure 7: *Historical and projected drought in New Ireland Province (a), Drought-affected districts in Enga Province during the 2015 ENSO (b)[66,67]*

[65] *Global Green Growth Institute (2021). Climate-Resilient Green Growth in Milne Bay Province*
[66] *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.*
[67] *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*

1.4.2 Climate risks and impact on selected key food crops

- *1.4.2.1. Sweet potato (Ipomoea batatas L.)*

Sweet potato is an important staple food crop across Enga, Milne Bay, and New Ireland. It feeds 66% of the population, representing a higher proportion compared to another staple food crops[68,69]. Sweet potato is a major food in PNG and dominates production in the Highlands. It is one of PNG's top five staple foods, taking the top position with 99% of rural New Guineans growing it, followed by banana with 96% and taro with 95%. PNG's rural communities consume about 670 kg/person/ year and sweet potato makes up almost two-thirds of the staple food crops both by weight (64%) and food energy (63%)[70]. It is a climate-sensitive crop grown in typical village mixed-farming systems, and its response to changes in climatic conditions is critically important.

Increased frequency and intensity of extreme rainfall will threaten sweet potato, which is susceptible to waterlogging[71]. Increased 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[72]. Currently, due to its low tolerance to high humidity conditions, farmers manage to grow sweet potatoes in locations with high to very high rainfall such as Enga (up to 5000 mm/year), using mounds or drains to reduce the level of water in the soil [73].

In addition, the increase in intensity and frequency of heatwaves threatens sweet potato production worldwide as heatwaves cause tuberization failure. Indeed, heat and drought stresses are among the most important climatic events aggravated by climate change that affect sweet potato productivity[74]. Extreme droughts have reduced the yield of sweet potatoes and increased the incidence of weevil (Cylas formicarius) infestation. Sweet potato has also been impacted by severe frosts as experienced in the Highlands of Papua New Guinea, and has been affected by salinity, although the extent of these impacts is not clear[75, 76, 77]. Among 166 varieties of sweet potato distributed to Pacific Island Countries including 50 varieties from Papua New Guinea, about 25.7% were drought-tolerant varieties, 9% were salt-tolerant varieties but only 0.8% were varieties tolerant to waterlogging[78, 79]. For the rainfed sweet potato, projected yield losses due to climate change in 2050 are expected to be 11%, compared to yields recorded in 2000.

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[68] *Sago (11%), Banana (9%), lesser yam (7%), Colocasia taro (6%), Chinese taro (3%), and cassava (1%)*
[69] *Bourke, R. M., & Allen, R. (2009). Food and agriculture in Papua New Guinea. In R. M. Bourke & T. Harwood (Eds.), Village food production systems (pp. 194–269). Canberra, Australia: ANU Press.*
[70] *Bourke, R.M., Vlassa, V., 2004. Estimates of Food Crop Production in Papua New Guinea. Land Management Group, The Australian National University, Canberra, Australia.*
[71] *Bourke et al. 2006. Solomon Islands Smallholder Agriculture Study. Canberra: Australian Agency for International Development (AusAID).*
[72] *Bourke, R.M. (1988). Taim hangre: variation in subsistence food supply in the Papua New Guinea highlands. Unpublished PhD thesis.*
73 Bourke RM and Harwood T (eds) (2009) Food and Agriculture in Papua New Guinea. ANU E Press, The Australian National University, Canberra, Australia
[74] *Heider et al. (2020). Intraspecific diversity as a reservoir for heat-stress tolerance in sweet potato. Nature Climate Change.*
[75] *Iese, V., et al., 2015. Farming adaptations to the impacts of climate change and extreme events in Pacific Island Countries. In: Ganpat, W.G., Isaac, W.-A.P. (Eds.), Impacts of Climate Change on Food Security in Small Island Developing States. IGI Global, United States of America, pp. 166–194. https://doi.org/10.4018/978-1-4666-6501-9.ch006.*
[76] *McGregor, A., et al., 2016a. Vulnerability of staple food crops to climate change. In: Taylor, M., McGregor, A., Dawson, B. (Eds.), Vulnerability of Pacific Island Agriculture and Forestry to Climate Change. Pacific Community (SPC), Noumea, New Caledonia, pp. 161–238.*
[77] *McGregor, A., Fink, A., Dawson, B., 2016b. Implications of climate change for contributions by agriculture and forestry to Pacific Island economies and communities. In: Taylor, M., McGregor, A., Dawson, B. (Eds.), Vulnerability of Pacific Island Agriculture and Forestry to Climate Change. Pacific Community (SPC), Noumea, New Caledonia, pp. 447–482.*
[78] *Tuia, V.S. et al., 2012. Role of the Centre for Pacific Crops and Trees in the sustainable conservation and the safe movement of plant material. Suva, Fiji.*
[79] *Sisifa, A., et al., 2016. Pacific communities, agriculture and climate change. In: Taylor, M., McGregor, A., Dawson, B. (Eds.), Vulnerability of Pacific Island Agriculture and Forestry to Climate Change. Pacific Community (SPC), Noumea, New Caledonia, pp. 5–46.*

Planting climate-resilient crops can significantly reduce expected losses due to projected climate change. To adapt to current and future climate conditions, it is important to implement effective soil management practices, such as irrigation and drainage, to improve soil quality and support crops during drought and wet conditions are needed in the Highlands (Enga). Other responses and mitigating actions in Highlands include novel farming techniques such as mounding, terracing, mulching, ditching draining, and irrigation systems. In coastal areas and islands (Milne Bay and New Ireland), the adoption of the heat-tolerant cultivar will contribute to the resilience of farming communities.

- *1.4.2.2. Swamp taro (Cyrtosperma merkusii* (Hassk.) Schott*)*

Swamp taro is grown in artificial pits dug down to the duckweed and covered with mulch to maintain soil fertility[80]. Variations in climate parameters (temperature and precipitation) have not been reported to have impacts on production, nevertheless, sea level rise is flagged to impact yield[81,82]. This occurs when seawater contaminates the freshwater lens of the atolls. It was also pointed out that a further 50-150 mm of sea level rise is likely to result in future loss of swamp taro production on many atolls by 2030[83].

- *1.4.2.3. Yams (Dioscorea* spp.*)*

It is 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 and extreme rainfall events. Therefore, an increase in annual rainfall or a reduction in the number of drier months may reduce tuber yield. Yam yields also declines depending 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[84].

- *1.4.2.4. Banana (Musa* spp.*)*

Banana is a staple food in areas that experience a long regular dry season and in the locations with varying rainfall[85]. Banana is grown in all parts of PNG up to its altitudinal limit at about 2200 m[86] . An increase in temperature of about 1°C or an increase in rainfall of about 8% is not likely to result in a significant reduction in banana yield. However, an increase in annual rainfall of up to 25% may reduce the yield of the crop[87].

[80] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*
[81] *Bourke R.M. and Betitis T. (2003). Sustainability of agriculture in Bougainville Province, Papua New Guinea. Land Management Group, Australian National University*
[82] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*
[83] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*
[84] *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*
[85] *Taylor et al. (2016). Vulnerability-of-Pacific-Island-agriculture-and-forestry-to-climate-change*
[86] *Bourke, R.M. and Vlassak, V. (2004). Estimates of Food Crop Production in Papua New Guinea. Land Management Group, The Australian National University, Canberra.*
[87] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*

- *1.4.2.5. Cassava (Manihot esculenta* Crantz*)*

Cassava is an essential food crop in locations where the dry season is accentuated, and rainfall is high most months each year[88]. The nutrient demand of cassava per tonne of dry matter is lower than that for another crop major[89], and therefore, it can be grown where no other crop would provide a decent yield[90]. However, it reported that an increase in temperature of about 1 °C or an increase in rainfall of about 8% may reduce significantly tuber yield[91].

- *1.4.2.6. Rice (Oryza sp.)*

Rice consumption is common in PNG, and its development considering the climate threat, is a priority for government[92]. Indeed, increased and frequent rainfall would mean changes in production and management systems[93]. Seasonal rainfall variation fragilized the non-irrigated and non-resilient rice production and can lead to the reduction of rice production in PNG[94]. Increase in temperature is expected to lead to a decrease in rice production in the Pacific islands, mainly in many areas, where soils have low water-holding capacity[95,96]. While for most crops, the addition of nitrogen results in substantial 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, comparing worst (pessimistic) and best (optimistic) climate change scenarios, rain-fed rice yields increase by 5.0–11.7% with the application of nitrogen at low rates, while high rate of nitrogen application decreases corresponding projected yields by between -2.5% to -0.4%[97].

The potential impacts on climate risk on staple food crop are summarized in the table 1.

***Table 1**: Climate issues affecting some crops and their potential impacts*

Crops	*Climate issues*	*Manifestations*
Banana	- *Increase in annual rainfall [98]*	- *Increase in annual rainfall up to 25% may decrease the yield of bunches*
Cassava	- *Increase in annual rainfall[99]*	- *Increase in annual rainfall up to 25% could reduce production*
Sweet potato	- *High soil moisture[100]* - *Increase in mean annual rainfall[101]*	- *Increase in soil moisture affects the formation of tubers after planting, and excessive high soil moisture can lead to the reduction of tuber yield* - *Increase in average annual rainfall leads to a decline in tuber production*
Swamp taro	- *Sea level rise[102,103]*	- *Sea-level rise is potentially having a serious effect on swamp taro production by contaminating the freshwater lens on atolls*
Yams	- *Increase in annual rainfall and decrease in number of drier months [104]*	- *8% increase in annual rainfall or a reduction in the number of dry months can reduce tuber yields*
Rice	- *Rainfall variation within a given year and across year[105]* - *Rainfall variation in terms of start of the wet season[106]*	- *Rainfall variation can lead to a reduction in irrigated rice yield due to poor water-holding capacity of soil, pests and diseases*

1.5 ***Food system vulnerability*** *to climate change and threats to food security*

Climate change is expected to negatively impact agricultural production and productivity in PNG. This could reduce the welfare of PNG's population, as agriculture plays a significant role in the country's economy. In 2017, agriculture, largely from subsistence farming, accounted for about 40% of PNG's GDP and supported more than 80% of the population. Most agricultural products in PNG are exported, except for a growing local market for vegetables. Additionally, PNG has abundant forests, but the wood processing industry has not fully developed. The country is also a major yam market in the Pacific region

While three-quarters of the population depends on their gardens for food security, only 40% of the population has access to improved water and only 19% of the population has access to improved sanitation. As a result, the occurrence of a prolonged drought, such as the El Nino weather event the country experienced in 2015 and 2016, can have significant impacts on the population. On smaller islands, communities do not have access to rivers or streams and therefore rely on rainwater and wells. Many communities report that salinity in wells remains a problem, during periods of drought, because there is not enough rainfall to replenish the water table.

In PNG, the agriculture sector is the most vulnerable to extreme weather conditions, including excessive precipitation, drought, and frost associated with drought in areas over 1,800 meters above sea level[107,108]*. A number of people died as a direct result of the 2015/2016 drought. The average number of deaths reported in the most vulnerable communities was two people. In some provinces including Enga, at least five drought-related deaths were reported*[109]*. Reports of drought-related deaths were even more prevalent in high and severe food insecurity, with 58% and 63% of people reporting drought-related deaths in their community. Sweet potato prices increased dramatically, by 257% compared to six months prior to the drought are*

[88] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*
[89] *Howeler RH (2002) Cassava mineral nutrition and fertilization. In RJ Hillocks, JM Thresh and AC Bellotti (eds) Cassava, Biology, Production, and Utilization. CAB International, Wallingford, United Kingdom, 115–147*
[90] *Taylor et al. (2016). Vulnerability-of-Pacific-Island-agriculture-and-forestry-to-climate-change*
[91] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*
92 PNG National Rice Policy 2015 – 2030 https://www.parliament.gov.pg/uploads/hansard/H-09-20150210-M17-D01.pdf
[93] *Harvey, C. A., Saborio-Rodríguez, M., Martinez-Rodríguez, M. R., Viguera, B., Chain Guadarrama, A., Vignola, R., & Alpizar, (2018). Climate change impacts and adaptation among smallholder farmers in Central America. Agriculture & Food Security, 7(57). https://doi.org/10.1186/s40066-018-0209-x*
[94] *Rosegrant M.W., Valmonte-Santos R., Thomas T., You L. and Chiang C. (2015). Food security, and socioeconomic livelihood in Pacific Islands. ADB, IFPRI.*
[95] *Taylor et al. (2016). Vulnerability-of-Pacific-Island-agriculture-and-forestry-to-climate-change*
[96] *ibid*
[97] *Rosegrant M.W., Valmonte-Santos R., Thomas T., You L. and Chiang C. (2015). Food security, and socioeconomic livelihood in Pacific Islands. ADB, IFPRI.*
[98] *ibid.*
[99] *ibid.*
[100] *ibid.*
[101] *ibid.*
[102] *Bourke R.M. and Betitis T. (2003). Sustainability of agriculture in Bougainville Province, Papua New Guinea. Land Management Group, Australian National University*
[103] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*
[104] *ibid.*
[105] *Rosegrant et al. (2015). Climate change, food security, and socioeconomic livelihood in pacific islands. ADB, IFPRI.*
[106] *ibid.*
[107] *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.*
[108] *Papua New Guinea National Disaster Centre (2016). El Nino 2015/2016 Post Drought Assessment. Report from Interagency Post Drought Assessment in Papua New Guinea*
[109] *World Food Program and National Disaster Center (2016). El Nino food security impact in Papua New Guinea*

used[110]. One year later, the 2017' food security assessment presented the worst food insecurity level[111] (Figure 8).

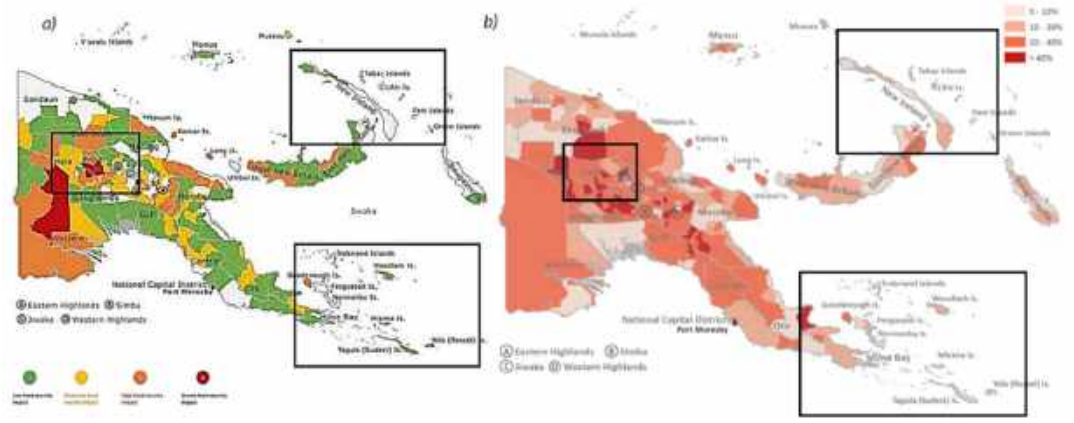

***Figure 8:** Food Security level by LLGs in 2016 and 2017*

Changes in precipitation and temperature imply that PNG will be facing hotter days and drier dry seasons in 2000-2050. Higher temperatures or changes in rainfall patterns will likely lead to increased heat stress, with associated crop pests and post-harvest losses, which will significantly reduce yields of important commodities and negatively impact food security.

*1.6 **Adaptation solutions***

Taking into account climate change vulnerability, risks and threats outlined above for a diversity of crops and ecosystems underpinning the food system in the PNG, the ASSA project offers a comprehensive set of adaptation solutions with a wide range of actions to be implemented by a variety of stakeholders with farmers at the centre of all interventions across the value chain of critical food crops.

To build resilience and enhance adaptation in this context, it is necessary to promote a "resilient productive system based on three pillars":

- *resilient varieties of crops: This implies the promotion of traditional food crops that demonstrate suitability to current or future climatic conditions and/or alternatively the promotion of variety of seeds for critical crops at risks under current or future climatic conditions. Table 2 presents the impact chains for understanding the expected impacts of climate change on the production of key staple food crops, in the tropical Pacific, and potential adaptations measures in project area. The impact chain is useful for identifying the initial list of specific crops. Given the extreme sensitivity of crops to agronomic, climatic, and other factors, and lessons learned from previous experiences, the project calls for community-led screening, supported by expert evaluation and validation prior to multiplication and dissemination of proposed resilient crops during implementation.*

[110] *Papua New Guinea National Disaster Centre (2016). El Nino 2015/2016 Post Drought Assessment. Report from Interagency Post Drought Assessment in Papua New Guinea*
[111] *World Food Program (2018). Papua New Guinea, mVAM Food Security & Livelihoods Monitoring System. National Disaster Centre, Department of Agriculture and Livestock, National Statistics Office and the Government of Papua New Guinea*

- *resilient and climate friendly agricultural practices centred on local farmers (proposed Model farmers) for sustainability and higher degree of adoption. The farmers interventions will be enhanced with the support of professional agricultural advisors tasked to implement the extension services for wider dissemination of both resilient crops and practices.*
- *resilient lands and ecosystems enabled through reforestation practices to address landslide risks expected to increase with higher occurrence of floods.*

The project not only aims to enhance the resilience of the agricultural production system but also promotes resilient and environmentally friendly post-harvest solutions and increased market access for value-added products. As a fundamental part of the project, capacity building will facilitate the adoption of new practices and support the acquisition and implementation of these practices.

***Table 2**: Summary of projected effects of climate change on crop production and adaptation measures*[112,113,114]

Commodities	*Targeted provinces*	*Climate change/climate variability impact in recent decades*	*Short Term (2030)*	*Medium-term (2050)*	*Adaptation measures*
Sweet potato	*Enga, Milne Bay and New Ireland*	*El Niño-Southern Oscillation (ENSO)-induced droughts had a major impact on production* *Increased rainfall between November and April is likely to result in yield reductions in the project area. Indeed, excessively high soil humidity reduces tuber yield and is a major cause of food shortages in the PNG highlands*	***Moderately impacted*** *Impact on tuberization and yield will be greatest in those areas where rainfall is already high, and where the temperature is currently around 32°C. Impact on pests and diseases are unclear — possibly increased pressure from sweet potato scab.* ***Moderately impacted*** *Model ensembles project increases in both the intensity of high rainfall events and the frequency of wet days. Excessively high soil humidity reduces tuber yield and is a major cause of food shortages in the PNG highlands*	***Moderately impacted*** *Increasingly serious impact on areas where there is currently high rainfall and temperatures, especially with high emissions scenarios. The impact on pests and diseases is unclear.*	*Adoption of cultivars more suited to drought and high soil humidity conditions, as well as continued soil improvement, including drainage, are needed in the highlands. In coastal areas and islands, adoption of heat-tolerant cultivars can improve community resilience.*
Banana	*Morobe, East New Britain, Central and Madang*	*Growing at higher elevations with warmer temperatures. Increased annual precipitation and temperatures can impact yield.*	***Lowly impacted*** *In summary, banana is a particularly versatile crop in PNG. An increase in temperature of about 1°C or an increment in rainfall of about 8% is likely to result in no significant reduction in banana yield.*	***Lowly to moderately impacted*** *By 2050, the negative effects of climate change are expected to become mild for banana. However, an increase in annual precipitation of up to 25% could reduce the yield of the crop.*	*Adoption of varieties that tolerate heavy rainfall and severe drought*

[112] *Bell J and Taylor M. (2015). Building climate-resilient food systems for Pacific Islands. WorldFish. Program Report: 2015-15.*
[113] *Taylor et al. (2016). Vulnerability-of-Pacific-Island-agriculture-and-forestry-to-climate-change*
[114] *Bourke R.M. (2018). Impact of climate change on agriculture in Papua New Guinea*

Commodities	*Targeted provinces*	*Climate change/climate variability impact in recent decades*	*Short Term (2030)*	*Medium-term (2050)*	*Adaptation measures*
Cassava	*Milne Bay, West New Britain*	*Increase in temperature and rainfall may have an impact on production by reducing yield*	***Lowly impacted*** *Cassava is a particularly resilient crop. By 2030, an increase in temperature of about 1°C or an excess rainfall of about 8% is likely to result in a significant reduction in tuber yield.*	***Lowly to moderately impacted*** *The negative effects of climate change are expected to become minimal for cassava in the medium term. However, it is possible that a 25% increase in annual precipitation could lead to reduced yields, but this is not certain.*	*Promotion of excess water-tolerant and excess drought-tolerant cassava cultivars*
Swamp taro	*Coastal regions*	*Sea-level rise may affect the production of Swamp taro with Increased salinization*	***Moderately to highly impacted*** *Changes in temperature and rainfall are unlikely to have a significant impact on production. However, sea-level rise is likely to have a serious deleterious effect on swamp taro production by contaminating the freshwater lens on atolls. A further rise of 50–150 mm in sea level is likely to result in further loss of swamp taro production on many atolls by 2030*	***Highly impacted*** *Negative effects of climate change will become high by 2050 for Swamp taro. Increased salinization from climate change events (e.g., sea-level rise) could result in an accelerating decline in swamp taro production by 2035, with production potentially disappearing entirely by 2050*	*Promotion of swamp taro cultivars adapted to inland areas across the country in order to reduce its vulnerability.*
Rice	*Milne Bay and New Ireland*	*Rising temperatures, especially at night might result in yield losses by 10–20%.*	***Moderately to highly impacted*** *Increasing temperature expected to decrease rice yields and overall rice production in tropical locations. Rice production in PICTs likely to become even less viable in terms of productivity*	***Highly impacted*** *Severe global shortages in rice available for export. The high price of imported rice expected to enhance the comparative advantage of Pacific Island rice production*	*Optimal planting dates of heat-tolerant rice cultivars under irrigated conditions and low chemical fertilization rate*

1.7 ***Barriers to the agricultural sector in PNG***

At least 70% of smallholder farmers living in rural areas grow crops for household consumption and sale of surplus for income[115]. Hence, food security is vulnerable to climate shocks that affect local food production. Between 800,000 to 1.2 million villagers suffered food shortage after droughts (combined with frost at high altitudes) that occurred in 1997 and 2015[116]. Although people generally have access to sufficient food, there is a widespread nutritional deficiency due to constrained access to quality and diversified food for a nutritionally balanced diet. Local food production is not competitive with imported food due to supply issues such as poor quality, irregular supply, poor road connectivity, and high marketing costs. Critical challenges for the value chain also exist, such as post-harvest management, food contamination, food loss and waste, and food storage. [117]. These factors have not been addressed in the target regions so far due to insufficient financial resources for necessary infrastructure, technology upgrades and limited capacity to propagate and widely distribute crop varieties, implement climate-sensitive practices and post-harvest techniques, or operate and maintain climate-resilient value chain technologies.

According to the Agriculture Medium Term Development Plan 2018–2022[118], the agriculture sector is facing several challenges and issues such as inadequate infrastructure network related to lack of transport/storage/ energy infrastructure within the country, lack of agricultural advisory services, lack of agricultural data and statistics; increasing environmental threats including ecosystem and biodiversity degradation, climate change, and inadequate access to markets and finance. This proposal will address these structural barriers to food security and agriculture development exacerbated under the changing climate and by doing so, create a favourable operating environment for increased productivity and income generation, while supporting post Covid 19 recovery efforts.

An assessment by the Australian Center for International Agricultural Research (ACIAR) reveals problems with food security have been exacerbated by the COVID-19 crisis in 2020. The agricultural sector faced challenges resulting from limited agricultural inputs, increased transportation costs, supply chain disruption, and underlying nutritional insecurity among smallholder farmers and rural community members. In this context, this project will support climate-resilient agricultural production with climate-resilient, high-performance and high-yielding crop varieties provided to farming households (Output 1.1). Combined with the dissemination of climate-resilient agriculture (CRA) practices through demonstrators, farmer field schools and extension services (Output 1.2), this will increase food security in vulnerable communities. Post-harvest management, constrained market access and access to market information will be addressed through eco-friendly and climate-smart processing and storage technologies (Output 2.3) combined with training on operating, maintaining, and managing these technologies, while an integrated digital platform will foster exchange and collaboration among smallholder farmers, small-scale processors, traders, and buyers (Output 2.1).

[115] *Schmidt et al. (2019). Papua New Guinea survey report: Rural household survey on food systems. IFPRI.*
[116] *Kanua et al. (2016). Assessing village food needs following a natural disaster in PNG. Australian National University.*
[117] *Gunasekera et al. (2017). Postharvest loss reduction in Asia-Pacific developing economies. Journal of Agribusiness in Developing and Emerging Economies,7(3)303-317*
[118] *Department of Agriculture and Livestock (2020). Agriculture Medium Term Development Plan 2020 - 2022*

1.7.1 Limited agricultural advisory services

Agricultural training, information and extension services are the backbone of agricultural development for rural poverty reduction. However, agricultural training, extension, research, development, biosecurity and quarantine services are limited in PNG. An effective extension system coupled with regular farmer trainings and engagements in the areas of production, postharvest and agribusiness is missing[119]. Most farmer cooperatives have limited access to extension and related services, and public-sector agricultural extension in PNG has been declining. Provision of farmers' training and extension service is the responsibility of the provincial and district governments. However, agricultural training and extension centers have been neglected and in many provinces this function is ineffective due to lack of funding. Crop-specific institutions for commodities like coffee, cocoa, coconut and palm oil were established to carry out industry-specific research and extension services to small-scale farmers but these institutions have continuously run into institutional difficulties that beset government agencies. They are too focused on regulating the industry and finding market for farmers. Finally, some of them are not mandated to provide extension services and some which are mandated to provide extension services are facing resources limitations (human and finance). To address this shortfall, the project will improve access to extension services in the project areas (Output 1.2) to showcase climate resilient agriculture practices and train farmers on their adoption, facilitate knowledge transfer, and initiate climate responsible behavioral changes in agricultural systems.

1.7.2 Lack of agricultural statistics and Information

Agricultural data and information are important tools for policy formulation, decision-making, coordination and tracking of progress for future planning. However, the PNG agriculture database is obsolete and agriculture sector planning is thus undertaken on an ad hoc basis with insufficient data and information provided by sub-sector agencies. The lack of statistics and information has resulted in reduced efficiency of sectorial adaptation planning, resulting in reduced performance in the agricultural sector. In this context, the project will improve the capacity of the actors involved in the agriculture sector on the monitoring and evaluation of the proposed interventions and associated results (Output 3.1).

1.7.3 Ecosystem degradation affecting agriculture productivity

Socio-economic growth has increased pressure on land and natural resources, contributing to PNG having the second highest rate of primary forest degradation over 2002–2020, with 777,000 ha of total forest loss. The main drivers for deforestation and degradation are logging, agriculture and mining, with the agriculture drivers mainly comprising land use shifts (63%) and palm oil production (30%). With the majority of forests under customary ownership, and limited arable land due to steep mountainous terrain, peatland, poor soils, the demand for arable land to enhance agricultural production in response to increasing population growth is one of the main drivers of forests deforestation and degradation.

In coastal areas, saltwater intrusion is affected by factors such as the frequency and magnitude of storms and tides. This has a rippling effect on ecology, such as the retreat of upland forests, conversion of freshwater wetlands, nutrient mobilization, and declining agricultural productivity. Few crops can grow under sustained conditions of salinity greater than 2 parts per thousand, which is significantly lower than the salinity levels of many salt-affected fields. For example, crops such as sweet potatoes and rice are very sensitive to salt water. In addition, salinized farmland with high nutrient levels can be quickly colonized by many species of agricultural weeds.

[119] *Okrupa et al. (2019). Identifying Value Chain Constraints for Sweet potato, Irish potato and Bulb onion in the Highlands of Papua New Guinea*

Efforts to combat degradation are in place and driven by global pressures to combat biodiversity loss and protect the environment. The country is engaged in sustainable land management to address ecosystem degradation and build resilient communities. 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 of technical capacity and knowledge on the latest sustainable land management and climate smart agricultural techniques that aim to preserve soils and natural ecosystems. This project will implement nature-based solutions (NbS) to enhance ecosystem services (Output 1.3) that will sustain agricultural production.

1.7.4 Agricultural marketing issues and processing

PNG's diverse setting with a heavily rural population (85%), over 800 different languages, limited education, rugged terrain and poor infrastructure create constraints to developing marketing systems. Under projected climate scenarios, the increase in extreme rainfall events will exacerbate the degradation of infrastructure and further reduce market access. Ultimately, this directly reduces local populations' abilities to actively participate in the economy. Because of this, market systems will further be disrupted during the period needed to transport commodities. This can in turn increase losses from perishable commodities such as horticultural products. 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 these barriers through the distribution of eco-friendly technologies for processing and/or storage (Output 2.2). This will complement effort undertaken by the Government of PNG for improving physical access to markets through climate-resilient road networks[120,121,122].

There is limited information available to farmers about best practices for productivity and site-specific weather forecasts, which acts as a barrier to their access to markets[123]. Due to the unpredictable nature of weather patterns, farmers currently rely on their own observations, as well as input from family members, neighbors, community leaders, and religious leaders, as their main source of information[124]. However, these sources may not always have access to accurate or current information. In addition, access to information such as daily rainfall, temperature data, and drought advisories[125], is important for farmers because it allows them to make informed decisions about activities such as land preparation, irrigation, pest and disease management, and post-harvest management[126]. With the increasing mobile connection in PNG (+8.3% between January 2020 and January 2021)[127], digital interventions in Papua New Guinea's agricultural sector are increasingly being used to address various opportunities, including the development of digital solutions to improve agribusiness operations and the provision of support for extension services[128]. Digital technologies can provide farmers and consumers with accurate information about agriculture and facilitate market access. The ASSA project will support the dissemination of agricultural information in digital form in Papua New Guinea, with the goal of strengthening relationships among stakeholders in the country's agricultural value chain (Output 2.1).

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[120] *https://ewsdata.rightsindevelopment.org/projects/p166991-papua-new-guinea-resilient-transport-project/*
[114] *The PNG Transport Sector Support program supports local road contractors to build climate-resilient roads, bridges and wharves. More info on: https://www.pngtssp.com/*
[122] *PNG recently submitted a concept note to the Green Climate Fund, focusing on improving climate-resilient road infrastructure. The project also targets Enga, Milne Bay, and New Ireland provinces in terms of upgrading climate-resilient road networks to facilitate improved access to markets by farmers.*
[123] *GSMA (2019). Landscaping New Opportunities for Digital Agriculture in Papua New Guinea, 58p. https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/09/Landscaping-New-Opportunities-for-Digital-Agriculture-in-Papua-New-Guinea.pdf*
[124] *ibid.*
[125] *Australian National University (ANU), 2019, "Engaging agricultural communities in climate responsive food production: a PNG case study," Steven Crimp.*
[126] *GSMA (2019). Landscaping New Opportunities for Digital Agriculture in Papua New Guinea, 58p.*
[127] *https://datareportal.com/reports/digital-2021-papua-new-guinea#:~:text=The%20number%20of%20mobile%20connections,34.4%25%20of%20the%20total%20population*
[128] *ibid*

1.7.5 Inadequate infrastructure

Facilities provide an equitable basis for future development and economic growth. PNG being topographically challenging with many people living in remote locations, a number of important improvements are required to make infrastructure network suitable to drive agricultural development in the three provinces targeted in this proposal. In PNG, roads are the main transportation route to transport agricultural products. It is therefore vital that they remain in good conditions. However, lack of maintenance and increasing extreme weather events make it challenging for remote farmers to access affordable transportation systems. There is currently a heavy reliance on generators, as the electricity network does not include last-mile infrastructure, and the supply is unreliable. Access to water needs to be extended and improved beyond urban areas. Due to the small size of the market, it is difficult to compete with the global market in a similar commodity trading market. In addition, in most cases, the volumes available do not reach the minimum volumes required for efficient transportation. Other critical points limiting access to markets include lack of post-harvest and processing equipment (sorting, grading and packing), inadequate quality standards and certifications, etc. The ASSA project will focus on addressing the need for post-harvest and processing equipment that will complement current governmental efforts to build and improve road networks across the country. Hence the ASSA project will not address resilient road infrastructure as originally planned.

*1.8 **Gender assessment***

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 age 15.

Constraints such as culturally embedded patriarchal and social norms may 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 2 women representatives in the national parliament and women hold less than 2% of local government positions[129]. 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[130]. Women are increasingly recognised as leaders and are developing skills to move into elected office and other formal positions of authority[131]. Despite this progress, such barriers as 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[132].

Conversely, it is acknowledged that achieving gender parity in formal labor force participation would result in a 14% increase in economic output[133].

Table 3 below presents some aspects of PNG's Gender Inequality Index.

[129] *Pacific Women Shaping Pacific Development. (2021). What Works for Gender Transformative Approaches in Papua New Guinea.*
[130] *Department of Personnel Management, 2011, Gender Equity and Social Policy, PNG.*
[131] *USAID, 2013, Women's Economic Participation in Papua New Guinea: Achieving APEC Priorities for Gender Equality.*
[132] *SPC, 2012, Stock-take of the Gender Mainstreaming Capacity of Pacific Island Governments, PNG.*
[133] *Pacific Women Shaping Pacific Development. (2021). What Works for Gender Transformative Approaches in Papua New Guinea.*

Table 3: *Aspects of PNG's Gender Inequality Index (GII value of 0.725, rank 161)*[134,135]

Component	*Value*			
Maternal mortality ratio	*145.0*			
Adolescent birth rate	*55.3*			
Female seats in parliament (%)	*1.7*			
Population with at least some secondary education (%)	*Females:*	*10.8*	*Males:*	*15.5*
Labour force participation rate (%)	*Females:*	*46.3*	*Males:*	*48.1*

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.

1.8.1 *Gender and social inclusion intertwining with climate risks in agriculture*

A voluntary national review of PNG's SDG 2020 notes that between 75 and 80 percent of the population lives in rural areas and depends on agriculture and fisheries for their livelihoods in underserved and hard-to-reach rural and remote areas, where women do not routinely participate in agricultural extension training. 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[136] *.*

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[137]*. Crops typically cultivated by women tend to be valued at only half as much as crops typically cultivated by men. Women tend to be responsible for food security, including usually cultivating food crops such as sweet potato, banana, taro, yam, edible greens, vegetables and fruits. Traditionally, men tend to focus on cash crops production, particularly cocoa or coffee and are most often landowners. Men tend to work in economically profitable activities, whereas women are mainly responsible for domestic activities, restricting time that could be spent working in the formal sector. 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 impact from hazards can directly result in food insecurity for rural households[138]*. 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*[139]*. 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.*

[134] *UNDP. (2021). Human Development Report.*
[135] *https://www.abc.net.au/news/2022-09-03/png-election-brings-women-back-for-first-time-since-2017/101374734*
[136] *Department of National Planning and Monitoring. (2020), Papua New Guinea's Voluntary National Review 2020.*
[137] *Asian Development Bank, 2016, Country Partnership Strategy: Papua New Guinea, 2016–2020. Gender Analysis Summary.*
[138] *Brun, Delphine (March 2018). CARE Rapid Gender Analysis, Papua New Guinea – Highland's earthquake.*
[139] *Lane R, McNaught R. Building gendered approaches to adaptation in the pacific. Gender Dev 2009, 17:67–80 71–72.*

Women have less access to essential resources for disaster preparedness, mitigation and rehabilitation, while their workloads are comparatively higher than those of men. To make matters worse, men are more likely to migrate out of rural areas in search of work and because of limited access to energy sources, clean water, sanitation, and health impacts. 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. [140,141].

Climate risks aggravate the institutional and governance challenges that persist in promoting and strengthening 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, even though women are major contributors to the agricultural economy (on farms, at home, and in the community) and to food security. 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[142]*. 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 New Ireland, land ownership follows matrilineal principles, and female landowners influence decisions made in allocating land. Household decisions are made by the family and women's power is not always recognized in a matrilineal society.*[143] *Access to knowledge and skills for women is also constricted, as gaps in education, literacy, skills, safety and security issues, and participation in extension and training activities persist.*[144] *It is therefore important to ensure equal access for women to training, productive resources, and to climate-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.*[145]

[140] *Lambrou Y, Nelson S. Farmers in a Changing Climate: Food Security in Andhra Pradesh, India. Rome: FAO; 2010.*
[141] *Alber G. Gender, cities and climate change: thematic report prepared for cities and climate change global report on human settlements, 2011.*
[142] *Papua New Guinea National Food Security Policy 2016-2025 Development.*
[143] *World Bank, 2012, Papua New Guinea Country Gender Assessment 2011–2012. New York.*
[144] *World Bank, 2012, Papua New Guinea Country Gender Assessment 2011–2012. New York.*
[145] *FAO, 2019, Country Gender Assessment of Agriculture and the Rural Section in Papua New Guinea*

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 produces' 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, particularly women and youth farmers*
- *to boost the ability of vulnerable smallholder farming communities, particularly women farmers, to access postharvest processing, storage technologies, and profitable markets*
- *To foster the development of climate-resilient practices of farmers, 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 food crops systems, the differences in the crop cycles, as well as institution-building needs in the sector and time needed to improve significantly women's' participation and leadership in the agricultural 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. Selection, validation and dissemination of climate-resilient crops* *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*	*4,279,230*
Component 2: Climate-resilient access to markets	*2.1. Digital platform to strengthen relationships among agricultural value chains actors* *2.2. Eco-friendly technologies for climate-smart seed saving, postharvest processing, and modern storage.*	*2. Improved access to appropriate processing, storage technologies, and profitable markets*	*2,925,171*
Component 3: Capacity building and knowledge management for scaling-up CRA practices	*3.1. Training-of-trainers to monitor, report and verify impacts of climate-resilient practices across agricultural value chains* *3.2. Capacity building programme on climate-resilient agricultural production* *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*	*3. Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.*	*1,148,106*
3. Project activities cost (A)			*8,352,508*
4. Project/Programme Execution cost (B)			*864,992*
5. Total Project/Programme Cost (A)+(B)			*9,217,500*
6. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable) (8.5%)			*782,500*
Amount of Financing Requested			*10,000,000*

Projected Calendar:

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

Milestones	*Expected Dates*
Start of Project/Programme Implementation	*2024*
Mid-term Review	*2026*
Project/Programme Closing	*2028*
Final Evaluation	*2028*

PART II: PROJECT/PROGRAMME JUSTIFICATION

Description of project components and activities

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 agricultural production in PNG, with effects particularly acute for smallholder farmers. With the expected increase in climatic events in the coming decades, the PNG's ASSA program sets the overall objective to strengthen the sustainability of key agricultural value chains in the face of a changing climate through the adoption of climate-smart practices, contributing to improved product quality, better market access and the creation of green jobs for women and youth in fragile communities. Doing so, it will contribute to reduce the vulnerability of smallholder farmers to the effects of climate change and improve their ability to adapt while protecting the agro-ecological resources in rural areas. The programme targets three provinces (Enga, New Ireland, and Milne Bay) identified by the Government of PNG under its Climate Resilient Green Growth (CRGG) project. It will provide integrated solutions to address key barriers preventing adaptation in the agricultural sector through the implementation of the three components outlined below.

Component 1: Climate-proofed small-scale agricultural production (resilient crops, resilient agricultural practices, and resilient agroecological ecosystems)

This component will provide a substantial contribution towards an enhanced climate-resilience of agricultural production focusing on vulnerable small-scale farmers. It will do so by supporting smallholders' farmers in identifying and disseminating tested resilient seeds for selected crop varieties, promoting resilient agricultural practices, and ensuring agroecological resilience. This component will foster the cultivation of climate-resilient crop varieties by vulnerable smallholder farmers adopting resilient practices and preserving the agroecological conditions of their lands and ecosystems.

The project will promote a community-led approach towards the selection of the crops that are the most relevant in the context of each province, thereby supporting the promotion of a diversified resilient economic base at the rural level.

Beneficiaries' communities from each one of the three participating provinces will be engaged in the selection and prioritization of the crops that present high potential for community adoption for long term sustainability, and potential for contributing to the resilience of the agricultural system. Priority will be given to staple food crops with high nutritional value to enable vulnerable households to meet their needs. Clear criteria will be adopted to promote a community led identification and selection process of the crops of interest, supported by an expert led validation process confirming the resilient seeds variety for this crop, as well as an evaluation phase to demonstrate and showcases the potential of this crops to contribute to resilience.

An initial menu of eligible crops has been considered during the design phase of this ASSA programme with a focus on crops that will contribute to food security. A menu approach for crops will enable further

prioritization and validation before the wide dissemination of the most relevant crops. This will also ensure full community support, necessary for sustainability. The final selection will be undertaken during implementation, using a community-driven process and guided based on eligibility criteria, to demonstrate link to resilience and adaptation. Selected food crops shall need to be highly vulnerable to climate change, have a strong resilience attribute and demonstrate a significant contribution to the food security of local communities. The initial menu includes:

- *Roots: taro, yam, cassava, sweet potato, English potato.*
- *Berry: banana*
- *Cereals: rice*
- *Pulses: beans*

Additionally, component 1 will support these resilient cultivars' uptake. The resilient seeds or planting materials will be validated by the Government of Papua New Guinea's National Agriculture Research Institute (NARI) and SPC Land Resources Division (SPC LRD) and made available to smallholder farmers. Dissemination, uptake and sustainable integration of the new cultivars in the agriculture production system will be facilitated by Model farmers, comprised of equal number of men and women Models.

Activities under component 1 include the provision of knowledge and climate-smart agriculture practices through an improved extension services provision. The users of climate-resilient crops will require basic skills and knowledge on the crop management of new resilient cultivars that will be disseminated through farms fields schools and demonstration plots. Tools for extension services including capacity-building manuals for propagating resilient food crops and training of key smallholder farmers, decentralized technical staff, as well as provincial authorities will be developed. This component is aligned with the Government of Papua New Guinea's Department of Agriculture and Livestock (DAL) priorities, the need to increase smallholder' farmers' resilience through cropping in areas that are less prone to land erosion and landslide, and resilient farming systems and extension services.

To prevent those efforts from being undermined by landslides induced by heavy rain events and coastal erosion, nature-based solutions will be deployed during the implementation of this component to protect cropping areas in highlands and coastal zones threatened by these climate-driven risks.

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

This outcome will be achieved through: (i) a selection and validation of climate resilient crops; (ii) the dissemination of climate-resilient agricultural practices and (iii) the implementation of land and ecosystems conservation through nature-based solutions to reduce climate-related impacts.

Output 1.1. Selection, validation, and dissemination of resilient crop varieties

***Activity 1.1.1:** Community-led selection, evaluation and validation of resilient crops menu based on relevant eligible criteria*

1.1.1.1: Co-identify the targeted resilient- crops through community-led approach *Representatives of FBOs, CBOs, NGOs, FPDA and NARI will be invited to attend a 5-day workshop at the provincial level to: (i) co-identify eligibility criteria for the selection of the resilient-crop that will be promoted in the various communities of the project area.*

<u>Eligibility criteria for crop' selection from the menu:</u> The eligibility criteria should reflect the clear contribution of the selected crop to the resilience and adaptation of the local communities. As previously mentioned, selected crops need to be highly vulnerable to the relevant climate risks threatening crop production in each rural district of the project area, demonstrate a relevant contribution to food security and have a strong resilience attribute. The selection criteria will also include site-species matching to ensure that crops selected are adapted to the area and are suitable for the site-conditions. The co-identified eligibility criteria will be used to select and prioritize up to three crops per province among the initial list of root crops, cereals, berry and pulses that was pre-identified during the consultancy process leading to the development of the ASSA fully funding proposal. They are: (i) taro, yam, cassava, sweet potato and English potato (for the root crops); (ii) banana (for berry); (iii) rice (for cereals) and beans (for pulses).

This activity will be executed by Divisions of Agriculture and Livestock within the Provincial Administrations (PDAL) of Enga, Milne Bay and New Ireland in collaboration with FPDA and NARI.

1.1.1.2: Identify 40 Model Farmers (at least 50% women) through a series of two workshops at the provincial level to co-define criteria for the Model Farmers' selection

The identification of Models Farmers will be based on a participatory approach and co-identified criteria such as: (i) interest in crops promoted by the project (ii) experience, skill, and knowledge in seed multiplication; (iii) ability to understand seed multiplication techniques; (iv) capacity to apply multiplication guidelines and recommendations[146]; (v) willingness to collaborate with NARI or SPC LRD, and (vi) commitment to deliver and supply seed. Other relevant criteria can be added during the workshop.
According to the public consultations, following the 2007 drought, NARI distributed drought tolerant sweet potatoes that perform well under experimental conditions. But those distributed varieties don't meet the expectation in farm conditions. Based on the lessons learned from that experience and technology transfer approach for smallholder farmers, adopted by the South Pacific Institute for Sustainable Agriculture & Rural Development (SPISARD)[147], field trials and demonstration plots will be conducted in farm conditions with smallholders' farmers at the center of the process. A workshop will be held during the first year of the project, to identify a list of the 80 potential Model Farmers (with at least 2 farmers in each rural LLGs[148]).

Once the list of potential farmer Models are established, the PDAL, in collaboration with the provincial climate change committees (PCCC), will select the 40 Model farmers based on alignment between the following: (i) needs for provincial resilience and the farmers' crop of interest; (ii) availability of a permanent water source; (iii) accessibility of the Models' farms; (iv) available land to isolate the seed multiplication area if needed, and (v) ability to provide locally available time, labor, and/or materials for the construction of the multiplication sheds planned in Activity 1. 1.2. The identification of women will take into account their leadership potential, and their ability to replicate this initiative with other women or to encourage other women to participate, particularly young women. Other criteria may be considered for selection at the workshop. The Models will: (i) receive seeds and planting materials for the crops co-identified in sub-activity 1.1.1; (ii) host demonstration plots to be used for the community-led evaluation (1.1.1.3), (iii) and be equipped with propagation sheds for the multiplication of the selected and evaluated crops (1.1.1.4).

This activity will be executed by Divisions of Agriculture and Livestock within the Provincial Administrations (PDAL) of Enga, Milne Bay, and New Ireland in collaboration with FPDA and NARI. The other implementing partners associated with this activity will be the UN Women, NGOs, CBOs, farmer cooperatives, and LLGs.

[146] *Availability of permanent source of water, available land to isolate land if it's needed*
[147] *https://www.unitech.ac.pg/spisard/*
[148] *There are respectively 15, 15, 9 rural LLGs in Enga, Milne Bay, and New Ireland, respectively*

1.1.1.3: Provide technical support to Model Farmers for implementing field trials that must be used for community-led evaluation of their adaptation to the provincial context. NARI will provide technical support for 40 field trial plots that will be implemented on farmer's lands.
1.1.1.4: Organize field visits for the assessment of the climatic resilient varieties grown in the Models' demonstrators. *Field visits will be led by PDAL in collaboration with NARI which will analyze the perception of the communities regarding the adoption criteria of the selected resilient crops grown in the field trials plots of Model Farmers. Adoption criteria will reflect the adaptation to the local climate conditions, the preference based on the characteristics of commodities produced in the field trials and resistance to locally existing pests and diseases. Climate resilient crops with high levels of adoption potential will be considered to achieve the output 1.2.*

Activity 1.1.2: *Support the construction of 40 multiplication sheds for resilient varieties distribution*

1.1.2.1: Design the standard plan of locally acceptable, small-size multiplication sheds using locally-available materials. *This activity will be executed by PDAL with technical support from NARI. Group of experts in crop multiplication technics from NARI will be contracted for designing locally-accepted multiplication sheds considering the use of locally-available materials, the geographical locations (highlands, coastal area) and targeted crops for multiplication. The standard plans of locally-acceptable small size will be accessed and approved during the 1-day validation workshop with PCCC and NARI, based on the criteria like the level of local materials needed for the construction, its costs, size, and its ease of maintenance.*
1.1.2.2: Contract local firm specialized in rural infrastructure for building 40 multiplication sheds and equip them with basic materials in the project area. *The PDAL will contract local firms to build multiplication sheds. Building materials will be also provided by the project. PDAL will collaborate with NARI to ensure the quality control of the built sheds. Prior to building the sheds, the project will conduct a site-specific EIA to ensure proper site selection and minimal risk to biodiversity and soil disruption.* *Once built, seeds or planting materials of resilient crops co-identified (under in sub-activity 1.1.1.1), evaluated (under in sub-activity 1.1.1.4) will serve as inputs for planting material multiplication with the sheds. The project will support the multiplication sheds with a provision of basic equipment (irrigation tools) for their operationalization.*
1.1.2.3. Distribute the validated resilient planting material or seeds (activity 1.1.1) to the extension service providers for advisory support (output 1.2). Some of the stock of planting materials produced by the Model farmers will be made available to the extension service providers and used in their agricultural advisory support to the communities. Model farmers will use some of the stock for their own consumption and the share of proceeds from the sale of some of the stock can be used for shed maintenance. PDAL will carry out this activity.

<u>Output 1.2. Extension services for climate-resilient agriculture</u>

Activity 1.2.1: *Identify and setup 30 demonstrators including recruitment of-members.*

Demonstration plots will be set up in the project area for farmers engaged in the production of crops eventually selected in the menu.

1.2.1.1: Identify farmers using a participatory approach at Enga, Milne Bay, and New Ireland. *PDAL will collaborate with NARI, Fresh Produce Development Authority (FPDA), to define selection criteria and identify 30 farmers during 5-day field visit.* *Pilot farmers are farmers willing and able to conduct on-farm demonstrations with one of the targeted crops. They should have the potential to advise other peer farmers. A sample group should be formed with farmers owing similar production conditions, agricultural basic practices, and interest in trying out new climate resilient practices for the crops that was prioritized for their province under sub-activity 1.1.1.1. Their farms should be suitably located to allow easy access to the maximum number of farmers. Critical success factors for this activity include: the farmers' willingness and ability to accept novel agriculture extension ideas and to integrate new agriculture extension information into their cropping system, and their willingness to undergo further training on cropping practices.*
1.2.1.2: Train selected farmers on the basic knowledge and skills of production to become Model Farmers. *Farmers identified under sub-activity 1.2.1.1 will manage demonstration plots to promote resilience with high adoption of resilient crops selected from the menu using sustainable and adaptive cropping practices. The manuals developed under Activity 1.2.2 will be used to conduct a 5-day on-farm training at the provincial level. PDAL will carry out this sub-activity.*
1.2.1.3: Provide resilient and high-adoption potential planting materials to selected Model Farmers according to their communities' need. *Planting material selected, evaluated, validated (Activity 1.1.1) and propagated by the farmer Models under Activity 1.1.2 will be used to supply the demonstration plots of the model farmers.* *Model farmers will select from the priority crops for their province under sub-activity 1.1.1. This sub-activity will be carried out by PDAL.*
1.2.1.4: Provide technical support to Model Farmers for implementing 30 demonstration plots that must be used for farmer-to-farmers-extension actions. *The Model Farmers will serve their communities as endogenous trainers.* *PDAL will collaborate with NARI and Fresh Produce Development Authority (FPDA) to provide technical support through a 5-day field visit.*
1.2.1.5: Provide support to organize one awareness campaigns per demonstrator to enroll 30-50 other farmers per demonstration plots[149]*.* *PDAL will carry out that activity, in collaboration with NARI, Fresh Produce Development Authority (FPDA). They will provide technical support for the farmer enrolment during a 4-day field visit in the project area.*

Activity 1.2.2: *Design the training curriculum and manual on resilient agronomic packages and translate into local language as appropriate.*

[149] *Assuming one enrolment per demonstration plots during the project lifetime*

1.2.2.1: Recruit a national consultant to develop a curriculum and training manual on resilient agronomic packages for the finally selected crops from the menu.

A national consultant will be recruited to develop curriculum and training package for each targeted crop covering resilient agronomic and post-harvest management practices (following a value chain approach). The manuals shall be prepared in English and translated in Tok Pisin (New Guinean Pidgin)
A workshop at the provincial level (3 validation workshops) to validate training curricula and manuals on resilient agronomic packages for the crops finally selected in the menu.
The validation workshop will be attended also by CBOs, NGOs, CSOs, and farmers cooperatives from the provincial level (3 validation workshops) FPDA and NARI to validate training curricula and manuals on resilient agronomic packages for finally selected crops from the menu. This activity will be led by the National DAL.

Activity 1.2.3: *Identify and map potential (non-state) extension service providers including well-functioning cooperatives, women cooperatives groups or associations, grassroot organizations, intermediaries, smallholder SMEs, and input suppliers for each province.*

1.2.3.1: Identify and map potential (non-public) extension services providers including well-functioning cooperatives, grassroots organizations, intermediaries, smallholder SMEs, and input suppliers for each province. A national consultancy firm or consultant with expertise in stakeholder mapping will be recruited for this identification and mapping. The consultant will undertake a capacity assessment of these potential service providers and prepare a long list of suitable candidate service providers for the activity 1.2.4. The deliverables produced under this sub-activity (capacity assessment report of the extension service providers and the list of suitable candidate service providers) will be validated during a 1-day validation workshop for each province. National DAL will lead this sub-activity.

Activity 1.2.4: *Support for 50 contracts related to extension services provision between local service providers and farmers' organizations. Based on those contracts a series of technical training will be provided to farmers on resilient agronomic packages and input support to lead farmers to pilot and implement improved techniques).*

Based on the result from activity 1.2.3, extension service providers will be selected and recommended by PDAL in collaboration with Fresh Produce Development Authority (FPDA) and provincial climate change committees (PCCC), to the National DAL. The contract will be signed between the National DAL and extension serviced recommended by PDAL, FPDA and PCCC to:

1.2.4.1: Provide monthly training for finally selected crops from the menu for groups of farmers including model farmers on modules related to climate and weather forecast, climate-smart practices, post-harvest processing, and conservation practices. The contracted extension services will also (i) closely monitor and advise farmers on the best course of action during periods of pest and disease outbreaks or weather disasters, and visit farms monthly to provide advice, information, new technologies and techniques, and support services to enable farmers to improve their productivity.

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

Activity 1.3.1: *Carry out a ground survey and map degraded areas for reforestation in the project areas.*

The consultations undertaken in the three provinces during the ASSA project full design phase confirmed the availability of degraded land suitable to carry out reforestation activities. Therefore, this activity will provide information about the precise location of the degraded areas in the three target provinces. This activity encompasses:

1.3.1.1: Identify degraded and areas prone to landslides in the three targeted provinces (Enga, Milne Bay, and New Ireland) through a participatory survey. *This activity will be implemented by PNG Forest Authority (PNGFA), in collaboration with Conservation and Environment Protection Authority (CEPA), PDAL, LLGs, NGOs, and PNG National Disaster Centre (NDC).*
1.3.1.2: Mapping degraded and areas prone to landslides including the provision of the biophysical database in excel format in Enga, Milne Bay, and New Ireland. *PNGFA will recruit a consultant/ expert or firm in GIS who will collaborate with PDAL and CEPA. The consultant will use the list of georeferenced degraded areas from sub-activity 1.3.1.1*
1.3.1.3: Validation workshop for degraded and areas prone to landslides mapping in Enga, Milne Bay, and New Ireland. PNGFA will implement this activity (one validation workshop) in collaboration with PDAL, LLGs, NDC, NGOs, CBO and CEPA. An assessment report will be produced at the end.

Activity 1.3.2: *Implement a reforestation program of 3000 ha around croplands, mangroves, and degraded forest, vegetation planting along riverbanks or unstable lands.*

The activity aims to promote the protection and rehabilitation of agroforestry systems on cropland/degraded forest and mangrove systems. It involves:

1.3.2.1: Identify and rehabilitate existing community nurseries. *PNGFA in Enga, New Ireland, and Milne Bay will be in charge of this activity and will collaborate with PDAL, LLGs, NGOs, and cooperatives to identify and rehabilitate 10 community nurseries for the production of native tree seedlings and saplings, for reforestation action on 3000 ha.*
1.3.2.2: Consult local communities for selecting 1000 ha (for each province) of degraded or areas prone to landslides in forest, mangroves, and croplands ecosystems located in Enga, Milne Bay, and New Ireland. *The purpose of the consultation is to obtain free prior informed consent of the community when the selected areas are on customary land. This identification will be based on a map and biophysical database, and other co-identified criteria. Guidance on site-species matching will be developed for specific locations which will provide information on key tree species that are native to the area and their ideal site-conditions. It will further identify areas where certain tree species should not be planted based on site-conditions. In addition to native species, the project will only promote tree species which are already locally adapted and do not pose a risk to the local biodiversity.* *PNGFA will implement this activity in partnership with PDAL, LLGs, NGOs, and NDC.*
1.3.2.3: Training of 10 community nurseries for reforestation action on 3000 ha.

This training will also include techniques in seed/seedling collection and handling, preparation, germination and caring for seedlings with techniques on cloning native tree species that cannot germinate from seeds. The manual developed under 1.3.2.4 will be used for the training. PNGFA will implement this activity in collaboration with PDAL and NARI for delivering the hands-on training.
1.3.2.4: Development of a technical manual in official and local languages on collection, handling, producing and planting native trees. *PNGFA will contract a technical consultant or expert, and the technical manual will be developed in collaboration with PDAL, NARI, NGOs, and Cooperatives*
1.3.2.5: Support 10 community nurseries with a kit for seedlings and saplings production. Kits for seedlings provided to cooperatives, and grassroots organizations trained in 1.3.2.3. *The activity will be handled by PNGFA in collaboration with SPC LRD, PDAL, and NARI for supplying forest tree seeds.*
1.3.2.6: Planting of 1,200,000seedlings/saplings[150] over three years for 3000 ha of degraded land (riverbanks, mangroves, croplands, forests) in Enga, Milne Bay, and New Ireland. *Specifically, for areas prone to landslides, rock-filled gabions combined with trees planting technics will be used to reduce the risk of landslides and erosion. The activity will be implemented by PNGFA in collaboration with cooperatives, and grassroots organizations trained in 1.3.2.3., PDAL, LLGs, CBO, NGOs.*

Activity 1.3.3: *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.*

1.3.3.1: Workshop sessions to raise community awareness on the ecosystem services provided by wooded or forested areas and on the importance of maintaining reforested areas and development of local plans for maintaining agroecological systems. *PDAL will lead the workshop in partnership with existing staff at the provincial level from PNGFA, as well as CEPA and NARI to raise community awareness on the ecosystem services, with the active participation of women.*
1.3.3.2: Support for the protection and implementation of local maintenance plans of the reforested areas. *This sub-activity involves a replanting program. One month after planting, a survival count and replanting of dead seedlings will be performed along with a weeding. Then, at six months old, another weeding and small amount of replanting will be conducted. Annual replacement of dead seedlings will take place over a period of three years following planting. It will also include the weeding of reforested areas, protection against wildfires and strong winds. The community can be involved in the replanting, construction of firewalls every year and weeding (2 or 3 times per year). For the weeding, the agroforestry practice called "taungya system" can be applied when trees are interplanted with other food crops. This system will enable the community to grow food and, by maintaining the crops, they are also maintaining the plants. PDAL will lead this activity, in partnership with existing staff from PNGFA, as well as grassroots organizations, cooperatives, NGOs, NARI and CEPA.*

Component 2: Climate-resilient access to markets

[150] *Assuming 400 plants/ha for relining, subsequent seedling enrichment, and potential loss.*

This component is designed to provide smallholder farmers in the rural parts of Enga, Milne Bay, and New Ireland with adequate post-harvest solutions to accelerate their entry into market, moving away from subsistence farming mainly. The proposed activities will contribute to increase household incomes, especially for women and the youth, and ultimately improve their livelihoods. The component aims at achieving two main results, (i) improved access to lucrative markets with high-quality product; (ii) increased climate-resilient post-harvest management practices including climate-proof storage solutions for agricultural products. Doing so, PNG smallholder farmers will be able to minimize post-harvest losses and improve the processing of agricultural products for value addition. As a means to achieve these goals, there will be specific trainings that will guide farmers on how to access post-harvest processing services in the three (3) targeted provinces.

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

The achievement of this outcome will be realized by building sustainable commercial relationships between different stakeholders involved in agricultural value-addition and linking them to markets, while facilitating the access to eco-friendly storage and processing technologies. This goal will be achieved by building sustainable business relationships between various stakeholders involved in adding value to agriculture and connecting them to markets through a digital platform, while also providing access to environmentally friendly storage and processing technologies.

Output 2.1. Digital platform to strengthen relationships among agricultural value chain actors

Activity 2.1.1: *Assess existing agricultural market information and flows in project areas to identify needs and gaps.*

This activity will provide information on existing agricultural market data needs and gaps. It includes:

2.1.1.1: Assessment of agricultural market information and flows in Enga, Milne Bay and New Ireland. *DAL will lead this activity and will contract a consultant or specialized firm in agricultural market flow analysis for this assessment.*
2.1.1.2: Validation workshop of the assessment study. *DAL will lead this activity, coordinating with LLGs, NGOs, Farmer organizations, FPDA, NARI and relevant stakeholders to validate the assessment report that will be produced under 2.1.1.1.*

Activity 2.1.2: *Support the development of an integrated digital platform to link farmers, small-scale processors, traders, and buyers along the value chain.*

The activity aims to connect all parties involved in the value chain and information related to commodities (e.g., prices, weather forecasts) through a digital platform. Sub-activities are presented below:

2.1.2.1: Evaluation of the commonly used digital platforms linking farmers, small-scale processors, traders, and buyers in PNG. *This activity aims to identify lessons learned from the development of similar digital platforms, related best practices, and which has the best potential to connect all parties involved in targeted value chains in the project*

areas. The identification of the best platform will also consider the need of the users, the way the system operates, its self-sustained potential. This sub-activity will be implemented by DAL which will hire a consultant specialized in agricultural sector digitization.
2.1.2.2: Development of an integrated agricultural digital platform *DAL will lead this activity and will recruit a consulting firm to improve agricultural extension, weather monitoring and forecasting or e-commerce provided by the suitable digital platform identified in sub-activity 2.1.2.1. The platform will also be disseminated and promoted at all relevant project events with farmers and stakeholders (training of Model Farmers, extensions services, workshops, etc.). National Information and Communications Technology Authority will be associated to this sub-activity to provide technical support.*
2.1.2.3: Maintenance and update of the digital platform with new data, parameters and functions *DAL will lead this activity and contract a consultant or specialized firm in agricultural digital platform. The maintenance of the platform will be done on annual basis by the consultant during 3 years after the improvement of the platform.*
2.1.2.4: Training of farmers, traders, and buyers in the use of the platform at the provincial level *DAL will lead this activity, support the consultant who developed the platform to train communities and group farmers, traders, and buyers involved in the use of the platform. PDAL, will select participants that will attend to the training. They should demonstrate their willingness to attend the training, be able to install and use the platform on their mobile phone and be involved in community or farmer groups. Since women often lack the digital literacy for online platforms, they will be trained to acquire digital skills first.*

Output 2.2. Eco-friendly technologies for climate-smart seed saving, post-harvest processing, and modern storage

Activity 2.2.1: *Undertake joint planning with women and youth farmers organizations to identify the specific needs and priorities of the beneficiaries.*

This activity aims to give special attention to women and young farmers during the implementation of the project. It aims to limit their disproportionate vulnerability to the effects of climate change and enable their transition to commercial farming that can not only increase their income but also improve their livelihoods.

2.2.1.1: Identify women and young farmer organizations that will be the beneficiaries and their specific need *The consultant, in collaboration with LLGs, NGOs, CBOs, UN Women, and youth and women's associations, will identify women's and young farmers' organizations as beneficiaries of Activity 2.2.1. The consultant will produce a report on the need assessment of women and young farmers organizations for eco-friendly technologies for processing and storage. The selected beneficiaries should be functional with at least 20 members and have business skills. DAL will implement this activity.*
2.2.1.2: Workshop to validate needs assessment of women and young farmers organizations for eco-friendly technologies for processing and storage of climate-resilient food crops *Norms and standards will be validated in collaboration of LLGs, EPC contractors, the private sector, NGOs, and farmers organizations. DAL will implement this activity.*

Activity 2.2.2*: Procure and install processing and storage technologies (e.g., solar-powered dryers, solar-powered storage facilities)*

The purpose of the activity is to make processing and storage more affordable and available to even more farmers, (ii) reduce post-harvest losses due to improper storage methods, and (iii) add value to agricultural yields for increased revenue. The objective of this activity is to (i) make processing and storage more affordable and accessible to more farmers, (ii) reduce post-harvest losses due to inappropriate storage methods, and (iii) add value to farm yields to increase income. This activity will be led by DAL, in close coordination with PDAL, and gathers:

2.2.2.1: Procurement, transport and taxes of equipment (climate-smart seed drying systems, solar-powered dryers or solar-powered storage facilities)
2.2.2.2: Installation of solar-powered dryers and solar-powered storage technologies *Prior to the installation of the solar equipment, an EIA will be conducted to ensure that the selection of installation sites will be made to minimize any environmental risks to biodiversity, waterways during construction, soil disturbance, etc., and to ensure that the site is adequately protected from climatic risks and theft. Firm specialized in solar-powered installation will support the installation of facilities.*

Activity 2.2.3: *Develop O&M guidelines in local languages and provide hands-on training sessions on the operation and maintenance, and management of the technologies to the beneficiary farmer organizations.*

The activity intends to put in place, strict guidelines or manuals to prevent premature damage/ware and help sustain the technologies long-term. This activity will be carried out by DAL. This involves:

2.2.3.1: Development of O&M guidelines and provide hand-on training session to beneficiaries. *One international consultant (individual or firm) specialized in solar equipment and National consultant specialized in solar equipment, will develop these guidelines.*
2.2.3.2: Two training sessions on the operation and maintenance of the solar equipment, given by the international consultant specialized in solar equipment and the national consultant specialized in solar equipment.

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

This last component is designed to disseminate knowledge about the project's activities to local governments, farmers and community members, enabling sustenance and creating a lasting impact. It's based on three (3) main outputs: (i) training of trainers to monitor and report on the impacts of the project's interventions on the agricultural sector, (ii) capacity building for provincial authorities on climate-resilient agriculture, and (iii) knowledge dissemination to policymakers to address underlying issues and effect climate-resilience policies in the agricultural sector. A robust monitoring, evaluation, and learning (MEL) framework will be developed to inform the decisions made under this component.

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

The desired outcome of Component 3 is increased uptake of CRA practices, scale-up of practices and technologies through knowledge dissemination, and capacity-building amongst local government, farmers, and communities.

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

Activity 3.1.1: *Develop training curriculum and training manual on methods and tools to track changes in behaviours and environment incorporating gender and social inclusion and translate into local languages as appropriate.*

3.1.1.1: Development of the training curriculum and manual incorporating gender and social inclusion perspectives in the assessment tools. *DAL will lead this activity, in collaboration with UN Women to recruit a national consultant specialized in methods and tools to track changes in the behaviour and environment of local communities, including gender and social inclusion assessment. The national consultant will deliver the training curriculum and manual in official and local language.*
3.1.1.2: Validation workshop of the developed curriculum and manual. *DAL will lead this activity, in collaboration with SPC LRD, NARI and existing staff in provincial level, universities, CEPA, grassroots organizations and cooperatives to ensure that the training curriculum is well suitable for PNG context.*

Activity 3.1.2*: Conduct Training of Trainers (ToT) for the provincial stakeholders to establish Lead Trainer teams (at least 50% women) comprising of various actors involved in the agriculture value chain.*

The activity aims to train a pool of master trainers capable to train other provincial stakeholders operating at the sub-national level (district and LLGs).

3.1.2.1: Identify 20 trainers from provincial administrations. *PDAL will lead the activity in collaboration with PNGFA, NARI, CEPA and LLGs. A number of trainers with experience and knowledge in M&E, knowledge management, or gender and social inclusion working at provincial level will be identified as master trainers who will further train other administration staff at the District and LLG levels.*
3.1.2.2: Conduct ToT workshop using the developed curriculum. *The activity will be conducted by DAL. The national consultant who develops curriculum and training material under 3.1.1.1 will deliver a 5-day training session for the identified master trainers.*

Activity 3.1.3*: Support Master Trainers to conduct subsequent training sessions at the district level.*

This activity aims to build the monitoring capacity at the district-level. The intention is to support master trainers, trained under sub-activity 3.1.2.2, to provide a series of trainings for key administrative staff working at district levels. This encompasses:

3.1.3.1: Organize twelve 5-day training sessions for key district stakeholders *PDAL will lead these training activities at the provincial level and LLGs. PDAL will make sure that at least 50 % of attendees will be women. At least 100 people working at the LLG and district level in agriculture, forestry, , gender inclusion will be trained per district as well as NGOs, CBOs and FBOs.*

Output 3.2. Capacity building programme on climate-resilient agricultural production

- ***Activity 3.2.1:*** *Provide technical training and support to selected Model Farmers to run seed or planting material multiplication sheds including multiplication techniques, nucleus seeds, development of management, and business plan (under Activity 1.1.2).*

3.2.1.1. Organize three workshops of 3-days at the provincial level (one for each province) on multiplication techniques and nucleus seeds production). *NARI will conduct the training modules' conception and training delivery.*
3.2.1.2. Organize six 3-day workshops (two workshops in each province on the development of farm management plan and business plan). *Commodity boards such as Fresh Produce Development Agency (FPDA), will conduct the training modules' conception and training delivery on farm management and business plan.*

Activity 3.2.2*: Develop gender-sensitive training programs on climate-resilient agriculture including curriculum and training materials, translated into local language.*

The activity intends to reflect the disproportionate ways that climate change affects gender and also act as an incentive for more women to participate. The activity consists of:

3.2.2.1: Development of curriculum and training manual. *This training will highlight the importance of gender involvement in climate-resilient agriculture issues. DAL will lead this activity with support from UN Women as an implementing partner, to contract a national consultant expert in climate and gender to develop the curriculum and deliver the training.*
3.2.2.2: Translation of the curriculum and the manual. *PDAL will lead the activity, with support from UN Women as an implementing partner to recruit a national expert in translation (English to Tok Pisin (New Guinean pidgin)).*

Activity 3.2.3*: Provide training sessions for national, provincial, district and local government authorities involved in promoting climate-resilient agriculture in Milne Bay, Enga, and New Ireland.*

This activity aims to improve their understanding and technical knowledge on gender-sensitive climate resilient agriculture. This includes:

3.2.3.1: Training sessions *DAL will lead this activity, with support from UN Women as an implementing partner. A national consultant specialized in climate and gender, who developed the curriculum and training modules under sub-activity 3.2.1.1 will deliver one training at national level (5-day workshop) and 12 training at district level for Key persons from administration staff at national level, provincial and district and LLGs level. At least 30 people including women (50%) will attend the training workshops.*

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

Activity 3.3.1: *Undertake participatory monitoring, evaluation and learning (MEL) of project activities, and conduct targeted stakeholder awareness sessions.*

Beneficiaries of training under output 3.3.1 will support the M&E specialist in identifying the best practices, especially the master trainers. This activity aims to gather and share in a collaborative way the lessons learned from the activities of this project and the best adaptive management strategies, and to ensure transparent communication of the results of the activities in accordance with the commitments of the stakeholders. It includes:

3.3.1.1: Monitoring of the project activities to identify and document best practices and lessons learned *M&E specialist, housed at DAL, will lead the activity with the support from provincial project officers and PDAL to monitor the project activities.*
3.3.1.2: Conduct targeted stakeholder awareness sessions for transparent communication of results in line with the stakeholder engagement plan through MEL activities such as workshops, conferences and forums to share results, lessons and challenges. *PDAL will implement this activity, in partnership with existing staff, provincial officers, and partners.* *During the beginning phase of the project, a national consultant will be hired to create a stakeholder engagement plan. The national consultant will: (i) draw a stakeholders map with related issues; (ii) develop a stakeholder intervention strategy; (iii) elaborate on stakeholder's influence matrix; (iv) and elaborate on stakeholders' engagement plan.*

Activity 3.3.2: *Develop and publish knowledge products such as policy briefs, technical reports, social media posts, short documentaries, and news media mentions emphasizing best practices and lessons learned concerning CRA practices in each province and at the national level.*

This activity intends to share the results and best practices of the project with the public in each target province. It includes:

3.3.2.1: Development of policy briefs, reports and press release, and stakeholder awareness session. *DAL will lead this activity in partnership with LRD SPC and PDAL, and will contract an expert in Climate policy analysis for delivering the policy briefs, and stakeholders awareness session*
3.3.2.2: Communications of knowledge products *The activity will be implemented by DAL in collaboration with LRD SPC and PDAL. The Communications and Media Specialist (CMS) will support the development of these products which will be released in printed, and electronics format.*

1.10 Economic, Social and Environmental benefits

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.

The project will:

- *introduce CRA measures including resilient crops, in farm and off farm agriculture practices;*
- *introduce post-harvest management technics and technologies that will deliver sustainable and diversified crop production systems; this includes support for post-harvest handling through eco-friendly, solar-powered processing and storage technologies;*
- *improve connectivity between farmers and traders via the integrated digital platform;*
- *create other benefits for vulnerable communities (youth and women) by creating green jobs through processing staple food crops.*

Economic and developmental benefits: Agriculture plays a significant role in the economy of Papua New Guinea (PNG), comprising about a third of the GDP, employing 80% of the active population, and mostly consisting of small family farms. As a significant portion of economic activity in PNG takes place in the household sector, including most agricultural production, retail activity, transportation, and housing services, the project is expected to lead to increased income for local producers through increased production, reduced post-harvest losses, and improved market access. The proposed interventions will provide a real contribution to PNG's sustainable development goals by delivering socioeconomic and environmental benefits (e.g., protection of lives, economic activities, livelihoods, and assets) and create an enabling environment for resilience to address the impacts of climate change. In addition, the project will also support income generation and economic diversification for vulnerable populations, composed mainly of people living below the national poverty line in rural areas, with a clear focus on empowering women and youth (who generally have few opportunities in the countryside, where many have had no formal education).

While the project will increase the income of smallholder farmers, the involvement of local authorities in the project may also be useful in the long run for the development of the country's economy as a whole. In effect, a gradual establishment of a mechanism to bring the informal activities of smallholder farmers into the regulatory/fiscal system that attracts the Goods and Services Tax (GST) can be developed following the project's positive effects. Also, the project results will ultimately contribute to the NDC adaptation target on food security, support livelihoods, and contribute to poverty reduction.

Environmental benefits: The promotion of nature-based solutions (NbS) is at the heart of the project intervention and will support the restoration of degraded land as well as the implementation of more sustainable agricultural techniques. The restoration of forested areas around degraded croplands, mangroves, and forests will help combat soil erosion and land degradation and will help create natural buffers against floods and run-off. Re-forestation also has co-benefits such as carbon sequestration as well as inclusion of native plant species that provide fiber, medicine, fruit, timber, and habitat for animal species, conserving PNG's great biodiversity assets and maintaining populations of migratory birds and fishes in the reforested areas.

Implementation of NbS (e.g., mangrove conservation, vegetation planting along riverbanks or unstable lands) to restore agro-ecological systems and enhance ecosystem services will support stabilization of essential croplands and forest assets. In addition, NbS will contribute to reducing climatic risks such as flooding and landslides. Introducing climate-smart agricultural practices will contribute to soil improvement and soil carbon sequestration through more effective rotation and the use of nitrogen fixing crops, as well as using crops that extract nutrients from different soil depths. This will lead to an increase in biodiversity in the natural landscape surrounding agricultural lands, allowing for the maintenance of

key ecological services crucial for agricultural production. The use of wastes for energy and compost production will also help reduce local source pollution and reduce the use of agro-chemicals on farms.

Social benefits including gender and social inclusion, health and wellbeing:

The capacity building component of this project will help improve the knowledge and skills of vulnerable populations and prepare them to cope with the projected impacts of unmitigated climate change. This will include improving the capacity of actors to monitor and evaluate adaptation results and benefits across agriculture value chains. This will enhance the effectiveness and benefits of other initiatives that target improvement of nutrition, wellbeing and health of vulnerable communities. The implementation of Nature based Solutions, that will involve the community led by women and youth will provide nutritional locally-available supplements to communities. The project will contribute to gender equality and favor social inclusion, as at least 50% of farmers targeted by the project will be women and youth, who will be supported to engage in climate-resilient agricultural production. Furthermore, as described in the Gender Assessment and Action plan (annex 4), the ASSA project will contribute to:

- *documenting women's contribution to agriculture and food security under changing climate in the project area*
- *improving gender representation and leadership in governance arrangements. Indeed, women's groups and UN Women are involved in the Steering Committee to ensure oversight on gender considerations during the implementation of the project.*
- *improving women's access to means of production (resilient crops, small scale irrigation), and access to market through post-processing, storage facilities and digital platform.*
- *strengthening women's association or cooperatives to enable safe and meaningful participation of women in agricultural sector, through various capacity building program aligned with the needs of women and youth.*

Overall, the project will avoid and mitigate negative impacts of the interventions thanks to the inclusive involvement of vulnerable communities, women and youth, the coordination between the national and provincial level, technical support from government institutions and collaborating partners such as UN Women and SPC LRD. Moreover, the project will be implemented in accordance with national standards, the project Gender Action Plan (Annex 4), Environmental and Social Management Plan (Annex 2) and grievance redress mechanism (Annex 3).

1.11 Project cost -effectiveness

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

The project is designed to maximize the efficiency of the Adaptation Fund's investment. The project cost effectiveness relies on key attributes as presented below:
***Efficient budgetary allocation:** The budget for the project is structured in a way that maximizes its potential benefits, with the majority of the funds being directed towards investments (52%). Capacity building, technical assistance, and knowledge management, which are essential for the long-term sustainability of the project, make up 11% of the total budget. A cost-benefit analysis was performed for this project to confirm the relevance of the climate smart agriculture practices proposed in in the output 1.1 and to prioritize best option among alternatives for the storage solution adopted by the project for output 2.2. [Prefabricated storage sheds made of steel with ZINCALUME roofing have a long lifespan and are typically used for around 20 years before they can be recycled. These materials offer a superior option*

due to their durability and longevity]. The analysis was performed by determining the relative profitability of alternative practices and by comparing their differences in terms of flow of benefits and cost over their lifetime. In addition, the CBA showed that the project's financial performance is expected to improve in the longer term. The equipment provided for the project is expected to have a long lifespan and provide a good return on investment over time, but this will depend on effective maintenance, which will be facilitated by capacity building activities.

***Effective contribution to adaptation**: According to the economic and financial analysis presented in this report, the ASSA project, funded by the Adaptation Fund grant, is a strong investment. While it is economically viable, it is not expected to be financially profitable in the short term (up to 5 years). Its financial viability does improve in the long term. Given the low financial returns expected from the investments and the high positive socio-economic externalities, using a grant as the financial instrument for the project seems to be the most appropriate choice. The objectives of the ASSA project are best achieved through public interventions and international climate finance, which align with the provisions for the project's implementation, which involve the Papua New Guinea government as the executing entity and smallholder farmers in the three targeted provinces as the primary beneficiaries.*

For output 1.1, the development of improved seed multiplication sheds is a good investment in both the short and long term. The economic and financial performance of the project is expected to improve over time. Without these improved seeds, it is estimated that there would be 30-40% pre-harvest losses. However, the adoption of resilient seeds is expected to reduce these losses by 66-75%. In addition, the project is expected to result in a 25% increase in productivity. As a result, the investment in the improved seeds is expected to pay off over a period of 10 years.

Output 2.2 aims to address the problem of agricultural post-harvest losses, which are estimated to be as high as 75% due to a lack of storage facilities. These losses disproportionately affect smallholder producers, who make up approximately 32% of total production. The investment in prefabricated storage sheds is expected to be effective in reducing these losses, particularly for crops such as cassava, rice, and sweet potatoes, where post-harvest losses range from 26% to 45%. While the investment in storage is expected to have both short-term and long-term benefits, longer-term investment will be necessary to achieve a positive return on investment and realize the full positive socio-economic impacts of the project.

Considering the above, the Adaptation Fund's financial contribution to this project, in the form of a grant, is set to achieve significant results and benefit a larger number of stakeholders.

***Open, inclusive and transparent design process**: The proposed activities were identified through a participatory approach during stakeholder consultations undertaken in 2021 to assess interest in project interventions[151,152,153]. The ASSA project identified priorities and proven mechanisms for community participation, capacity-building opportunities (including field schools) for farmers, women, youth, and public staff, government involvement, and technology transfer through a participatory process. These mechanisms are expected to lead to adaptation benefits for local communities. The project's prioritization process was open, inclusive, and transparent, and the proposed activities effectively support the needs of the beneficiaries. The project aims to improve smallholder farmers' income-generation potential through providing them with knowledge, access to CRA technologies, extension services, post-harvest handling,*

[151] *Global Green Growth Institute (GGGI), 2021. Climate-Resilient Green Growth in New Ireland Province*
[152] *Global Green Growth Institute (GGGI), 2021. Climate-Resilient Green Growth in Enga Province*
[153] *Global Green Growth Institute (GGGI), 2021. Climate-Resilient Green Growth in Milne Bay Province*

and access to markets, in order to increase the efficiency of their economic activities. The project is cost-effective in achieving these goals.

Streamlining budget costs category and benchmarking: *The project budget has been carefully reviewed and its overall structure allows for a significant allocation towards concrete adaptation interventions. The prices of items have been benchmarked against comparable projects. The total investment of $10,000,000 will benefit 18,600 direct beneficiaries and 87,740 indirect beneficiaries[154], at a cost of USD 539 per direct beneficiary. For reference, other adaptation projects such as the PNG Productive Partnerships in Agriculture Project funded by the World Bank and the Smallholder Support Services Pilot Project co-funded by the Asia Development Bank cost $1,243 and $970 per beneficiary, respectively[155,156].*

Maximise efficiency during implementation: *The partnerships formed during the project design will inform implementation and increase the cost-effectiveness of the project interventions. Decision-making will be guided by the subsidiarity principle, ensuring that decisions are made, and interventions are carried out at the most appropriate level to avoid unnecessary bureaucracy. To improve coordination, communication, and streamline procurement and supervision procedures, the project will implement complementary interventions in the project districts, resulting in cost savings. The project will also work with and strengthen existing community structures.*

Monitoring of results for effective delivery: *The activities of the project are designed to provide tangible benefits to both direct and indirect beneficiaries. These activities are based on successful interventions implemented in similar contexts and have been adapted to meet the specific needs of the local communities. The results of the project implementation are expected to be long-lasting and valuable lessons will be learned that can inform future replication and scaling up of the project.*

1.12 Consistency with development strategies and plans

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.

The project is well aligned with the national policies, legislation, strategies, priorities, and objectives of PNG's Government in relation to climate change and agriculture, resulting in the Climate Change and Development Authority issuing of a letter of endorsement for this project.

- *Medium Term Development Plan III (2018 – 2022): PNG faces the challenge of generating enough internal revenue to support the needs of its growing population, which is expected to increase by 3.1% per year between 2018 and 2022. To meet the needs of this expanding population in a sustainable way, the country needs to promote economic growth that takes into account environmental considerations.*

[154] *Based on the number of persons per household in 2022 in the project area and 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)*
[155] *https://projects.worldbank.org/en/projects-operations/project-detail/P110959*
[156] *https://www.oecd.org/derec/adb/Papua-New-Guinea-Smallholder-Support-Project.pdf*

- *The outcomes of Key Result Area 1 'Increased Revenue and Wealth Creation' will be supported through seven Economic Growth Goals such as: reducing imports of major food items like rice, dairy, fresh produce, and meat; creating wealth by promoting SME growth and attracting direct investments; women's economic empowerment; and creating more jobs and economic opportunities for youth and building the capacity of productive workforce.*

- *PNG Vision 2050: Vision 2050 will ensure that Papua New Guinea has a strong, dynamic and competitive economy by 2050. Goal 2 Wealth Creation is focused on developing manufacturing, agriculture, forestry, fisheries, and tourism ventures to generate 70% of GDP.*

- *PNG Development Strategic Plan 2010-2030: Part 6 (Sections 6.2-6.8), clearly articulates the strengthening of cross-sectoral policies on youth, gender, HIV/AIDS, Vulnerable and Disadvantaged, Environment, Climate Change and Natural Disaster Management as priority. The project will support this through building climate change resilience in communities and fostering development 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 including investment in agriculture, health, transport, and infrastructure. The project will contribute to the NDC target of 10% of the population (25% 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.*

- *The Forestry Act 1991 regulates the conservation, management and use of PNG's forests. Several amendments have been approved since that legislation, the latest of which is from 2010. It places the conservation and management of forests under the Ministry of Forests through the Papua New Guinea Forest Authority (PNGFA). The PNGFA is responsible for monitoring and ensuring compliance with the rules and regulations within the country's forestry sector, and is as such, among others, responsible for the allocation of timber harvesting rights in accordance with the Forestry Regulations (1998). The ASSA project will ensure that the agricultural areas used in the establishment of demonstrators are not in protected forest areas. In addition, the project promotes reforestation (Output 1.3). Special attention was given to the impact of the project on the forest areas of the selected provinces and involved the PNGFA.*

- *PNG Climate Compatible Development Strategy. This strategy has the ambitious goal of achieving carbon neutrality by 2050 while ensuring annual economic growth of 7%. Climate change mitigation through low-carbon growth: Reducing emissions from deforestation and forest degradation and increasing forest carbon stocks (REDD+), reducing greenhouse gases in non-forestry sectors, shifting to low-carbon growth, and climate resilience through adaptation by identifying hazards and effective adaptation measures. By encouraging the use of solar energy in agriculture and promoting reforestation, the ASSA project will build community resilience, while generating co-benefits such as GHG mitigation (outcomes 1.3 and 2.3). Therefore, the project is aligned with the objective of PNG's climate compatible development strategy*

- *The Papua New Guinea National Strategy for Responsible Sustainable Development (StaRS) redefines the development roadmap by prescribing a growth strategy based on the principles of green growth and sustainable development; a new growth strategy in which greater economic growth is based on renewable resources rather than extractive activities, with priority given to preserving the environment and sustainability by using it to add economic value. The current ASSA project comes*

close to meeting the 21 StaRS guiding principles for inclusive and innovative green economic growth.[157]

- *National Food Security Policy: The policy sets the medium to long-term direction and signals priority areas to focus resources (financial and human) to build sustainable food security for all Papua New Guineans. It provides a platform for joint planning to guide coherent programs and actions from all key stakeholders to strengthen food security in Papua New Guinea. A key objective of the policy is to foster strong public-private partnerships and thereby leverage the potential of agriculture to promote improved nutrition and health by bringing together profitable small farms, efficient food value chains, women's incomes, and child nutrition. Successful implementation of the policy will help move the nation toward Vision 2050, a smart, wise, equitable, and happy society, and achieve Global Sustainable Development Goal #2 to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. Implementing actions in favor of smart agriculture to overcome the adverse effects of climate change, enhancing processing, and promoting green jobs …, the project contributes to increasing resilience of food and water security, health, and wellbeing in PNG. Therefore, the project is aligned with the National Food Security Policy.*

- *National Adaptation Plan (upcoming). The plan aims to reduce PNG's vulnerability to the impacts of climate change by building capacity and resilience. The impending NAP has been approved by National Executive Council and is expected to be launched in February 2023. Sectoral Priority Area 1: Climate resilient agriculture with strategic actions on: Scale-up climate-smart agriculture best practices and action in vulnerable regions of PNG; Develop climate resilient agricultural value chains and value chain/market infrastructure, market information, and business support to enhance food security and the resilience of vulnerable farmers; and Increase sustainable income-generating opportunities for women and diversify economies to reduce risks of climate impacts and improve access to food for children and families.*

- *SDG 1 Goal: End poverty in all its forms everywhere. The project contributes to achieving the SDG 1 target 1.5, aiming to build by 2030, the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters.*

  SDG 2 Goal: Zero hunger. In terms of this SDG, the project aims to support small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists, and fishers, in doubling their agricultural productivity and incomes. This will be achieved through providing secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and off-farm employment (Target 2.3). The project also aims to establish sustainable food production systems and implement resilient agricultural practices that increase productivity and production, preserve ecosystems, enhance resilience to climate change and other disasters, and progressively improve the quality of land and soils (Target 2.4).

- *SDG 13 Goal: Take urgent action to combat climate change and its impacts. The project contributes to achieving several targets of SDG 13, including strengthening resilience and adaptive capacity to climate-related hazards and natural disasters in all countries (target 13.1); improving education, awareness-raising, and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning (target 13.3); promoting mechanisms for raising capacity for*

[157] *NATIONAL STRATEGY FOR RESPONSIBLE SUSTAINABLE DEVELOPMENT FOR PAPUA NEW GUINEA. Second Edition. Page 46 – 49 http://extwprlegs1.fao.org/docs/pdf/png176416.pdf*

effective climate change-related planning and management in the least developed countries and small island developing States, including focusing on women, youth, local and marginalized communities (target 13.B).

1.13 ***Relevance and alignment to national technical standards***

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 are part of smallholder farming systems. The project will promote the adoption of resilient farming practices through: deployment of resilient crop varieties selected and validated by communities, improved extension services and enhanced ecosystem services (Component 1); improved post-harvest technologies and access to markets through digital platform and eco-friendly technologies (Component 2); and increased capacity of stakeholders and greater knowledge sharing (Component 3).

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. In terms of this SDG, the project aims to support small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists, and fishers, in doubling their agricultural productivity and incomes. This will be achieved through providing secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and off-farm employment (Target 2.3). The project also aims to establish sustainable food production systems and implement resilient agricultural practices that increase productivity and production, preserve ecosystems, enhance resilience to climate change and other disasters, and progressively improve the quality of land and soils (Target 2.4).

In Papua New Guinea, there are several policies and laws that provide a framework for managing and complying with environmental and social issues. These include:

- *The Environment Act (2000), which under Section 7 imposes a general environmental duty on both the national government and Local Government Councils.*
- *The Lands Act (1996), which consolidates, and amends legislation related to land and repeals various statutes.*
- *The Land Groups Incorporation Act (1984), which recognizes certain customary and similar groups under the law and grants them some powers related to the management, acquisition, holding, and disposal of land.*
- *The PNG National Food Security Policy (2016-2025), which is the main guide for agricultural development and food security in Papua New Guinea. Section 3 of Annex 2 provides a more detailed overview of specific national legislation related to environment, land tenure, and relevant agriculture laws in Papua New Guinea.*

The following overview lists the relevant legislation and regulations that will apply to the environmental and social safeguards (ESS) for each project output, as well as the relevant AF Environmental and Social Policy (ESP).

Project Output	*Relevant AF ESP*	*Relevant rules, regulations, standards and procedure*[158]
Output 1.1. Selection, validation, and dissemination of resilient crop varieties	• *Access and Equity* • *Marginalized and Vulnerable Groups* • *Gender Equity and Women's Empowerment*	· *Climate Change (Management) Act (2015)* · *Papua New Guinea National Food Security Policy 2016-2025.*[159] · *National Agriculture Development Plan (NADP) 2007-2016* · *National Rice Policy 2015-2030*
Output 1.2. Extension services for climate-resilient agriculture	• *Access and Equity* • *Marginalized and Vulnerable Groups* • *Gender Equity and Women's Empowerment*	· *Papua New Guinea National Food Security Policy 2016-2025.*[160] · *National Agriculture Development Plan (NADP) 2007-2016* · *National Rice Policy 2015-2030*
Output 1.3. Nature-based solutions to protect agro-ecological systems from landslides and coastal erosion induced by flooding and heavy rain events	• *Climate Change* • *Pollution Prevention and Resource Efficiency* • *Protection of natural habitats* • *Conservation of biological diversity*	· *Conservation and Environment Protection Authority Act (2014)*[161] · *Environment (Prescribed Activities) Regulations 2002* · *Environment (Permits) Regulations 2002* · *Environment (Fees and Charges) Regulation 2002* · *Environment (Council's Procedure) Regulation 2002* · *Environment (Water Quality Criteria) Regulation 2002* *National Strategy for Reforestation and Afforestation in PNG 2020-2024* *National Forest Policy 1991*
Output 2.1. Digital platform to strengthen relationships among agricultural value chains actors	• *Compliance with law* • *Access and Equity* • *Marginalized and Vulnerable Groups* • *Gender Equity and Women's Empowerment*	· *Papua New Guinea National Food Security Policy 2016-2025.* · *National Agriculture Development Plan (NADP) 2007-2016* · *National Agriculture Administration Act 2014* · *National Agriculture Research Institute Act 1997* ·
Output 2.2. Eco-friendly technologies for climate-smart seed saving, post-harvest processing, and modern storage	• *Compliance with law* • *Access and Equity* • *Marginalized and Vulnerable Groups* • *Gender Equity and Women's Empowerment* • *Pollution Prevention and Resource Efficiency*	· *Papua New Guinea National Food Security Policy 2016-2025.* · *National Agriculture Development Plan (NADP) 2007-2016* · *Agriculture Investment Corporation Act 2014*
Outputs 3.1.-3.3: Capacity building and knowledge management for scaling-up CRA practices	• *Access and Equity* • *Marginalized and Vulnerable Groups* • *Gender Equity and Women's Empowerment*	*N/A*

[158] *SPREP Legislative Review of Papua New Guinea. Available at: https://www.sprep.org/attachments/Publications/EMG/sprep-legislative-review-png.pdf*
[159] *National Food Security policy, available at: file:///C:/Users/emily/Downloads/Draft%202%20National%20Food%20Security%20Policy%20Document%20November%20%202015-correct%20photo.pdf*
[160] *National Food Security policy, available at: file:///C:/Users/emily/Downloads/Draft%202%20National%20Food%20Security%20Policy%20Document%20November%20%202015-correct%20photo.pdf*
[161] *Ibid.*

1.14 Complementarity with other projects

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 the initiatives described in the following table, some of which have already been completed. In addition, these initiatives will serve as a resource for valuable lessons learned and, at the same time, will 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) will participate in any external workshops upon request and will coordinate annual retreat workshops with the projects listed below. Invite project coordinators and monitoring, evaluation, and learning (MEL) experts/officials to discuss project progress, lessons learned on effective implementation, and areas where complementarity between projects could be reinforced to maximize impact. In addition, an online community of practice will be established between PMUs at the national level and between provincial implementation teams at the interim levels. Strengthened coordination will streamline inputs to national workshops organized by the Climate Change and Development Authority (CCDA) and, at the provincial level, to Provincial Climate Change Committee meetings to facilitate better coordination of climate action. This will allow for real-time updates and coordination between projects to avoid duplication and maximize synergies. At the national level, the COP will engage and encourage stakeholder participation in projects operating beyond the target area, particularly 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 table 4.

***Table 4:** Complementarity and duplication of the proposed project with other projects*

Community Capacity Adaptation to Flood (CCAF)	
Description and objectives	*CCAF was a joint initiative of UNDP and CCDA to enhance the adaptive capacity of communities to cope with flooding. This Programme aims to enhance the adaptive capacity of coastal and riverine communities in North Coast and Islands Regions of Papua New Guinea to make informed decisions and to undertake concrete action to manage climate change-driven hazards. CCAF focused on building and strengthening the resilience towards the occurrence of coastal and inland flooding events, including key economic centres such as Wewak, Madang, Lae and other coastal provinces of New Ireland, Milne Bay and Northern Provinces.*
Complementarity and synergy	*The proposed ASSA project will reinforce the CCAF project interventions for resilience building in two of the three provinces, common to these two projects. Nature-based Solutions promoted by the ASSA project for the coastal agricultural system protection against saltwater intrusion and landslides.*
Duplication	*Although, CCAF project is implemented in two of the three provinces targeted by the ASSA project. There will be no duplication because ASSA will target different localities in New Ireland and Milne Bay. In addition, CCAF project focus is on the coastal areas, while ASSA project interventions target inland regions for reforestation of degraded forests agricultural, and landslides areas.*
Coping with Climate Change in the Pacific Island Region (CCCPIR)	
Description and objectives *"2009 – 2015"*	*CCCPIR is implemented by GIZ in partnership with CCDA, and it is a food and water security project. CCCPIR project was carried out in two vulnerable communities in Milne Bay province. The objectives of this project were to i) improve food security through maintenance of traditional irrigation systems and sustainable agricultural development, and ii) increase resilience of vulnerable communities through improved land-use planning.*

Complementarity and synergy	*CCCPIR supported land use planning, irrigation systems, and sustainable agriculture development. ASSA project reinforces the actions carried out by CCCPIR by focusing on the resilience of the agricultural production systems. ASSA project will build on the results and outcomes of the CCCPIR project by promoting resilient cropping systems, agricultural practices, afforestation and post-harvest solutions. ASSA will also strengthen crop products processing initiated by CCCPIR through the establishment of post-harvested products facilities more adapted to PNG new climatic conditions.*
Duplication	*No duplication. CCCPIR has operated only in Milne Bay while ASSA covers two other provinces such as Enga and New Ireland, besides Milne Bay.*
Productive Partnerships in Agriculture Project (PPAP)	
Description and objectives "2010-2019"	*PPAP is funded by the World Bank and IFAD, and aims to improve the livelihoods of smallholder cocoa and coffee producers, and promote rural development and poverty reduction more broadly.*
Complementarity and synergy	*PPAP has supported the improvement of the living conditions of rural populations and the reduction of poverty by promoting staple food crops. ASSA will build on the actions undertaken by the PPAP project to deliver improved food crops to the communities. ASSA will equally support improved agricultural technologies and production services for enhancing productivity and ensuring food security in the targeted areas.*
Duplication	*There is no duplication as ASSA will focus on staple food crops by promoting new varieties more adapted to the increasingly extreme climatic conditions of the target areas to ensure food security. PPAP was more focused on the coffee and cocoa sector.*
Strengthening integrated Sustainable landscape management (SISLaM) project in Enga province	
Description and objectives "2021-2025"- Ongoing	*SISLaM is Funded by the European Union and implemented by UNDP in partnership with the CCDA in Enga province. This project aims to increase the sustainable and inclusive economic development of the Enga province. Specifically, the project seeks to implement solutions that will overcome the root causes of the threats to land use, agriculture, biodiversity, ecosystem services, and ecological processes as well as overcome the barriers to sustainable green growth in the country. Training on biodiversity, forests, and ecosystem conservation and event on awareness rising such as the EU climate diplomacy week are implemented as part of the project.*
Complementarity and synergy	*SISLaM is supporting ecosystem conservation, implementing solutions that overcome threats to land use and agricultural production. ASSA project will supplement activities undertaken by SISLaM to strengthen landscape management and conservation by promoting NbS. In addition, ASSA will work to support sustainable and resilient agriculture.*
Duplication	*No duplication. Although, both projects (SISLaM and ASSA) target Enga province, ASSA will operate in different localities. Furthermore, ASSA will extend its actions to Milne Bay and New Ireland provinces that are not covered by SISLaM project.*

1.15 Learning and knowledge management

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, working closely with the provincial implementation coordination teams and collaborating partners. The MEL system will: (i) produce, organize and disseminate information for strategic management of the project, (ii) document results and lessons learned for internal use and public dissemination on project achievements (policy brief), and (iii) respond to information needs for reporting on activities, progress and impact to the Adaptation Fund (AF), SPC and Government representatives. An M&E manual will outline a simple and effective system for collecting, processing, analyzing, and disseminating data, to be prepared in the first year of the Project. As part of the simple and effective system 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 afore mentioned projects in Section F. This will enhance transparency and learning by and between projects.

In conjunction with the mid-term review workshop, relevant lessons learned across the projects can be captured and incorporated to the project. A low-cost databank (using Excel, Access or any appropriate tool) will be developed by the National Project Manager (NPM), to enable generation of project dashboards for rapid data analysis. The system will be fed by data collected from the field by implementing partners, provincial implementation coordination teams as well as studies carried out as part of project implementation. The MEL system will be coupled with a geo-localized information system to allow mapping and spatial-temporal analyses of impacts. The 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 feature will be included to allow separation by project to permit project-specific functional analysis and reporting, but also to allow for a more complete streamlining of data collection across projects. The database will then feed the Pacific Data Hub and other regional platforms to further aggregate data. The operationality and functionality of this system will be further defined during the full design and launch phase. Information and knowledge from this repository will be incorporated into the annual brainstorming workshops. In addition, ad hoc workshops or presentations may be held among relevant stakeholders based on specific project results. Awareness of the use and application of the toolkit will be widely disseminated by the PMUs to encourage broad input.

An M&E manual will outline a simple and effective system for collecting, organizing, processing, analysing, and disseminating data, to be prepared in the first year of the project.

The trainings planned under Component 3 will build the capacity of various stakeholders on methods and tools for monitoring change and environmental conditions at the community level. The project's monitoring and evaluation activities will be guided by some key considerations: (i) data will be disaggregated by poverty, livelihood group, and gender; (ii) implementing partners will have clear responsibilities for monitoring and evaluation, with specific reporting deadlines and a forum for presenting results; and (iii) monitoring and evaluation will be linked to the project's rationale, logical framework, annual work plans, and budgets. The results of the monitoring and evaluation will be used to take corrective or reinforcing actions to improve project management. Stakeholder outreach sessions and the publication of policy briefs, reports, and press releases on social media will facilitate communication of results and consistent stakeholder engagement.

*1.16 **Consultative process***

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 priority and investment case for the three provinces under the Government of PNG Climate Resilient Green Growth (CRGG) project (2019-2022), funded by Australia's Department of Foreign Affairs & Trade (DFAT), executed by the Global Green Growth Institute (GGGI) and implemented by GGGI, CCDA, DPLGA, and DNPM. Provincial stakeholders consulted to identify the priorities included members from various sectors, communities and the private sector, in areas such as agriculture, construction, community development, disaster management, energy, fisheries,

forestry, information and communication, landowner associations, lands and physical planning, mining, provincial government administration and tourism. 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 of the stakeholder's consultation).

During May–December 2021, the CRGG project conducted provincial administration- and provincial sector-level consultations and assessments in the three provinces to compare it to other investment cases[162,163,164]. 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. Consequently, GGGI and CCDA transferred the project idea to the AF Concept Note template in December 2021, which 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) for this project. 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 submitting it to the AF.

Representatives from indigenous communities participated in consultations with women in agriculture groups, NGOs, CBOs, faith-based organizations, SMEs, political associations, and locally led governments and councils. The key findings from 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 are 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 the 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.

[162] *GGGI (2021). Climate-Resilient Green Growth in New Ireland Province*
[163] *GGGI (2021). Climate-Resilient Green Growth in New Ireland Province*
[164] *GGGI (2021). Climate-Resilient Green Growth in Milne Bay province*

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 improved access to appropriate renewable processing equipment and storage technologies to improve market access. Further through 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.

During the full development stage, various levels of engagement with different stakeholders were carried out through initial meetings to launch the development of the full ASSA proposal, including consultations with national-level stakeholders (DAL, DoWH, CCDA), consultations with stakeholders at the provincial level, bi-weekly and weekly meetings between SPC and GGGI, gender consultations conducted by UN Women, and a validation workshop.

The kick-off meeting for the development of the full ASSA proposal was held on September 20, 2022, and agreed upon the approach to be implemented.

During the full development stage, various levels of engagement with different stakeholders were carried out through initial meetings to launch the development of the full ASSA proposal, including consultations with national-level stakeholders (DAL, DoWH, CCDA), consultations with stakeholders at the provincial level, bi-weekly and weekly meetings between SPC and GGGI, gender consultations conducted by UN Women, and a validation workshop.

On September 20, 2022, an inception meeting was held to develop the full ASSA proposal and identify key stakeholders to be engaged and consulted during the project development. On October 17, 2022, consultations with DAL were held to gather and incorporate lessons learned from past experiences to strengthen extension services for climate-resilient agriculture, eco-friendly technologies, nature-based solutions, capacity-building programs on climate-resilient agricultural production for local authorities, the monitoring and evaluation framework, and knowledge management and dissemination system. Consultations with the Department of Works and Highways (DoWH) on October 18, 2022 focused on norms and standards for climate-resilient farm roads, which are not yet available.

More information about the different levels of engagement with various stakeholders can be found in annex 6.

1.17 Justification with full cost of adaptation reasoning

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, strengthening the resilience of smallholder farmers is needed. This AF project includes activities with clear potential to improve the resilience of agriculture in PNG. The expected results, outcomes and impact of this project will fully be achieved thanks to the funding from the Adaptation Fund. The contribution of the Adaptation Fund is crucial for the implementation of the project, in a context where 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 2446 in 2020.[165] Despite efforts between 2002 and 2011 to reduce the country's debts, PNG's public debt increased from 19% of GDP in 2012 to 44% of GDP in 2019. This increasing debt is due to optimistic revenue expectations expected from tax credits and benefits granted under Project Development Agreements, which led to a threefold increase in credit and debt underwritten by domestic banks, which are now exposed to sovereign risk. To address this, the country is trying to increase the share of its external financing to reduce exposure of domestic players and to attract foreign currency. The failure to reach the forecasts expected by domestic actors is explained by (i) the fluctuation of international prices, (ii) the country's sensitivity to natural disasters, and (iii) 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 minerals and energy, which provides the bulk of export earnings and GDP. The agricultural, forestry and fishing sectors are influenced by natural disasters, while the minerals and energy sector is influenced by international price levels. Additional challenges were posed by the COVID-19 crisis. Subsidies thus represent the best means of protecting the agricultural sector from the 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 resilient adaptations actions will continue to increase the vulnerability of PNG's rural communities. 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. Three possible scenarios are presented, with and without Adaptation Fund support:

- *Alternative without any project: The current situation is marked by adverse effects of climate change. Without any project, damage and losses caused by climate change will increase and will lock farmers in extreme vulnerability and poverty. Agricultural production will decline and exacerbate the risks and impacts associated with food insecurity, climate migration, environmental degradation, and high unemployment.*
- *Alternative with a development project (i.e., no resilience-building actions): With a traditional development project that doesn't include resilience-building actions, current maladaptive and coping agricultural practices (e.g., slash and burn, rainfed agriculture, deforestation, logging) will be exacerbated by climatic stresses. This will lead to food insecurity, malnutrition, conflicts over natural resources, greater unemployment, climate migration and ongoing vulnerability to climate change.*
- *Alternative with an adaptation project: A climate change adaptation project focused on the sustainability of agricultural values chains (adoption of climate-smart practices, green jobs creation for vulnerable women and youth) will lead to food security, improved nutrition, and protection for natural resources, a high employment rate and job opportunities, and resilience to climate shocks.*

Below are potential consideration for alternative options:

Project components	*Technological solutions*	*Option 1*	*Option 2*
Component 1: Climate-proofed small-scale agricultural production	*Crops planting material* *Climate resilient agriculture practices*	*Traditional materials and agriculture practices*	*Tested and validated crops planting materials and agriculture climate proof and resilient practices*

[165] *GDP per capita (current US$) - Papua New Guinea | Data (worldbank.org)*

Component 2: Climate-resilient access to markets	*Storage solutions* *Post-harvest management equipment*	*Building option*	*Modern prefabricated option to be procured on competitive basis* *Postharvest management equipment will also be procured through open and competitive basis*
Component 3: Capacity building and knowledge management for scaling-up CRA practices	-	-	-

*1.18 **Sustainability of the project outcomes***

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

<u>Environmental sustainability</u>: ASSA project will strengthen the resilience of vulnerable populations to the adverse effects of climate change. The project will not involve the conversion of natural habitats to other uses and, in fact, activities such as small-scale climate-resilient agricultural production will enable farmers to improve 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. Nature based solutions (NbS) 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. NbS 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. Such restoration will enhance biodiversity in agricultural systems to improve the resilience of agro-ecosystems to climate change and climate variability.

<u>Financial and economic sustainability</u>: The project is designed to be financially sustainable. Indeed, the sustainability strategy for the overall project is based on the integrated value-chain approach to be adopted. It considers interlinked interventions to reshape the way staple are produced, processed, and sold at 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 resilient practices and increased market access will enhance beneficiary incomes and livelihoods. The capacity building program on climate-resilient agricultural production (Output 3.2) aims to improve the productivity and profitability of community-selected value chain assets through technical training on management and business plan development. The increased financial resources generated by this improvement will support post-project maintenance.

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 rational 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.

Social sustainability: 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. In order to include all resource users in the decision-making process and ensure broader community support, gender equality, indigenous representation, and youth engagement will be emphasized in participatory decision-making processes The same participatory approaches will be used for the identification and selection of the most suitable resilient crops, sites for multiplication sheds, field trials under output 1.1; demonstrators under output 1.2, degraded area to be reforested under output 1.3, and processing or storage facilities under output 2.2. 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.

Physical and technological sustainability: For community assets like climate-proofed processing and storage facilities, agreements will be established beforehand to specify ownership, management, and monitoring and maintenance plans to ensure their long-term viability. As for the digital platform under outcome 2.1, the provincial government's terms of reference for selecting an operator to develop and maintain the platform will include provisions for its operations and maintenance (OM).

Institutional sustainability: At the institutional level, the selection of DAL as a host the PMU, the establishment of extension services through the development of demonstrators, 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 exit strategy for the ASSA project is based on long-term environmental, financial and economic, social, physical and technological as well as institutional sustainability from the project's activities. The development of a plan for the continued use of the resources and capacity-building programme (Trainers of trainers' approach adopted by the project), and the identification of measures for long-term monitoring and evaluation (participatory monitoring, evaluation and learning (MEL) of project activities and plan for the dissemination of the project's lessons learned and best practices to other stakeholders under output 3.3), will ensure the replication potential and sustainability of benefits beyond the project's timeline.

*1.19 **Overview of the environmental and social impacts and risks***

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

The AF's checklist of the 15 environmental and social principles of the AF's Environmental and Social Policy (ESP) provides an indication that the project falls in Category B (medium risk), because some activities have potential adverse impacts that are less adverse, fewer in number, smaller in scale, less widespread, reversible

or easily mitigated. At this stage, an ESAP has been developed for the project to mitigate the identified risks (see Annex 2). It critically analyses all the project activities with a view of ensuring that any identified environmental and social risks are mitigated. The table 5 provides the results of screening for potential environment, social and gender impacts and risks to ensure that the project complies with the 15 principles of the AF's ESP and section C in Part III of the proposal includes the specific identified risks and proposed mitigation measures for each identified risk.

***Table 5**: ESP Screening Checklist for compliance with the Environmental and Social Principles*

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	X	
Access and Equity		X
Marginalized and Vulnerable Groups	X	
Human Rights	X	
Gender Equality and Women's Empowerment		X
Core Labour Rights		X
Indigenous Peoples	X	
Involuntary Resettlement	X	
Protection of Natural Habitats		X.
Conservation of Biological Diversity		X
Climate Change	X	
Pollution Prevention and Resource Efficiency		X
Public Health	X	
Physical and Cultural Heritage	X	
Lands and Soil Conservation		X

PART III: IMPLEMENTATION ARRANGEMENTS

1.20 ***Project management and implementation arrangements***

A. Describe the arrangements for project/programme implementation.

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

Steering Committee
The Steering Committee (SC) will provide strategic orientation and guidance to the project and oversee its implementation. It will monitor the progressive achievement of the project's objectives and ensure a high level of quality assurance for the results. The SC will approve annual work plans and budget, progress reports, and other documents submitted by the Project Management Unit (PMU). Other responsibilities of the Board include problem solving and policy decision making, approving scope changes in consultation with the AF Secretariat, and ensuring project alignment with national priorities. The proposed composition of the ASSA Board includes 11 members, 9 of whom are active and the other 2 have observer status.

Membership comprises Department of Agriculture and Livestock (DAL), Climate Change and Development Authority (CCDA), the Department of Finance (DoF), Department of National Planning and Monitoring (DNPM), representative of gender groups, representative of NGO/CBO groups, one representative from each Provincial Administrators (Enga, Milne Bay and New Ireland). SPC, UN Women and other relevant technical partners will be included as observers. The SC will be co-chaired by DAL and CCDA. The PMU will act as the secretariat to the Board and to the Technical Advisory Committee. The composition of the SC will be further refined at the inception stage of the project. The SC will convene meetings at least twice a year, or as decided by the SC.

Technical Advisory Committee
The Technical Advisory Committee (TAC) will serve as the technical arm of the SC. It will provide technical and strategic recommendations to the SC, considering latest scientific knowledge and the needs of the three provinces. The TAC is comprised of institutions with demonstrated experience and expertise in the field relevant for the implementation of the ASSA project. TAC members include designated CCDA Technical Working Groups representatives on adaptation (National Adaptation Plan (NAP)), Low-carbon growth and REED+); National Agriculture Research Institute (NARI); UN Women; GGGI, Conservation and Environment Protection Authority (CEPA), National Disaster Center (NDC), Department of Lands and Physical Planning (DLPP), Department of Provincial and Local-level Government Affairs (DPLGA) and Fresh Produce Development Agency (FPDA).

AF Implementing Entity
SPC, through the Climate Finance Unit (CFU) within its CCES program, is the Regional Implementing Entity (RIE) for the project. The CFU will be responsible for overseeing and providing financial management and reporting support for the project, as well as implementing, monitoring, and evaluating project interventions. SPC is the leading scientific and technical organization supporting development in the Pacific region. It was established in 1947 and is owned and operated by its 27 members, including 22 Pacific Island countries and territories

(including PNG). SPC works to achieve sustainable economic development, empowerment and resilience of Pacific communities, and improve the health and livelihoods of Pacific people, to meet the development goals of its members. This role as a leading development organization in the region led the PNG NDA to request SPC to act as the RIE for this project.

SPC as the implementing entity for this project will be responsible to ensure compliance with key policies including the grievance redress mechanism and anti-money laundering/counter-terrorism financing (AML/CTF) provisions, as well as with applicable procedures for efficient use of resources, financial management and procurement.

Executing Entity

The Government of PNG will be the Executing Entity (EE) for the project. Mainly through DAL, the Government of PNG will be responsible for the implementation of project activities.

- *As the lead Department for agriculture in PNG, DAL 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. DAL will host the PMU. As such, it will be responsible for leading the implementation on-the ground interventions across the target project areas. DAL will lead engagement with the PNGFA, DPLGA, the Department for Community Development and Religion, 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). DAL will compile financial and technical reports from the PMU, the provincial implementation coordination and individual consultants and consultancy firms to report to SPC CCES as the RIE.*
- *As part of the Government of PNG, National Agriculture Research Institute (NARI) is a research organization set up 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. FPDA will support the execution of project 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. PNGFA will support the execution of the project on NbS under output 1.3 of Component 1.*

Project Management Unit

The national PMU to be housed in DAL consists of three (3) core staff: a National Project Manager (NPM), Finance Manager (FM) and Procurement & Administration Associate (PAA), along with an ESS, Gender and Youth Specialist (EGYS). 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). The provincial project officers will lead the provincial implementation coordination.

Additional specialists supporting implementation of project activities include a Communications and Media Specialist (CMS) for Component 3, an Agriculture & Environment Specialist (AES) for Component 1 and a Monitoring and Evaluation Specialist (MES). The three-core staff of the PMU (NPM, FM, PAA) will be based in the DAL office in Waigani, Port Moresby, PNG. The four specialists (CMS, AES, MES and EGYS) 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. The NPM will report to the Director of DAL.

The NPM should have between 5-10 years of experience in project management, preferably in the development sector. The NPM should have experience in leading and managing teams, as well as in developing and implementing project plans and budgets. As a head of the PMU, the NPM will be required to:

- *Lead the overall management and implementation of the project, including the development of project annual plans, budgets, and schedules*
- *Have strong skill in database development and management*
- *Coordinate and oversee the work of the provincial project officers and specialists, as well as any external consultants or contractors*
- *Ensure that project activities are carried out in accordance with the project's terms of reference, budget, and schedule*
- *Develop and maintain strong relationships with key stakeholders, including government agencies, civil society organizations, and local communities*
- *Monitor and report on project progress, including the achievement of project objectives and the use of project resources*
- *Ensure that project activities are aligned with gender and youth inclusion principles and that the project's gender and youth specialist is able to effectively support these efforts*

The Finance Manager (FM) should have at least 5-10 years of experience in financial management and procurement, with a strong understanding of donor and government regulations and experience in the agricultural sector. The FPM will be required to:

- *Oversee the financial management of the project, including the development of budget plans, tracking of project expenses, and preparation of financial reports*
- *Coordinate procurement activities for the project, including the development of procurement plans and the selection of suppliers*
- *Ensure that all financial transactions and procurement activities are in compliance with donor and government regulations*
- *Support the NPM in the preparation of project reports and other financial documentation as required*

The Procurement & Administration Associate (PAA) should have at least 3-5 years of experience in financial management and administration, with a strong understanding of donor and government regulations. Experience in the development sector is preferred. The FAA will be required to:

- *Assist the FPM in the financial management of the project, including the tracking of project expenses and the preparation of financial reports*
- *Assist with procurement activities, including the development of procurement plans and the selection of suppliers*
- *Support the NPM and the FPM in the preparation of project reports and other financial documentation as required*
- *Provide administrative support to the PMU, including the scheduling of meetings, the maintenance of project records and documents, and the coordination of travel arrangements*

The ESS/Gender and Youth Specialist (EGYS) should have at least 5-10 years of experience in Environment and Social Impact Assessment (ESIA), in the development and implementation of ESMP and gender and youth inclusion, with a strong understanding of best practices in this field. The EGYS will:

- *Support the integration of ESS norms and standards, gender and youth considerations into all aspects of the project, including the development of environment and social safeguard studies, the development, implementation and monitoring and evaluation of environment and social management activities, and the of project results*
- *Advise the PMU on best practices for gender and youth inclusion and provide technical assistance to project staff as needed*
- *Conduct EIAs for storage multiplication sheds and installation of storage facilities, and monitor the overall project E&S risks to ensure compliance with the ESMP*
- *Work with project partners to ensure that gender and youth considerations are integrated into their work*
- *Monitor and report on the project's progress in addressing gender and youth issues, based on the GAAP*

Communications and Media Specialist (CMS) should have at least 5-10 years of experience in communications and media, with a strong understanding of best practices in this area. Experience in the development sector is preferred. The CMS will:

- *Develop and implement a communications and media strategy for the project, including the development of materials and the use of social media and other channels*
- *Coordinate the production and distribution of project materials, including reports, newsletters, and promotional materials*
- *Support the NPM in the preparation of project reports and other documentation as required*
- *Assist with the organization of events and other outreach activities*

Agriculture & Environment Specialist (AES) should have at least 5-10 years of experience in agriculture and the environment, with a strong understanding of best practices in these areas. Experience in the development sector is preferred. The CMS will be required to:

- *Provide technical assistance to project staff and partners on issues related to agriculture and the environment*

- *Support the integration of agriculture and environmental considerations into project plans and activities*
- *Monitor and report on the project's progress in addressing agriculture and environmental issues*
- *Advise the PMU on best practices for sustainable agriculture and environmental management*

Monitoring & Evaluation Specialist (MES) should have at least 5-10 years of experience in monitoring, evaluation and learning of projects. Experience in the development sector is preferred. The MES will be required to:

- *Undertake participatory monitoring, evaluation and learning 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*
- *Support the development of studies for the mid-term and final evaluation of the project.*

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 PCCC oversees integration and coordination of climate change activities in provinces, including monitoring progress of mitigation and adaptation projects. Another key function is to ensure that coordination and cooperation within and among provincial agencies and communities are maximized to deliver climate change projects effectively and efficiently. 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.

Provincial Project Officers (PPO) should have at least 3-5 years of experience in project management, with a strong understanding of local needs and priorities. PPO will:

- *Coordinate the provincial implementation committee in their respective provinces, including the development of work plans and budgets and the management of project staff and resources*
- *Liaise with provincial government agencies, civil society organizations, and local communities to ensure that project activities are aligned with local needs and priorities*
- *Monitor and report on project progress in their provinces, including the achievement of project objectives and the use of project resources*
- *Provide support to the NPM and PMU as needed in the coordination and management of project activities.*

Collaborating Partners

UN Women Papua New Guinea 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 supports a 'Markets for Change' program through 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 safety and productivity. The program covers 11 provinces including Enga and Milne Bay and benefits market management and over 10,000 market vendors in the targeted markets as well as family members of these vendors. Improved market conditions also benefit the local users of the markets and improve circulation of income and revenue within the local economy. UN Women will collaborate with the Executing Entity on Components 2 and 3.

- *The Land Resources Division aims to contribute to the Pacific Community goal for resilient and food and nutritionally secure Pacific peoples and communities, with well-managed natural resources, ecosystems and markets. Its mission is to provide effective expert scientific advice, capacity building and services on conservation, development and utilization of plant genetic resources, forest and landscape management, resilient agricultural systems, diversification of livelihood strategies and access to markets to maintain ecosystem services and improve land productivity and the food, nutrition security and resilience of Pacific communities. Consequently, SPC LRD services are based on 4 pillars or programs: Genetic Resources (Pillar 1) with focus on conservation, development, and promotion of resilient and nutritious crop varieties; Sustainable Forests & Landscapes (Pillar 2) with a focus on forest and tree management and mainly participatory community-based land use plans; Sustainable agriculture (Pillar 3) for providing support in sustainable crop production systems, soil health technologies, water use, and management technologies, etc.; and Markets for Livelihood (Pillar 4) for providing value chain support and market access for member countries, post-harvest capacity building, food processing, and biosecurity strategies. SPC LRD will collaborate with the Executing Entity on Component 1. Specifically, LRD will provide resilient varieties that are not available nationally.*

  The proposed institutional arrangement and flow of funds are described in Figure 9.

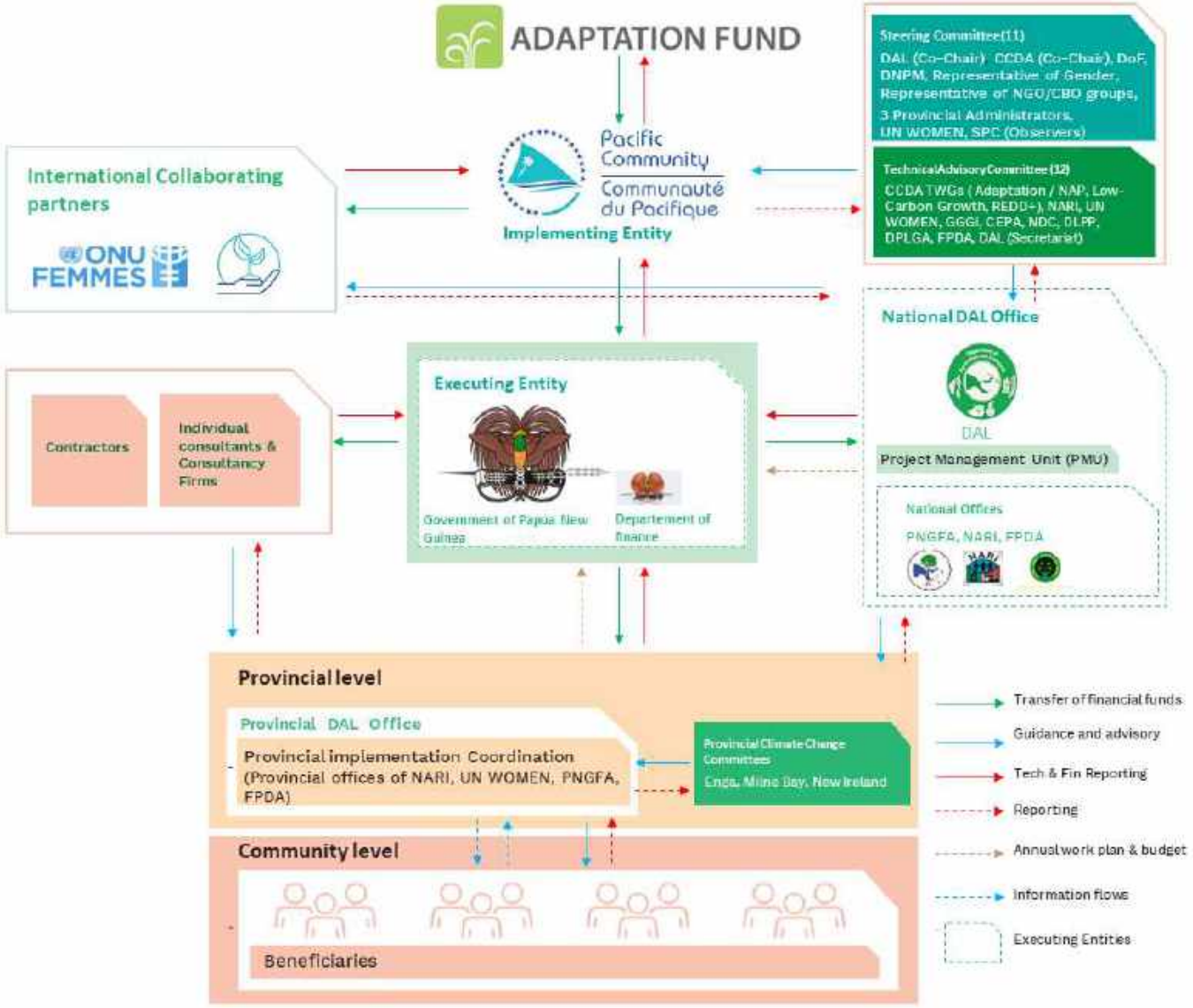

Figure 9: *Implementation arrangement scheme including funding flow*

1.21 Financial and risks management measures

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)*
Insufficient capacities of executing entity to implement the project	*M*	- *Steering Committee including National Entity DAL with administrative and financial management autonomy that assumes the fiduciary management functions of the project* - *Recruitment of experts with specific experiences in development project management and financial management procedures and mastery of project resources planning software* - *The staff of the PMU will be recruited for long-term contracts to avoid staff turnover and ensure sustained capacity* - *Start-up support considers training in financial management*	*L*
Delays in budget process and disbursements impede timely implementation of project activities	*M*	- *The budget preparation process will be carried out by the PMU staff which will then be submitted to the Steering Committee 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* - *The budgeting process will be defined in the project procedures manual* - *The approved budget must be entered into the accounting and financial management software to monitor its implementation* - *Quarterly financial reports including information on budget monitoring should be submitted to the Steering Committee* - *Funds will be made available through the standard channel provided. This includes replenishment of the designated account, direct payment and reimbursement.*	*L*

Risk	*Initial risk assessment (H = high, M = moderate, L = low)*	*Proposed mitigation measure*	*Final risk assessment (H = high, M = moderate, L = low)*
		- *The use of Certified Statement of Expenditures in support of expenses incurred by the Project is also planned* - *For implementing partners and utilities, resources will be transferred in accordance with signed agreements and service contracts, which must include mechanisms for releasing funds based on the agreement/contract work plan and budget, and disbursements based on quarterly and semi-annual reports of activities performed by the provider/partner.*	
Insufficient transparency and accountability of project implementation, monitoring, and financial management procedures	*M*	- *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 SC to ensure true and fair view of the project activities* - *Financial monitoring based on:* *a) regular preparation of withdrawal requests, based on rolling quarterly cash plans, and bank monitoring of the designated account and the account of operations, budget monitoring; accounting monitoring; technical and economic monitoring provided by the project FPM and FAA* *b) The project FPM 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 Boar*	*L*
Fluctuations in foreign exchange rates result in unpredictability in the availability of	*L*	- *Financial monitoring and adaptive management of the project budget will be undertaken to re-programme funds as necessary to ensure that any fluctuation*	*L*

Risk	Initial risk assessment (H = high, M = moderate, L = low)	Proposed mitigation measure	Final risk assessment (H = high, M = moderate, L = low)
funds for project interventions		*in foreign exchange rates has a minimal impact on project activities*	
Low engagement of beneficiaries and project stakeholders	*L*	- *All project stakeholders, beneficiaries and interested parties will have access to a 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. Moreover, stakeholders will be engage in the training of lead trainers at the district level to track behaviour change, but also into the knowledge management component*	*L*
Lack of technical capacity to implement climate-resilient practices	*M*	- *By providing dedicated training to farmers and supporting extension service providers, they will be able to understand and effectively apply new techniques and practices.*	*L*
Lack of coordination between the national and provincial level	*M*	- *The project will recruit Provincial officers who will have workload and reportings commitment to inform about the project progress with local communities. They will use ICT tool (zoom, Teams, etc.) to ease the communication and be faster*	*L*
Solar equipment and facilities failure	*M*	- *Development of a manual and training to create local skills for maintenance and ensure the sustainability of solar-powered facilities and equipment.*	*L*
Lack of digital literacy limiting the use of online platforms to access profitable markets	*M*	- *Training to acquire digital skills is included in the project.*	*L*

1.22 Environmental and social risk management

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

The pre-feasibility stage of the assessment and the concept note for this project initially flagged several specific activities which present potential E&S risks and impacts. Activities which are anticipated to have a greater potential for E&S risks and impact include:

- ***Activity 1.1.2.:*** *Construction of multiplication sheds (ESP 6, 12, 14, 15,)*
- ***Activity 1.3.2.:*** *Reforestation program (ESP 7, 9, 10, 15)*
- ***Activity 2.2.2.:*** *Procure and install processing and storage technologies (ESP 6, 12, 14, 15)*

The following table 6 provides a detailed look at the anticipated E&S risks for the entire program, broken down for each component.

***Table 6**: Assessment of E&S Risks for Each Component*

Component	Risk Categorization
Component 1: Climate-proofed small-scale agricultural production	*Risk: Medium Potential Impact: Medium* *There are several activities under Component 1 which present specific E&S-related concerns. Among these include the construction of multiplication sheds, which present some environmental concerns and considerations due to the nature of construction, as well as a reforestation activity which, while it is a direct response to climate change activities itself, needs to be carefully planned and monitored to ensure that there are no ecosystem-related or environmental risks such as the introduction of invasive or threatening species, or infringement upon lands which are culturally-significant. As such, the type, approach, techniques and species used in ecological restoration will be undertaken to ensure that net positive benefits to the local ecosystems result, in turn providing climate-resilient ecosystem goods and services.*
Component 2: Climate-resilient postharvest solutions and access to markets	*Risk: Medium Potential Impact: Medium* *The primary activity under Component 2 which presents some E&S risks is the installation of processing and storage technologies. Given these will be procured prefabricated there will be minimal to low risk to water usage, damage due to extraction of raw materials, ppollution of waterways, disruption of land during installation. To ensure minimal impact the installation will take place mostly on government land and will require an EIA to be conducted by the ESS officer at each site to ensure the installations are undertaken in a manner as to cause minimal disruption and that the installations are in line with PNG's regulations.*
Component 3: Capacity building and knowledge management for scaling-up CRA practices	*Risk: Low Potential Impact: Low* *The activities under Component 3 pertain to training, capacity building, and knowledge and information management. As such, there are limited, even negligible risks pertaining to the AF's E&S principles.*

To elaborate on the assessment above, the assessment of potential E&S risks against AF's checklist of environmental and social principles is provided in table 7 below. Table 7 details the mitigation measures that may or may not be required. Each of these risks will be further expanded upon in the project 's ESMP, with specific mitigation strategies and stringent roles and responsibilities for monitoring and reporting.

***Table 7:** AF E&S Principles and Risk Assessment of Project*

AF ES Principles	Identified Risks	Level	Mitigation Measures
ESP 1: Compliance with the Law	*All components of the project are aligned with the texts, laws and decrees currently applied in PNG. The project complies with the legal framework for agriculture, water and environmental protection.*	*None*	*The identified project activities do not need mitigation measures since they generate no risks.*
ESP 2; Access and Equity	*The proposed project promotes fair and equitable access for all beneficiaries and is supported by a Gender Analysis and Gender Action Plan to ensure that women and*	*Low*	*SPC has adopted a people-centred approach to project design and consulted with a wide range of stakeholders, including women and youth groups. The*

	vulnerable groups have the opportunity to benefit as well. There is a slight risk that multiplication sheds (1.1.2) and installation of storage facilities (activity 2.2.2) will not be easily accessible.		*activities are designed to engage and benefit vulnerable people throughout project implementation.* *To ensure equal representation, access and participation, gender quotas have been established where relevant and necessary, and a comprehensive gender assessment and action plan has been developed to address needs and vulnerabilities that are specific to women (see Annex 4).* *To mitigate the risk of accessibility to storage facilities and multiplication sheds, the project undertook stakeholder consultations at the provincial level to solicit feedback on placement for accessibility. Based on the consultations most of the sheds and storage facilities will be placed on government land. This will also mitigate the risk of any land-tenure issues.*
ESP 3: Marginalized and Vulnerable Groups	*The project's activities are oriented to ensure and promote fair and equal access to both participation in the project's activities, as well as access to the anticipated outcomes and benefits.* *To date, no activities have been identified which might generate negative impacts on marginalized people and vulnerable groups.* *Vulnerable small-scale farmers are being specifically targeted for project intervention as well as vulnerable and marginalized households to improve food security for these communities.*	*Low*	*The project development team has undertaken numerous stakeholder consultations during the concept note and proposal development stages to identify and mitigate potential risks and concerns for all stakeholders and parties, including those for vulnerable groups. This feedback has been incorporated into project design, to ensure that community-level needs are considered. 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.* *In addition, the nature of the project and a core focus is to serve vulnerable and marginalized groups as a whole, and it aims to provide tangible benefits such as the creation of green jobs through processing of staple food crops.*
ESP 4: Human Rights	*The project respects the fundamental rights of people in the areas of intervention and will not infringe on their freedom.*	*Low*	*All parties will be consulted to avoid risks pertaining to human rights. The project respects the fundamental rights of people in the areas of intervention and therefore does not infringe on their freedom. Project activities are not expected to have any negative human rights impacts, but rather increase and enhance access to markets, green jobs, and even food security for women and vulnerable groups, specifically.*
ESP 5: Gender Equality and Women's Empowerment	*The project pays special attention to women and youth, and UN Women is an collaborating partner for this project. The project will specifically ensure that gender-sensitivity is mainstreamed throughout project activities.*	*Low*	*Women and youth will be the biggest beneficiaries of the project. All project activities have been screened and analysed to ensure full participation of women. Gender-sensitive indicators and activities will ensure that the priorities of women and other vulnerable groups are included.*
ESP 6: Core Labour Rights	*There are some activities which involve construction, which has some inherent occupational health and safety hazards for workers, primarily the construction of multiplication sheds (activity 1.1.2) and the installation of storage facilities (activity 2.2.2).*	*Low*	*The project respects the ILO's labour standards. The project will ensure that minors do not work on the sites and that national health and safety legislation is applied.* *Any contracts will include provisions for ensuring ILO and country-level labour standards are followed.*

	There are no activities planned under the project that would entail unsafe, indecent or unhealthy working conditions.		
ESP 7: Indigenous Peoples	*The project will take the people-centred approach adopted by SPC for all of its activities ensures that peoples' and communities' rights are always protected.*	*Low*	*The project will comply with (i) all adaptation fund requirements, and (ii) national laws. Broad community support will be obtained. Serious documentation of stakeholder engagement will be done.*
ESP 8: Involuntary Resettlement	*None of the project activities are envisaged to lead to relocation or displacement.*	*None*	*No expropriation, relocation of farmers or disruption of producers' livelihood activities will be undertaken.*
ESP 9: Protection of Natural Habitats	*Due to direct engagement of the project for the specific activities detailed above, the project may have negative impacts on the biophysical environment, including natural habitats, if project activities are not properly monitored.* *There are some risks to natural habitats due to the anticipated construction of multiplication sheds and installation of storage facilities (activities 1.1.2 and 2.2.2)– these include potential of pollution of waterways and land during construction, and inappropriate locations for structures. Under the reforestation activity (activity 1.3.2) there is a risk that the techniques and species used are not appropriate for local environmental conditions, reducing survival of re-planted vegetation and disrupting ecosystem integrity*	*Medium*	*Guidance on site-species matching will be developed for specific locations which will provide information on key tree species that are adapted to the area and their ideal site-conditions. It will further identify areas where certain tree species should not be planted based on site-conditions. In addition to native species, the project will only promote tree species which are already locally adapted and do not pose a risk to the local biodiversity.* *A EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific environmental impact assessments will be conducted for the construction of multiplication sheds and installation of storage facilities to ensure minimal disruption for any construction activities.*
ESP 10: Conservation of Biological Diversity	*The project includes reforestation action in various ecosystems to boost biodiversity. However, there is a possibility that some activities may lead to minor and localised impacts on biodiversity or natural habitat in agricultural settings.*	*Medium*	*Project activities will be undertaken outside of protected areas. No invasive alien species will be introduced by project activities. Furthermore, the project will not operate in any UNESCO biosphere reserves or protected sites applicable to this project.* *For climate-resilient crops to be utilized (activity 1.1.1), the selection criteria will include site-species matching to ensure that selected crops are adapted to the area and are suitable for the site-conditions.*
ESP 11: Climate Change	*The project includes adaptation and mitigation actions and is inherently designed to enhance resilience to climate change. Small GHG emissions may arise from agricultural activities, e.g., use of vehicles running on fossil fuels, emissions from construction of multiplication sheds and installation of storage facilities. However, these are likely to be negligible and off-set by the reforestation activities.*	*None*	*The project design will ensure that there is no large-scale deforestation or forest degradation, and that all GHG emissions are minimised. The introduction of training and capacity building for farmers will help to facilitate the adoption of more climate-resilient farming practices and other agricultural techniques.*
ESP 12: Pollution Prevention and	*The project is only expected to lead to minor and negligible release of pollutants, largely*	*Medium*	*Measures have been proposed in the ESMP to avoid the risks and impacts of water and soil pollution. To the extent possible, local materials will be sourced to build*

Resource Efficiency	*from emissions from agricultural and processing equipment.* *There is some risk of disruption to soil, waste water, and high resource usage from the construction of multiplication sheds and installation of storage facilities.*		*multiplication sheds and storage facilities will be procured pre-fabricated. The siting of the sheds and storage facilities will be selected to ensure minimal disruption to land and will be mostly placed on government land (Local Level Governments (LLGs))* *An EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific environmental impact assessments will be conducted for the construction of multiplication sheds and installation of storage facilities to ensure minimal pollution for any construction activities.* *Farmers will be trained on resilient agronomic packages covering resilient agronomic and post-harvest management, which will include better management of resources including water and soil (activity 1.2.2).*
ESP 13: Public Health	*The project is not envisioned to have any negative impacts on public health.*	*None*	*The project is expected to have an overall beneficial impact on the public health with improved, healthier and more resilient natural environments. Reduced unemployment and the development of community-driven sustainable income generating agricultural activities will also* *improve food security and bring nutritional benefits.*
ESP 14: Physical and Cultural Heritage	*No impacts on cultural heritage are anticipated. No construction or rehabilitation activities will take place on or around an area of cultural significance.*	*Low*	*Sites to be selected will not be located in a known or suspected cultural heritage area. Sites for the multiplication sites and storage facilities will be mostly on government land.* *The project will promote the use of indigenous practices and tools where applicable, and will ensure that the project considers and actively seeks out the opinions and needs of indigenous peoples and local communities to ensure that all activities and outcomes are locally-led and focused. The project will also actively seek to obtain community endorsement at the onset of project implementation, and feedback has already been provided through consultations during the proposal development stage.*
ESP 15: Lands and Soil Conservation	*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*	*Low*	*There are specific activities which target and aim to improve soil quality and conservation. While there is a small risk of the construction and rehabilitation activities having an impact on the soil and land quality in specific areas, the project will closely monitor to ensure that there are no negative impacts on the land and soil surrounding the activity sites.*

Based on the above assessment the majority of the project activities are low-risk with the potential for medium risk through specific, limited activities in Components 1 and 2. However, the scale of the activities planned are anticipated to have limited adverse E&S impacts and can be readily addressed through mitigation measures. As such, the overall risk level for the project

is rated as medium risk (Category B). To mitigate the risk an ESMP has been developed (see section 6 of Annex 2).

1.23 Monitoring, evaluation and budgeted

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 Pacific Community (SPC), serving as the Implementing Entity, will oversee and manage the implementation of this project in accordance with the agreement between SPC and the AF. SPC will be responsible for project-level monitoring and evaluation, using tools and methods developed during the inception phase and in compliance with SPC and AF policies. This will be carried out through coordination between the Climate Finance Unit (CFU), Strategy, Performance and Learning (SPL) Team, the Designated Authority for PNG, and the Project Management Unit (PMU). The program indicators described in the results framework will be jointly monitored by the DA, the PMU, and SPC through six-monthly supervision missions (or as needed) that include results, reflection, and planning meetings.
- The project management unit (PMU) will have a designated monitoring, evaluation, and learning (MEL) specialist to oversee the evaluation of the overall project, including site visits to project sites. Environmental and social (E&S) concerns will be incorporated into the monitoring, evaluation, and reporting of project activities. Annual performance reports and the final project closure report will include updated information on E&S risks, which will be shared with SPC and the AF.
- In order to sustain the benefits for vulnerable groups in the target communities, the project will monitor indicators related to gender equity and women's empowerment and will ensure that project reports include gender-disaggregated data. This monitoring and evaluation (M&E) system will be aligned with the policies and results frameworks of the AF, the PNG DA, SPC, and the project itself. The MEL specialist will collaborate with other PMU members to develop MEL tools, approaches, and reporting arrangements for sub-projects, including annual performance reports.
- The Climate Finance Unit (CFU) will coordinate the independent mid-term and terminal evaluations, utilizing a question-driven approach and possibly including assessments of relevance, effectiveness, sustainability, and other criteria. These evaluations will provide operational and strategic recommendations to improve implementation, identify necessary corrective and adaptive management measures for the remainder of the project, and gather lessons learned for stakeholders in PNG and the broader Pacific region. The mid-term evaluation will contribute to the evidence base for adaptation to climate change in PNG and the Pacific region and will be published on the SPC website and other relevant platforms. The terminal evaluation will assess the relevance, performance, sustainability and scalability of results, differential impacts, and lessons learned of the intervention and will also be published
- The evaluation will utilize mixed methods, including qualitative methods such as participatory rural appraisal and counterfactual analysis (if reliable control group data is available from the project's baseline and end-line surveys). In addition to primary data collected by the evaluators and secondary national data, both the interim and final evaluations will incorporate monitoring reports and activities prepared by project staff. Data will be carefully disaggregated by gender. The interim evaluation will be conducted when 50% of the initial budget has been spent or at the midpoint of the scheduled project duration. The independent terminal evaluation will begin within six months of the project's actual completion date.

1.24 *Results framework with milestones, target and indicators*

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.

Result (Project Objective(s))	Project Objectives Indicator (s)	Baseline	Target	Means of Verification	Risks and Assumptions
Objective: T*o enhance the sustainability of main agricultural value chains through the adoption of climate-smart practices, contributing to improving the produces' quality, increasing access to markets, and creating green jobs for women and youth in vulnerable communities*	*Number of beneficiaries (direct and indirect) disaggregated by gender*	*0*	*18,600 direct beneficiaries, including at least 50 per cent women and youth;* *87,740 indirect beneficiaries including 50 per cent women and youth*	*- Project M & E reports* *- Progress reports* *- Mid-term and final project evaluations*	*Political and economic stability in the country, no disruptions from other externalities*
	Number of smallholder farmers reporting improvements in their living conditions	*0*	*18,600 direct beneficiaries, including at least 50 per cent women and youth;*	*- Evaluation assessments at farm level* *- Project M & E reports* *- Progress reports* *- Mid-term and final project evaluations*	*Political and economic stability in the country, no disruptions from other externalities*
Component 1: Climate-proofed small-scale agricultural production					
Outcome 1. *Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers*	*Number of smallholders farmers reporting an increase in programme crop productivity*	*0*	*14,880 direct beneficiaries (80% of total beneficiaries)*	*- Evaluation assessments at farm level* *- Project M & E reports* *- Progress reports* *- Mid-term and final project evaluations*	*Political and economic stability in the country, no disruptions from other externalities*
Output 1.1. *Selection, validation and dissemination of climate-resilient crops*	*Number of smallholder model farmers- equipped with multiplication sheds for improved and resilient*	*0*	*40 including 20 female farmers (50% women)*	*- Assessment repots* *- Project M & E reports*	*Political and economic stability in the country, no disruptions from other externalities*

	varieties seed multiplication				
***Output 1.2** Extension services for climate-resilient agriculture*	*Number of operational demonstrators or climate field schools*	*0*	*30*	*- Project M & E reports* *- Assessment report* *- Mid-term and final project evaluations*	*Political and economic stability in the country, no disruptions from other externalities*
	Number of contract-based extension services to provide climate and weather forecasting, climate-smart practices, effective post-harvest processing and conservation practices.	*0*	*50*	*- Project M & E reports* *-Assessment report*	*Political and economic stability in the country, no disruptions from other externalities*
***Output 1.3.** Nature-based solutions to protect agro-ecological systems from landslides and coastal erosion induced by flooding and heavy rain events*	*Area in hectares (ha) of croplands, mangroves and degraded forest afforested*	*0*	*3000 ha*	*- Field visit to inspect the reforested areas* *- Assessment report*	*Political and economic stability in the country, no disruptions from other externalities*
Component 2: Climate-resilient access to markets					
***Outcome 2:** Improved access to appropriate processing, storage technologies, and profitable markets*	*Number of smallholder farmers reporting improved food security and market access as a source of income*	*0*	*14,880 direct beneficiaries (80% of total beneficiaries)*	*- Project M & E reports* *- Progress reports* *- Mid-term and final project evaluations*	*Political and economic stability in the country, no disruptions from other externalities*
***Output 2.1**. Digital platform to strengthen relationships among agricultural value chains actors*	*Number of digital platforms to link farmers, small-scale processors, traders, and buyers along the value chain*	*0*	*1*	*-Assessment report* *- Checking the website to check the existence of the platform and see what information is transmitted*	*Political and economic stability in the country, no disruptions from other externalities*
***Output 2.2.** Eco-friendly technologies for climate-smart seed saving, postharvest processing,*	*Number of food crops processor*	*0*	*9*	*- Existence of facilities for processing food crops* *-Assessment report*	*Political and economic stability in the country, no disruptions from other externalities*
	Number of food crops	*0*	*3*	*- Existence of facilities for*	*Political and economic stability*

and modern storage	*storage facilities*			*food crops storage* *- Assessment report*	*in the country, no disruptions from other externalities*
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*	*Number of key representatives of administration at national level, provincial and district and LLGs level trained for scaling up climate-resilient cropping, processing, and storage practices*	*0*	*At least 30, (50% women representation in the training)*	*- Project M & E reports* *- Progress reports* *- Training registers*	*Political and economic stability in the country, no disruptions from other externalities*
Output 3.1. *Training-of-trainers to monitor, evaluate, track and report on impacts of climate-resilient practices across agricultural value chains*	*Number of electronic publications of monitoring, evaluation and learning (MEL) on social media for knowledge management*	*0*	*10*	*-Assessment report* *- Project M & E reports* *- Progress reports*	*Political and economic stability in the country, no disruptions from other externalities*
Output 3.2. *Capacity building programme on climate-resilient agricultural production*	*Number of national, provincial, district and local government authorities trained in climate resilient agriculture*	*0*	*At least 30, including 50% women*	*-Assessment report* *- Project M & E reports* *- Progress reports*	*Political and economic stability in the country, no disruptions from other externalities*
Output 3.3*. Knowledge management and dissemination of lessons learnt on scaling up climate-resilient agricultural practices*	*Number of electronic publications of policy brief, report, and press releases on social media for knowledge management by Year 5*	*0*	*10*	*-Assessment report* *- Project M & E reports* *- Progress reports*	*Political and economic stability in the country, no disruptions from other externalities*

1.25 *Alignment with the Results Framework of the Adaptation Fund*

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

A 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 the full proposal stage dependent on more in-depth consultation and analysis.

Project Objective(s) [1]	**Project Objective Indicator(s)***	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (USD)****
Enhance the sustainability of main agricultural value chains through the adoption of climate-smart practices, contributing to improving the produces' quality, increasing access to markets, and creating green jobs for women and youth in vulnerable communities	*Number of beneficiaries (direct and indirect) disaggregated by gender* *Number of smallholder farmers reporting improvements in their living conditions*	*Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas*	*Percentage of targeted population with sustained climate-resilient alternative livelihoods*	*10,000,000*
Project Outcome(s)	**Project Outcome Indicator(s)***	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)****
Outcome 1 - Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers	*Number of smallholders Farmers reporting an increase in programme crop productivity*	*Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability*	*6.1.1.No. and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies*	*4,279,230*
Outcome 2 - Improved access to appropriate processing, storage technologies, and profitable markets	*Number of smallholder farmers reporting improved food security and market access as a source of income*	*Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability*	*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)*	*2,925,171*

Outcome 3 - Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.	*Number of key representatives of administration at national level, provincial and district and LLGs level trained for scaling up climate-resilient cropping, processing, and storage practices*	*Output 2.1: Strengthened capacity of national and subnational centers and networks to respond rapidly to extreme weather events*	*2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)*	*1,148,106*
		Output 7: Improved integration of climate-resilience strategies into country development plans	*7.1. No. of policies introduced or adjusted to address climate change risks (by sector)*	

[1] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

1.26 ***Detailed budget***

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.**

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: Climate-proofed small-scale agricultural production (resilient crops, resilient agricultural practices, and resilient agroecological ecosystems)	*Output 1.1. Selection, validation and dissemination of climate resilient crops*	*Activity 1.1.1. Community-led selection, evaluation and validation of resilient crops menu based on relevant eligible criteria*	*travel cost*	*Three 5-day field missions to provide technical support to model farmers to co-identify the targeted resilient- crops (sub-activity 1.1.1.1)* *5-day missions @ lumpsum of USD 4000 per mission (transport/car rental, accommodation, perdiem, communication) 5pax*	*12 000*					*12 000*
			workshop	*3-day workshop at the provincial level to co-identify eligibility criteria for the selection of the resilient-crop that will be promoted in the various communities of the project area (sub-activity 1.1.1.1)* *A 3-day workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*	*15 000*					*15 000*
			workshop	*Six 1-day workshops at the provincial level to identify 40 model farmers and to co-define criteria for the model farmers' selection (sub-activity 1.1.1.2)* *A 1-day workshop at @ USD 2000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*	*12 000*					*12 000*
			NARI technical support	*Technical support from NARI experts to model farmers for implementing 40 demonstration plots and field visit for assessment (including travel and mission costs) (sub-activity 1.1.1.3)*		*50 000*				*50 000*
			travel cost	*Field visits for the assessment of the climatic resilient varieties grown in the champions' demonstrators (sub-activity 1.1.1.4)* *1-day mission @ lumpsum of USD 1000 per mission (transport/car rental,*		*40 000*				*40 000*

				accommodation, perdiem, communication, catering) 3pax						
		Activity 1.1.2: Support the construction of 40 multiplication sheds for resilient varieties distribution	*NARI technical support*	*Design of the standard plan of locally acceptable, small size multiplication sheds using locally available materials by NARI staff (sub-activity 1.1.2.1) 15 working days @ lumpsum of USD 5000*	*5 000*					*5 000*
			workshop	*A 1-day workshop with the Provincial Climate Change Committees (PCCC) and NARI to validate plan of locally acceptable multiplication sheds using locally available materials (sub-activity 1.1.2.1) A 1-day workshop at @ USD 2000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*	*2 000*					*2 000*
			construction	*Construction of 40 multiplication sheds @ USD 20000 per shed / 20 sheds per year (sub-activity 1.1.2.2)*		*400 000*	*400 000*			*800 000*
			materials	*Purchase and distribution of validated resilient planting material or seeds to the extension services (x50) for the advisory support (sub-activity 1.1.2.3) Lump sum of USD 1200 / extension services per year (this cost integrate all logistic from order to delivery and including tax)*		*30 000*	*30 000*			*60 000*
	Total output 1.1				***46 000***	***520 000***	***430 000***	*-*	*-*	***996 000***
	Output 1.2. Extension services for climate-resilient agriculture	*Activity 1.2.1: Identify and setup 30 climate field schools including recruitment of members*	*travel cost*	*Three 5-day field missions to define selection criteria and identify farmers at Enga, Milne Bay, and New Ireland (sub-activity 1.2.1.1) 5-day mission @ lumpsum of USD 2000 per mission (transport/car rental, accommodation, perdiem, communication) 3 pax*		*6 000*				*6 000*
			training	*Three 5-day training workshop for selected farmers on the basic knowledge and skills to become a Model Farmers (sub-activity 1.2.1.2) A 5-day training workshop at @ USD 1500 (catering, perdiem, logistic) / 20 pax*		*4 500*				*4 500*

			logistic	*Provision of resilient and high-adoption potential planting materials for selected Model Farmers according to the need of their communities (sub-activity 1.2.1.3) Lumpsum of USD 1000 for logistics to provide materials per Model farmer (x45)*			*25 000*	*25 000*		*50 000*
			travel cost	*Three 5-day field visit in 3 provinces to provide technical support to Model Farmers for implementing 30 demonstration plots that must be used for farmer-to-farmers-extension actions (sub-activity 1.2.1.4) 5-day mission @ lumpsum of USD 2000 per mission (transport/car rental, accommodation, perdiem, communication) 3 pax*			*6 000*			*6 000*
			awareness campaign	*Awareness campaigns per demonstrator to enroll at 30-50 other farmers by field school (sub-activity 1.2.1.5) Three 4-day mission @ lumpsum of USD 1000 per mission (transport/car rental, accommodation, perdiem, communication) 3 pax*			*25 000*	*20 000*		*45 000*
		Activity 1.2.2: Design the training curriculum and manual on resilient agronomic packages and translate into local languages as appropriate	*national consultant*	*A specialist in Agronomy and Climate change to develop the curriculum and manual (sub-activity 1.2.2.1) Level of effort: 30 days @ USD 400 per day*		*12 000*				*12 000*
			workshop	*A 1-day validation workshops of training curricula and manuals on resilient agronomic packages (sub-activity 1.2.2.1) 1-day workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants, travel cost and accommodation) / 30 pax*		*5 000*				*5 000*
			translation	*Translations of curriculum and manual in a local language (Tok Pisin/pidgin) @ US$ 0.1 per word for a document of max 20000 words*		*2 000*				*2 000*

		Activity 1.2.3: Identify and map potential (non-state) extension services providers including well-functioning cooperatives, grassroot organizations, intermediaries, smallholder SMEs, and input suppliers for each province	*national consultant*	*A stakeholders mapping consultant engaged to identify and map potential (non-state) extension services providers including well-functioning cooperatives, grassroot organizations, intermediaries, smallholder SMEs, and input suppliers for each province (sub-activity 1.2.3.1) Level of effort: 20 days @ USD 400 per day*	*8 000*					*8 000*
			travel cost	*Travel to project sites for field consultation and data collection for mapping Lumpsum of USD 1000 per province*	*3 000*					*3 000*
			workshop	*Three 1-day validation workshops of identified potential (non-public) extension services providers (sub-activity 1.2.3.1) 1-day workshop at @ USD 2000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*	*6 000*					*6 000*
		Activity 1.2.4. Support for 50 contracts related to extension services provision between local service providers and farmers' organizations.	*professional firm*	*Provision of monthly training for Climate Field Schools on modules related to climate and weather forecast, climate smart practices, post-efficient post-harvest processing and conservation practices 50 Extension service providers for annual contract at lumpsum of USD 2330 each per year*		*116 500*	*116 500*	*116 500*	*116 500*	*466 000*
	Total output 1.2				***17 000***	***146 000***	***172 500***	***161 500***	***116 500***	***613 500***
	Output 1.3. Land and ecosystems conservation through Nature-based Solutions	*Activity 1.3.1: carry out ground survey and map degraded areas for reforestation in project area*	*travel cost*	*Three 5-day missions to conduct participatory survey with an aim to identify degraded and areas prone to landslides in the three targeted provinces (Enga, Milne Bay, and New Ireland) (sub-activity 1.3.1.1) 5-day mission @ lumpsum of USD 2000 per mission (transport/car rental, accommodation, perdiem, communication) 3 pax per province*	*6 000*					*6 000*

			national consultant	*Consultant in GIS to collaborate with PNGFA and use the list of georeferenced degraded areas / Mapping degraded and areas prone to landslides including biophysical database provision in Enga, Milne Bay, and New Ireland (sub-activity 1.3.1.2)* *Level of effort: 60 days @ USD 400 per day*	*24 000*					*24 000*
			workshop	*1-day validation workshop for degraded and areas prone to landslides mapping in Enga, Milne Bay, and New Ireland (sub-activity 1.3.1.3)* *1-day workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants, travel and accommodation) / 30 pax*	*5 000*					*5 000*
		Activity 1.3.2: Implement a reforestation program of 3000 ha around croplands, mangroves and degraded forest, vegetation planting along riverbanks or unstable lands	*travel cost*	*Three 5-day missions (in each province) to Identify and rehabilitate existing community nurseries and confirm the selection of 1000 ha (for each province) of degraded or areas prone to landslides in forest, mangroves and croplands ecosystem located in Enga, Milne Bay, and New Ireland (sub-activities 1.3.2.1 and 1.3.2.2)* *5-day mission @ lumpsum of USD 2000 per mission (transport/car rental, accommodation, perdiem, communication) 3 pax per province*	*6 000*					*6 000*
			training	*Three 3-day training of 10 community nurseries for afforestation action on 3000 ha. Training will be on techniques in seed/seedling collection and handling, preparation, germination and caring for seedlings with techniques on cloning native tree species that could not germinate from seeds (sub-activity 1.3.2.3)* *A 3-day training workshop at @ USD 3000 (support catering, perdiem, logistic, kit of participants) / 30 pax per province*	*9 000*					*9 000*

			national consultant	*A technical expert for the development of a technical manual in official and local language on collection, handling, producing and planting native trees. (sub-activity 1.3.2.4)* *Level of effort: 30 days @ USD 400 per day*	*12 000*					*12 000*
			workshop	*1-day validation workshops of manuals (sub-activity 1.3.2.4)* *1-day workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants, travel cost and accommodation) / 30 pax*	*5 000*					*5 000*
			translation	*Translations of curriculum and manual in local language (Tok Pisin/pidgin) @ US$ 0.1 per word for a document of max 20000 words*	*2 000*					*2 000*
			seedlings/saplings' kit	*Support of 10 community nurseries with a kit for seedlings and saplings production. Kits for seedlings provided to cooperatives, and grassroots organizations trained in 1.3.2.3 (sub-activity 1.3.2.5)* *Kit at USD 240000 (USD 0,2 per kit) for 1,200,000 kits for seedlings*	*240 000*					*240 000*
			planting cost	*Planting of 1,200,000 seedlings/saplings over 3000 ha of degraded land (riverbanks, mangroves, croplands, forests) in Enga, Milne Bay and New Ireland (sub-activity 1.3.2.6)* *USD 200 per ha (400 trees per ha at USD 0,5 the tree) + USD 200 labor cost per 1ha for planting activities + USD 100 for logistic per ha*		*500 000*	*500 000*	*500 000*		*1 500 000*
		Activity 1.3.3: Conduct awareness raising events with local communities on the importance of ecosystem services to enhance their participation in the protection and	*workshop*	*Three 3-day workshops (one for each province) to raise community awareness on the ecosystem services provided by wooded or forested areas (sub-activity 1.3.3.1) and the importance of maintaining reforested areas and development of local plans for maintaining afforested areas (sub-activity 1.3.3.2)* *A 3-day workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax per province*				*15 000*		*15 000*

		maintenance of reforested areas	*maintenance*	*Support to protection and implementation of local maintenance plans of the reforested areas (sub-activity 1.3.3.2)* *USD 20 per ha (40 trees per ha at USD 0,5 the tree) + USD 50 labor cost per 1ha for planting activities + USD 50 for logistic per ha*		*120 000*	*120 000*	*120 000*	*120 000*	*480 000*
		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	*ESS, Gender and Youth Specialist @USD2500 per month considering annual inflation of 4.9%*	*10 000*	*10 490*	*11 004*	*11 543*	*12 109*	*55 146*
			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*
			national consultant	*Gender specialist to conduct GAAP implementation (support and monitoring)* *Level of effort: 60 days per year @ USD 400 per day (20 days/year/component))*	*8 000*	*8 000*	*8 000*	*8 000*	*8 000*	*40 000*
		Local travel	*travel cost*	*Lumpsum of US$ 10000 per year for project coordination travel and field visit*	*10 000*	*10 000*	*10 000*	*10 000*	*10 000*	*50 000*
	Total output 1.3				***377 000***	***690 450***	***693 020***	***710 716***	***198 544***	***2 669 730***
	Total Component 1				***440 000***	***1 356 450***	***1 295 520***	***872 216***	***315 044***	***4 279 230***
Component 2: Climate-resilient postharvest solutions and access to markets	*Output 2.1: Digital platform to strengthen relationships among agricultural value chains actors*	*Activity 2.1.1: Access existing agricultural market information and flows in project areas to identify needs and gaps*	*national consultant*	*Assessment of agricultural market information and flows in Enga, Milne Bay and New Ireland (sub-activity 2.1.1.1)* *Level of effort : 20 days per province @ USD 400 per day*		*24 000*				*24 000*
			workshop	*Three 1-day validation workshop of the Assessment report on the access of existing agriculture market (sub-activity 2.1.1.2)* *1-day workshop at @ USD 2000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*		*6 000*				*6 000*

		Activity 2.1.2: Support the development of an integrated digital platform to link farmers, small-scale processors, traders, and buyers along the value chain	*professional firm*	*Evaluation of the commonly used digital platforms linking farmers, small-scale processors, traders, and buyers in PNG and setup of digital integrated platform (@ US$ 100000: Y2) and annual maintenance support to update data (@ US$ 15000) - considering annual inflation of 4.9% (sub-activities 2.1.2.1, 2.1.2.2, and 2.1.2.3)*		*100 000*	*15 000*	*15 735*	*16 506*	*147 241*
			training	*Training of farmers, traders, and buyers in the use of the platform at the provincial level (activity 2.1.2.4)* *A 3-day training workshop at @ USD 3000 (support catering, perdiem, logistic, kit of participants) / 30 pax per province*		*9 000*				*9 000*
	Total output 2.1				*-*	***139 000***	***15 000***	***15 735***	***16 506***	***186 241***
	Output 2.2. Eco-friendly technologies for seed saving, postharvest processing, and storage	*Activity 2.2.1: Undertake joint planning with women and youth farmers organizations to identify the specific needs and priorities of the beneficiaries*	*national consultant*	*Stakeholder engagement specialist to identify and assess women and youth farmers organizations that will be the beneficiaries and their specific need - needs assessment of vulnerable communities (sub-activity 2.2.1.1)* *Level of effort: 20 days per province @ USD 400 per day*		*24 000*				*24 000*
			workshop	*1-day validation workshop of need assessment of women and youth farmers organizations for eco-friendly technologies for processing and storage of coffee, copra, and food crops (sub-activity 2.2.1.2)* *1-day workshop at @ USD 2000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*		*2 000*				*2 000*
		Activity 2.2.2: Procure and install processing and storage technologies (e.g., solar-powered dryers, solar-powered storage facilities)	*construction*	*Setup and install processing and storage shed in each province* *USD 613.500 (per facility / province) including procurement, transport, custom, tax, and installation*		*1 740 000*				*1 740 000*
			equipment	*Solar-powered dryers, solar powered storage facilities @ lump sum of USD 195.000 per province - including procurement, transport, custom, tax, and installation*			*585 000*			*585 000*

		Activity 2.2.3: 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	*national consultant*	*National consultant specialized in solar equipment to develop O&M guidelines and provide hand-on training session to beneficiaries @ US$ 400 for 60 days (sub-activity 2.2.3.1)*			*24 000*			*24 000*
			translation	*Translations of O&M guidelines in local language (Tok Pisin/pidgin) @ US$ 0.1 per word for a document of max 20000 words (sub-activity 2.2.3.1)*			*2 000*			*2 000*
			training	*2 Trainings of farmers organizations members (sub-activity 2.2.3.2)* *A 3-day training workshop at @ USD 4500 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*			*9 000*			*9 000*
		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	*ESS, Gender and Youth Specialist @USD2500 per month considering annual inflation of 4.9%*	*10 000*	*10 490*	*11 004*	*11 543*	*12 109*	*55 146*
			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 cost*	*EGYS officer's travel to the multiplication shed sites (Activity 1.1.2), to the storage sites to inspect (Activity 2.2.2) and to reforestation program sites (Activity 1.3.2) to undertake their site-assessment and monitor risk* *Total travel would be (2 trips x 3 target areas x 3 years (Y1, 2 & 3) + 1 trip x 3 target areas x 2 years (Y4&5) = 19 total trips)* *Lumpsum of USD 300 per trip*	*1 800*	*1 800*	*1 800*	*900*	*900*	*7 200*
			national consultant	*Gender specialist to conduct GAAP implementation (support and monitoring)* *Level of effort: 60 days per year @ USD*	*8 000*	*8 000*	*8 000*	*8 000*	*8 000*	*40 000*

				400 per day (20 days/year/component))						
		Local travel	*travel cost*	*Lumpsum of US$ 6000 per year for project coordination travel and field visit*	*6 000*	*6 000*	*6 000*	*6 000*	*6 000*	*30 000*
	Total output 2.2				***65 800***	***1 834 250***	***690 820***	***72 616***	***75 444***	***2 738 930***
	Total Component 2				***65 800***	***1 973 250***	***705 820***	***88 351***	***91 950***	***2 925 171***
Component 3: Capacity building and knowledge management for scaling up CRA practices	*Output 3.1. Training-of-trainers to monitor, report and verify impacts of climate-resilient practices across agricultural value chains*	*Activity 3.1.1: Develop training curriculum and training manual on methods and tools to track changes in behaviours 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 for 60 days (sub-activity 3.1.1.1)*			*16 000*			*16 000*
			translation	*Translations of curriculum and manual in local language (Tok Pisin/pidgin) @ US$ 0.1 per word for a document of max 20000 words (sub-activity 3.1.1.1)*			*2 000*			*2 000*
			workshop	*Validation workshop of the developed curriculum and manual (sub-activity 3.1.1.2)* *1-day workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants, travel cost and accommodation) / 30 pax*			*5 000*			*5 000*
		Activity 3.1.2: 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	*training*	*A 3-day training workshop at @ USD 10000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 15 pax (Sub-activities: 3.1.2.2)*			*10 000*			*10 000*
		Activity 3.1.3: Support Lead Trainers to conduct subsequent training sessions	*training*	*Organize twelve 5-day training sessions for district key stakeholders* *A 5-day training workshop at @ USD 8000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*			*96 000*			*96 000*

		at the district level								
	Total output 3.1				*-*	*-*	***129 000***	*-*	*-*	***129 000***
	Output 3.2. Capacity building Programme on climate-resilient agricultural production	*Activity 3.2.1: Provide technical training and support to selected model farmers to run seed or planting material multiplication sheds including multiplication techniques, nucleus seeds, development of management and business plan*	*national consultant*	*Three Consultants in seed or planting material multiplication techniques and nucleus seeds production for the training modules conception and provision of training @ USD 400 per day (sub-activity 3.2.1.1)* *Estimate level of effort : 20 days per Consultant in each province*		*24 000*				*24 000*
			training	*Three training workshops of 3-days (one for each province on multiplication techniques and nucleus seeds production) (sub-activity 3.2.1.1)* *A 3-day training workshop at @ USD 4000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 20 pax*		*12 000*				*12 000*
			national consultant	*Consultant in farm management and business plan for the training modules conception and provision of training @ USD 400 per day (sub-activity 3.2.1.2)*		*18 000*	*18 000*			*36 000*
			training	*Six training workshops of 3-days (two workshops in each province on development of farm management plan and business plan) (sub-activity 3.2.1.2)* *A 3-day training workshop at @ USD 4000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 20 pax / one training per year per province*		*12 000*	*12 000*			*24 000*
			travel cost	*Travel costs of the Consultants to provide trainings in the provinces* *Lumpsum of USD 1500 in each province / 6 trainings in Y2 and 3 trainings in Y3*		*9 000*	*4 500*			*13 500*
		Activity 3.2.2: Develop gender-sensitive training programs on climate-resilient agriculture including curriculum and	*national consultant*	*national consultant specialized in climate and gender-sensitized to develop curriculum and training manual @ US$ 400 per day (x 60 days) (Sub-activities: 3.2.2.1)*				*24 000*		*24 000*
			translation	*Translations of curriculum and manual in a local language (Tok Pisin) @ US$ 0.1*				*2 000*		*2 000*

		training materials, translated into local languages		*per word for a document of max 20000 words (Sub-activities: 3.2.2.2)*						
		Activity 3.2.3: Provide training sessions for national, provincial and local 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	*Two training session for national and provincial authorities @ US$ 5000 per province* *A 3-day training workshop at @ USD 5000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*				*40 000*		*40 000*
	Total output 3.2				*-*	***75 000***	***34 500***	***72 000***	*-*	***181 500***
	Output 3.3. Knowledge management and dissemination to policymakers, development partners, private sector including smallholder SMEs, and civil society organizations on scaling up climate-resilient agricultural practices	*Activity 3.3.1: 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*	*personnel cost*	*M&E specialist to recruit under the project @ US$ 2500 per month - considering annual inflation of 4.9%*	*30 000*	*31 470*	*33 012*	*34 630*	*36 326*	*165 438*
			travel cost	*travel cost to undertake participatory MEL (site visits, tec.) to support continuous monitoring of the project Lumpsum of USD 2000 per year*	*2 000*	*2 000*	*2 000*	*2 000*	*2 000*	*10 000*
			travel cost	*Awareness campaigns (in each province: Enga, Milne Bay and New Ireland) for transparent communication of results in line with the stakeholder engagement plan (sub-activity 3.3.1.2)* *One 3-day mission @ lumpsum of USD 2000 per mission (transport/car rental, accommodation, perdiem, communication) 3 pax*				*6 000*		*6 000*
		Activity 3.3.2: Develop and publish knowledge products such as policy briefs, technical reports, social media posts, short	*national consultant*	*Climate policy analyst for the development of policy briefs, report and press release and stakeholder awareness session (sub-activity 3.3.2.1) @ US$ 400 per day (x60 days per year during the last 3 years)*			*24 000*	*24 000*	*24 000*	*72 000*
			communications	*Printing costs for policy briefs and technical reports and realization of short documentary*				*5 000*	*5 000*	*10 000*

		documentaries, and news media mentions emphasizing best practices and lessons learned concerning CRA practices in each province and at the national level	*personnel cost*	*Comms 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*
		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	*ESS, Gender and Youth Specialist @USD2500 per month considering annual inflation of 4.9%*	*10 000*	*10 490*	*11 004*	*11 543*	*12 109*	*55 146*
			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*
		Monitoring Evaluation and Learning	*database setup*	*Online hosting of computerized database associated with geolocalisation software online hosting + user fees @ USD 500 per year + Software @ USD 40000 (Y2)+ maintenance @ USD 5000 year*		*40 500*	*5 500*	*5 500*	*5 500*	*57 000*
		Monitoring Evaluation and Learning	*workshop*	*biannual refection workshops for MEL and Knowledge management Validation workshop of the developed curriculum and manual (sub-activity 3.1.1.3) 1-day workshop at @ USD 2000 (support for venue, catering, perdiem, logistic, kit of participants and media) / 30 pax*	*2 000*		*2 000*		*2 000*	*6 000*
		Support to the implementation of project	*national consultant*	*Gender specialist to conduct GAAP implementation (support and monitoring) Level of effort: 60 days per year @ USD 400 per day (20 days/year/component))*	*8 000*	*8 000*	*8 000*	*8 000*	*8 000*	*40 000*

		Local travel	*travel cost*	*Lumpsum of US$ 6000 per year for project coordination travel and field visit*	*6 000*	*6 000*	*6 000*	*6 000*	*6 000*	*30 000*
	Total output 3.3				***128 000***	***171 890***	***174 544***	***177 475***	***185 697***	***837 606***
	Total Component 3				***128 000***	***246 890***	***338 044***	***249 475***	***185 697***	***1 148 106***
(A) Project activities cost					***633 800***	***3 576 590***	***2 339 384***	***1 210 042***	***592 691***	***8 352 508***
Project Executive Costs (up to 9,5%)		*National Project Manager (NPM)*	*personnel cost*	*National Project Manager to coordinate the project implementation @ US$ 4000 per month - considering annual inflation of 4.9%*	*48 000*	*50 352*	*52 819*	*55 407*	*58 122*	*264 701*
		Finance Manager (FM)	*personnel cost*	*Project Finance Manager @ US$ 3000 per month - considering annual inflation of 4.9%*	*36 000*	*37 764*	*39 614*	*41 556*	*43 592*	*198 526*
		Procurement & Administration Associate (PAA)	*personnel cost*	*Project Procurement & Administrative Associate @ US$ 2500 per month - considering annual inflation of 4.9%*	*30 000*	*31 470*	*33 012*	*34 630*	*36 326*	*165 438*
		Monitoring and evaluation	*professional firm*	*project final evaluation report @ US$ 55000 Y5)*					*55 000*	*55 000*
		Office supplies and Miscellaneous	*supplies cost*	*Lumpsum of US$ 1000 per month - considering annual inflation of 4.9% / (bank fees, mail couriers, etc.)*	*12 000*	*12 588*	*13 205*	*13 852*	*14 531*	*66 175*
		Office equipment	*furniture cost*	*Office Equipment (laptops @ US$ 2000 per unit (x9) - Y1, US$ 2000 per unit (x9) - Y3/Y4, desks and chair @ US$ 1500 per unit (x9), and other equipment @ lumpsum of US$ 10652)*	*42 152*		*18 000*			*60 152*
		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*
		Financial Audit	*professional firm*	*Conduct annual financial audit*	*4 000*	*4 000*	*4 000*	*4 000*	*4 000*	*20 000*
(B) Project Execution Cost					***179 152***	***143 174***	***167 651***	***156 444***	***218 571***	***864 992***
(A)+(B) Total Project Cost					***812 952***	***3 719 764***	***2 507 035***	***1 366 487***	***811 262***	***9 217 500***
(C) Implementing Entity Fee (up to 8,5%)		*Startup activities*	*professional firm*	*Appraise and finalize project implementation arrangements including travel and meeting @ US$ 100000*	*100 000*					*100 000*

		Startup activities	*professional firm*	*Assistance and advise on the establishment of project management structure/unit @ US$ 100000*	*100 000*					*100 000*
		Monitoring and evaluation	*professional firm*	*Supervision of preparation of annual (including mid-term) project monitoring reports and project evaluation reports @ US$ 25000 in Y1, Y2 and Y4 @ US$ 55000 in Y3*	*25 000*	*25 000*	*55 000*	*25 000*		*130 000*
		Monitoring and evaluation	*professional firm*	*Oversee each year procurement and financial management to ensure implementation is in line with the policies and timelines @ US$ 15000*	*15 000*	*15 000*	*15 000*	*15 000*	*15 000*	*75 000*
		Travel	*travel cost*	*Travel costs for Project supervision missions and steering committee meetings @ US$ 15000*	*15 500*	*15 500*	*15 500*	*15 500*	*15 500*	*77 500*
		Outreach	*professional firm*	*Annual project outreach and knowledge sharing @ US$ 20000*	*20 000*	*20 000*	*20 000*	*20 000*	*20 000*	*100 000*
		Audit	*professional firm*	*Annual audit (including mid-term and final) @ US$ 50000 in Y3 and Y5*			*50 000*		*50 000*	*100 000*
		Closing activities	*professional firm*	*Support to prepare and finalize project closing documents for submission @ US$ 61827*					*100 000*	*100 000*
(C) Implementing Entity Fee					*275 500*	*75 500*	*155 500*	*75 500*	*200 500*	*782 500*
AMOUNT OF FUNDING REQUESTED / GRANT AMOUNT					***1 088 452***	***3 795 264***	***2 662 535***	***1 441 987***	***1 011 762***	***10 000 000***

** Notes:*
Multiplication shed construction & equipment - 300 breeding lines - average cost based on data from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjF-fj39N37AhUAhc4BHVByBdoQFnoECA8QAQ&url=https%3A%2F%2Fwww.dmknl.de%2Fde%2Fstudien.html%3Ffile%3Dfiles%2FHomepageDatein%2FSeiten%2FPublikation%2FAnalyse%2520der%2520Wirtschaftlichkeit%2520von%2520Pflanzenz%25C3%25BCchtung%2520und%2520Saatgutvermehrung%2FAnalyse%2520der%2520Wirtschaftlichkeit%2520von%2520Pflanzenz%25C3%25BCchtung%2520und%2520Saatgutvermehrung.pdf%26cid%3D2637&usg=AOvVaw1GxWHEfOmzw7rZzlp-7ZR8

Storage shed: https://www.nowbuildings.com.au

Equipment: https://french.alibaba.com/p-detail/automatic-60700218794.html / https://french.alibaba.com/p-detail/Professional-1600598336014.html?spm=a2700.galleryofferlist.normal_offer.d_title.229f5b40cGWawE. / https://french.alibaba.com/product-detail/Agriculture-product-drying-equipment-tomato-processing-1600068978634.html / https://french.alibaba.com/p-detail/Agricultural-1600443161376.html?spm=a2700.galleryofferlist.0.0.1bab2d8fdL4IMl

geolocalisation software: https://georezo.net/wiki/main/logiciels/prix_des_logiciels

Inflation based on the most recent data of the world bank 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 perdiem 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)

The breakdown budget for the monitoring and evaluation (M&E) plan is presented below.

Table 8: Budgeted M&E Plan

Type of Monitoring	***Responsible Party(ies)***	***Budget USD***	***Timeframe***
TOTAL		*366,438*	
Terminal Evaluation	*IE, PMU, External Consultants*	*55,000*	*End of project*
Monitoring and Evaluation Officer	*PMU*	*165,438*	*Total for project*
Evaluation and assessment	*IE, PMU, External Consultants*	*130,000*	*Annually and Mid-point*
Annual Progress Reports	*PMU*	*16,000*	*Annually*

*1.27 **Disbursement schedule with milestones***

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

Scheduled date	*Project Start January 2024*	*Year 2 January 2025*	*Year 3 January 2026*	*Year 4 January 2027*	*Year 5 January 2028*	***Total***
	1st disbursement	*2nd disbursement*	*3rd disbursement*	*4th disbursement*	*5th disbursement*	
Milestones	*Start of Project/Programme Implementation*	*Programme Implementation*	*Programme Implementation/ Mid-term Review (if planned)*	*Programme Implementation*	*Programme closing/Terminal Evaluation*	
Project activities cost (A)	*633,800*	*3,576,590*	*2,339,384*	*1,210,042*	*592,691*	***8,352,508***
Project Execution cost (B)(USD)	*177,152*	*146,174*	*165,651*	*159,444*	*216,571*	***864,992***
Total Project cost (A+B)	*810,952*	*3,722,764*	*2,505,035*	*1,369,487*	*809,262*	***9,217,500***
Implementing Entity Fee (USD)	*275,500*	*75,500*	*155,500*	*75,500*	*200,500*	***782,500***
Total (USD)	*1,086,*	*3,783,764*	*2,660,535*	*1,444,987*	*1,009,762*	***10,000,000***

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

A. Record of endorsement on behalf of the government[2]

Include the name and position of the government official and the date of approval. If this is a regional project/program, list the officials who approved it in all participating countries. The letter(s) of support should be attached as an annex to the project/program proposal. Please attach the letter(s) of endorsement to this template; add as many participating governments if it is a regional project/program:

William Lakain Acting Managing Director Climate Change & Development Authority, Papua New Guinea	Date: *(Month, day, year)*

B. Implementing Entity certification

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/program 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, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Dirk Snyman Coordinator: Climate Finance SPC Implementing Entity Coordinator	
Date: 08 *January 2022*	Tel. and email: +687 262000; dirks@spc.int
Project Contact Person: Pauline Siret	
Tel. and Email: +687 262000; paulines@spc.int	

PART V: ANNEXES

Annex 1: Endorsement letter by the Government

CLIMATE CHANGE AND DEVELOPMENT AUTHORITY
OFFICE OF THE MANAGING DIRECTOR
Enchi Building, Ground Flr, Fig Street, Wards Road Hohola, Port Moresby
P O Box 4017, Boroko 111, National Capital District,
Papua New Guinea
Telephone: (+675) 3414286 | Mobile: (+675) 77007851 or 77007955 | Email: garau.podi@ccda.gov.pg | Website: www.ccda.gov.pg

January 6, 2023

LETTER OF ENDORSEMENT BY GOVERNMENT

To: **The Adaptation Fund Board**
c/o Adaptation Fund Board Secretariat
Email: afbsec@adaptation-fund.org
Fax: 202 522 3240/5

SUBJECT: **ENDORSEMENT FOR THE PROPOSAL "ADAPTATION OF SMALL-SCALE AGRICULTURE (ASSA) FOR IMPROVED FOOD SECURITY OF RESILIENT COMMUNITIES IN PAPUA NEW GUINEA"**

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

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by the Pacific Community and executed by the Government of Papua New Guinea.

Sincerely,

Climate Change & Development Authority
Common Seal

WILLIAM LAKAIN
Acting Managing Director
Government of Papua New Guinea

Annex 2: Environmental & Social Assessment and Management Plan

Adaptation of Small-Scale Agriculture for improved food security resilient communities in Papua New Guinea (ASSA)

Target Provinces: Enga, Milne Bay & New Ireland

Table of Contents

1. Introduction

This annex provides an overview of the context in Papua New Guinea (PNG) for environmental and social risk assessment, details the specific E&S risks associated with the AF Project "Adaptation of Small-Scale Agriculture for Improved Food Security Resilient Community in Papua New Guinea" (ASSA), and includes an Environmental and Social Management Plan (ESMP) for the overall project.

The ESP of the Adaptation Fund is designed to ensure that supported projects promote environmental and social benefits and mitigate or avoid adverse environmental and social risks and impacts. The ESP, in effect since November 2013, requires that all AF projects enhance positive social and environmental opportunities and benefits and minimize adverse social and environmental risks and impacts.
ESP has 15 principles to manage unnecessary risks that are put into practice during the development of the project. Among them are compliance with the law, access and equity, marginalized and vulnerable groups, human rights, gender equality and women's empowerment, core labour rights, indigenous people, involuntary resettlement, protection of natural habitats, conservation of biological diversity, climate change, pollution prevention and resource efficiency, public health, physical and cultural heritage, and lands and soil conservation.

An initial screening to identify potential adverse environmental and social impacts and risks was undertaken at the concept note stage of project design, which identified a few areas for further assessment during the full project design stage. Among these are areas related to release of waste and pollutants, production of small-scale GHG emissions, an inability to reach all potential beneficiaries for consultation and engagement in project design, and localized impacts on biodiversity and natural habitat. During the full proposal development process these areas were evaluated further and addressed in this annex order to:

- *Integrate the ESP Principles in order to maximize social and environmental opportunities and benefits and strengthen social and environmental sustainability,*
- *Identify any further potential social and environmental risks and their significance; and*
- *Determine the level of social and environmental assessment and management required to address potential risks and impacts.*

Based on the identified risks and determination of E&S level as medium risk (Category B), an ESMP has been developed to ensure these risks are fully mitigated during project implementation.

2. Project Summary

PNG, like many other Pacific nations, is exposed to numerous climate risks. However, climate change presents a unique threat to the agricultural sector which, along with the forestry, fishing, and minerals and energy extraction sectors, is one of the most dominant and important to the economy, livelihoods, and wellbeing of the people of PNG[166]. Most of the rural population is involved in producing staple foods (sweet potato, taro, cocoyam, swamp taro, coconut, and other vegetables) as well as cash crops (coffee, cocoa, oil palm) and other forms of income-earning activities to purchase foods that they do not produce themselves.
This project aims to ***enhance the sustainability of main agricultural value chains through the adoption of climate-smart practices, contributing to improving the produces' quality, increasing access to markets, and creating green jobs for women and youth in vulnerable communities. More details on*** *specific objectives provided in the section 2.1 of the Funding proposal.*

3. PNG Environmental Policy Context

In PNG, a number of policies and laws provide the framework for E&S management and compliance. The following section provides a more detailed overview of specific national legislation in respect of the environment land tenure and agriculture in PNG is provided here. The Secretariat of the Pacific Regional

[166] *World Bank (2018) The World Bank in Papua New Guinea. Available at http://www.worldbank.org/en/country/png/overview.*

Environmental Program (SPREP) and the Environmental Defenders Offices ltd (EDO NSW) conducted an extensive review of natural resource and environment-related legislation for PNG[167]. From that review, discussions with stakeholders and additional desk research, the following section provides a summary of the policy and regulatory context in PNG. It should be noted that the project has been designed to align closely with the policies and strategies of the country and to ensure compliance with relevant laws and regulations.

The Constitution

PNG's legal framework is composed of the Constitution, organic laws, ordinary statutes, and custom, with the Constitution and organic laws (which are laws passed by the National Parliament and are above the status of an ordinary Act of Parliament given that they can only be changed or appealed via specific procedures set out in the Constitution) serving as the supreme law of PNG.
While the Constitution does not set out or identify substantive environmental rights, it does contain an introductory passage called 'National Goals and Directive Principles'. One of the guiding principles relates to natural resources and the environment as follows:

> *"We declare our fourth goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generations. WE ACCORDINGLY CALL FOR-*
>
> *Wise use to be made of our natural resources and the environment in and on the land or seabed, in the sea, under the land, and in the air, in the interests of our development and in trust for future generations; and*
>
> *The conservation and replenishment, for the benefit of ourselves and posterity, of the environment and its sacred, scenic and historical qualities; and All necessary steps to be taken to give adequate protection to our valued birds, animals, fish, insects, plants and trees."*

The Constitution mandates that the Government's powers include oversight of the environment, fisheries, forestry and agro-forestry, harbours and marine, parks and reserves waste management, water and sewage, water resources, and wildlife preservation. Local management of these sectors is provided by Local Government Councils, per the ***Local Government Act (Chapter 57).***

National Environmental Legislation
There are several pieces of legislation which set out the rules and regulations pertaining to environmental management and protection. Chief among these is the ***Environment Act (2000)***[168] *which, under Section 7, creates a general environmental duty for both the national government and Local Government Councils. It covers a wide range of matters including environmental offences, environmental policies, environmental impact assessment (EIA) and environmental permits. Under Sections 9-13, it is an offence to cause environmental harm (material or otherwise), and also establishes an Environment Council under Section 17. Specific regulations created under the Environment Act include:*

- *Environment (Prescribed Activities) Regulations 2002*
- *Environment (Permits) Regulations 2002*
- *Environment (Fees and Charges) Regulation 2002*
- *Environment (Council's Procedure) Regulation 2002*
- *Environment (Water Quality Criteria) Regulation 2002*

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167 SPREP Legislative Review of Papua New Guinea. Available at: https://www.sprep.org/attachments/Publications/EMG/sprep-legislative-review-png.pdf
168 Per the SPREP review, the Environment Act repeals the Environmental Planning Act, the Environmental Contaminants Act, the Environmental Contaminants Amendment, and the Water Resources Act.

*Another important piece of legislation is the **Lands Act 1996**[169]. The purpose of the Lands Act is to consolidate and amend legislation relating to land, and to repeal various statutes, and for related purposes. The Act creates a comprehensive regulatory framework for land ownership and use in Papua New Guinea. Under section 4, all land other than customary land is the property of the State, subject to any estates, rights, titles or interests in force under any law. Significantly, the Minister may acquire customary land for the purpose of granting a Special Agricultural Business License (SABL) over the land. The Lands Act also contains mechanisms for the compulsory acquisition of land and compensation. Land can be reserved under the Lands Act. Land is regulated in many ways including through the grant of state, agricultural, pastoral, business and residence, mission, government-owned building, special purpose, SABL, and urban development leases. The Lands Act enables the Minister to grant licenses to people for specific purposes and approve certain dealings and activities (referred to respectively as "controlled dealings" and "permitted dealings"). A Land Board is also established to, amongst other things, consider all applications for grant of leases referred to it by the Department and other matters referred to it by the Minister. In addition, the **Land Groups Incorporation Act (1984)**[170] has specific provisions to ensure that certain customary and similar groups are recognized under the law and that they have some ancillary powers of the management, acquisition, holding, and disposal of land. This provision is primarily to ensure that local people have greater participation in the national economy via use of land.*

*PNG has specific legislation pertaining to the conservation of natural resources, protected areas, and the safekeeping of endangered species. First is the **Conservation Areas Act of 1978**[171], which sets out a legal mandate to preserve the environment and national cultural inheritance through the conservation of biological, topographical, geological, historical, scientific and/or social importance, as well as the management and protection of those sites and areas. This law was developed in accordance with PNG's Fourth Goal of the National Goals and Directive Principles, as detailed under Section 25 of the Constitution. The Conservation Areas Act also establishes the National Conservation Council, which is the responsible entity for declaring, protecting, and monitoring conservation areas. The Act is complemented by the **Conservation and Environment Protection Authority Act (2014)**[172], which establishes the Conservation and Environment Protection Authority, which has multiple responsibilities, modalities and functions to enable to preservation and protection of the environment and natural resources.*

PNG has several other laws and regulations pertaining to environmental protection and preservation, including but not limited to[173]*:*

- *Forestry Act 1991*
- *Fauna (Protection and Control) Act 1996*
- *Crocodile Trade Protection Act 1974*
- *Fisheries Management Act 1998*
- *Fisheries (Torres Strait Protected Zone) Act 1984*
- *International Trade (Fauna and Flora) Act 1979*
- *Mineral Resources Authority Act 2005*
- *Mining Act 1992*
- *Mining Development Act 1955 and Mining Development Regulation 1957*
- *Oil and Gas Act 1998*
- *Petroleum (Submerged Lands) Act 1967 (Adopted)*
- *Unconventional Hydrocarbons Act 2015*
- *National Seas Act 1977*
- *Plant Disease and Control Act (1953)*
- *Public Health Act 1973*

[169] *SPREP Legislative Review.*
[170] *Ibid.*
[171] *Ibid.*
[172] *Ibid.*
[173] *Ibid.*

Each of these Acts has additional legislation falling under their prevue pertaining to the establishment of protected areas, exploitation of natural resources, and management of waste and hazardous materials. Notably, PNG does have legislation that is specific to climate change. The ***United Nations Paris Agreement (Implementation) Act (2016)***[174] *sets out PNG's obligations and commitments to address climate change per its commitments and obligations under the United Nations Framework convention on Climate Change (UNFCCC). In addition, PNG's* ***Climate Change (Management) Act (2015)***[175] *provides a regulatory framework for managing, designing, and overseeing climate change mitigation and adaptation activities, carrying out both national and international laws, regulations and agreements pertaining to climate change, and establishing PNG's NDA.*

Agriculture

PNG has directive principles in the Constitution which contribute to the realization of the right to adequate food. However, the core guiding document pertaining to agricultural development and food security in PNG is the ***Papua New Guinea National Food Security Policy 2016-2025.***[176] *The policy sets the medium to long-term direction and signals priority areas to focus resources (financial and human) to build sustainable food security for all Papua New Guineans. It provides a platform for joint planning to guide coherent programs and actions from all key stakeholders to strengthen food security in Papua New Guinea, and complements other agriculture policies and frameworks.*

In addition, PNG has several other policies and legislation governing the agricultural sector and the protection of resources. These include[177]*:*

- *National Agriculture Development Plan (NADP) 2007-2016*
- *National Rice Policy 2015-2030*
- *NARI Strategy and Results Framework 2011-2020*
- *National Agriculture Administration Act 2014*
- *Agriculture Investment Corporation Act 2014*
- *National Agriculture Research Institute Act 1997*
- *Animal Disease and Control Act 1952*
- *Animals Act 1952*

4. Stakeholder Consultations

From December 8-13, 2022, stakeholder focus groups for the ASSA program were undertaken. As part of these focus groups, a series of questions related to environmental and social risk were asked across the three target Provinces: Milne Bay, Enga, and New Ireland.

The questions around E&S issues related to specific activities included activity 1.1.2 the multiplication sheds to be constructed and activity 2.2.2: installing storage technologies (e.g., solar-powered dryers, solar-powered storage facilities)– questions included:

- *Where will these sheds/storage facilities be placed? Will this be on private land or land owned by the state? If private land, will it be communal/community property or individual property? If it is private land, there will need to be a process set-up for securing an agreement to build*
- *Who will build the sheds? The farmers themselves?*
- *Is there any additional information on the shed construction? i.e., examples of others so we can eliminate the risk of heavy machinery use, soil disruption, solid waste generation, and any other potential contamination/disruption from construction*

Related to crop variety selection (activity 1.1.1) – questions included:

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[174] *Ibid.*
[175] *Ibid.*
[176] *National Food Security policy, available at: file:///C:/Users/emily/Downloads/Draft%202%20National%20Food%20Security%20Policy%20Document%20November%20%202015-correct%20photo.pdf*
[177] *Ibid.*

- *How will the types of varieties of crops be selected? Will farmers have an opportunity to have input on the types of crops/seeds to focus on?*
- *Are these varieties of crops already in use by farmers in PNG?*
- *Have they been tested prior, or can they be tested prior to ensure they are appropriate for the environment?*

Related to activity 1.3.2: the reforestation program of 3000 ha – questions included:

- *What is the ownership structure of the lands that will be targeted?*
- *If it is on communal or individual land, there will need to be built into the project a community engagement process and agreement to implement the re-forestation program*

Land-use and sites of sheds/storage

In both Milne Bay and New Ireland Provinces – stakeholders requested that the siting of multiplication sheds as well as storage facilities be done on state land – Local Level Governments (LLGs) state land. Moreover, interviewees in these two provinces indicated that if sheds are placed on private land, it will generate more social issues such as land and asset ownership disputes within the communities. For multiplication sheds, one per LLGs was preferable to ensure accessibility.
For Enga Province, the discussion centered on the need for the sheds to be built at Pyakain community in Wapenamanda District because Pyakain is centrally located and can be easily accessible by farmers and households from neighbouring communities. It was suggested during consultations that land owned by the women's umbrella association, Enga Enda Anda Association (an association that represents 32 affiliated women's associations with a membership of 35,000 plus local voices) could be potentially used as it is more centrally located than government land. An MoU could be signed with the association to ensure access and use for all farmers. The final siting of land will be selected during project implementation and will follow the ESMP laid out in section 6 below.

Construction and Installation.
In all three Provinces, stakeholders mentioned that the farmers themselves can help build sheds (free labour) but that there will need to be a building contractor for the actual design and guidance for how to construct the sheds. An estimate of 10 m by 10m was provided for multiplication sheds and 20 m by 20 m for the storage facility. The stakeholders mentioned that the assumption is that most of these sites will have minimal environmental damage. However, this will need to be confirmed during implementation before any actual construction.

Stakeholders also mentioned that, based on past experiences, multiplication shed construction does not need heavy machinery use that can cause soil disruption, soil waste or any other potential contamination as it is done manually with simple tools like spades and knives. In Enga Province, stakeholders mentioned that the Enga Provincial Government has built greenhouses and igloo houses at their field bases without the use of heavy machinery, so we can utilize similar approaches for shed construction.
Since the storage facilities will be procured prefabricated – no construction will be needed for these facilities.

5. Environmental and Social Analysis Impact Assessment (ESIA)

Based on a review of activities and the discussion with stakeholders on potential E&S risks, several activities that present potential E&S risks and impacts have been flagged. Activities which are anticipated to have a greater potential for E&S risks and impact include:

- ***Activity 1.1.1:** Selection, evaluation and validation of menu of resilient crops (ESP 9, 10, 15)*
- ***Activity 1.1.2.:** Construction of multiplication sheds (ESP 6, 12, 14, 15,)*
- ***Activity 1.3.2.:** Reforestation program (ESP 7, 9, 10, 15)*
- ***Activity 2.2.2.:** Procure and install processing and storage technologies (ESP 6, 12, 14, 15)*

The following table provides a detailed look at the anticipated E&S risks for the entire project, broken down for each component.

Table 1: Assessment of E&S Risks for Each Component

Component	Risk Categorization
Component 1: Climate-proofed small-scale agricultural production	*Risk: Medium Potential Impact: Medium* *There are several activities under Component 1 which present specific E&S-related concerns. Among these include the construction of multiplication sheds, which present some environmental concerns and considerations due to the nature of construction interventions (activity 1.1.2), as well as a reforestation activity (activity 1.3.2) which, while it is a direct response to climate change activities itself, needs to be carefully planned and monitored to ensure that there are no ecosystem-related or environmental risks such as the introduction of invasive or threatening species, or infringement upon lands which are culturally-significant. As such, the type, approach, techniques and species used in ecological restoration will be undertaken to ensure that net positive benefits to the local ecosystems result, in turn providing climate-resilient ecosystem goods and services.* *For climate-resilient crops to be utilized (activity 1.1.1), there is a slight risk that the selected species will be ill suited for site-conditions and as such the project will need to ensure that species selected are suitable for the site-conditions*
Component 2: Climate-resilient postharvest solutions and access to markets	*Risk: Medium Potential Impact: Medium* *The primary activity under Component 2 which presents some E&S risks is the installation of processing and storage technologies (activity 2.2.2). Given these will be procured prefabricated, there will be minimal to low risk to water usage, damage due to extraction of raw materials, pollution of waterways, and disruption of land during installation. To ensure minimal impact, the installation will take place mostly on government land and will require an EIA to be conducted by the Environmental, Social, Gender and Youth (EGYS) officer at each site to ensure the installations are undertaken in a manner as to cause minimal disruption and that the installations are in line with PNG's regulations.*
Component 3: Capacity building and knowledge management for scaling up CRA practices	*Risk: Low Potential Impact: Low* *The activities under Component 3 pertain to training, capacity building, and knowledge and information management. As such, there are limited, even negligible risks pertaining to the AF's E&S principles.*

To elaborate on the assessment above, the assessment of potential E&S risks against AF's checklist of environmental and social principles is provided in table 2 below. Table 2 details the mitigation measures that may or may not be required. Each of these risks will be further expanded upon in the project 's ESMP, with specific mitigation strategies and stringent roles and responsibilities for monitoring and reporting.

Table 2: AF E&S Principles and Risk Assessment of Project

AF ES Principles	Identified Risks	Level	Mitigation Measures
ESP 1: Compliance with the Law	*All components of the project are aligned with the texts, laws and decrees currently applied in PNG. The project complies with the legal framework for agriculture, water and environmental protection*	*None*	*The identified project activities do not need mitigation measures since they generate no risks.*
ESP 2; Access and Equity	*The proposed project promotes fair and equitable access for all beneficiaries and is supported by a Gender Analysis and Gender Action Plan to ensure that women and vulnerable groups have the opportunity to benefit as well. There is a slight risk that multiplication sheds (1.1.2) and installation of storage facilities (activity 2.2.2) will not be easily accessible.*	*Low*	*SPC has adopted a people-centred approach to project design and consulted with a wide range of stakeholders, including women and youth groups. The activities are designed to engage and benefit vulnerable people throughout project implementation.* *To ensure equal representation, access and participation, gender quotas have been established where relevant and necessary, and a comprehensive gender assessment and action plan has been developed to address needs and vulnerabilities that are specific to women (see Annex 4).* *To mitigate the risk of accessibility to storage facilities and multiplication sheds, the project undertook stakeholder consultations at the provincial level to solicit feedback on placement for*

			accessibility. Based on the consultations most of the sheds and storage facilities will be placed on government land. This will also mitigate the risk of any land-tenure issues.
ESP 3: Marginalized and Vulnerable Groups	*The project's activities are oriented to ensure and promote fair and equal access to both participation in the project's activities, as well as access to the anticipated outcomes and benefits. To date, no activities have been identified which might generate negative impacts on marginalized people and vulnerable groups.* *Vulnerable small-scale farmers are being specifically targeted for project intervention as well as vulnerable and marginalized households to improve food security for these communities.* .	*Low*	*The project development team has undertaken numerous stakeholder consultations during the concept note and proposal development stages to identify and mitigate potential risks and concerns for all stakeholders and parties, including those for vulnerable groups. This feedback has been incorporated into project design, to ensure that community-level needs are considered. 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.* *In addition, the nature of the project and a core focus is to serve vulnerable and marginalized groups as a whole, and it aims to provide tangible benefits such as the creation of green jobs through processing of staple food crops.*
ESP 4: Human Rights	*The project respects the fundamental rights of people in the areas of intervention and will not infringe on their freedom.*	*Low*	*All parties will be consulted to avoid risks pertaining to human rights. The project respects the fundamental rights of people in the areas of intervention and therefore does not infringe on their freedom. Project activities are not expected to have any negative human rights impacts, but rather increase and enhance access to markets, green jobs, and even food security for women and vulnerable groups, specifically.*
ESP 5: Gender Equality and Women's Empowerment	*The project pays special attention to women and youth, and UN Women is a collaborating partner for this project. The project will specifically ensure that gender-sensitivity is mainstreamed throughout project activities.*	*Low*	*Women and youth will be the biggest beneficiaries of the project. All project activities have been screened and analysed to ensure full participation of women. Gender-sensitive indicators and activities will ensure that the priorities of women and other vulnerable groups are included.*
ESP 6: Core Labour Rights	*There are some activities which involve construction, which has some inherent occupational health and safety hazards for workers, primarily the construction of multiplication sheds (activity 1.1.2) and the installation of storage facilities (activity 2.2.2).* *There are no activities planned under the project that would entail unsafe, indecent or unhealthy working conditions.*	*Low*	*The project respects the ILO's labour standards. The project will ensure that minors do not work on the sites and that national health and safety legislation is applied.* *Any contracts will include provisions for ensuring ILO and country-level labour standards are followed.*
ESP 7: Indigenous Peoples	*The project will take the people-centred approach adopted by SPC for all of its activities ensures that peoples' and communities' rights are always protected.*	*Low*	*The project will comply with (i) all adaptation fund requirements, and (ii) national laws. Broad community support will be obtained. Serious documentation of stakeholder engagement will be done.*
ESP 8: Involuntary Resettlement	*None of the project activities are envisaged to lead to relocation or displacement.*	*None*	*No expropriation, relocation of farmers or disruption of producers' livelihood activities will be undertaken.*

ESP 9: Protection of Natural Habitats	*Due to direct engagement of the project for the specific activities detailed above, the project may have negative impacts on the biophysical environment, including natural habitats, if project activities are not properly monitored. There are some risks to natural habitats due to the anticipated construction of multiplication sheds and installation of storage facilities (activities 1.1.2 and 2.2.2)– these include potential of pollution of waterways and land during construction, and inappropriate locations for structures. Under the reforestation activity (activity 1.3.2) there is a risk that the techniques and species used are not appropriate for local environmental conditions, reducing survival of re-planted vegetation and disrupting ecosystem integrity*	*Medium*	*Guidance on site-species matching will be developed for specific locations which will provide information on key tree species that are adapted to the area and their ideal site-conditions. It will further identify areas where certain tree species should not be planted based on site-conditions. In addition to native species, the project will only promote tree species which are already locally adapted and do not pose a risk to the local biodiversity.* *An EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific environmental impact assessments will be conducted for the construction of multiplication sheds and installation of storage facilities to ensure minimal disruption for any construction activities.*
ESP 10: Conservation of Biological Diversity	*The project includes reforestation action in various ecosystems to boost biodiversity. However, there is a possibility that some activities may lead to minor and localised impacts on biodiversity or natural habitat in agricultural settings.*	*Medium*	*Project activities will be undertaken outside of protected areas. No invasive alien species will be introduced by project activities. Furthermore, the project will not operate in any UNESCO biosphere reserves or protected sites applicable to this project.* *For climate-resilient crops to be utilized (activity 1.1.1), the selection criteria will include site-species matching to ensure that selected crops are adapted to the area and are suitable for the site-conditions.*
ESP 11: Climate Change	*The project includes adaptation and mitigation actions and is inherently designed to enhance resilience to climate change. Small GHG emissions may arise from agricultural activities, e.g., use of vehicles running on fossil fuels, emissions from construction of multiplication sheds and installation of storage facilities. However, these are likely to be negligible and off-set by the reforestation activities.*	*None*	*The project design will ensure that there is no large-scale deforestation or forest degradation, and that all GHG emissions are minimised. The introduction of training and capacity building for farmers will help to facilitate the adoption of more climate-resilient farming practices and other agricultural techniques.*
ESP 12: Pollution Prevention and Resource Efficiency	*The project is only expected to lead to minor and negligible release of pollutants, largely from emissions from agricultural and processing equipment.* *There is some risk of disruption to soil, wastewater, and high resource usage from the construction of multiplication sheds and installation of storage facilities.*	*Medium*	*Measures have been proposed in the ESMP to avoid the risks and impacts of water and soil pollution. To the extent possible, local materials will be sourced to build multiplication sheds and storage facilities will be procured prefabricated. The siting of the sheds and storage facilities will be selected to ensure minimal disruption to land and will be mostly placed on government land (Local Level Governments (LLGs))* *An EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific environmental impact assessments will be conducted for the construction of multiplication sheds and installation of storage facilities to ensure minimal pollution for any construction activities.*

			Farmers will be trained on resilient agronomic packages covering resilient agronomic and post-harvest management, which will include better management of resources including water and soil (activity 1.2.2)
ESP 13: Public Health	*The project is not envisioned to have any negative impacts on public health.*	*None*	*The project is expected to have an overall beneficial impact on the public health with improved, healthier and more resilient natural environments. Reduced unemployment and the development of community-driven sustainable income generating agricultural activities will also improve food security and bring nutritional benefits.*
ESP 14: Physical and Cultural Heritage	*No impacts on cultural heritage are anticipated. No construction or rehabilitation activities will take place on or around an area of cultural significance.*	*Low*	*Sites to be selected will not be located in a known or suspected cultural heritage area. Sites for the multiplication sites and storage facilities will be mostly on government land.* *The project will promote the use of indigenous practices and tools where applicable and will ensure that the project considers and actively seeks out the opinions and needs of indigenous peoples and local communities to ensure that all activities and outcomes are locally led and focused. The project will also actively seek to obtain community endorsement at the onset of project implementation, and feedback has already been provided through consultations during the proposal development stage.*
ESP 15: Lands and Soil Conservation	*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*	*Low*	*There are specific activities which target and aim to improve soil quality and conservation. While there is a small risk of the construction and rehabilitation activities having an impact on the soil and land quality in specific areas, the project will closely monitor to ensure that there are no negative impacts on the land and soil surrounding the activity sites.*

A more detailed analysis of the possible environmental and social impacts and risks of the project in relation to the social and environmental principles of the AF that apply to this project is presented below. The section presents the probability of risks occurring, anticipated magnitude of impacts and possible mitigation measures.

***Principle 1: Compliance with the law**: The project activities shall be implemented in compliance with the National laws and regulations as explained in section 3. All relevant laws and regulations and their relevance to the project has been explained and no further assessment of potential impacts and risks is required for compliance with the law. For activities in components 1 and 2 involving construction or rehabilitation, as well as reforestation, the risk screening process has been done considering the adherence of these activities in accordance with the national laws and technical standards, including pertaining to labor standards, environmental protection, and any other applicable laws and regulations. All contracts will ensure that both local and international labor laws are adhered to. In addition, site-selection will be done following PNG land-use laws with the majority of sites selected for multiplication sheds and storage facilities taking place on government land, the risk of non-compliance is negligible.*

***Principle 2: Access and equity:** To prevent marginalization of any stakeholders or beneficiaries, detailed stakeholder mapping, consultations and assessments have been undertaken during the proposal development stage. Special focus has been given to vulnerable groups including women. Issues and proposed actions specific to each group have been captured and incorporated in the design of the project and included in both the Gender Action Plan and the ESMS. Furthermore, the project seeks to actively*

engage women, youth, and other vulnerable groups through several activities, thereby lowering the risk of their exclusion even further (see Principle 3 below).

As indicated in table 2 above, there is a slight risk that multiplication sheds (1.1.2) and installation of storage facilities (activity 2.2.2) will not be easily accessible to farmers or that the siting of the facilities/sheds will exclude certain groups. To mitigate the risk of accessibility to storage facilities and multiplication sheds, the project undertook stakeholder consultations at the provincial level to solicit feedback on placement for accessibility (see Section 4). Based on the consultations in Milne Bay and New Ireland all of the sheds and storage facilities in these two Provinces will be placed on government land to ensure equal access. One multiplication shed per Local Level Government (LLG) has been included in the project design to ensure there is equal distribution of multiplication resources all across the province.
In Enga province where most land is privately owned; stakeholders have stated that the government land is too far for farmers to access. As such, in Enga the sites will be either on communal land owned by women's associations or farmer's associations. To ensure access for all MoUs will be signed between the local government and the associations to require access to the facilities for local small-holder farmers.

***Principle 3: Marginalized and vulnerable groups**: Detailed stakeholder mapping and consultations have ensured that all the marginalized and vulnerable groups in the project area have been identified and incorporated in the project design. Some project activities such as capacity building are mainly designed to benefit these groups, particularly women. To ensure equity amongst the groups, there will be deliberate effort to integrate vulnerable and marginalized groups such as women, youth, and marginalized communities to directly benefit from project activities. Furthermore, the selection of project activities was done after wide consultations with all stakeholders and potential beneficiaries. The project 's M&E system will include disaggregated data to enable tracking of the participation by these groups during project implementation.*

***Principle 4: Human rights:** The project is designed to respect and adhere to the requirements of all relevant conventions on human rights in compliance with the ESMS. No violation of human rights is envisaged during implementation of this project, and the project shall promote the rights of all stakeholders involved in the project. No activities are identified whose execution is not in line with the established international human rights. Project objectives promote basic human rights for fair and equitable access to resources to enhance their resilience to climate change in the beneficiary communities. Ultimately, Project activities are not expected to have any negative human rights impacts, but rather increase and enhance access to markets, green jobs, and even food security for women and vulnerable groups, specifically.*

***Principle 5**: **Gender equality and women's empowerment:** 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.178 This project aims to combat some of the most critical gaps identified which hinder women's equality and socio-economic participation by directly engaging women, setting quotas for women's participation, and offering tailored services – including technical trainings – for women. At least 30% of farmers targeted by the project will be women and youth, who will be supported to engage in climate-resilient agricultural production. This includes support for post-harvest handling through eco-friendly processing and storage technologies, and market access via the integrated digital platform and climate-resilient roads. This will support economic empowerment of women and youths through income generation. The M&E Framework as well as the Grievance Redress Procedure (see Annex 3) shall incorporate gender equity and women empowerment issues such that they are closely followed during project implementation. To emphasize the issues of gender in this project a more detailed assessment focusing on integration of gender issues in project design and implementation has been done separately, and a gender action plan has been developed (see Annex 4).*

[178] *Department of National Planning and Monitoring. (2020), Papua New Guinea's Voluntary National Review 2020.*

Principle 6: Core labour rights: *There is a potential risk, especially for Activities under component 2 involving construction or rehabilitation which shall involve the use of local labor. The project's management will ensure that the project activities fully comply with relevant National labor laws and regulations as elaborated in section 3, and those detailed in the full proposal, as well as the ILO labor standards. Contracts under this project shall have clear clauses on compliance with the National labor laws and regulations as well as requirements relating to the safety of workers in accordance with ILO Convention in so far as they are applicable to the project. The project itself will offer competitive salaries and training opportunities to project management staff. All stakeholders including workers and populations should be sensitized about the risks related to the activities to be undertaken. In addition, adequate safety measures for timely payments for services offered, non-discrimination on basis of sex, and a defined grievance redress mechanism will be put into place.*

Principle 7: Indigenous people: *The indigenous population of PNG is one of the most heterogeneous in the world, comprising several thousand separate communities and tribal groups. 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[179]. Given this amount of diversity, there is a risk that traditional natural resource use and land use rights are undermined, and a risk that the community will be averse to the utilization of land for reforestation activities under Component 1, and the installation of storage facilities under Component 2, though these risks are likely to be minimal given that extensive stakeholder consultations were undertaken during the proposal development phase. Nonetheless, community buy-in will be sought from the outset and the community will be actively engaged with throughout the project 's implementation period. Requirements for community engagement will be included in the project's management and M&E frameworks, and specific indicators will be included to monitor and measure both engagement and reception of the project and its activities.*

Principle 8: Involuntary resettlement: *There are no activities that will lead to involuntary resettlement under this project, nor is there expropriation, relocation of farmers or disruption of producers' livelihood activities will be undertaken.*

Principle 9: Protection of Natural Habitats *and* ***Principle 10: Conservation of biological diversity:*** *The project's activities include reforestation in various ecosystems, which should have a positive impact on the integrity of both agricultural resources and agro-forestry systems. All Project activities will be undertaken outside of protected areas. No invasive alien species are likely to be introduced by project activities, and the project will not operate in any UNESCO biosphere reserves or protected sites applicable to this project.*

There are some risks to natural habitats due to the anticipated construction of multiplication sheds and installation of storage facilities (activities 1.1.2 and 2.2.2)– these include potential of pollution of waterways and land during construction, and inappropriate locations for structures. Under the reforestation activity (activity 1.3.2) there is a risk that the techniques and species used are not appropriate for local environmental conditions, reducing survival of re-planted vegetation and disrupting ecosystem integrity. Guidance on site-species matching will be developed for specific locations which will provide information on key tree species that are adapted to the area and their ideal site-conditions. It will further identify areas where certain tree species should not be planted based on site-conditions. In addition to native species, the project will only promote tree species which are already locally adapted and do not pose a risk to the local biodiversity.

An EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific environmental impact assessments will be conducted for the construction of multiplication sheds and installation of storage facilities to ensure minimal disruption for any construction activities.

[179] *UNDP, 2018. National Adaptation Plan process in focus: Lessons from Papua New Guinea.*

Principle 11: Climate change: *All three project components are in line with PNG's NDC and priorities defined in the NAPA, and the PNG Food Security Policy, and the upcoming National Adaptation Plan, which has already been approved by the National Executive Council. Apart from potential changes in land use due to reforestation, none of the activities is envisaged to result in any significant or unjustified increase in greenhouse gas (GHG) emissions or other drivers of climate change. Any adverse changes in vegetation will be closely monitored as per the ESMS. In addition, the project's emphasis on raising awareness and community engagement is anticipated to have a significant impact on behavioural change, which will likely cause a shift and buy-in for more sustainable practices. In fact, it is anticipated that the introduction of training and capacity building for farmers will help to facilitate the adoption of more climate-resilient farming practices and other agricultural techniques.*

Principle 12: Pollution prevention and resource efficiency: *Activities under Components 1 and 2 will involve construction or installation activities and as such there is risk of waste not being disposed of properly. To mitigate this risk, to the extent possible, local materials will be sourced to build multiplication sheds and storage facilities will be procured prefabricated. The siting of the sheds and storage facilities will be selected to ensure minimal disruption to land and will be mostly placed on government land (Local Level Governments (LLGs))*

An EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific environmental impact assessments will be conducted for the construction of multiplication sheds and installation of storage facilities to ensure minimal pollution for any construction activities.
Farmers will be trained to on resilient agronomic packages covering resilient agronomic and post-harvest management, which will include better management of resources including water and soil (activity 1.2.2)

Principle 13: Public Health*: There are no anticipated adverse effects on Public Health resulting from project implementation.*

Principle 14: Physical and cultural heritage*: As mentioned in principles 9 and, 10 above most of the project activities promote and enhance biodiversity conservation including sensitizing stakeholders in sustainable utilization of natural resources (i.e., appreciation and importance of the natural ecosystems), and by actively engaging with local community and placing representatives from the local community in positions of authority, management and oversight. The project will not have any activity that damages or affects physical and cultural heritages. Sites to be selected will not be located in a known or suspected cultural heritage area. The project will promote the use of indigenous practices and tools where applicable, and will ensure that the project considers and actively seeks out the pinions and needs of indigenous peoples and local communities to ensure that all activities and outcomes are locally led and focused.*

Principle 15: Land and soil conservation*: There is a small risk that the construction and installation activities could have an impact on the land surrounding the facilities in terms soil and land disruption. The project will include site-specific EIAs to ensure minimal negative impacts on the land and soil surrounding the activity sites.*

Overall Risk Categorization
Based on the above assessment the majority of the project activities are low risk with the potential for medium risk through specific, limited activities in Components 1 and 2. However, the scale of the activities is anticipated to have limited adverse E&S impacts and can be readily addressed through mitigation measures which have already been put into place. As such, ***the overall risk level for the project is rated as medium risk (Category B).*** *To mitigate the risk an ESMP has been developed (see section 6 below).*

6. Environmental and Social Management Plan (ESMP)

Based on the ESIA the main E&S risk for the project is concentrated within Components 1 and 2. The risks identified are included in table 3 below which lays out the overall ESMP for the project.

Table 3. ASSA Project ESMP

ESP AF Principles	*Risks identified Against ESPs*	*Mitigation measures*	*Risk Category*	*Monitoring responsibility and frequency*	*Budget*
ESP 1: Compliance with the Law	*All components of the project are aligned with the texts, laws and decrees currently applied in PNG. The project complies with the legal framework for agriculture, water and environmental protection*	*The identified project activities generate low risks. Site-selection for multiplication sheds, reforestation and storage facilities will be undertaking during implementation and will follow all local and international laws*	*Low*	*EGYS Officer, PMU, SPC initially during site-selection and then annually through M&E reports*	*EGYS Officer Incorporated in activities (1.1.2, 1.3.2, and 2.2.2)*
ESP 2: Access and Equity	*The proposed project promotes fair and equitable access for all beneficiaries and is supported by a Gender Analysis and Gender Action Plan to ensure that women and vulnerable groups have the opportunity to benefit as well.*	*SPC has adopted a people-centred approach to project design from its design phase has provided access and equity for women and youth groups. The activities are designed to engage and benefit vulnerable people throughout project implementation.* *To ensure equal representation, access and participation, gender quotas have been established where relevant and necessary, and a comprehensive gender action plan developed to address needs and vulnerabilities that are specific to women (see Annex 4).* *An EGYS officer will be hired to undertake site-specific EIAs for multiplication sheds (1.1.2) and storage facilities (2.2.2) to ensure site-selection is accessible and equitable.*	*Low*	*EGYS initial EIAs (years 1-2) and periodic monitoring, PMU, SPC through procurement process and M&E reports*	*EGYS Officer and travel costs*
ESP 3: Marginalized and Vulnerable Groups	*The project respects the fundamental rights of people in the areas of intervention and will not infringe*	*SPC has undertaken numerous stakeholder consultations during the proposal development stage to identify and mitigate potential risks and concerns for all*	*Low*	*PMU, SPC annually through M&E reports*	*M&E budget*

ESP AF Principles	Risks identified Against ESPs	Mitigation measures	Risk Category	Monitoring responsibility and frequency	Budget
	on their freedom. To date, no activities have been identified which might generate negative impacts on marginalized people and vulnerable groups .	stakeholders and parties, including those for vulnerable groups. This feedback has been incorporated into project design, to ensure that community-level needs are considered. 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. The nature of the project and a core focus is to serve vulnerable and marginalized groups as a whole, and it aims to provide tangible benefits such as the creation of green jobs through processing of coffee, copra, and staple food crops.			
ESP 4: Human Rights	The project's activities are oriented to ensure and promote fair and equal access to both participation in the project's activities, as well as access to the anticipated outcomes and benefits. The project itself aims to increase	All parties will be consulted to avoid risks pertaining to human rights. The project respects the fundamental rights of people in the areas of intervention and therefore does not infringe on their freedom. Project activities are not expected to have any negative human rights impacts, but rather increase and enhance access to markets, green jobs, and even food security for women and vulnerable groups, specifically.	Low	PMU, SPC ongoing	M&E budget/Grievance Mechanism
ESP 5: Gender Equality and Women's Empowerment	The project pays special attention to women and youth, and UN Women is an implementing partner for this project. The project will specifically ensure that gender-sensitivity	Women and youth will be beneficiaries of the project. All project activities have been screened and analysed to ensure full participation of women. Gender-sensitive indicators and activities will ensure that the priorities of women and other vulnerable groups are included.	Low	EGYS Officer, PMU, SPC - ongoing	EGYS Officer

ESP AF Principles	Risks identified Against ESPs	Mitigation measures	Risk Category	Monitoring responsibility and frequency	Budget
	is mainstreamed throughout project activities.				
ESP 6: Core Labour Rights	The project respects the ILO's labour standards. The project will ensure that minors do not work on the sites and that national health and safety legislation is applied.	There are some activities which involve construction, which has some inherent occupational health and safety hazards for workers, primarily the construction of multiplication sheds and installation of storage facilities. Any contracts will ensure labour laws are followed and will be monitored.	Low	PMU, SPC ongoing	NA
ESP 7: Indigenous Peoples	The project will take the people-centred approach adopted by SPC for all of its activities ensures that peoples' and communities' rights are always protected.	The project will comply with (i) all adaptation fund requirements, and (ii) national laws. Broad community support will be obtained. Serious documentation of stakeholder engagement will be done	Low	EGYS Officer, PMU, SPC, ongoing	NA
ESP 8: Involuntary Resettlement	None of the project activities are envisaged to lead to relocation or displacement.	No expropriation, relocation of farmers or disruption of producers' livelihood activities will be undertaken. If for some reason this occurs, a provision will be made for compensation.	None	NA	NA
ESP 9: Protection of Natural Habitats	Due to direct engagement of the project for the specific activities detailed above, the project may have negative impacts on the biophysical environment, including natural habitats, if project activities are not properly monitored.	For climate-resilient corps to be utilized (activity 1.1.1), the selection criteria will include site-species matching to ensure that selected crops are adapted to the area and are suitable for the site-conditions. For re-forestation program (activity 1.3.2) guidance on site-species matching will be developed for specific locations which will provide information on key tree species that are adapted to the area and their ideal site-	Medium	EGYS officer to ensure selection criteria for crops include site-species matching and to develop guidance on site-species matching for re-forestation program (year 1); PMU, SPC	EGYS position

ESP AF Principles	Risks identified Against ESPs	Mitigation measures	Risk Category	Monitoring responsibility and frequency	Budget
		conditions. It will further identify areas where certain tree species should not be planted based on site-conditions. In addition to native species, the project will only promote tree species which are already locally adapted and do not pose a risk to the local biodiversity.			
ESP 10: Conservation of Biological Diversity	The project includes reforestation action in various ecosystems to boost biodiversity. However, there is a possibility that some activities may lead to minor and localised impacts on biodiversity or natural habitat in agricultural settings and through construction of small-scale structures	Project activities will be undertaken outside of protected areas. No invasive alien species are likely to be introduced by project activities. Furthermore, the project will not operate in any UNESCO biosphere reserves or protected sites applicable to this project. As per ESP 9, there are some risks to biodiversity due to the anticipated construction of multiplication sheds and installation of storage facilities (activities 1.1.2 and 2.2.2)– these include potential of pollution of waterways and land during construction, and inappropriate locations for structures. Under the reforestation activity (activity 1.3.2) there is a risk that the techniques and species used are not appropriate for local environmental conditions, reducing survival of re-planted vegetation and disrupting ecosystem integrity. Guidance on site-species matching will be developed for specific locations which will provide information on key tree species that are adapted to the area and their ideal site-conditions. It will further identify areas	Medium	EGYS officer to ensure selection criteria for crops include site-species matching and to develop guidance on site-species matching for re-forestation program (year 1); PMU, SPC	EGYS position

ESP AF Principles	Risks identified Against ESPs	Mitigation measures	Risk Category	Monitoring responsibility and frequency	Budget
		where certain tree species should not be planted based on site-conditions. In addition to native species, the project will only promote tree species which are already locally adapted and do not pose a risk to the local biodiversity.			
ESP 11: Climate Change	The project includes adaptation and mitigation actions and is inherently designed to enhance resilience to climate change. Small GHG emissions may arise from agricultural activities, e.g., use of vehicles running on fossil fuels. However, these are likely to be negligible.	The project design will ensure that there is no large-scale deforestation or forest degradation, and that all GHG emissions are minimised. The introduction of training and capacity building for farmers will help to facilitate the adoption of more climate-resilient farming practices and other agricultural techniques.	None	PMU, SPC to provide ongoing project monitoring	NA
ESP 12: Pollution Prevention and Resource Efficiency	Water resources are currently exposed to various forms of pollution from the use of fertilizers, pesticides and manure. The project is only expected to lead to minor and negligible release of pollutants, largely from emissions from agricultural and processing equipment. There is some risk of disruption to soil, wastewater, and high resource usage from the construction of multiplication	To the extent possible, local materials will be sourced to build multiplication sheds and storage facilities will be procured prefabricated. The siting of the sheds and storage facilities will be selected to ensure minimal disruption to land and will be mostly placed on government land (Local Level Governments (LLGs)) An EGYS officer will be hired to support the mitigation of environmental risks and monitor and update the implementation of the ESMP. Site-specific EIAs for the construction of multiplication sheds and installation of storage facilities will be undertaken to ensure minimal pollution	Medium	EGYS Officer to undertake site-specific EIAs (years 1 & 2); PMU, SPC to monitor and report on implementation	EGYS Officer; travel budget, training budgeted under Activity 1.2.2

ESP AF Principles	Risks identified Against ESPs	Mitigation measures	Risk Category	Monitoring responsibility and frequency	Budget
	sheds and installation of storage facilities.	for any construction activities. Farmers will be trained on resilient agronomic packages covering resilient agronomic and post-harvest management, which will include better management of resources including water and soil (activity 1.2.2)			
ESP 13: Public Health	The project is not envisioned to have any negative impacts on public health.	NA	None	NA	NA
ESP 14: Physical and Cultural Heritage	No impacts on cultural heritage are anticipated. No construction or rehabilitation activities will take place on or around an area of cultural significance.	Sites to be selected will not be located in a known or suspected cultural heritage area. The project will promote the use of indigenous practices and tools where applicable and will ensure that the project considers and actively seeks out the opinions and needs of indigenous peoples and local communities to ensure that all activities and outcomes are locally led and focused.	Low	EGYS Officer to undertake site-specific EIAs; PMU, SPC to monitor and report on implementation	EGYS Officer , travel budget
ESP 15: Lands and Soil Conservation	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	There are specific activities which target and aim to improve soil quality and conservation. While there is a small risk of the construction of multiplication sheds and storage installation having an impact on the soil and land quality in specific areas, site-specific EIAs will be undertaken to ensure minimal disruption.	Low	EGYS Officer undertake site-specific EIAs; PMU, SPC to monitor and report on implementation	EGYS Officer, travel budget

7. Monitoring and Evaluation

Per the E&S screening policies, the overall project E&S risks shall be monitored by the EGYS officer to ensure compliance with the ESMP. Monitoring will enable the project team to adjust and respond to unexpected events during the implementation phase as well as to build trust and respond to stakeholders and affected communities.

Annex 3: Compliance and grievance procedure

A grievance is a complaint or concern raised by people who are affected by a project, such as beneficiaries and stakeholders. The purpose of establishing a grievance redress mechanism (GRM) is to:

- *Allow stakeholders in the ASSA project to voice their comments and concerns anonymously through a clear process*
- *Quickly address and manage comments, responses, and grievances*
- *Ensure that comments, responses, and grievances are handled fairly, transparently, and in accordance with local and national policies.*

The GRM can serve as an effective tool for early identification, assessment, and resolution of grievances. As a result, it can serve to reinforce accountability to beneficiaries. The GRM is an important feedback mechanism that can improve project impact and respond quickly to the concerns and grievances of project-affected parties (e.g., related to the project's environmental and social performance). With movement restrictions, it is important that, to the extent possible, staff managing grievances be able to access systems remotely to enable the Adaptation Fund management processes to be conducted efficiently. The PMU will inform local communities and other stakeholders of project activities, specifically addressing gender-based violence (GBV) and other cross-cutting issues.

- *All grievances will be closely monitored by the implementing entity (SPC) to evaluate the number and type of grievances and to assess any trends over time. This monitoring will be conducted by the appropriate responsible parties as indicated in the SPC's accountability policies[180]. A All monitoring and reporting will be undertaken with due regard for the confidentiality and consent of aggrieved parties or survivors. This applies to all reporting obligations to the AF.*

<u>SPC's Grievance Redress Mechanism</u>

The SPC has a Grievance and Redress Mechanism (GRM) in place to quickly address and resolve complaints made by stakeholders, including affected communities, about the social and/or environmental impact of the project.181 This process aims to take action to remedy any issues that may arise. For the process to be effective, it is important that stakeholders are aware of the existence of the GRM and know how to access it to resolve their grievances. See section 7.2 for more information

The SPC GRM can be accessed through a web page on the SPC website, where stakeholders can express their concerns or complaints using a complaints template.[182] These concerns will be received by the legal team, who will then reach out to the appropriate division within the company to address the issue. Grievances will be resolved through a conflict resolution process, and if that is not possible, an alternative process such as a compliance system will be used to efficiently address and resolve the grievances of stakeholders.

<u>Project-level Grievance Redress Mechanism</u>

Through a project-level GRM, SPC will be able to receive concerns or grievances from affected communities about the environmental and social plans or performance of the project. To facilitate this process, communities and stakeholders will be informed about the available grievance process

180 https://www.spc.int/accountability
181 https://www.spc.int/accountability
182 (Please see Annex IV of SPC's GRM see SPC website: https://www.spc.int/sites/default/files/documents/Application%20SPC%20Social%20and%20Environmental%20Rresponsibility%20Grievance%20Mechanism.pdf).

and form. Both national and provincial government agencies will be responsible for providing communities with the information they need to properly submit a grievance letter and will participate in the GRM by documenting grievances and coordinating with SPC to resolve them. There are several ways in which project-related grievances can be submitted:

- *Raising the complaint during Steering Committee or provincial climate change committee meetings, which will then be directed to the project AF Designated Authority and forwarded to the SPC legal team*
- *Contacting the Project Management Unit by email*
- *Contacting key project institutions (DoF and DAL) by email, which will then forward the concern to SPC*
- *Emailing SPC through the online process at* https://www.spc.int/accountability *or by sending an email to* complaint@spc.org.

The Project Management Unit will receive and register grievances and will contact the SPC legal team. Within two business days, they will provide an initial response to the person who submitted the grievance to acknowledge receipt and explain that the grievance will be logged into the SPC GRM. A response to the complaint is expected to be provided within a two-month period, outlining the process for addressing the grievance. This process may involve engaging with other stakeholders to resolve the issue. The two-month timeline should be sufficient to review the complaint, determine the appropriate process for addressing it, assess its eligibility, and assign responsibility for proposing a response

If the complainant is not satisfied with the resolution provided through the SPC MRG process, they have the right to pursue other options for resolving their complaint. The SPC MRG will inform the complainant of this right and may answer questions but is not expected to serve as an advisor or counsellor for the complainant. All grievances will be recorded and kept in a secure location for up to three years after the project is completed.

Community-level Grievance Redress Mechanism

In Papua New Guinea, concerns or grievances at the community level can be addressed through traditional governance structures and processes managed by the Local-Level Government (LLG). The community-level GRM will primarily address issues such as access to utilities, conflicts among villagers, complaints from marginalized or vulnerable groups, access to resilient cultivars and eco-friendly technologies for processing and storage, and gender-limited access to project benefits. This level of the GRM will allow communities to try to resolve issues and conflicts through consensus before escalating to the project-level GRM if necessary. This approach will ensure that the project can benefit from active, traditional mechanisms of conflict resolution and decision-making structures within the indigenous communities it targets.

The Village Council is a group of chiefs and community leaders from a specific village who are responsible for resolving matters at the village level, such as family matters, disputes, and land disputes. This authority is convened by the paramount chief or a designated customary leader. The Ward Council of Chiefs is made up of chiefs and customary leaders from several different villages within a designated Ward Council area. This council mainly handles disputes related to land ownership.

Should an issue not be resolved at the neighbourhood council level, it may be elevated to the Area Council of Chiefs or even higher to the Island Council of Chiefs. If an individual or group is aggrieved and wishes to seek redress, they can raise their grievance at the Village Council. If the matter is not resolved at this level, the paramount chief or head of the council may decide on the next course of action.

- *Elevate the grievance for redress at the Ward Council or with the Chief*
- *Register the grievance directly with the representatives of the provincial authority for redress through the provincial institutional arrangements.*

If a matter is raised with the representatives of the provincial authority, it may be handled by Area Administrators or Area Secretaries. These provincial officers have the option to seek redress for the grievance in the following ways:

- *Table the grievance for redress at the Provincial Area Council level through the Provincial Climate Change Committee (PCCC)*
- *Table the grievance for redress directly through the Provincial Climate Change Committee (PCCC)*
- *Raise the grievance directly with the relevant national government representative present at the provincial level*

If the grievance is raised through the provincial institutional arrangements, it may be elevated to the national government level for redress by the relevant government agency or ministry.

Annex 4: Gender assessment and action plan

Adaptation of Small-Scale Agriculture for improved food security of resilient communities in Papua New Guinea (ASSA).

Target Provinces: Enga, Milne Bay & New Ireland

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1. Overview

Papua New Guinea is a lower middle-income country with over 8 million people, of which 49 per cent are women, according to a United Nations Population Division report in 2019. Its gross national per capita income is USD 2,386, according to the 2021 World Bank report. The Asian Development Bank in 2021 estimated that 37.5 per cent of the people live below the poverty line, many of them in the rural areas[183]. Rural women, children and people living with disabilities are some of the most vulnerable to poverty, insecurity, and violence. The insecurities imposed by climate change further exacerbates the vulnerability of this group.

Section 55 of Papua New Guinea's Constitution calls for equality of citizens in all areas of social, economic, and political development irrespective of race, tribe, place of origin, political opinion, color, creed, religion, or sex. However, progress towards gender equality has been slow. PNG is currently ranked 160 out of 161 countries on the United Nations Development Programme's 2021 Gender Inequality Index[184].

Inequality for PNG women cuts across critical sectors in the country including agriculture, where the bulk of the women's population participates. With increasing negative impacts from climate change on agricultural production, inequalities and vulnerabilities are being further exacerbated for women and girls.

Section 1.6 of the Adaptation of Small-scale agriculture for improved food security (ASSA) proposal provides a generic gender assessment of agriculture in PNG. To further validate the impacts of climate change on agriculture and women and girls, UN Women was invited by Global Green Growth Institute (GGGI) and the Pacific Commission (SPC) to carry out a gender assessment specifically to ascertain how gender differences at household and institutional level within the implementation locations of Enga, Milne Bay and New Ireland provinces will affect the achievement of planned results in the ASSA Programme.
The assessment examined the roles and responsibilities, access and control over resources and the subsequent opportunities and constraints to different genders. This assessment has informed the development of an action plan for the Programme design that sets the basis for gender transformative outcomes in increasing the benefits to women and ensures responsible institutions implementing this Programme improve their capacity to deliver more gender responsive interventions.

2. Methodology

The gender assessment was carried out from November 23 to 15 December 2022. The assessment included a literature review and data collection in the three target provinces framed around the 3 primary objectives of the ASSA Programme. The data collection utilizes gender analytical questions on division of labor, access, control of resources, opportunities, and constraints.

Data collection was done using participatory methodologies taking into consideration ethics for safe collection of data and meaningful engagement of women and youth. In ***conducting the interviews*** *women and men farmers were arranged into groups of ten (10) for focus group discussions (FGD) while extension service interviews were conducted individually.*

UN Women's Market Vendor Association representatives from Milne Bay and Enga were included as main interviewees. The FGDs had five (5) key areas for assessment i.e., 1. Division of labour between

[183] https://asiapacific.unwomen.org/en/countries/png/about-un-women-png
[184] https://hdr.undp.org/data-center/thematic-composite-indices/gender-inequality-index#/indicies/GII

women and men, 2. Access and control of resources between women and men, 3. Family income disaggregated, 4. Climate change impacts and responses, and 5. Opportunities and constraints faced by women and men.

In Enga Province, the Districts surveyed were Sirunki (Tubilam and Sirunki Station villages) and Wapenamanda (Mirumanda and Yaibos villages) with a total of 8 FGD with Women and 11 FGDs for Men. In the Milne Bay Province, the Districts surveyed were Alotau (Bou and Divinai villages) and Kirriwina Goodenough (interviewed vendors from Kirriwina & Goodenough in Alotau market) with a total of 5 men Focus Groups and 10 women focus groups. In New Ireland Province, the Districts surveyed were Kavieng and Namatanai. Covering villages of Djaul Island and Lelet Plateau with a total of 6 men and 4 women groups.

The consultant engaged with the PNG National Research Institute (NRI) for data analysis. NRI therefore ensured the analytical questions were appropriately framed for the focus group discussions and individual interviews for the consultation.

3. Gender analysis and assessment

3.1 Relevant legal and policy framework

Table 2: A list of Legal and Policy Framework on Gender & Climate Change In PNG

Framework Agreements	***Notes***
Local / International	
● *2005- 2010 National Policy on Gender Equality and Women's Empowerment* ● *National Public Service Gender Equity and Social Inclusion (GESI) Policy (2011-2015)* ● *2013 National Council of Women's Act* ● *Convention on the Elimination of all forms of Discrimination Against Women* ● *2024 PNG Country Gender Equality Profile (work in progress)* ● *Convention on the Rights of the Child (1994)* ● *Beijing Declaration and Platform for Action (1995, Fourth World Conference on Women).* ● *the 2015 Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC).* ● *2015 PNG Climate Change Management Act* ● *the 2030 Agenda for the Sustainable Development Goals (SDGs).* ● *Sendai Framework for Disaster Risk Reduction 2018 – 2030.*	● *The national gender policy is outdated. UN Women has committed funding to Dept for Community Development to develop a 2023-2027 National Policy on Gender Equality and Women's Empowerment* ● *The National Public Service GESI policy has also expired, and the Department for Personnel management is leading its review.* ● *2013 NCW Act is yet to be fully implemented given the governance arrangements and secretariate functions of NCW are dysfunctional for the last 10 years. UN Women has committed funds to support NCW convene a National Convention to appoint new Council as part of revitalizing the country's national machinery for women in PNG.* ● *Though PNG has ratified the Convention on the Elimination of Discrimination against Women (CEDAW) it is way behind in submitting its reports. UN Women has committed funds to Dept for Community Development in 2023 to ensure all 4 outstanding CEDAW reports are completed and submitted.* ● *A Country Gender Equality Profile (2024) is work in progress by UN Women and PNG National Statistics office. The profiling work would also consider data on status of women in contributing to food security in PNG.*

PNG has enshrined commitments to equality and further legislated a national machinery for women and developed several national and sectoral policies in advocating for gender equality, however after a few decades the challenge of inequality remains strong across the development sectors in PNG.

3.2 Existing gender inequality

There exists piecemeal sector or programmatic research and anecdotal evidence of the many challenges with gender inequality in PNG. The Gender Inequality Index from the Human Development Report (2022) ranks PNG 156th out of 191 countries[185]. This gives prominence to the need for more concrete data per sector and province to show cause for more political leadership and increased attention to gender equity and social inclusion in the country.

There are limited statistics on women's contribution to food security in PNG. In addressing the need for accurate data on the status of women and girls in PNG, UN Women is partnering with the National Statistics Office of PNG in carrying out a detailed 2024-2028 PNG Country Gender Equality Profile with the aim of updating it every five years. Data on gender inequality is important in informing policy and planning for women and girls and needs to be addressed.

3.3 Women's economic empowerment

Recent research only confirms that cultural norms around violence against women has a significant impact on women's economic aspirations and economic independence. Women in PNG are highly concentrated in the agriculture sector playing critical leading roles in planting, harvesting, post-harvest and marketing of food crops and commodities i.e., coffee, copra, cocoa etc. It is estimated that 85% of employment opportunities in PNG exist in the agriculture sector, providing significant opportunities for both women and men to participate in the country's economic growth. However, the opportunities that markets provide to communities for raising income are undermined by gender-based violence, which is endemic in markets and, particularly against women and girls. The absence of women's decision making within good quality public administration and management of these public spaces, diminishes the potential impact that markets could have on the ability for women to earn and control income and contribute to the economic development of Papua New Guinea.

3.4 Ending violence against women

Gender-based violence remains a challenge for Papua New Guinea. At least 60 per cent of the country's women have experienced physical and/or sexual violence from an intimate partner at some point in their lives. This is double the global average. Violence stemming from accusations of sorcery against older women appears to be on the rise.

A report by the International Finance Corporation in 2021 said that Papua New Guinea firms lose an average of 10 days for every staff member every year due to the impact of family and sexual violence.

A UN Women study in Port Moresby (2013) found that 90% of women and girls experienced some form of violence while waiting for buses or during bus rides in Port Moresby. 97% of women interviewed felt public transport to be unsafe and this safety hindered their mobility to access goods and services.

[185] https://hdr.undp.org/data-center/country-insights#/ranks

3.5 Women's political participation

The number of women in key leadership and decision-making roles remains low as women face cultural and systemic obstacles to participating in political life. In July 2022 there are only two female members among the 111 members of the National Parliament. In 2021 of the 6,190 ward seats and 319 local-level government seats, only 120 were held by women. The presence of women in senior management and executive appointments remains low despite the presence of a National Public Service Gender Equity & Social Inclusion (GESI) Policy.

The country's national women's machinery has not been effective for the last decade. The PNG National Council of Women has the potential and network necessary to effect change for increased women's leadership roles however it is currently faced with administrative and governance challenges. Fresh elections are currently being held in the 22 provinces and a convention planned for a national annual general meeting to vote for a new governing body.

3.6 Women Peace & Security

The country's history has been marked by political and civil conflicts. Stability returned to the Bougainville region with a 2001 peace agreement that established the Autonomous Region of Bougainville, and a referendum in 2019. The Highlands region has suffered from inter-clan rivalries and armed conflict. Security challenges in Papua New Guinea, including the high rate of gender-based violence, restrict women's and girls' mobility outside of their homes and communities. Such a lack of mobility tends to exclude women from key downstream activities within value chains, such as selling to exporters, therefore limiting their access to markets and their control over their income.

3.7 Women impacted by Climate Change

PNG as an island state is susceptible to impacts of climate change and has registered its first climate refugees in the Atolls, Bougainville. As statistics show women and girls are most vulnerable to increased impacts of climate change. The theme of the 2022 UN Commission on the Status of Women was Achieving gender equality and the empowerment of all women and girls in the context of climate change, environmental and disaster risk reduction policies, and programmes. The CSW66 conclusions pertinent to the PNG context and the ASSA Programme include that member states must integrate a disability-inclusive and gender, perspective while developing, reviewing, and implementing laws, policies and programmes on climate change adaptation and mitigation, biodiversity conservation and sustainable use, sustainable natural

- *Recognize and promote awareness to those facing violence, discrimination and displacement, harmful practices including child, early and forced marriage, insecurity in land tenure, income and food, and ensure that policies and programmes reflect these impacts*
- *Promote the full, equal and meaningful participation and leadership of young women, and as appropriate, adolescent girls in decision-making processes on climate change, environmental and disaster risk reduction action by addressing gender specific barriers, ensuring their full and equal access to quality education, technology and skills development, leadership and mentorship programmes, increased technical and financial support, and protection from all forms of violence and discrimination;*
- *Protect and promote the right to work and rights at work of all women and ensure the equal access of women to decent work and quality jobs in all sectors, such as sustainable energy, fisheries, forestry, agriculture and tourism, by eliminating occupational segregation, discriminatory social norms and gender stereotypes and violence and sexual harassment,*

supporting the transition from informal to formal work in all sectors, ensuring their equal pay for work of equal value, protecting against discrimination and abuse and ensuring the safety of all women in the world of work, and promoting the right to organize and bargain collectively to advance, as well as access to sustainable livelihoods, including in the context of a just transition of the workforce.

At COP 27 UN Women Executive Director calls for world leaders to focus on gender equality as central to climate action. *The UN Women Country Office is collaborating with partners like Global Green Growth Institute and South Pacific Commission, to mobilize resources from the Adaptation Fund as a proactive measure towards assisting women and girls of PNG adapt to and mitigate climate impacts into the future, which will also further the implementation of the CSW recommendations and COP27's aim for accelerated response.*

4. Gender mainstreaming considerations

4.1 Gender considerations in the PNG agriculture sector

Lead institutions on agriculture in the country working within the PNG National Department for Agriculture and Livestock (DAL) like UN's Food and Agriculture Organization and lead private sector players like Grow PNG, development banks i.e., World Bank and national commodity boards i.e., Coffee Industry, Cocoa Board have carried out similar gender assessments in ascertaining different gender roles in the sector in PNG in recent years.

The different available reports indicated similar findings on the roles and responsibilities, access and control over resources and the subsequent opportunities and constraints faced by women in the agriculture sector in PNG.

The 2019 FAO report on 'Country gender assessment of agriculture and the rural sector in Papua New Guinea'[186] states that:

- ***Roles and responsibilities*** *- more than 50 percent of the female labor force is engaged in agriculture and women comprise nearly 35 percent of the economically active population in agriculture. FAO report also show that 'rural women play a prominent role in subsistence food production, contribute to the agricultural value chains and rural livelihoods. actively participate in livestock and poultry production and in fish farming.*

- ***Access and control*** *- Rural women are major contributors to the economy – on farms, at home and in the community – but their rights are not properly recognized, and they have not benefitted equally from past economic growth. They are systematically excluded from access to resources, essential services, and decision-making. However, women own and operate a wide range of farm and non-farm microenterprises, mostly in the informal economy, which enable rural households to diversify and secure their income sources.*

- ***Opportunities and constraints*** *- rural women are challenged by multiple roles and experience severe time poverty. With multiple roles, rural women tend to lack the time to participate in other opportunities that could potentially contribute to enhancing their autonomy, knowledge, skills, and self-esteem. They have the primary responsibility for ensuring the nutritional, childcare and health needs of their families. This is in addition to other community, social and cultural activities they engage including agricultural activities. Security issues in PNG also limit the mobility of women in agriculture. In terms of opportunities, women sell surplus produce at local markets, to*

[186] https://www.fao.org/documents/card/en/c/CA6308EN/

generate income for families. Women have also ventured into small to medium enterprise activities.

The analysis from the PNG FAO 2019 reports sets the literary framework for women's role in agriculture in PNG. The ASSA gender assessment and action plan builds on from FAOs analysis but contextualized to three targeted provinces of Enga, Milne Bay, and New Ireland.

4.2 Summary of consultations in 3 provinces with Government, NGOs & Communities

*The **socio-economic and cultural contexts of each of the three provinces** are as follows:*
***Enga** is one of the seven (7) **highlands region of PNG** which is popular for having one language spoken throughout its six district administrations. It is a fast-growing town in PNG hosting one of PNG's major gold projects i.e., Porgera Gold Mine operated by Barrick. Enga is a patriarchal society where males have more power compared to the women. Sweet potato is a staple food crop, and the main livestock is pig which is also considered a valuable commodity. In Engan custom women play a key role in growing of sweet potatoes and raising pigs for family consumption and cultural obligations.*

***Milne Bay** is one province from the **southern region of PNG** popular for its yam harvesting and feasting. The province has four (4) main district administrations with an economy that thrives on tourism, oil palm and gold mining. The province is known as a matrilineal society where ancestry is traced through maternal and not paternal lines. Yam is a staple food for the province as well as wood carving using ebony trees is common in the islands. Respect for aunties is a long-held tradition where first harvests from gardens are dedicated to aunties is a strong cultural obligation for good fortune.*

*New Ireland is a province from the **island's region of PNG** popular for its matrilineal descent**.** It is a maritime province with two district administrations Kavieng and Namatanai connected by the famous Bolumnisky highway. New Ireland hosts two big gold mines and depends also on oil palm and tourism. Being a matrilineal society landownership rights rests with women. However, there is also a 'maimai' culture where each village has a male chief leader who represents the community. The provincial administration recognizes the maimai chieftain system and has given them a seat in the governance arrangements of the province.*

***Consultations with key stakeholders** began on the 28 of November and lasted until 15 of December 2022 beginning with Enga, Milne Bay and New Ireland. The consultation visits covered at least two districts of the three nominated provinces for the ASSA project. For sampling purposes **an average of two villages were visited per district in each province**.*

Data collected against the five (5) main assessment criteria was analysed with technical assistance from PNG National Research Institute (NRI). Emerging trends coming up are from the surveys are summarized as follows;

***Division of labour** – 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 as well as increase their workload related to food security. Across the 3 provinces surveyed, women and men farmers do not have a lot of time to spare in a 12-hour day after attending to both productive and reproductive duties. The nexus of population pressure, climate change impact and women's gender roles is told by Grace a Milne Bay market vendor association member from Kirriwina island who recounted from her recent trip to the island. Grace woke up the next morning on the island to find out it was 8am in the morning and her nieces and nephews had not yet gone to school. "There were no signs of smoke and fire in the kitchen." Grace asked her sister what was wrong, and sister said there was no firewood to cook breakfast for the children.*

Kirriwina is suffering from lack of necessities such as firewood due to increased population and fast coastal erosion. To collect firewood women and children who bear most of the labour must travel a distance from the main village which takes 2-3 hours. The trees around the coastlines which provide temporary support to villagers have now been washed away by high rising tides thus decreasing firewood sources for the Kirriwina islanders.

The survey also uncovered that both male and female share certain responsibilities i.e., for sago harvesting a male must cut the tree down before the women can pound and press for the sago starch in Djaul. For yam gardening the male digs and mounds the plots and plants support sticks for the vines. Women are responsible for tending the mounds, weeding, and harvesting. For households that lack a male presence due to death or marital abandonment the women bear much of the labour.
Given the roles of both men and women in securing household food, it will be critical to ensure both are engaged in the Programme. Furthermore, to address the extra burden of reproductive work on women, the Programme needs to consider the introduction of time saving technologies in food production and safe and accessible fuel for cooking.

***Access and control of resources** – this assessment shows women are slowly taking ownership of money generated from sales from the markets and sharing in the decision making on the use, however the gender dynamics plays out differently in the two matrilineal provinces of Milne Bay and New Ireland when it comes to the control of land and representation for resource allocation. The decision-making role is still dominated by males just like Enga province. In New Ireland the maimai who is a male assumes control and power over women community leaders. In Milne Bay even though traditional respect is still accorded to aunties, it is the male who makes decisions for the communities. Consultations on the lack of a market facility in Kavieng also showed the lack of a formalized women's voice mechanism. It is common sense for women to petition government if a critical infrastructure like market is lacking. The national women's machinery the Provincial Women's Council has established presence but is currently weak. The lack of women's leadership and voice in a matrilineal society shows a critical gap requiring attention. Further research into understanding the gap between matriarchy and power is required to enable transformational leadership for women in Milne Bay and New Ireland.*

Another consideration echoed by many women is the need for financial literacy for proper management and control of resources, however a few vendor association members stated that if ASSA is looking at farm level interventions, then adult literacy training is critical because moving from markets to farms the literacy level for women gets lower.

***Climate impacts and responses** –Majority of the respondents confirmed being aware of climate change, and that they have seen the impacts playing out i.e., 8 months of drought and coastal erosion in Djaul in New Ireland, loss of yield and sea water intrusion and flooding in Milne Bay and impacts of drought and frost on kaukau in Enga. Most men groups had good awareness of the impact of Climate Change on Food Security while most Women Groups had low level of awareness possibly due to their lack of access to relevant sources for information. Less than half of the agricultural extension workers interviewed have conducted community awareness on climate change. Focus group discussions for both men and women expressed the absence of any climate change awareness being conducted in communities to educate them and there also has been a lack of food production technologies introduced to assist with coping.*

The visit to Djaul island occurred on the eve of the community at Piliwas village conducting a funeral service for a woman in her early 30s who is the fourth (4^{th}) person to have died as an aftermath of the long eight (8) months of drought. It was a somber moment and at the meeting hall we were greeted by more than 20 males to a ratio of 5 females. When we enquired where most of the women were (also being conscious of the funeral service) we were told most were out pounding sago to store before the rains continue.

The encounter only reaffirms the fact that women take more the responsibility for food production and preservation for different weather conditions. Local authorities are yet to ascertain the deaths of the three women and an infant however the locals believe it was a direct impact of lack of good nutrition during the drought and with the onslaught of rains the heavy work on pounding sago has taken a toll. Another implication resulting from lack of validating the cause of deaths as expressed by the community members, is that people will quickly blame it as sorcery related thus amplifying the chances of community violence.

***Opportunities and constraints** – The survey shows that women are earning up to K600/week from market incomes, while men are earning up to K1000. Women from Enga Wapenamanda are involved in processing and packaging of spices. However, the impending constraints noted are cost of sea transportation for Milne Bay and New Ireland and rural road access and market access for Enga women. An added constraint for New Ireland mothers is the lack of transit accommodation and proper market facilities which increases security risks and burdens. A mother from Djaul island which produces surplus garden food for sale in Kavieng said a K60 daily commuting fare is too expensive and so they must be in Kavieng until all food crops are sold.*

***Consultation with NGOs -** Some NGOs are already well into implementing climate resilient programs. Especially in Milne Bay, Cool Earth does work in Suau on mangrove rehabilitation and livelihood improvement programs. There is also The Nature Conservancy working on a mangrove project with an emphasis on providing economic returns for women through a 'mud crab fattening' project called 'Mangoro Meri'. Eco-tourism also is a huge place for women networking in the provinces, especially in Milne Bay. They have Milne Bay Women in tourism network which would benefit from a collaboration opportunity on food security as expressed by the group. The outcome from the NGO consultations provided the opportunity to get a glimpse of existing players and the available organized women group networks for potential collaboration during implementation to avoid duplication of efforts and for efficiency and effectiveness considerations.*

***Private sector mapping** - For all three provinces, the private sector is mostly present through the mining and cash and food crop industry. In Enga are the Surinki Strawberries with Innovative Agro Industries and Wapenamanda Coffee Exporters who have won gold in a coffee competition in Australia in 2020[187]. In both Milne Bay and New Ireland, the major aagro-industry is New Britain Palm Oil which is a major employer in both provinces. The takeaway from mapping out and taking note of key private sectors is the identification of potential for project leverage through implementation of models that are already in place. These existing models provide food for thought during inception stages of project implementation.*

***Development partners - UN Women** through its Women's Economic Empowerment program has women market vendor associations well established within Enga's Wabag Market and Milne Bay's Alotau market. It was interesting to note at Milne Bay when a FGD with vendors was conducted, they recognized the importance of an enhanced network along the food crop value chain from farms to markets and expressed the need for farm women to be organized into formal groups to participate equally in the proposed project.*

***Consultations with the Government at subnational level** i.e., Provincial, District and Local Level - It was reaffirmed that all three provinces had Provincial Climate Change Committees and that all three have been working with other development partners on climate change related planning and programming. The surveys with government extension officers proved there is less awareness and training on food security in the wake of climate change impacts. There is also the sense that there will be increased focus on climate to program work going down into provinces. This will require more coordination and smarter ways of managing and delivering for different players. However, markets*

[187] https://postcourier.com.pg/wapenamanda-coffee-wins-global-awards

are a key feature in any province and Enga and Milne Bay boasts good market facilities. New Ireland has had no proper market to date. UN Women expressed concerns to New Ireland provincial representatives on their lack of a proper market facility which is depriving women and girls of economic opportunities. Authorities confirmed Japan through its development arm JICA has made funding allocations ready for a market facility for Kavieng however availability of land remains politicized.

5. Recommendations in implementation and management of ASSA

Drawing from the assessment and analysis the following recommendations are put forward for consideration:

- ***Gender representation at governance arrangement** of the ASSA project. Representatives of women's groups and UN Women to be represented at the board or technical level of the project to ensure oversight on the implementation of gender considerations.*

- ***Gender disaggregated data collection on women's contribution to food security** through ASSA project. Budget allocation for data collection and analysis on women's participation in the project and sharing of knowledge on how to transform gender relations through implementation of the intervention. UN women will ensure its five-year gender equality profile captures food security contributions by women towards informing policy and future investments.*

- ***Establish and strengthen women's association or women cooperatives** to enable safe and meaningful participation of women in project activities and achievement of outcomes. This approach has been effective in communities where women's participation in household decision making and overall status in society remains low. Women's associations can amplify women's voice in the efficient implementation of ASSA project outputs*

- ***Province and sector specific gender baseline collection**. To improve gender sensitive monitoring and reporting and clearly demonstrate the project's contribution to gender transformation, there is still need for a more thorough analysis of the project's gender indicators.*

- ***Development of project standards and criteria's to be gender sensitive.** Implementation guidelines, standards and procedures and risk management to be sensitive and gender inclusive.*

- ***Transform gender relations through targeted training and community engagements for** household beneficiaries of ASSA project**. This must be informed by a gender training needs analysis** which identifies the specific practices and underlying causes in the communities.*

- ***Creation of a gender inclusive farm to market women's network**. The proposed network will link women market vendors association to women farm cooperatives and other women in the value chain. Expanding the network to the private sector and other players in the value chain will be essential in expanding women's role and increasing incomes for better food security.*

- ***Women's access to project facilities and participation*** *at decision making committees is promoted and sustained.*

- ***Further research into addressing cultural and existing social norms for increased women's leadership in food security*** *to be enhanced and promoted for transformative gender outcomes as a sustainable investment for women and girls.*

- ***Nature based solutions to be community led by women and youth*** *with an emphasis placed on planting of native fruit trees as an adaptive measure promoting nutritional supplements to the community.*

- ***The CSW66 conclusions pertinent to the PNG context and the ASSA*** *Programme include that member states must integrate a disability-inclusive and gender, perspective while developing, reviewing, and implementing laws, policies and programmes on climate change adaptation and mitigation, biodiversity conservation and sustainable use, sustainable natural*

6. Gender Action Plan

Based on the recommendations from the gender assessment the following action plan has been developed for the project.

Table 3 Gender action by ASSA project outcome

Outcome/Output	***Gender Action Plan (GAP) Activities***	***AF Gender Principle***	***Gender-Responsive Indicators***
Outcome 1: *Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers*			
1.1. *Selection, validation and dissemination of climate-resilient crop varieties*	• *Establishment of women cooperative associations* • *Needs assessment on appropriate crop varieties for women uptake per province* • *Identification of most viable gender sensitized distribution points for women* • *A tally on distribution to women & male farmers*	*Equity* *Access*	• *Number of new women cooperatives established* • *Evidence of climate resilient improvements to food crops selected by women as per Needs assessment report with recommendations* • *Number of viable& accessible distribution sites for women* • *Number of farmers receiving climate resilient crop varieties disaggregated by Sex per distribution site/province (target 30% female headed households)*
1.2. *Extension services for climate-resilient agriculture*	• *Employ more female extension officers to work with women farmers (through cooperatives and grassroot organisations)*	*Equity* *Representation* *Access*	• *% Increase in number of female extension officers (Target: 30% female agriculture extension workers in ASSA project sites)*

1.3. Nature-based solutions to protect agro-ecological systems from landslides and coastal erosion induced by flooding and heavy rain events	• *Community women trained on NBS agro-ecological systems* • *Train women and youth on tree nursery and planting (native fruit and nut plants for nutrition)*	*Equity* *Representation*	• *Number of farmers trained on NBS agro-ecological systems disaggregated by sex, age and disability* • *Proportion of women / youth owned/led nurseries per province.* • *Number of fruit & nut trees planted for nutrition/population density*
Outcome 2: *Improved access to appropriate processing, storage technologies, and profitable markets*			
2.1. *Digital platform to strengthen relationships among agricultural value chains actors*	• *Survey on women SME/MSMEs participation in selected agricultural value chains* • *Enhancing capacity of women in the use of digital platforms for marketing* • *Negotiating commercial relationships for women led market SMEs (E.g., Enga Women Vendors Association negotiating with Porgera Mine / Mapai transport to subsidize freighting of food and crops to Lae)*	*Access* *Participation*	• *% Change in women's participation in project selected value chains (targets to be set based on Survey report)* • *Proportion of women users on digital technological platforms for improved market access* • *Number of private sector arrangements negotiated and agreed for women SMEs*
2.2. *Eco-friendly technologies for climate-smart seed saving, postharvest processing and modern storage*	• *Women to be trained to use and maintain eco-friendly technologies* • *Processing and storage facilities to be accessible and secured for women farmers and youth organisations to access.*	*Equity* *Representation* *Access* *Participation*	• *% of women and youth trained (Target: 30% women, 30 % youth)* • *% Change in women accessing storage & processing facilities*
Outcome 3 *Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.*			
3.1. *Training-of-trainers to monitor, report and verify impacts of climate-resilient practices across agricultural value chains*	• *Women adult literacy trainings to be considered as precursor to other trainings due to low literacy levels at farm level for women* • *Trainings to be designed sensitive to women needs with an emphasis on creating awareness on climate change*	*Equity* *Participation*	• *Proportion of women completing adult literacy for farmers (Target 75% completion rate)* • *Number of farmers reached with Climate change awareness (Target 60% women)*

3.2. Capacity building Programme on climate-resilient agricultural production	• *Provincial administrations to implement the Public Service GESI policy (including employ and train female extension officers; Prevent Sexual exploitation and abuse; and include performance measures for gender equity for all management level staff)*	*Participation*	• *Number of female government officers recruited and trained* • *Proportion of managers achieving gender equity goals in performance appraisal*
3.3 Knowledge management and dissemination to policymakers, development partners, private sector including smallholder SMEs, and civil society organizations on scaling up climate-resilient agricultural practices	• *Enhance stakeholder engagement on evidence generated on ASSA project's gender equity impact. Generate evidence of good practices for women's engagement in climate action*	*Participation*	• *Number of meetings/ forums organized for knowledge exchange and policy and implementation influence* • *Number of gender equity and women's empowerment policy briefs.*

Gender Action Plan Budget

Total programming costs	***USD 1,153,500***
Monitoring costs (3%)	*USD 34,605*
Total	*USD 1,118,105*
Support costs (8%)	*USD 95,048.4*
GAAP Budget (Monitoring Cost + Support Cost)	***USD 129,653.4***

Outcome/Output	Gender Action Plan (GAP) Activities	AF Gender Principle	Gender-Responsive Indicators		
Outcome 1: Enhanced climate-resilience of agricultural production for vulnerable small-scale farmers					
1.1. Selection, validation and dissemination of climate-resilient crop varieties	• Establishment of women cooperative associations	Equity	• Number of new women cooperatives established	sub-activity 1.1.1.1	15 000,00
	• Needs assessment on appropriate crop varieties for women uptake per province	Access	• Evidence of climate resilient improvements to food crops selected by women as per Needs assessment report with recommendations	sub-activity 1.1.1.2	12 000,00
	• Identification of most viable gender sensitized distribution points for women		• Number of viable& accessible distribution sites for women	sub-activity 1.1.2.1	2 000,00
	• A tally on distribution to women & male farmers		• Number of farmers receiving climate resilient crop varieties disaggregated by Sex per distribution site/province (target 30% female headed households)	sub-activity 1.1.2.3	50 000,00
1.2. Extension services for climate-resilient agriculture	• Employ more female extension officers to work with women farmers (through cooperatives and grassroot organisations)	Equity Representation Access	• % increase in number of female extension officers (Target: 30% female agriculture extension workers in ASSA project sites)	sub-activity 1.2.1.2 sub-activity 1.2.1.3 sub-activity 1.2.1.5 sub-activity 1.2.2.1 sub-activity 1.2.3.2	4 500,00 45 000,00 45 000,00 5 000,00 6 000,00
1.3. Nature-based solutions to protect agro-ecological systems from landslides and coastal erosion induced by flooding and heavy rain events	• Community women trained on NBS agro-ecological systems	Equity	• Number of farmers trained on NBS agro-ecological systems disaggregated by sex, age and disability	sub-activity 1.3.2.3	9 000,00
	• Train women and youth on tree nursery and planting (native fruit and nut plants for nutrition)	Representation	• Proportion of women / youth owned/led nurseries per province .	sub-activity 1.3.2.4	5 000,00
				sub-activity 1.3.2.5	240 000,00
				sub-activity 1.3.2.6	
				sub-activity 1.3.3.2	15 000,00
			• Number of fruit & nut trees planted for nutrition/population density	sub-activity 1.3.3.2	480 000,00
Outcome 2: Improved access to appropriate processing, storage technologies, and profitable markets					
2.1. Digital platform to strengthen relationships among agricultural value chains actors	• Survey on women SME/MSMEs participation in selected agricultural value chains	Access	• % change in women's participation in project selected value chains (targets to be set based on Survey report)	sub-activity 2.1.1.2	6 000,00
		Participation	• Proportion of women users on digital technological platforms for improved market access	sub-activity 2.1.2.4	9 000,00
	• Enhancing capacity of women in the use of digital platforms for marketing		• Number of private sector arrangements negotiated and agreed for women SMEs	sub-activity 2.2.1.2	2 000,00
	• Negotiating commercial relationships for women led market SMEs (E.g., Enga Women Vendors Association negotiating with Porgera Mine / Mapai transport to subsidize freighting of food and crops to Lae)				
2.2. Eco-friendly technologies for climate-smart seed saving, postharvest processing and modern storage	• Women to be trained to use and maintain eco-friendly technologies	Equity	• % of women and youth trained (Target: 30% women, 30 % youth)	sub-activity 2.2.3.2	10 000,00
	• Processing and storage facilities to be accessible and secured for women farmers and youth organisations to access.	Representation	• % change in women accessing storage & processing facilities		
		Access			
		Participation			

Outcome 3 *Scale-up of climate-resilient agriculture practices, processing, and storage technologies, facilitated through capacity building, and knowledge management.*					
3.1. Training-of-trainers to monitor, report and verify impacts of climate-resilient practices across agricultural value chains	• *Women adult literacy trainings to be considered as precursor to other trainings due to low literacy levels at farm level for women*	*Equity*	• *Proportion of women completing adult literacy for farmers (Target 75% completion rate)*	*sub-activity 3.1.1.3*	*5 000,00*
	• *Trainings to be designed sensitive to women needs with an emphasis on creating awareness on climate change*	*Participation*	• *Number of farmers reached with Climate change awareness (Target 60% women)*	*Sub-activities: 3.1.2.2*	*10 000,00*
	• *Provincial administrations to implement the Public Service GESI policy (including employ and train female extension officers; Prevent Sexual exploitation and abuse; and include performance measures for gender equity for all management level staff)*			*Activity 3.1.3*	*96 000,00*
3.2. Capacity building programme on climate-resilient agricultural production		*Participation*	• *Number of female government officers recruited and trained*	*sub-activity 3.2.1.1*	*12 000,00*
			• *Proportion of managers achieving gender equity goals in performance appraisal*	*sub-activity 3.2.1.2*	*24 000,00*
				Activity 3.2.3	*40 000,00*
3.3 Knowledge management and dissemination to policymakers, development	• *Enhance stakeholder engagement on evidence generated on ASSA project's gender equity impact. Generate evidence of good practices for women's engagement in climate action*	*Participation*	• *Number of meetings/ forums organized for knowledge exchange and policy and implementation influence*	*sub-activity 3.1.1.3*	*6 000,00*
			• *Number of gender equity and women's empowerment policy briefs.*		

Annex- *Gender Analytical Framework*

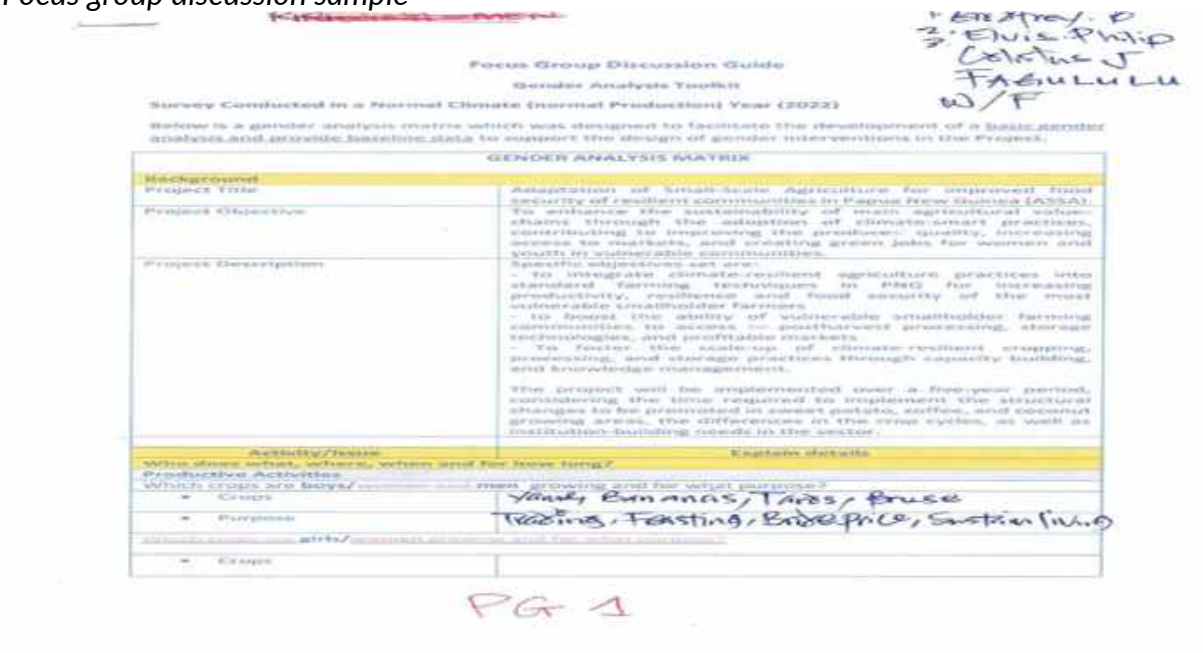
Project Component	**Gender division of labour (who does what)**	**Access and control of resources (who owns what)**	**Opportunities**	**Constraints**	**Data collection methods+ sample**
Small-scale Climate-proofed agricultural production	Which crops are women and men growing and for what purpose? How much time is spent on farming these crops? When there is drought, what do women and men do? Who cares for children and covers other family work ('reproductive work')? How many hours a day are spent on home and family care? What other community activities are women and men engaged in (e.g haus kraai) ? What number of hours is spent doing this community work?	What is the level of awareness of climate change and its potential impacts on food security? Do women have access to climate resilient crop varieties? Which decisions in the home do men and women typically make about cropping (e.g how are financial resources allocated to different crops? Who chooses which land to use?) Why?	What climatic changes have you observed? How have these affected you? What agricultural practices have men and women adopted in response to climatic changes?	What is preventing farmers from adapting new agricultural technologies?	Focus Group discussions **Enga** (Wapenamanda -coffee growers; and Sirunki) 2 villages reasonably apart) In each village 2 Women's groups (10 pax) 1 Men (10 pax) 1 Mixed group (10pax) **Milney Bay** Focus group discussions representing each of the

					following in Alotau town Highlands communities Inland Communities Coastal communities 2 groups of women x 10 pax 1 x men group 1 x mixed group Focus groups in Kiriwina **New Ireland**
Climate Resilient Postharvest Solutions and Access to Markets	What roles do men and women play in post harvest processing?	How many (proportion) households in the community are headed by women? Who makes decisions on how much produce can be sold? Who controls household income?	How much surplus are women producing? Which markets are women currently accessing? How many women's associations are registered in the area and how many members do they have?	What challenges have women faced in accessing markets? What level of education and/or training do men and women have?	Same as for component 1 above.

					following in Alotau town Highlands communities Inland Communities Coastal communities 2 groups of women x 10 pax 1 x men group 1 x mixed group Focus groups in Kirlwina **New Ireland**
Climate Resilient Postharvest Solutions and Access to Markets	What roles do men and women play in post harvest processing?	How many (proportion) households in the community are headed by women? Who makes decisions on how much produce can be sold? Who controls household income?	How much surplus are women producing? Which markets are women currently accessing? How many women's associations are registered in the area and how many members do they have?	What challenges have women faced in accessing markets? What level of education and/or training do men and women have?	Same as for component 1 above.

Annex- Interview questionnaire & answer sample

Focus group discussion sample



Focus Group Discussion Guide

Gender Analysis Toolkit

Survey Conducted in a Normal Climate (Normal Production) Year (2022)

GENDER ANALYSIS MATRIX

PG 1

Extension officers interview sample

Capacity Building and Knowledge Management for scaling-up Climate Resilient agricultural practices

Interview Schedule for Extension Officers (& Extension Agencies)

Organization details:
Name of Organization: *Cool Earth PNG*
Name of Officer: *Tory Kuria* ***Male or Female:*** *Male*
(Please tick as appropriate) Government Extension Officer---------- NGO
Agriculture Body:_____ Women's
Group:_____
Farmer Body:_____
Location of Interview: ***Province:*** *_Milne Bay* ***District:*** *Alotau*

Questions

Activity / Issue	***Circle correct response***		***Explain any reasons***
Gender division of labor (Who does what?)			
Are you offering Training on Climate Adaptation?	Ye	*No*	*participatory land use planning*
Who is targeted?	*Men*	*Women*	*Rural communities. All gender (male and female)*
Who is participating?	*Men*	*Women*	*Rural communities. All gender (male and female)*
What is the sex ratio of extension workers involved	*Men*	*Women*	*1:3. Less number of female extension workers than men.*

in the Programme? Why? Give reasons.			
Access and control of resources (Who owns what?)			
Are women employees paid different wages than men for their work in your Organization?	*Yes*	*No*	*Same salary scale. Variation depends on the type of positions held by respective workers.*
If so, Why? Explain reasons for this.			
Is data sufficiently segregated for Staff and Clients *Explain any reasons for this.*	*Yes*	*No*	*There is no restrictions on data access and therefore, Same level of data/information is delivered.*
How is this data being used in the organization?			*Data is used by staff for a well-informed decisions on training/projects delivery and accessible to all staff.*
Opportunities			
What climatic change events have you observed? (Respondents to tick observed events and explain details)			
Drought?			
Frost?			
Excess Rain?	✓		*Access rain causing flood, landslide etc. and block off accessibility. Also results in food crops destruction*
Sea Water Rise?	✓		*Causing soil erosion and settlements destruction.*
Temperature Rise?			
How have these affected you and your organization's work?			*Cannot access partnership communities. More requests from affected communities for relieve assistances.*
*What agricultural practices have **men** adopted in response to climatic changes?*	*Men*		*Men turn to cash crop, such as Vanilla and Cocoa to generate income to support family afford imported store goods.*

*What agricultural practices have **women** adopted in response to climatic changes?*		*Women*	*Women turn to Coconut for virgin oil production and growing season vegetables to generate income for long term livelihood support.*
Constraints			
What is preventing farmers from adapting new agricultural technologies? For men and women?	*Men*	*Women*	*New technologies skills not easily accessible to most remote farmers*
Education?	*Men*	*Women*	*High level illiteracy in the community for all gender.*
Knowledge/Skills?	*Men*	*Women*	*Less skillful person in community for both genders.*
Finance?	*Men*	*Women*	*Low-income level for both gender in communities*
Technology?	*Men*	*Women*	*Isolated communities with little access to new technologies.*
Others ?	*Men*	*Women*	*Traditional customs/tabus discourage participation of activities freely in most communities.*

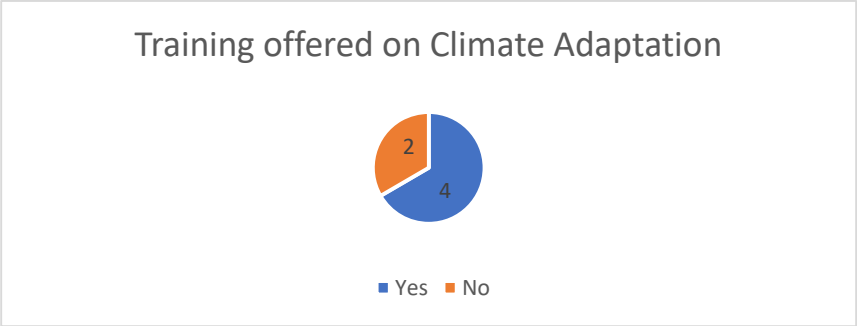
3.3 Enga province data from Extension officers' interviews

Results of Extension Data

Organization	***Officer***	***Gender***
Enga Provincial Government	*Davinah Apupuni*	*Female*
Enga Enda Anda Association (EEAA)	*Margaret Potane*	*Female*
Enga Provincial Government	*Chris Lakaio*	*Male*
Finnish Overseas Consultants (FinnOC) Ltd	*Hepri Sarkie*	*Female*
Enga Provincial Government	*Abraham Nane*	*Male*
PNG Forest Authority - Enga Provincial Office	*Kenzele Propis*	*Male*

Are you offering Training on Climate Adaptation?

Training Offered	
Yes	*4*
No	*2*
Total	*6*



Who is participating in training?

Type of Training	***Participants***	
	Male	***Female***
Trainers of trainee	*3*	*1*
NA	*1*	*5*
Trainers of trainee (They will go and train the affected communities)	*3*	*1*
Trainers of trainee	*4*	*1*
Trainers of trainee	*3*	*1*
	6	*1*

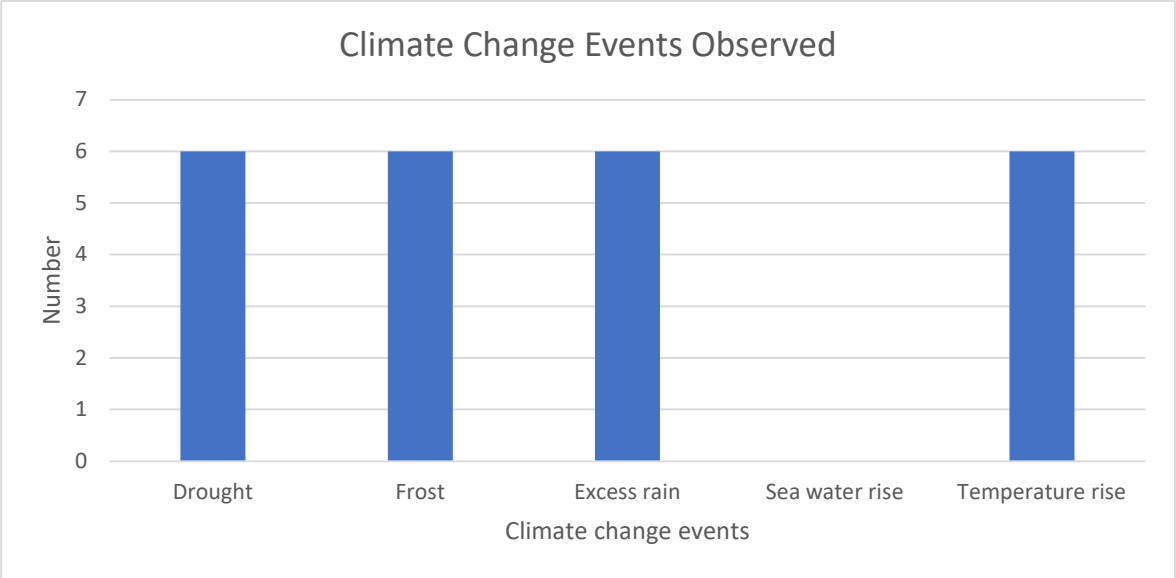
Sex ratio of extension workers involved in the program. Why? Give reasons.
No Information collected

Access and Control of resources

Are women employees paid different wages than men?	***Total***
Yes	*0*
No	*6*

What climatic change events have you observed?

Climatic change events observed	***Response***
Drought	*6*
Frost	*6*
Excess rain	*6*
Sea water rise	*0*
Temperature rise	*6*



Impact of climate change

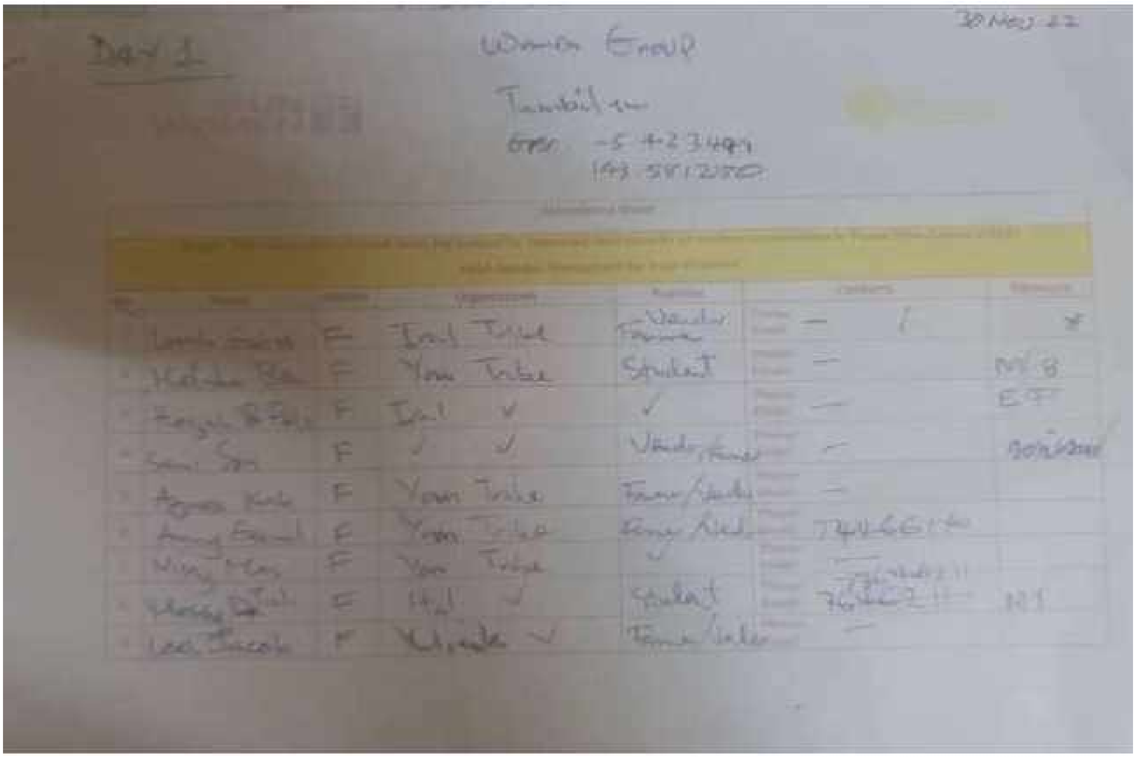
This question was answered with reference to general impact:

- *Decline in kaukau tuber formation*
- *Increase late blight infestation in English potato*
- *Traditional crop loss/ extinction, decline. Temperature rise causing sweet potato (kaukau) weevil to suck juice/ fluid out of the kaukau. Bacterial wilt affecting English potato*
- *Warm climate crops growing in colder areas. Cacao is growing well in Kompiam District*

Annex- Consultation photos (Available on request)

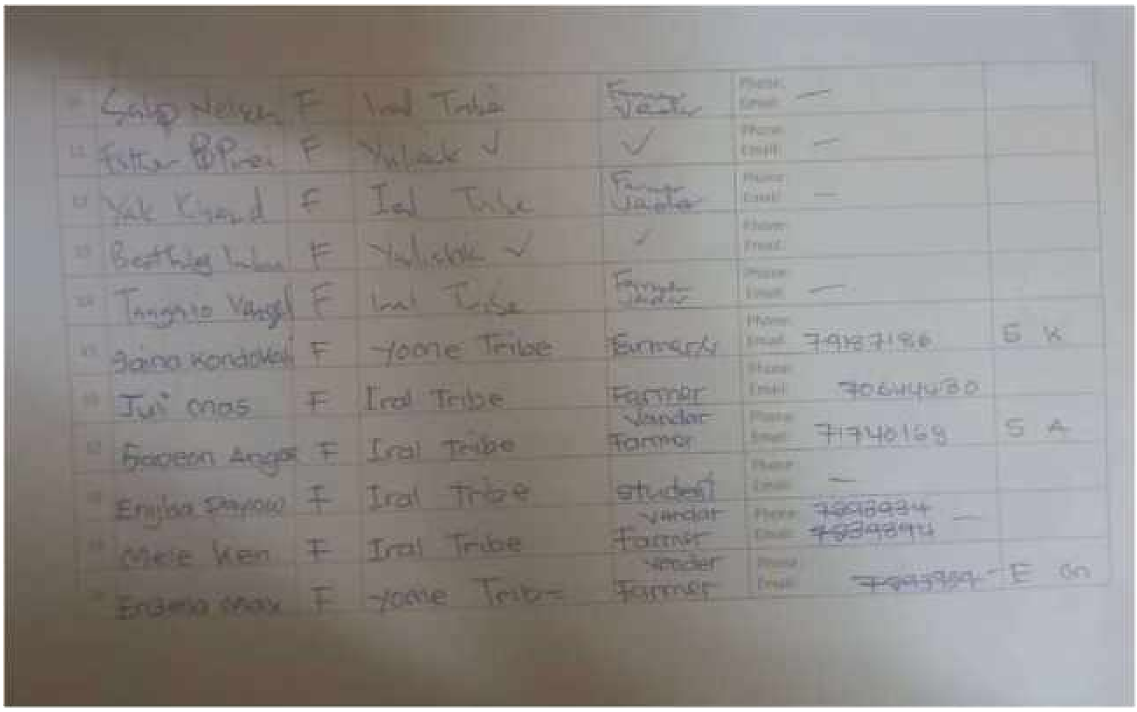
Annex *- List of Participant*

Enga participants

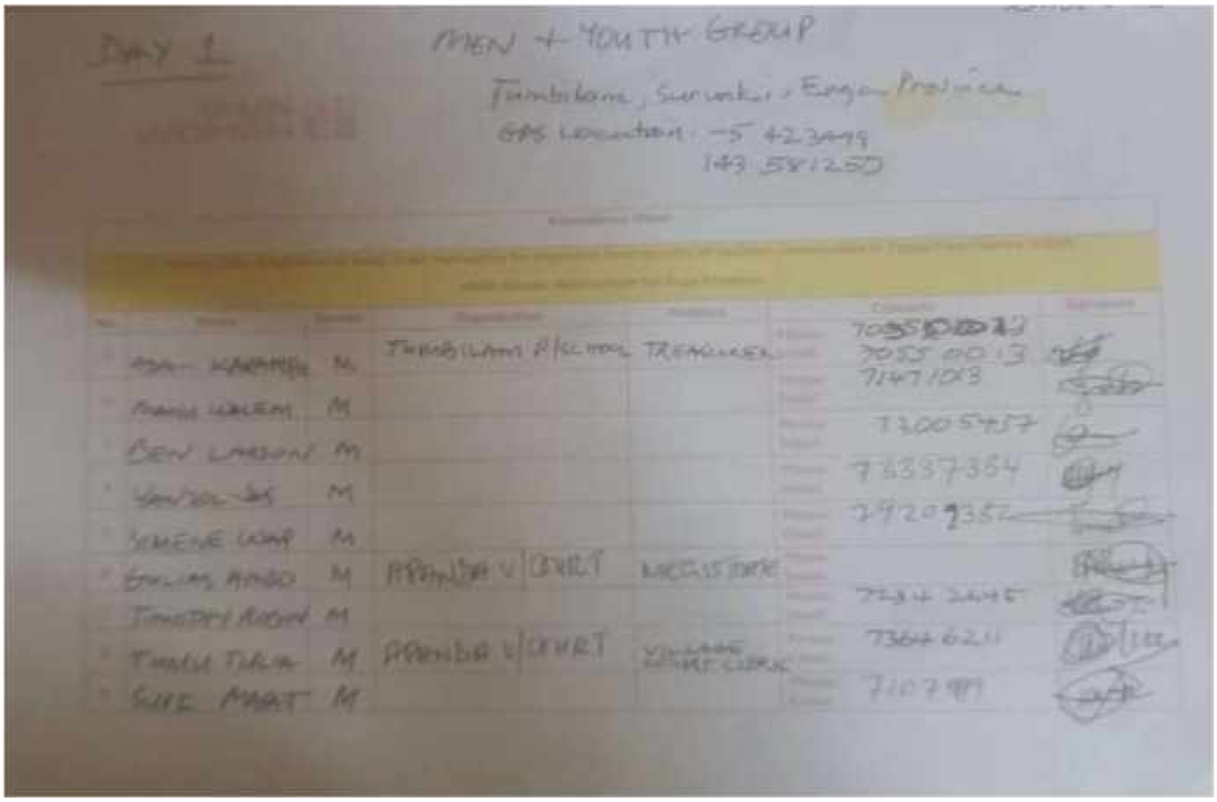


Day 1 | Women Group | 30 Nov 22

Leda [illegible]	F	Iral Tribe	Vendor Farmer	—	
[illegible]	F	Yoon Tribe	Student	—	M B
[illegible]	F	Iral ✓	✓	—	E F
[illegible]	F	✓ ✓	Vendor, Farmer	—	[illegible]
Agnes [illegible]	F	Yoon Tribe	Farmer/Vendor	—	
[illegible]	F	Yoon Tribe	[illegible]	7446610	
[illegible]	F	Yoon Tribe	✓	—	
[illegible]	F	Iral ✓	Student	[illegible]	N I
Lea Jacob	F	[illegible] ✓	Farmer/Vendor	—	



Salip Nelson	F	Iral Tribe	Farmer Vendor	—	
[illegible]	F	[illegible] ✓	✓	—	
Yak [illegible]	F	Iral Tribe	Farmer Vendor	—	
[illegible]	F	[illegible] ✓	✓		
[illegible]	F	Iral Tribe	Farmer Vendor	—	
Gaina Kondakoi	F	Yoone Tribe	Farmer/V	7987186	S K
Jui Onas	F	Iral Tribe	Farmer	70644630	
Gaoeen Angor	F	Iral Tribe	Vandar Farmer	7740169	S A
Enjlaa Payow	F	Iral Tribe	Student	—	
Mele Ken	F	Iral Tribe	Vandar Farmer	7993934 7839894	—
Endela Max	F	Yoone Tribe	Vender Farmer	[illegible]	E On



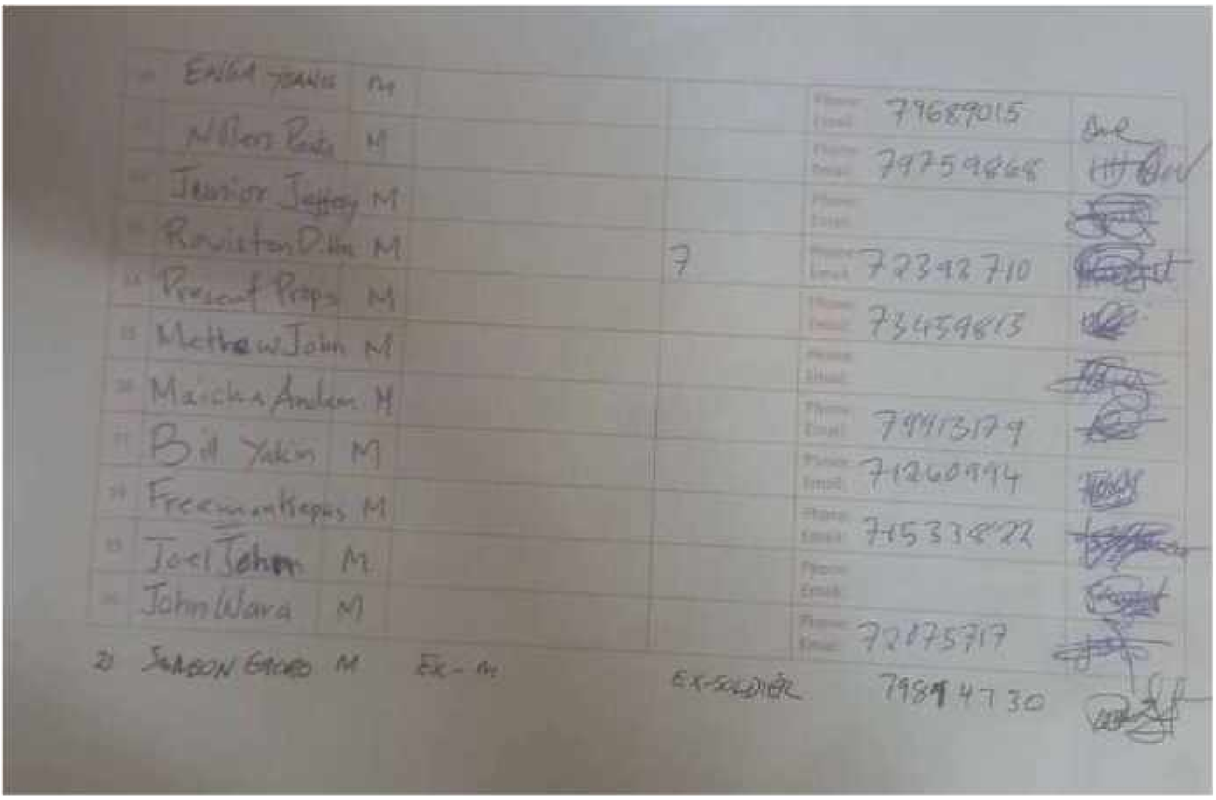
DAY 1

MEN + YOUTH GROUP

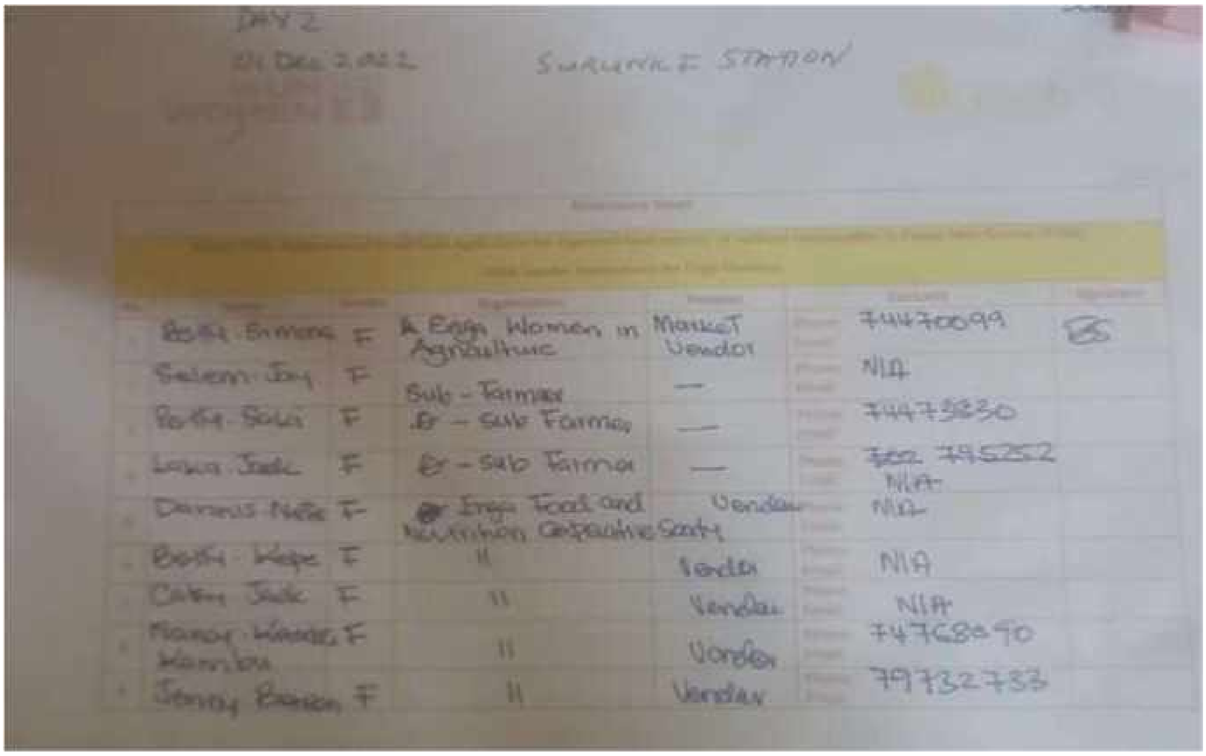
Tumbilam, Surunki, Enga Province

GPS Location: -5 423449
143 581250

No.	Name	Gender	Organisation	Position	Contact	Signature
[illegible]	[illegible] KARAPE	M	TAMBILAM P/SCHOOL	TREASURER	7055[illegible] 7055 0013	[signature]
[illegible]	[illegible] WALEM	M			7147 1013	[signature]
[illegible]	BEN LAWSON	M			73005457	[signature]
[illegible]	[illegible]	M			73337354	[signature]
[illegible]	SEMENE WAP	M			7920 9352	[signature]
[illegible]	[illegible] AMBO	M	APANDA V/COURT	MAGISTRATE		[signature]
[illegible]	TIMOTHY ROBIN	M			7234 2445	[signature]
[illegible]	[illegible]	M	APANDA V/COURT	VILLAGE COURT CLERK	7364 6211	[signature]
[illegible]	[illegible] MART	M			7107 [illegible]	[signature]

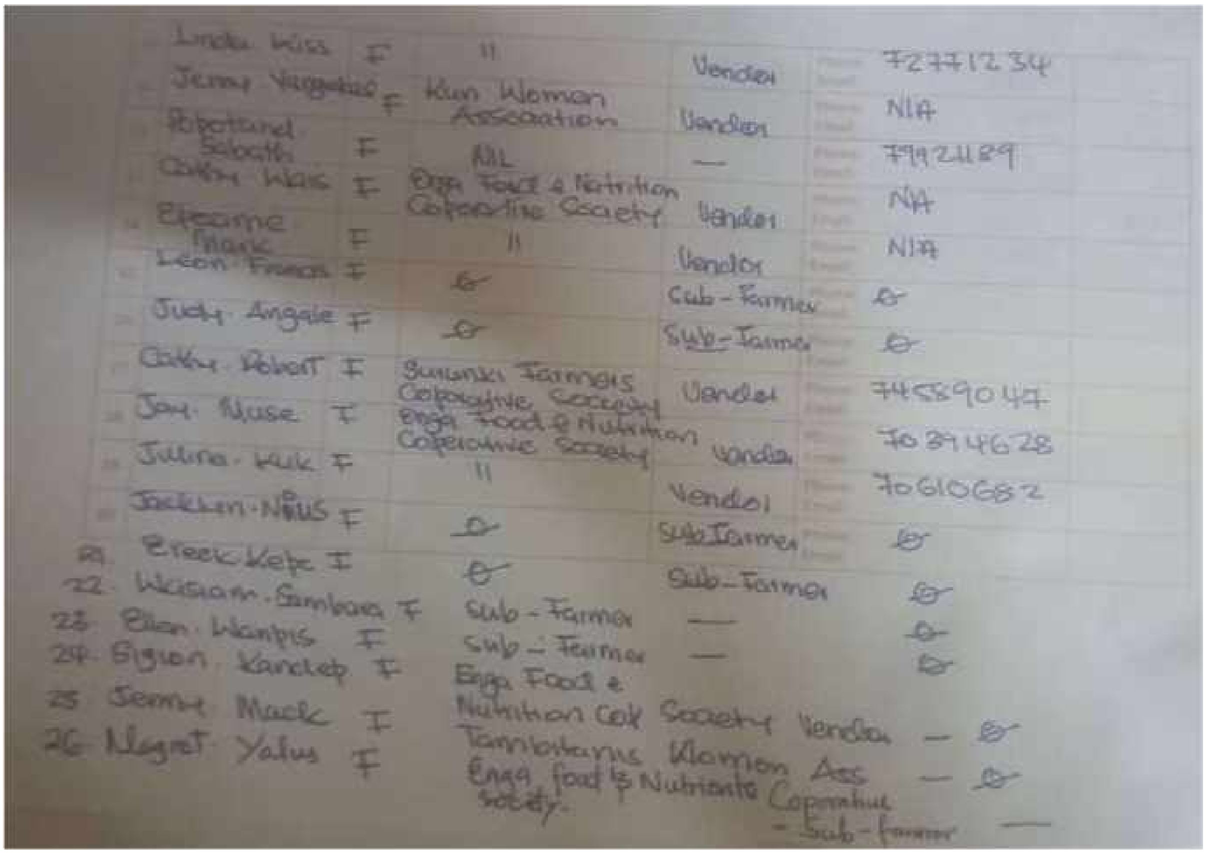


No.	Name	Gender	Organisation	Position	Contact	Signature
[illegible]	ENGA [illegible]	M			79689015	[signature]
[illegible]	[illegible]	M			79759868	[signature]
[illegible]	Junior Jeffery	M				[signature]
[illegible]	[illegible]	M		7	72392710	[signature]
[illegible]	[illegible]	M			73459813	[signature]
[illegible]	Methew John	M				[signature]
[illegible]	[illegible]	M			79913179	[signature]
[illegible]	Bill Yakin	M			71260994	[signature]
[illegible]	[illegible]	M			71533822	[signature]
[illegible]	Joel John	M				[signature]
[illegible]	John Wara	M			72875717	[signature]
21	[illegible]	M	Ex-M	EX-SOLDIER	7989 4730	[signature]

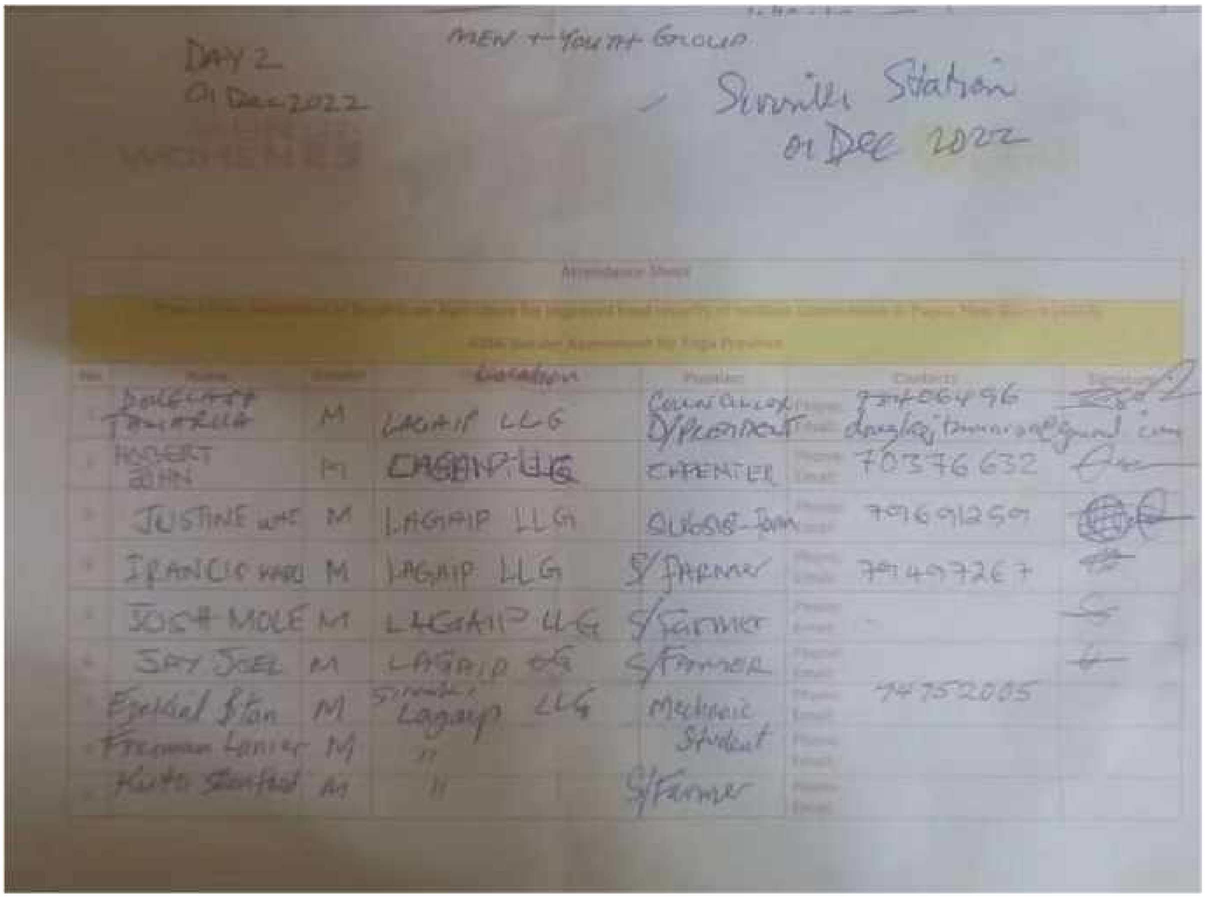


DAY 2
01 Dec 2022 SURUNKI STATION

Name	Sex	Organisation	Position	Contacts	Signature
Betty Simons	F	Enga Women in Agriculture	Market Vendor	74470099	BS
Selem Joy	F	Sub-Farmer	—	N/A	
Betty Saki	F	— Sub Farmer	—	74473830	
Laura Jack	F	— Sub Farmer	—	7... 795252 N/A	
Dennis Nese	F	Enga Food and Nutrition Cooperative Society	Vendor	N/A	
Betty Kepe	F	"	Vendor	N/A	
Cathy Jack	F	"	Vendor	N/A	
Nancy Wanis Hambu	F	"	Vendor	74768890	
Jenny Benson	F	"	Vendor	79732733	



Name	Sex	Organisation	Position	Contacts
Linda Kiss	F	"	Vendor	72771234
Jenny Yagabo	F	Kun Women Association	Vendor	N/A
Roboland Sebeth	F	NIL	—	7992489
Cathy Wais	F	Enga Food & Nutrition Cooperative Society	Vendor	N/A
Eteame Mark	F	"	Vendor	N/A
Leon Francis	F	—	Sub-Farmer	—
Judy Angale	F	—	Sub-Farmer	—
Cathy Robert	F	Surunki Farmers Cooperative Society	Vendor	74589047
Joy Nuse	F	Enga Food & Nutrition Cooperative Society	Vendor	70394628
Julina Kuk	F	"	Vendor	70610682
Jackson Nilus	F	—	Sub Farmer	—
21. Ereec Kepe	F	—	Sub-Farmer	—
22. Wasiam Sambara	F	Sub-Farmer	—	—
23. Elen Wanpis	F	Sub-Farmer	—	—
24. Sigion Kanclep	F	Enga Food & Nutrition Cop Society	Vendor	—
25. Sammy Mack	F	Tambitanis Women Ass	—	—
26. Magret Yalus	F	Enga food & Nutrients Coporative society	Sub-farmer	—



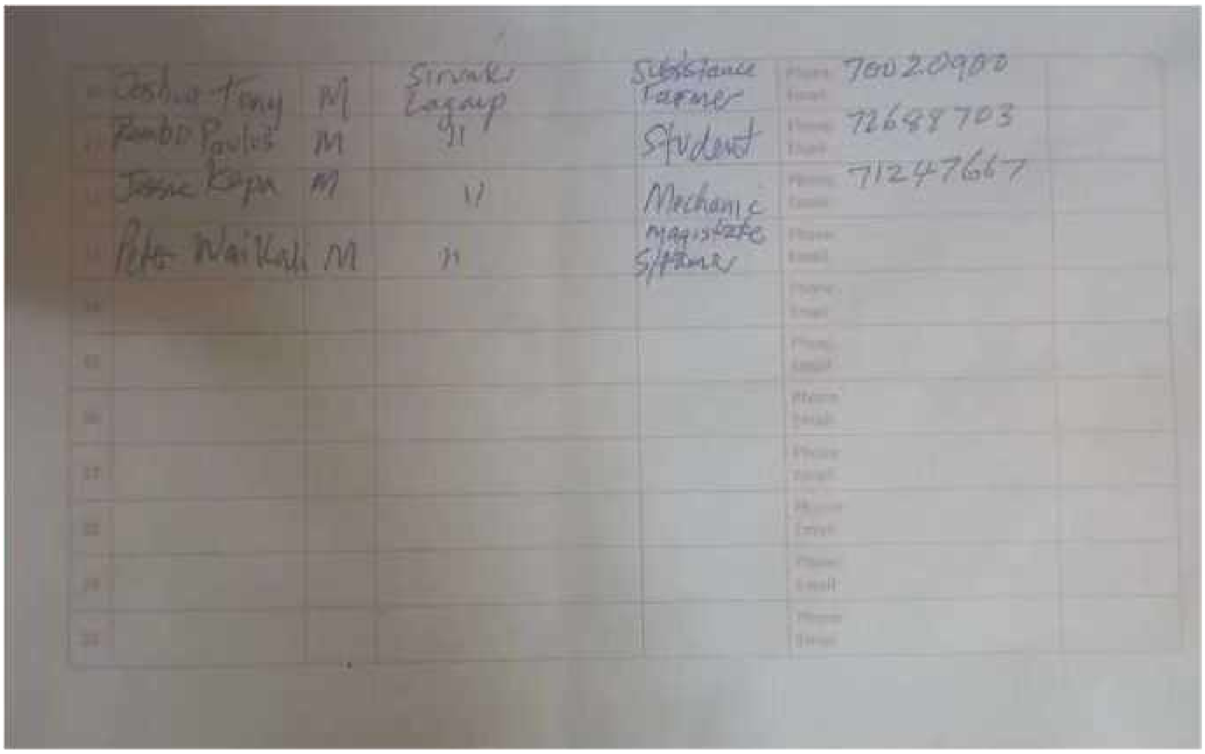
DAY 2
01 DEC 2022

MEN + YOUTH GROUP

Sirunki Station
01 DEC 2022

Attendance Sheet

No	Name	Gender	Location	Position	Contacts	Signature
1	DOUGLASS TAMAREA	M	LAGAIP LLG	COUNCILLOR D/PRESIDENT	Phone: 73406496 Email: [illegible]	[illegible]
2	HOBERT JOHN	M	LAGAIP LLG	CARPENTER	Phone: 70376632 Email:	[illegible]
3	JUSTINE [illegible]	M	LAGAIP LLG	SUBSIS-FARM	Phone: 79691259 Email:	[illegible]
4	FRANCIS [illegible]	M	LAGAIP LLG	S/FARMER	Phone: 79497267 Email:	[illegible]
5	JOSH MOLE	M	LAGAIP LLG	S/FARMER	Phone: - Email:	[illegible]
6	SAY JOEL	M	LAGAIP LLG	S/FARMER	Phone: Email:	[illegible]
7	Ezekiel Stan	M	Sirunki Lagaip LLG	Mechanic	Phone: 74752005 Email:	
8	Freeman Lenier	M	"	Student	Phone: Email:	
9	Kuto Stanfield	M	"	S/Farmer	Phone: Email:	



No	Name	Gender	Location	Position	Contacts	Signature
10	Joshua Tony	M	Sirunki Lagaip	Subsistance Farmer	Phone: 70020900 Email:	
11	Rombo Paulus	M	"	Student	Phone: 72688703 Email:	
12	Jessie Kopa	M	"	Mechanic	Phone: 71247667 Email:	
13	Peter Waikali	M	"	Magistrate S/Farmer	Phone: Email:	
14					Phone: Email:	
15					Phone: Email:	
16					Phone: Email:	
17					Phone: Email:	
18					Phone: Email:	
19					Phone: Email:	
20					Phone: Email:	

DAY 2

9 Dec 2022

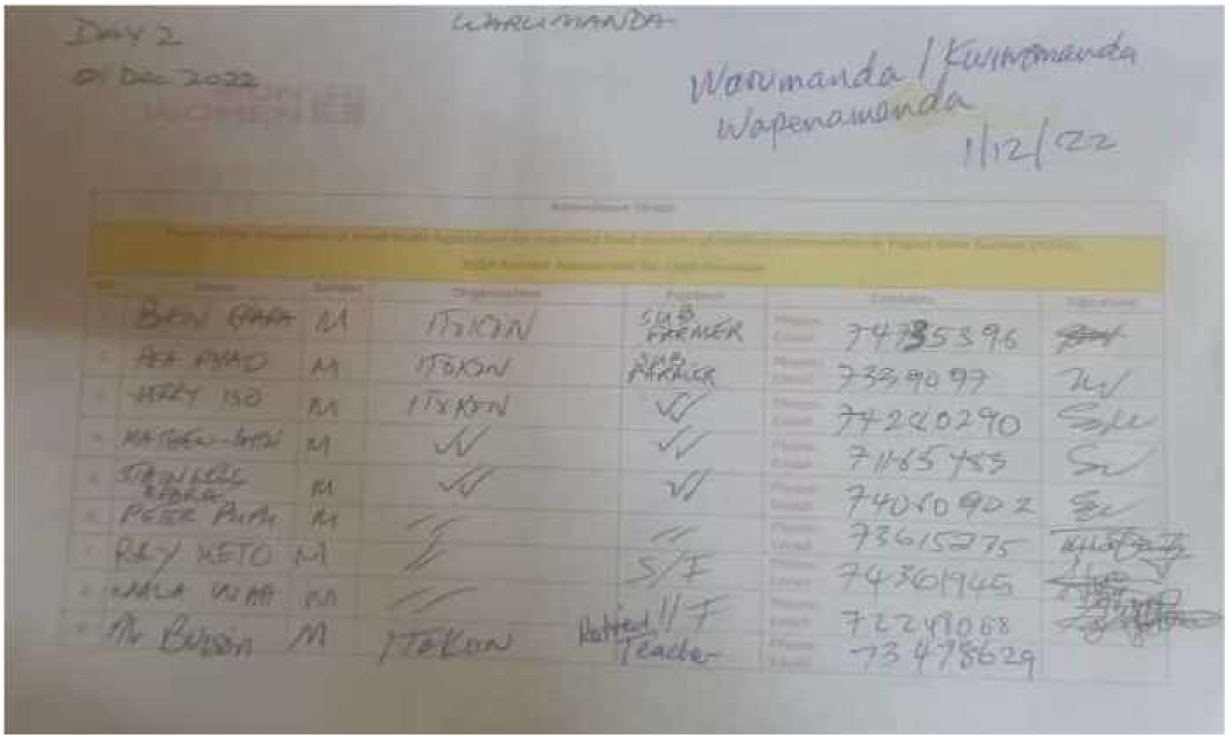
WOMEN & YOUTH

KUNDIAWA [illegible]

[illegible] 5 664 714 , 143.8886250

No.	Name	Sex	Organisation	Position	Contacts	Signature
1	[illegible]	F			Phone/Email: 735 68062	[signature]
2	[illegible]	F			Phone/Email: 72234728	[signature]
3	NANCY Kore	F			Phone/Email: 73500698	[signature]
4	NANCY-WAPRO	F			Phone/Email: 72163808	[signature]
5	[illegible]	F			Phone/Email:	[signature]
6	PENI CLEMENT	F			Phone/Email:	[signature]
7	Christine [illegible]	F			Phone/Email: 74040234	[signature]
8	[illegible]	F			Phone/Email: 74257679	[signature]
9	[illegible]	F			Phone/Email: 72270850	[signature]
10					Phone/Email: 79753564	[signature]

No.	Name	Sex	Organisation	Position	Contacts	Signature
10	[illegible]	F			Phone/Email: 79624906	[signature]
11	[illegible]	F			Phone/Email: 79624906	[signature]
12	Jenny [illegible]	F			Phone/Email: 70564047	[signature]
13	[illegible]	F			Phone/Email: 72775661	[signature]
14	[illegible]	F			Phone/Email:	[signature]
15	Susan [illegible]	F			Phone/Email: 72844930	[signature]
16	Mercy [illegible]	F			Phone/Email:	[signature]
17					Phone/Email:	
18					Phone/Email:	
19					Phone/Email:	
20					Phone/Email:	

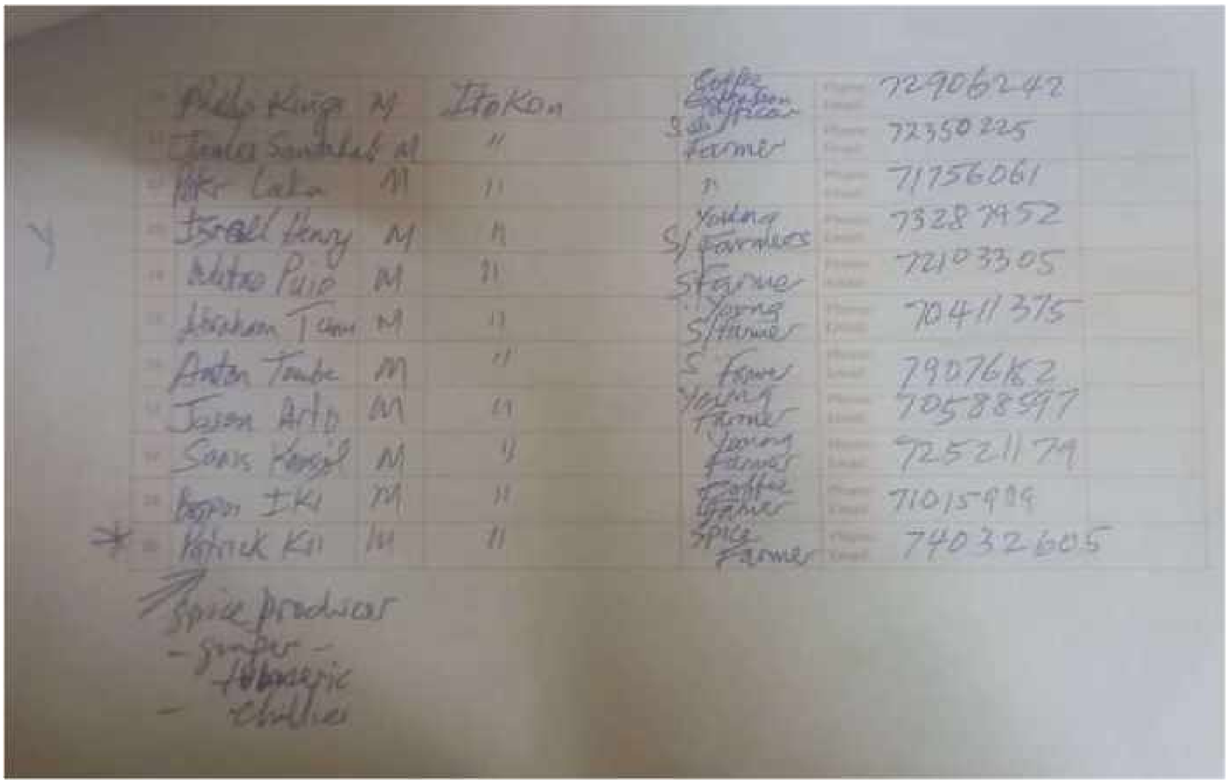


Day 2
01 Dec 2022

WARUMANDA

Warumanda / Kuiwomanda
Wapenamanda
1/12/22

No.	Name	Gender	Organisation	Position	Contacts	Signature
1	BEN GAPA	M	ITIKIN	SUB FARMER	74735396	
2	AEA AMAO	M	ITIKON	SUB FARMER	73390997	
3	JERRY ISO	M	ITIKIN	√√	74220290	
4	MATHEW JOSH	M	√√	√√	71165455	
5	STANLEY KOKA	M	√√	√√	74060902	
6	PETER PUPU	M	//	//	73615275	
7	RAY KETO	M	//	S/F	74361945	
8	WALA WAA	M	//	// F	72249068	
9	Mr Bursin	M	ITEKON	Retired Teacher	73478629	



No.	Name	Gender	Organisation	Position	Contacts
10	Philip Kinga	M	Itekon	Coffee Extension Officer	72906242
11	James Sandakal	M	"	3 S/Farmer	72350225
12	Aker Laka	M	"	"	71756061
13	Israel Henry	M	"	Young S/Farmers	73287952
14	Alatso Puio	M	"	S/Farmer	72103305
15	Abraham Tam	M	"	Young S/Farmer	70411375
16	Anton Toube	M	"	S Farmer	79076182
17	Jason Arto	M	"	Young Farmer	70588597
18	Sams Kaspal	M	"	Young Farmer	72521179
19	Bopa Eki	M	"	Coffee Farmer	71015999
20	Patrick Kii	M	"	Spice Farmer	74032605

Spice producer
- ginger -
- turmeric
- chillies

DAY 3

YAMBOS

MEN + YOUTH GROUP

Attendance Sheet

Project Title: Adaptation of Small Scale Agriculture for Improved food security of resilient communities in Papua New Guinea (ASSA)

ASSA Gender Assessment for Enga Province

Men

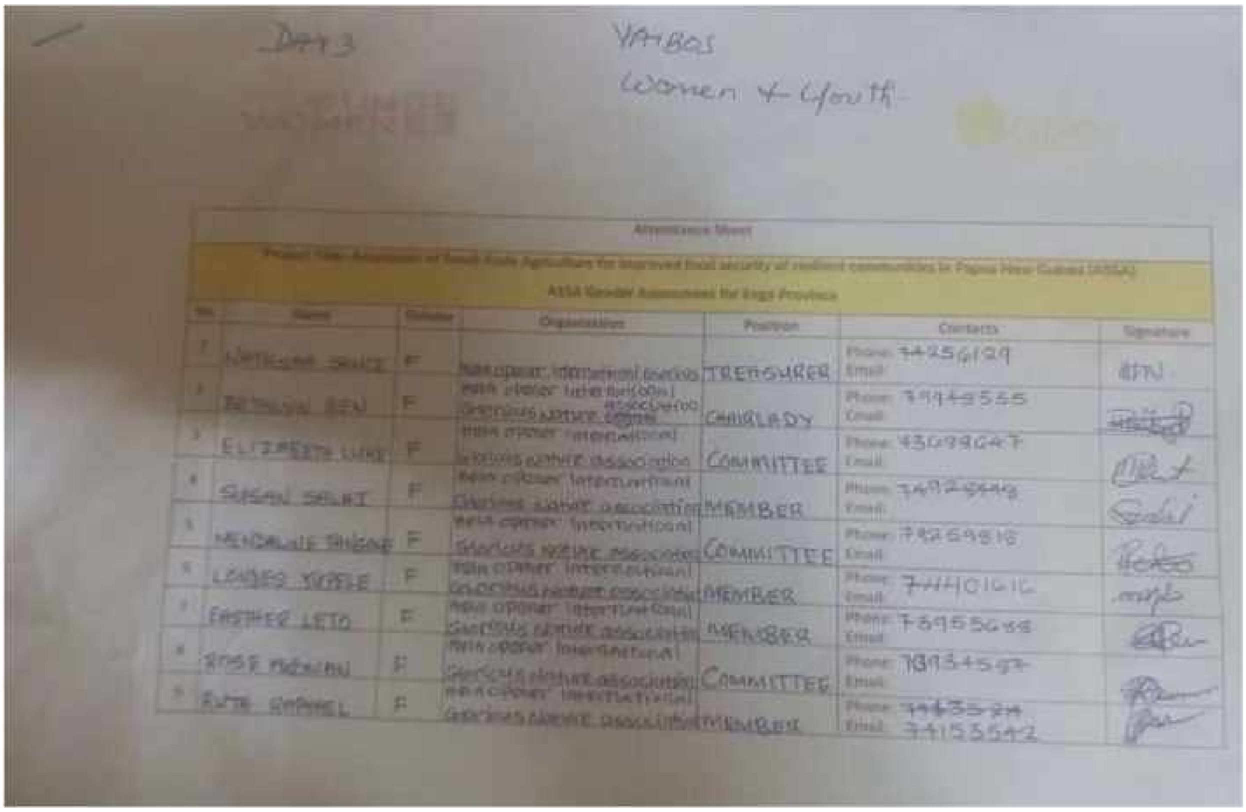
No	Name	Gender	Organization	Position	Contacts	Signature
1	BEN ITAYOK	M	HELA OPENER INTERNATIONAL GLORIOUS NATURE ASSOCIATION (HOGNA)	DIRECTOR	Phone: 73578736 Email:	
2	WIN TERRY	M	✓	MEMBER	Phone: 72516007 Email:	
3	WAIS WETE	M	✓ LAW & ORDER	MEMBER	Phone: 73473683 Email:	
4	PII IKITAE	M	✓ LEADER	MEMBER	Phone: — Email:	
5	JOHN ANSO	M	✓	MEMBER	Phone: — Email:	
6	WASO UMBOM	M	✓ LAW & ORDER	COMMITTEE	Phone: 72265243 Email:	
7	POTAKAI LIABO	M	M ✓	COMMITTEE	Phone: Email: 79879896	
8	SAKAN PAI	M	✓	MEMBER	Phone: — Email:	
9	WARI PAMBAR	M	✓	LEADER	Phone: 70777332 Email:	

Boys

10	Jonah Tobias	M	Sau tribe	Young (mechanic) Farmer	Phone: Email:	
11	Simon Pikia	M	" "	Young Student Farmer	Phone: Email:	
12	Nahel Pou	M	" "	Young Farmer	Phone: 79834587 Email:	
13	Jim Tande	M	" "	Subsistence Farmer	Phone: 73855659 Email:	
14	Junior Kit	M	" "	Young Farmer	Phone: Email: -	
15	Lynn Limbao	F	" "	Young Student Farmer	Phone: Email:	
16	Lorin Londe	F	" "	Student	Phone: Email:	
17	[illegible] Like	F	" "	Primary Student	Phone: Email:	
18	Marcy Kola	F	" "	Primary Student	Phone: Email:	
19	Howard George	M	" "	Primary Student	Phone: Email:	
20	Breal Tole	M	" "	High School Student	Phone: Email:	

Girls (rows 15–18)

Boys (rows 19–20)



DAY 3

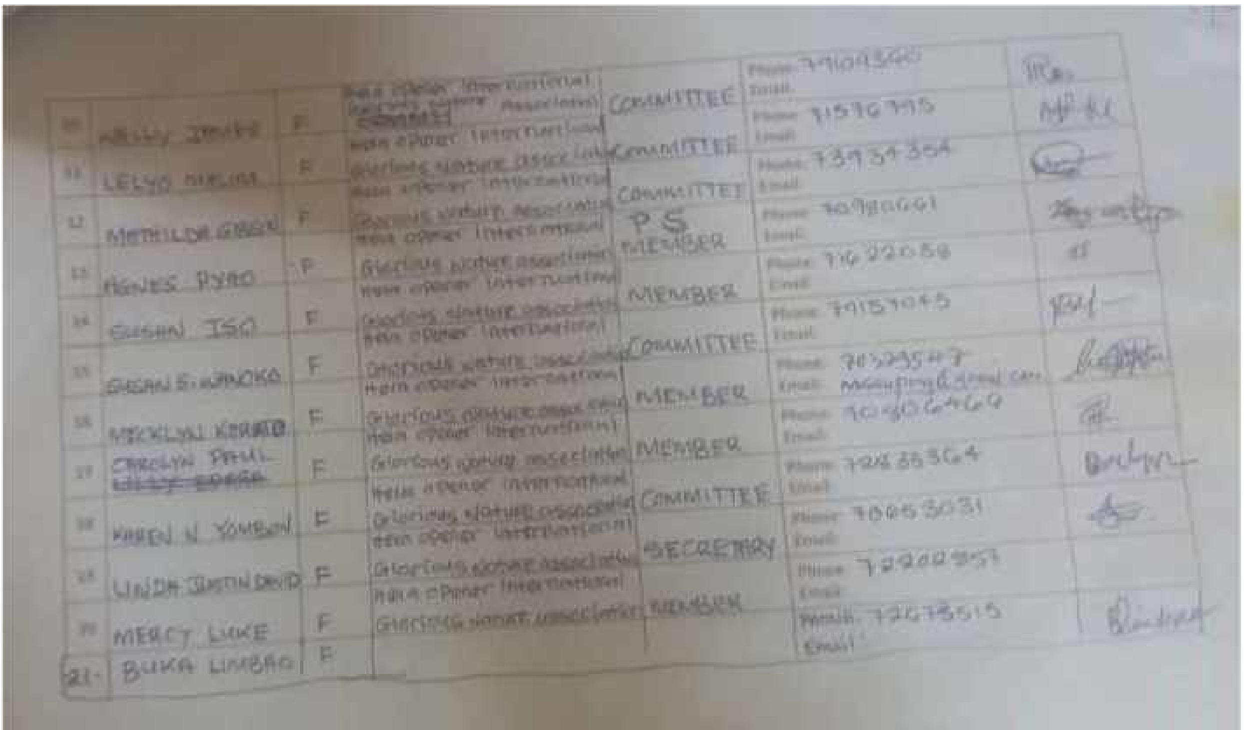
YAMBOS

Women + Youth

Attendance Sheet

ASSA Gender Assessment for Enga Province

No.	Name	Gender	Organization	Position	Contacts	Signature
1	NATASHA SAUZ	F	Hela Opener International Glorious [illegible]	TREASURER	Phone: 74256129 Email:	
2	BETHLYN BEN	F	Hela Opener International Glorious Nature association	CHAIRLADY	Phone: 79949555 Email:	
3	ELIZABETH LUKE	F	Hela Opener International Glorious Nature association	COMMITTEE	Phone: 43099647 Email:	
4	SUSAN SELAI	F	Hela Opener International Glorious Nature association	MEMBER	Phone: 74924449 Email:	
5	MENDALIE PHENE	F	Hela Opener International Glorious Nature association	COMMITTEE	Phone: 79259518 Email:	
6	LONGES TOPELE	F	Hela Opener International Glorious Nature association	MEMBER	Phone: 74401616 Email:	
7	FASHER LETO	F	Hela Opener International Glorious Nature association	MEMBER	Phone: 73955688 Email:	
8	ROSE PEWAU	F	Hela Opener International Glorious Nature association	COMMITTEE	Phone: 73934597 Email:	
9	RUTH GABRIEL	F	Hela Opener International Glorious Nature association	MEMBER	Phone: ~~74635214~~ Email: 74153542	



No.	Name	Gender	Organization	Position	Contacts	Signature
					Phone: 79109360 Email:	
10	KELLY JAMES	F	Hela Opener International Glorious Nature Association	COMMITTEE	Phone: 71576795 Email:	
11	LELYO NELIM	F	Hela Opener International Glorious Nature association	COMMITTEE	Phone: 73934354 Email:	
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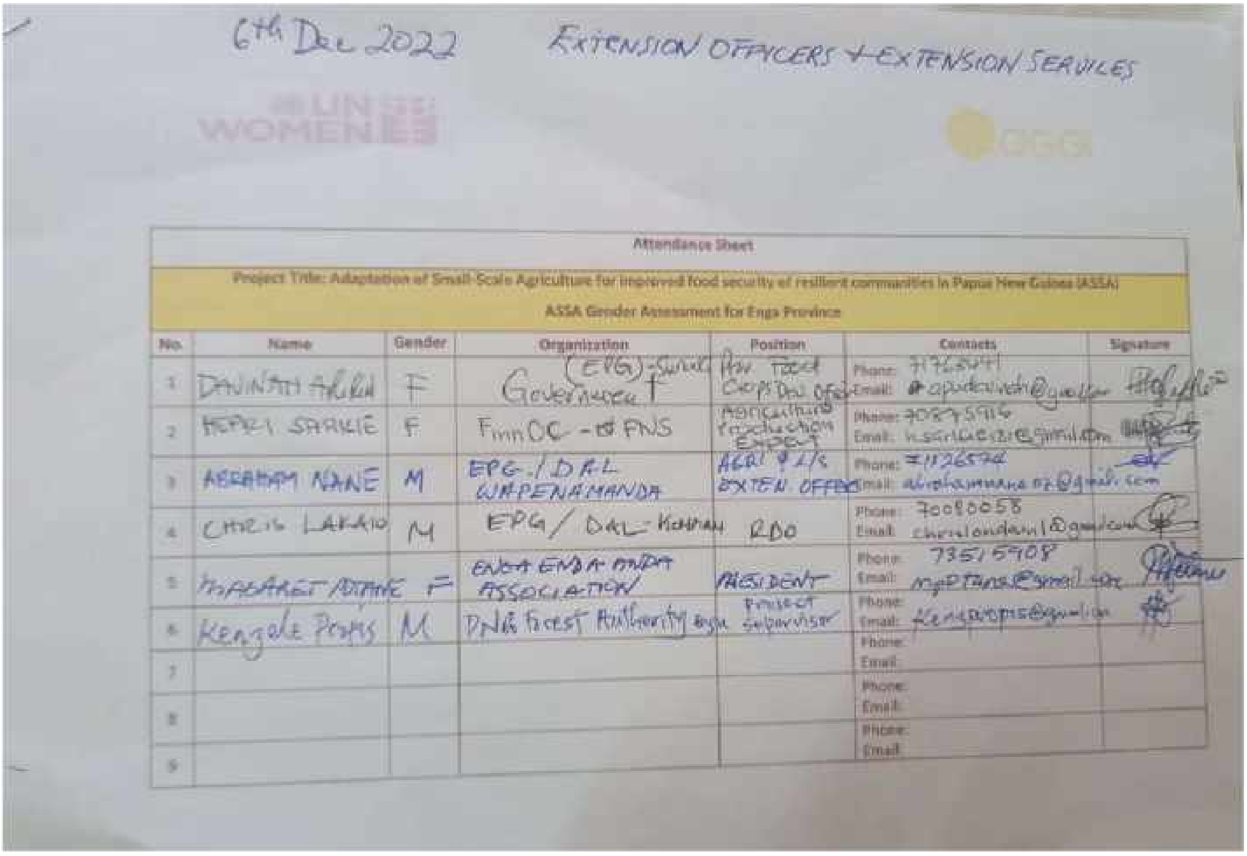
21.	BUKA LIMBAO	F				



6th Dec 2022 EXTENSION OFFICERS + EXTENSION SERVICES

Attendance Sheet

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

ASSA Gender Assessment for Enga Province

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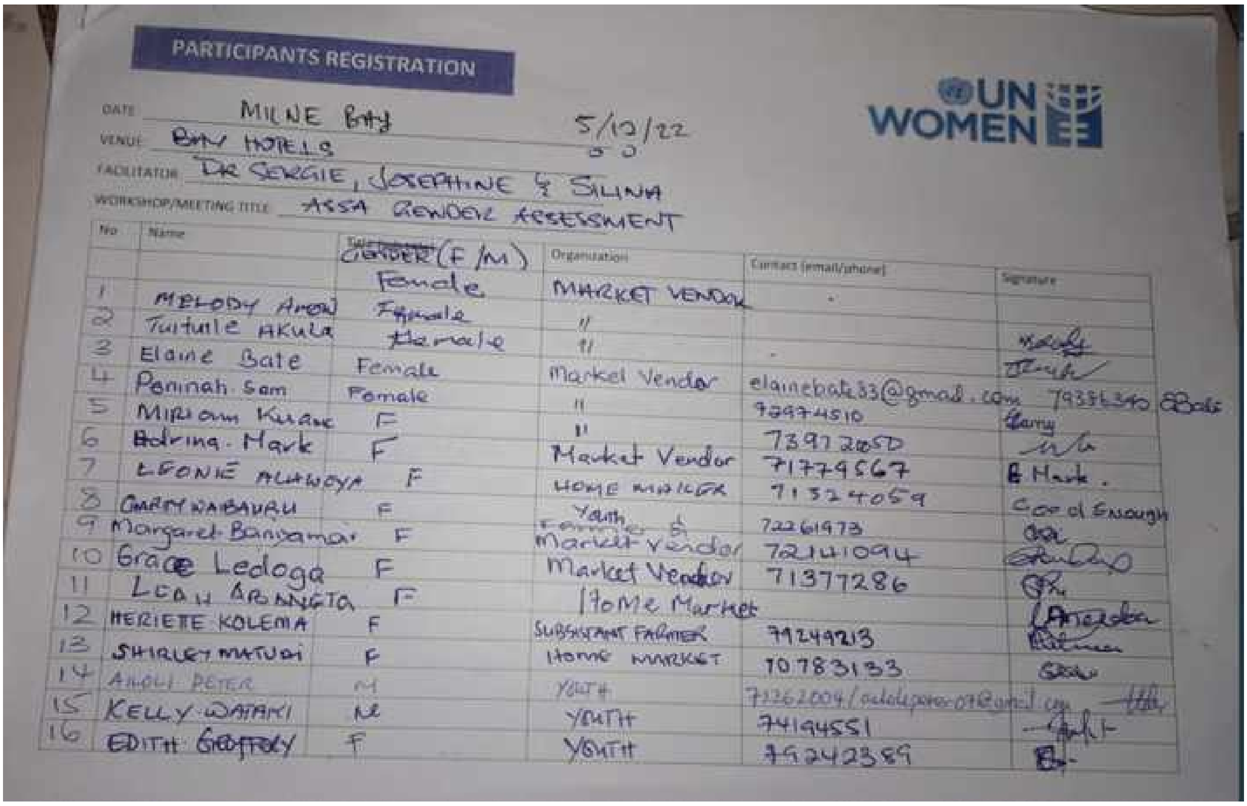

PARTICIPANTS REGISTRATION

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FACILITATOR: DR SERGIE, JOSEPHINE & SILINA

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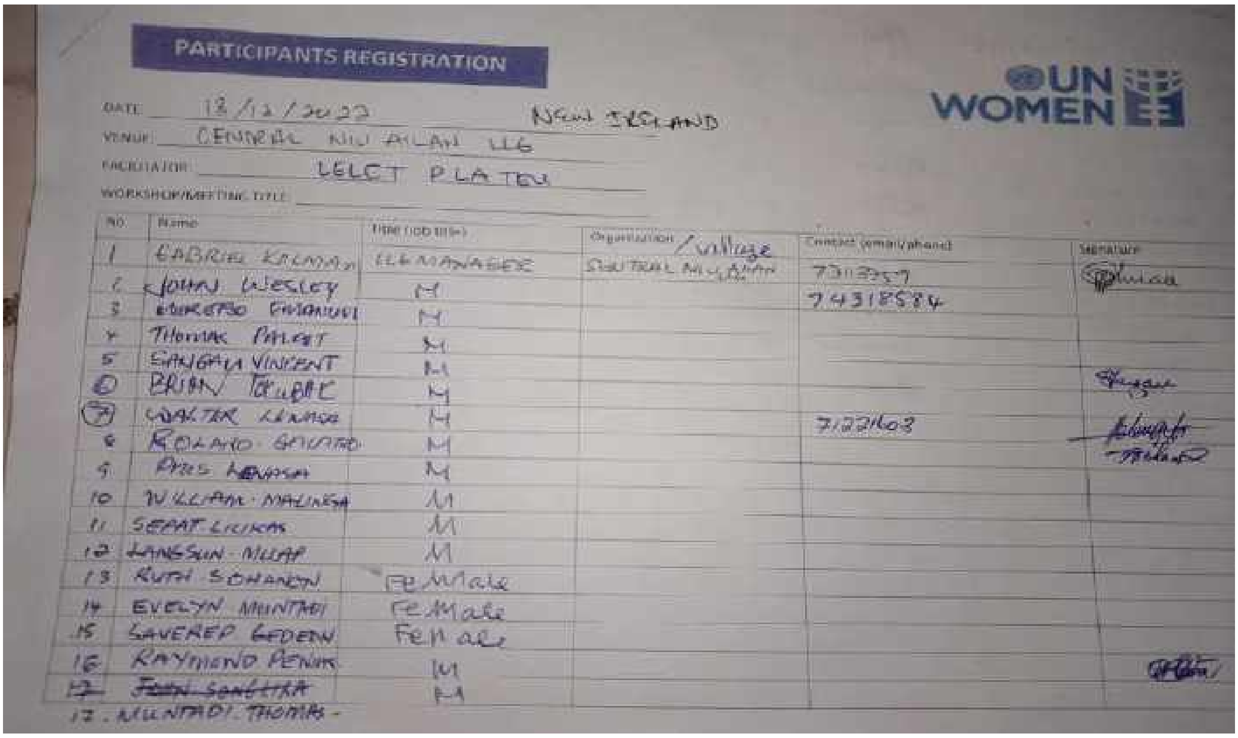
New Ireland participants



PARTICIPANTS REGISTRATION

UN WOMEN

DATE: 13/12/2022 NEW IRELAND

VENUE: CENTRAL NIU AILAN LLG

FACILITATOR: LELET PLATEU

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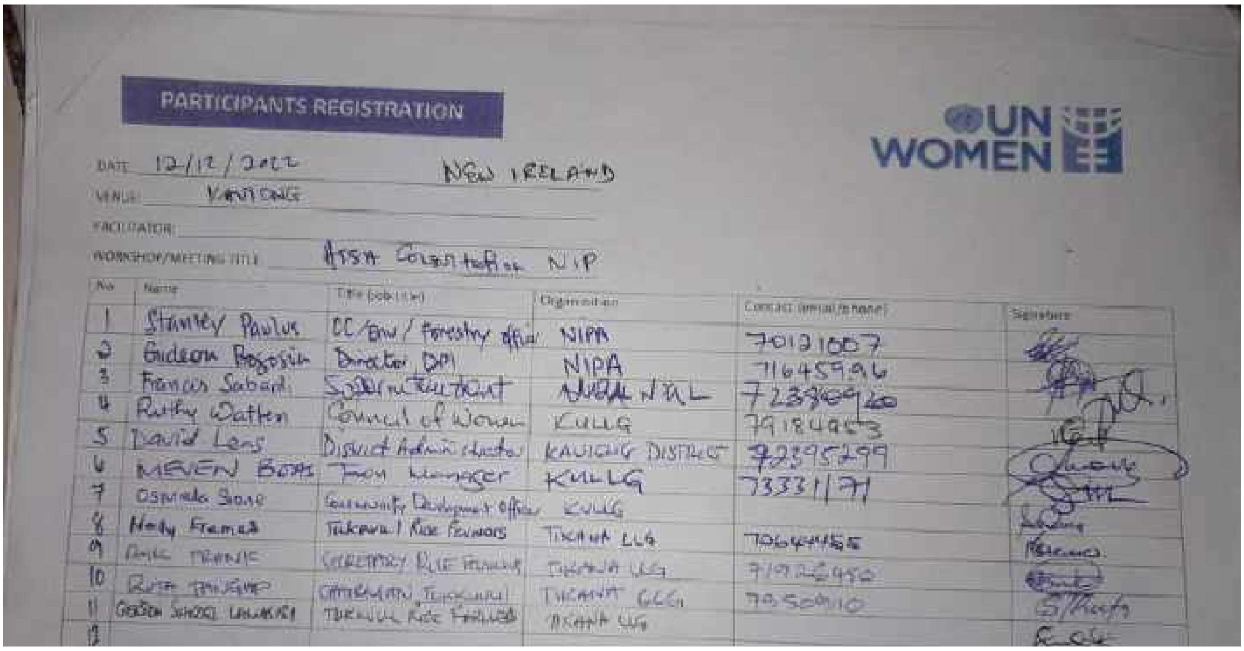
17	MUNTADI THOMAS -				



PARTICIPANTS REGISTRATION

UN WOMEN

DATE: 12/12/2022 NEW IRELAND

VENUE: KAVIENG

FACILITATOR:

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21. TONGA PHILIP.			M
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27. JAMES LEKUN.			
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29. LENBOM JOE.			M
30. GRAHM PETER.			
31. SILON LAXAMAN.			

Annex 5: Analysis of alternatives and Cost-effectiveness [OBJ]

LIST OF ACRONYMS

BAU. Business-As-Usual
S-BCR. Sustainable - Benefit Cost Ratio
S-NPV. Sustainable - Net Present Value

Introduction

Climate change is already having a detrimental effect on agricultural production in Papua New Guinea, particularly for smallholder farmers. The PNG's Adaptation of Small-Scale Agriculture (ASSA) program offers a range of adaptation solutions to these farmers, as it is expected that there will be an increase in climatic events in the coming decades. s. The project is designed to reduce the vulnerability of smallholder farmers to the effects of climate change and improve their ability to adapt while protecting the agro-ecological resources in rural areas. The program targets three provinces (Enga, New Ireland, and Milne Bay) identified by the Government of PNG under its Climate Resilient Green Growth (CRGG) project.

The ASSA program strives to build climate resilience in small-scale agricultural production in Papua New Guinea by promoting resilient crops, resilient agricultural practices, and resilient agroecological ecosystems. By focusing on vulnerable small-scale farmers, the project hopes to make a significant contribution to the overall resilience of the agricultural sector to climate change.

The principal objective of this document is to highlight key financial and economic information to substantiate the economic and financial viability of the project. Specifics objectives associated with this economic and financial analysis are to:

- *Determine the costs as accurately as possible;*
- *Justify the importance of the resources committed based on the expected financial and economic returns; and*
- *Justify the project's relevance from the point of view of the country's dynamic context, including its economic policies and structural reforms.*

The information presented in this report is derived from a Cost Benefits Analysis (CBA) performed on critical outputs of the program with readily measurable financial benefits.

The selected outputs are :

- *output 1.1: selection, validation, and dissemination of resilient crop varieties and;*
- *output 2.2: eco-friendly technologies for climate-smart seed saving, post-harvest processing, and modern storage*

The methodological approach that guided the preparation of this report involves an analysis of different project information including proposed activities, design structure and financials with the view to assess (i) the project's efficiency in the use of resources, (ii) the effect of the project' implementation of on the country's economic policy, and (iii) the alignment with and contribution to national priorities. This economic and financial analysis was conducted using quantitative analysis for the project financials, including economics cost and benefit evaluated for two specific outputs.

CBA was used in evaluating the Climate smart agriculture practices adopted by the project by determining the relative profitability of alternative practices in the output 1.1 and output 1.2 by comparing their differences in terms of flow of benefits and cost over their lifetime.

In development issues, "financial analysis" is used to describe the examination of the activities and resource flows of individual agents (industrial or commercial enterprises, government agencies, etc.) or large groups (artisans, farmers, retail traders, etc.)[188]. As the financial analysis aims to evaluate the costs and benefits generated by a single entity, the ASSA project itself was considered as an economic agent in order to provide a global view of the financial impact of its interventions for the project beneficiaries. The current analysis considers:

- *the added benefits (revenues from the production of additional crops) resulting from implementing the analyzed outputs; e.g., cash flows;*
- *the investment to acquire and install multiplication sheds, irrigation systems, and other operating and maintenance costs e.g., the cost of the output 1.1;*
- *the investment to construct and install postharvest storage, operating and maintenance cost, and other supports implementation cost e.g., the cost of the output 2.2.*

Unlike financial analysis, the economic analysis of CBA attempts to take into account all costs and benefits for the society, such as the social costs and benefits for the different beneficiaries. Therefore, data used for the economic analysis considered the value of the identified positive externalities as the GHG emissions avoided by using premanufactured materials for storage construction and by reducing post-harvest losses due to traditional seeds and lack of modern storage. The cash flows used for the economic analysis are composed of added benefits (the same as those determined for the financial analysis), and avoided benefits (valuation of the reduction of post-harvest losses due to the use of traditional seeds, valuation of the reduction of the purchase cost of seeds, valuation of the reduction of carbon emissions due to post-harvest losses).

I. Project overview

The ASSA project aims to enhance the sustainability of main agricultural value chains through the adoption of climate-smart practices, contributing to improving the produces' quality, increasing access to markets, and creating green jobs for women and youth in vulnerable communities.
Mare details on the project are provided in the section 2 of the Funding Proposal.

II. Project Duration and use of the proceeds

This section provides preliminary information about the project. It covers issues related to the timing of the project's economic and financial impact analysis and the structure of the project's budget.

2.1. Duration of the Project

The Adaptation of Small-Scale Agriculture (ASSA) for Improved Food Security of Resilient Communities in the Papua New Guinea project will be implemented over 5 years. Significant investment flows will be made in the second and third years during the project implementation (acquisition of improved seeds, post-harvest management equipment and storage facilities).

The equipment acquired and overall investments made by the project have the following average lifespan:

[188] European Commission's manual on economic and financial analysis of development projects

- *Solar panels: Solar panels: Panels are the first and most important part of a solar energy system. The lifespan of solar panel equipment varies from 20 to 25 years or more, with less than 1% annual efficiency loss per annum.*[189]
- *Solar dryers: Depending on the manufacturer, the lifespan of solar dryers is around 10 to 20 years.*
- *Multiplication Sheds: The longevity of a shed can depend on several factors, such as the quality of the shed's structure. The type of material used, such as wood, metal, plastic or resin, and whether the shelter is regularly maintained and repaired if necessary. Generally speaking, the following should be expected for the most common types of materials*[190]*:*

  - *Vinyl sheds: 25-30+ years;*
  - *Wooden Smart Panel Sheds: 20 to 25 Years*
  - *Resin sheds or plastic sheds: 5-7 years*
  - *Metal sheds: Less than 5 years*

The project prioritize options that have a longer lifespan (about 20 years on average) and can be easily recycled when selecting materials for shelters..

- *Storage sheds in steel: Prefabricated storage sheds made of steel with ZINCALUME roofing have a long lifespan and are typically used for around 20 years before they can be recycled. These materials offer a superior option due to their durability and longevity.*[191].

Determining the life of the project is an essential part of the financial and economic analysis, which significantly influences the profitability and determines the choice of the investment resources implemented. This analysis is carried out within the framework of a slightly drab scenario and assumes a project life of 5 and 20 years.

2.2. Use of proceeds

The grant proceeds requested from the Adaptation Fund for the ASSA project will be used to support various budget lines. The overall amount requested is estimated to USD10,000,000, with 52% dedicated to the adaptation investments, 11% to capacity building and knowledge management activities and the remaining 37% to operating costs including project oversight and implementation costs. The Table 1 below presents the details of the budget's structure by component.

Project's budget lines	*Amount*	*Percentage*
***Component 1**: Climate-proofed small-scale agricultural production (resilient crops, resilient agricultural practices, and resilient agroecological ecosystems)*	*USD 4,279,230*	*43%*
***Component 2**: Climate-resilient postharvest solutions and access to markets*	*USD 2,925,171*	*29%*
***Component 3**: Capacity building and knowledge management for scaling up CRA practices*	*USD 1,148,106*	*11%*
Project Executive Costs	*USD*	*9%*

[189] https://www.solar-electric.com/learning-center/life-expectancy-solar-power-system/
[190] https://www.glicksheds.com/blog/planning-your-shed/how-long-do-sheds-last#:~:text=Plastic%20or%20Resin%20Sheds%3A%205%20to%207%20Years&text=While%20the%20plastic%20won%27t,sun%2C%20which%20eventually%20causes%20cracking.
[191] https://www.worldstainless.org/files/issf/non-image-files/PDF/Team_Stainless/The_Global_Life_Cycle_of_Stainless_Steels.pdf

Project's budget lines	*Amount*	*Percentage*
	864,992	
Total Project Cost (= Project Components + Execution Cost)	*USD 9,217,500*	*92%*
Implementing Fee	*USD 782,500*	*8%*
***Grant Amount** (= Total Project Cost + Implementing Fee)*	*USD 10,000,000*	*100%*

Table 9: ASSA Project budget structure by component

Detailed breakdown analysis as presented in table 1 and Figure 1 below shows that 43% of the budget will be dedicated to Climate-proofed small-scale agricultural production disbursement (Component 1), followed by Climate-resilient postharvest solutions and market access (Component 2) representing 29% of the budget, and capacity building with knowledge management for scaling up CRA practices (component 3) representing 11% of the budget. The remaining 17% of the budget is split almost unevenly between project execution costs (PEC: 9%) and implementing entity fees (8%).

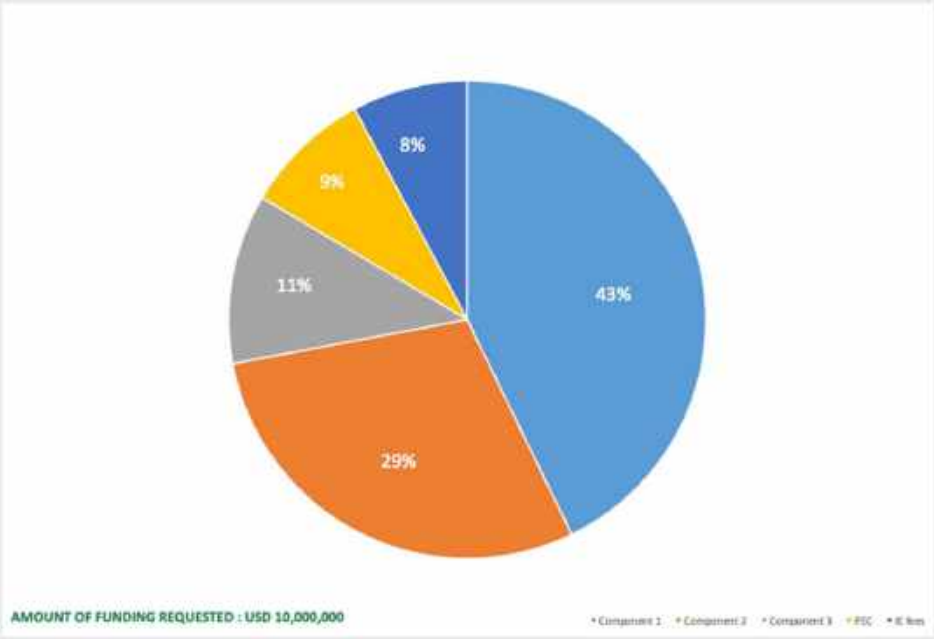


Figure 10: Budget breakdown by component

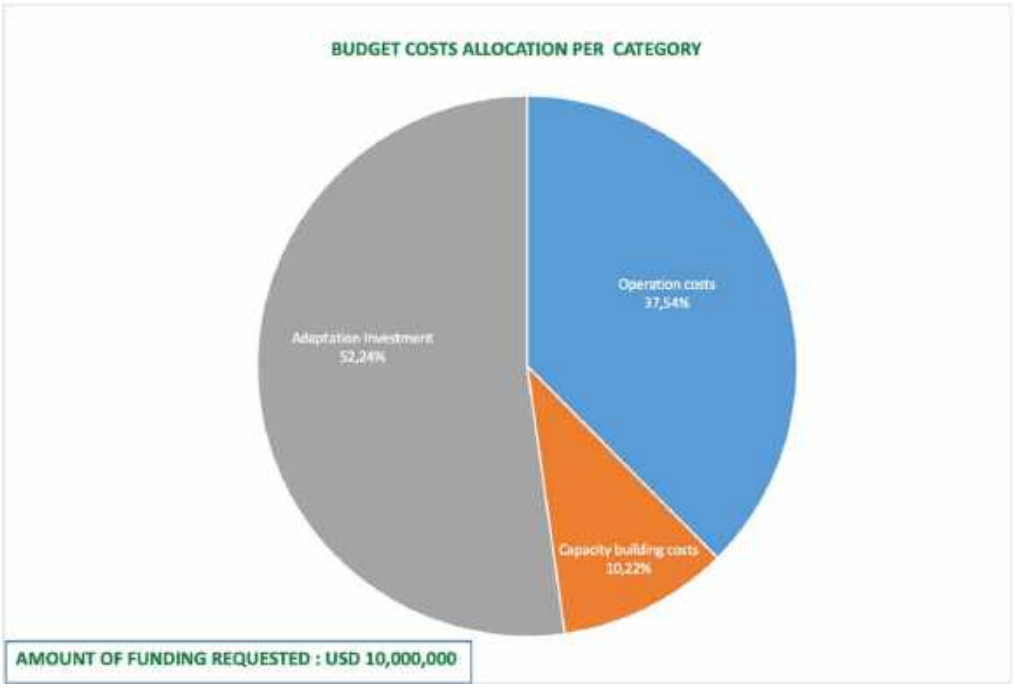


Figure 11: Budget costs allocation per category

As shown in the figure below, project payments are expected to peak at second disbursement expected in the second years of implementation. In effect, most of the major investments will be made in during the second and third years.

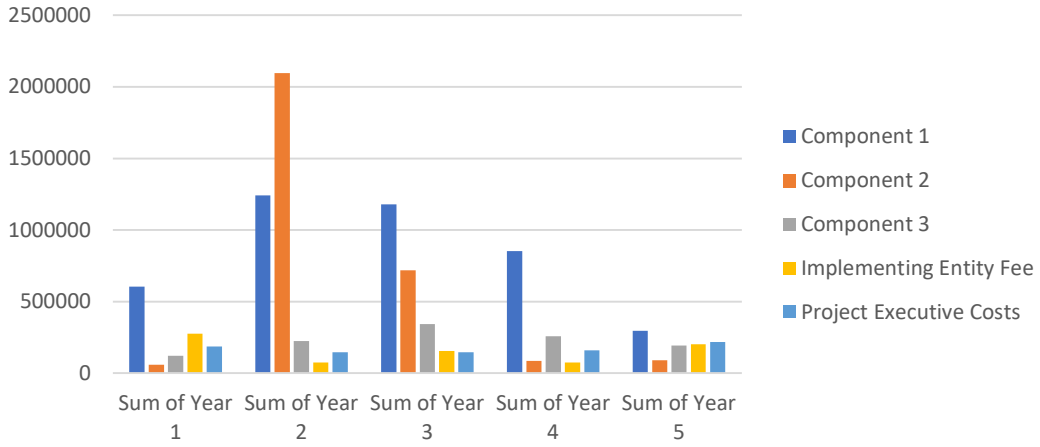


Figure 3 12: Representation of component expenditures by year

Nearly half of Component 1 expenditures are for "planting costs 36%» and "construction 14%"; disbursements for "maintenance" and "professional firm" together represent more than 20%; "seeding/saplings' kits" will require 6% of the component's expenditures; and the "personnel costs" is 7%.

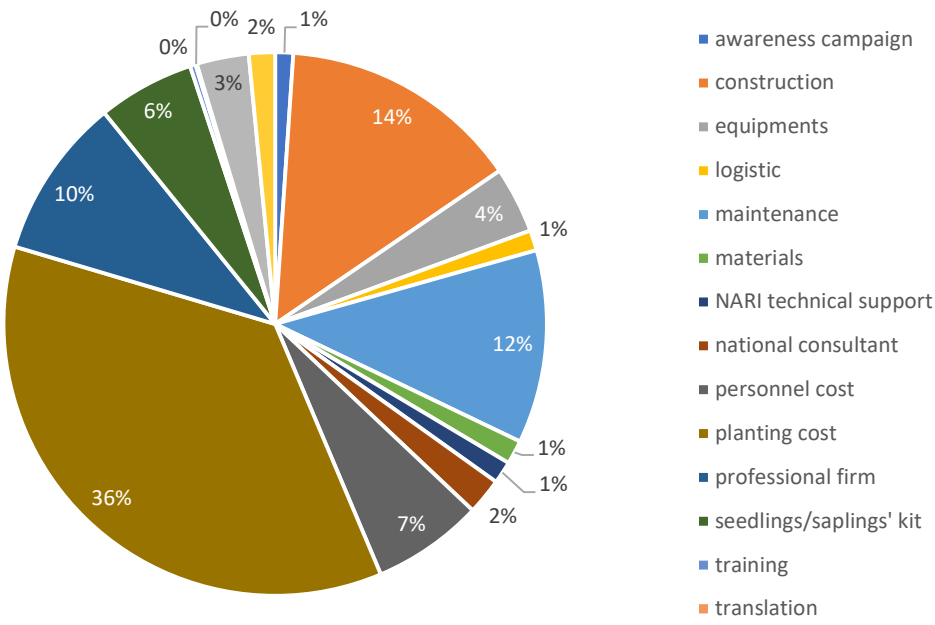


Figure 4 13: Breakdown of Component 1 budget lines

Component 2 expenses are dominated by the investment in construction of processing and storage sheds (60%) and equipment (19%). The two budget lines alone account for nearly 80% of total grant proceeds.

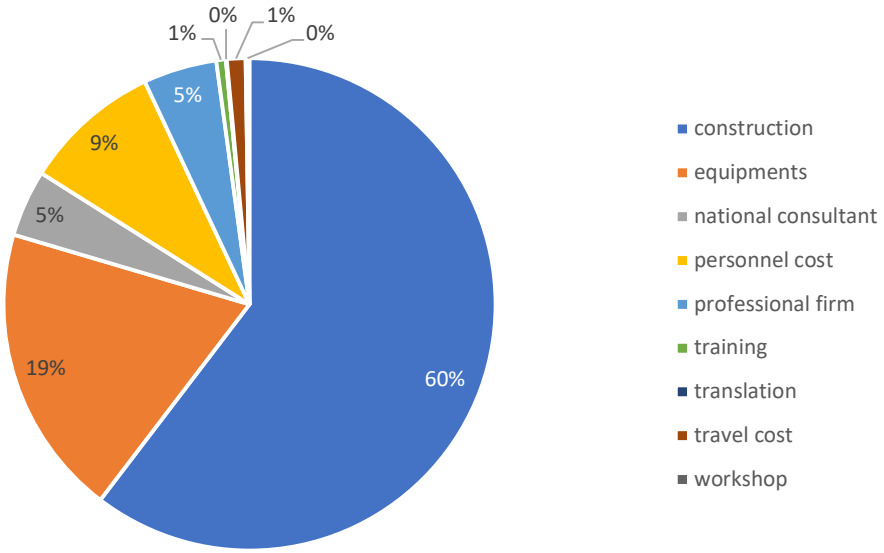


Figure 5 14: Breakdown of Component 2 budget lines

The remuneration of dedicated expertise including various international and national consultants and advisors, as well as training costs represent approximately 90% of the estimated expenditure for Capacity building and knowledge management for scaled-up CRA practices (component 3).

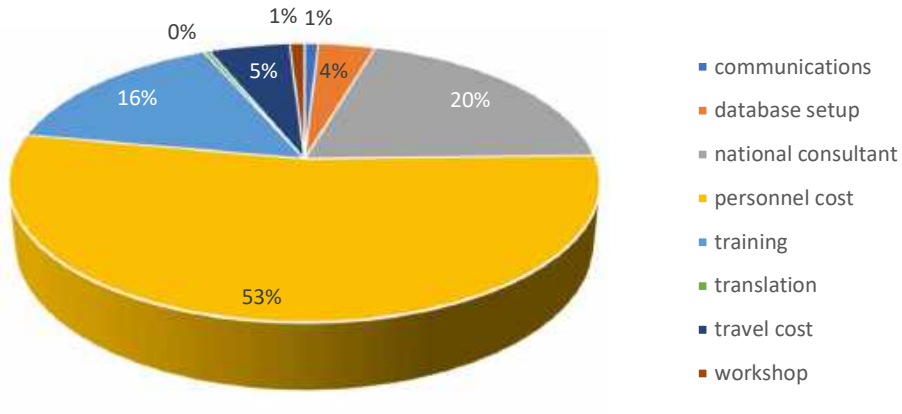


Figure 15: Breakdown of Component 3 budget lines

III. Cost benefits analysis

This section illustrates the link between the resources to finance the outputs (costs) and the impacts of those outputs (benefits). CBA is the approach used to do this in ASSA's economic and financial analysis. This approach requires that the results of actions undertaken can be evaluated in monetary terms or that they effectively contribute to the production of goods and services:

- *that are actually commercialized or have an existing market (self-produced food crops);*
- *Which are free of charge for the consumers, or whose purchase does not follow a commercial logic, but contributes mainly to activities for which the profit is "easily or reasonably" achievable.*

Because outputs 1.1 and 2.2 aim at delivering products that can be valued in monetary form, a CBA has been applied to their analysis.

3.1. Cost-Benefit Analysis of Output 1.1

The aims of output 1.1. is to select, validate, and disseminate resilient crop varieties. Two main activities are planned to deliver this output: (i) community-led selection, evaluation and validation of resilient crops menu based on relevant eligible criteria; (ii) support the construction of 40 multiplication sheds for resilient varieties distribution.

As the effects of climate change increasingly threaten Papua New Guinea's agricultural sector, improved seeds are a better choice for farmers because of their multiple benefits, including pest resistance, drought tolerance, herbicide tolerance, increased productivity and other environmental and health benefits. According to the Food and Agriculture Organization of the United Nations (FAO), "seeds are an essential input for improving crop production and productivity. Improving seed quality can significantly increase crop yield potential and is therefore one of the most cost-effective and efficient inputs for agricultural development." Improved seed also has the advantage of resisting post-harvest losses, which leads to increased income for farmers. In addition, the adoption of improved seeds avoids the costs associated with the use of nitrogen fertilizers[192], pesticides and the reduction of greenhouse gas emissions through losses from saved harvest.

192 The application of nitrogen fertilizers emits nitrous oxide, a greenhouse gas nearly 300 times more polluting than CO2

Thus, this output's economic and financial analysis seeks to underscore the added value induced by its implementation compared to the baseline scenario (without the project).

3.1.1. Baseline scenario (without the construction of a shed for the multiplication of improved seeds)

Investment Costs of Baseline scenario

No investment is needed in this scenario. Farmers will continue to use primarily traditional seeds with little resistance to the adverse effects of climate change. They will consequently encounter significant losses that will threaten their livelihoods and increase poverty.

Project revenues estimates of the baseline scenario

The baseline scenario does not account for some of the avoided costs or additional benefits because no action is taken to address the climate change problems faced by smallholders' farmers.

3.1.2. Scenario with the project (with the construction of a shed for the multiplication of improved seeds)

Basic assumptions of the analysis

- *The absence of improved seed results in 30-40% post-harvest losses. For the purposes of this analysis, 10% is used as a result of the adaptation of the resilient seeds.* OBJ;
- *The projection of climate change impact on crop productivity in country level is assessed using the CARD (Climate Adaptation in Rural Development Assessment)[193] tool;*
- *Increase of 25% in productivity with investment[194].*

Investment Costs

The total capital expenditure for this output is $867,000, released over the first three years. This investment is mainly concentrated on the acquisition and installation of seed multiplication sheds.

Investment	***Unit***	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Acquisition and Installation of multiplication sheds	*USD/Year*	*400,000*	*400,000*	*0*	*0*	*0*
Equipment for irrigation systems	*USD/Year*	*7000*	*0*	*0*	*0*	*0*
O&M cost	*USD/Year*	*0*	*15,000*	*15,000*	*15,000*	*15,000*
	Total	*407,000,00*	*415,000,00*	*15,000,00*	*15,000,00*	*15 000,00*

Table 2 10: Distribution of investments for output 1.1 over the project's lifetime

Project revenues estimates

[193] https://www.ifad.org/documents/38714170/41085512/CARD_Pacific.xlsb/4781217e-b496-2b2f-130d-e5a319338be5?t=1619789793646
[194] https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/134987/filename/135198.pdf

- *Avoided cost*

Building sheds to multiply improved seeds will reduce tubers and grain seed purchase costs. The estimated saved costs are as follows:

Over 5 years: $ 603,522.49

Avoided costs	**Unit**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Reduced seed purchase costs (Tubers)	*USD/year*	*4,600.00*	*4,600.00*	*4,600.00*	*4,600.00*	*4,600.00*
Reduced seed purchase costs (Grains)	*USD/Year*	*4,280.00*	*4,280.00*	*4,280.00*	*4,280.00*	*4,280.00*
Reduced post-harvest losses due to traditional seeds	*USD/Year*	*87 307,55*	*86 764,90*	*86 290,28*	*85 835,29*	*85 551,60*
Avoided cost 4 (Carbon)	*USD/Year*	*25379,37*	*25426,84*	*25474,44*	*25522,18*	*25570,04*
Sub-total 1		***121 566,92***	***121 071,74***	***120 644,72***	***120 237,47***	***120 001,64***

Table 11: Valorization of the avoided costs include quantities of GHGs saved over 5 years

Over 20 years the total avoided cost is estimated at $ 2,466,830.79

- *Added benefits*

As the yields per hectare of improved seeds are proven, the availability of these seeds through the multiplication sheds favors the production increase. Based on the assumption of a 15% increase in crops productivity due to the availability of improved seeds (with project scenario), the valuation of this increase in production is as follows:

Over 5 years: $ 1, 946,898.88

Added benefits		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Increased revenues	*USD/Year*	*384 687,15*	*389 290,96*	*388 845,98*	*387 879,20*	*396 195,60*
Total		***384 687,15***	***389 290,96***	***388 845,98***	***387 879,20***	***396 195,60***

Table 12: Estimated value of increase in sale revenues over 5 years

Over 20 years, the total benefits are estimated at $ 9, 052,158.89

Profitability of the investment

Over 5 years

The project's internal rate of return (IRR) in the first 5 years is 5% while the market discount rate is also 5%. This indicates the farmers would not make a profit but would probably incur losses if they had to take out a loan to finance this production. In effect, $1 invested produces $0.01.

The project's situation in the first five years, however, is much more favorable if, instead of a bank loan, the project was financed by a grant (as provided by the Adaptation Fund), which is greatly justified by the strong potential for positive externalities created by the project. The IRR would be 20% (four times the discount rate) in this case. Under this scenario, $1 of the grant would generate an additional margin of nearly $0.32, resulting in a net profit (NPV) of $539,409.77.

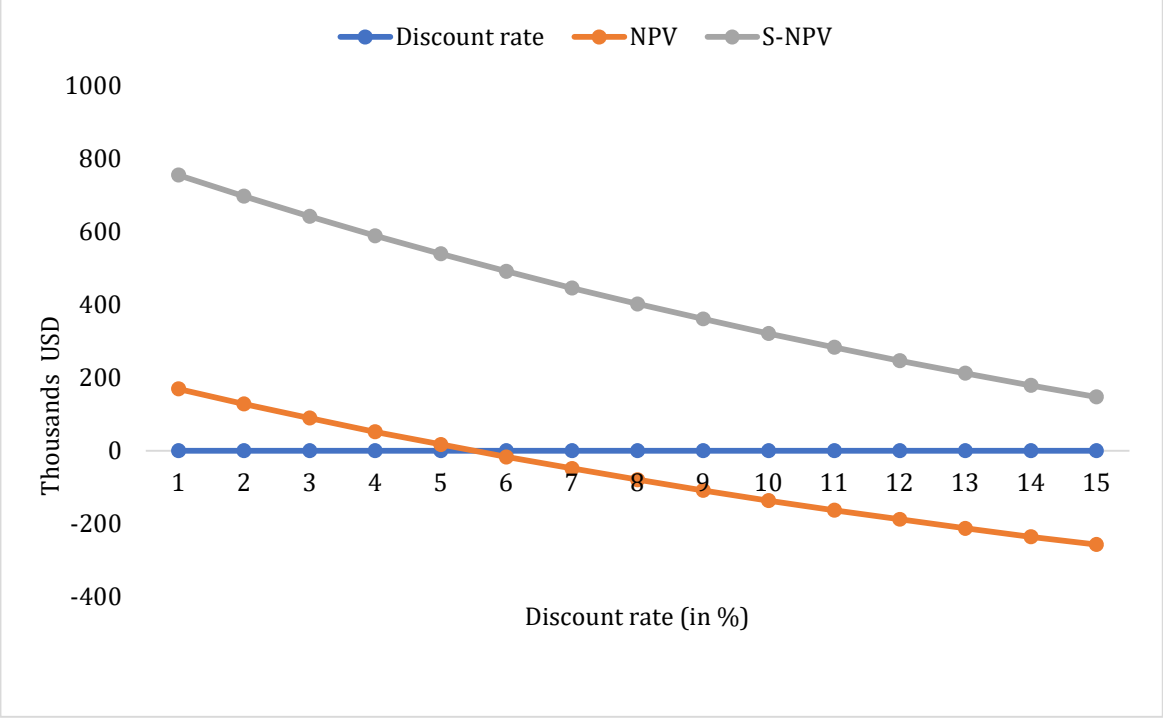
Over 20 years, the total benefits are estimated at $ 9,052,158.89

The profitability of the project over 20 years is much more satisfactory from both financial and economic standpoints.

Indicators	Over 5 years	Over 20 years
IRR	5%	27%
S-IRR	20%	37%
BCR	1,01	3,24
S-BCR	1,32	4,15
NPV	16 694,29	3 738 116,74
S-NPV	539 409,77	5 253 061,12
Payback Period	5	5
First value above 100%	112%	112%
S-Payback Period	4	4
First value above 100%	118%	118%

Profitability sensitivity analysis of the investment

Project viability is very sensitive to changes in the discount rate. However, the financial risk is much greater than the economic risk because an increase in the discount rate has a greater impact on financial viability than on economic rentability.



3.2. Cost-Benefit Analysis of Output 2.2

The output 2.2 is designed to procure and install eco-friendly technologies for climate-smart seed saving, postharvest processing, and modern storage.

Beyond providing an idea of the wealth created by the specific components of Activity 2.2 aimed at equipping and installing small-scale processing, storage and irrigation technologies (e.g., solar-powered dryers, solar-powered storage facilities), This analysis provides information that guides the selection between two types of investments, namely the construction of storage facilities using the most commonly used construction materials or the use of prefabricated and more environmentally friendly storage sheds.

3.2.1. Construction of storage facilities option

3.2.1.1. Basic assumptions of the analysis

The assumptions guiding this analysis are as follows:

- *the lack of availability of storage facilities explains 75% of the agricultural postharvest losses;*
- *the share of smallholder production in total production is 32%*[195]*;*
- *the share of production sold by smallholders is 25%;*
- *the proportion of beneficiaries in the agricultural population is 1.46%;*
- *the total number of farmers in the total population is 85%;*
- *the contribution in terms of agricultural production of the three provinces selected by the project in the national production is to 14%*[196]*;*
- *the percentage of postharvest losses*[197]*: 26% for cassava, 45% for vegetables, 19% for rice, 45 % for sweet potatoes;*
- *GHG emissions from PNG's agricultural sector are 0.007% of global agricultural emissions;*

3.2.1.2. Investment Costs of the construction of storage facilities

The total investment expenditure to supply and install small-scale processing, construct hard storage facilities, and procure irrigation technologies is ***$ 1 044 125.00*** *. This amount's disbursement is spread over 5 years, with a peak in the second year of implementation of the project. The table below shows the budget lines for the storage facility construction.*

		Years				
Investment budget lines	*Unit*	*1*	*2*	*3*	*4*	*5*
Construction and installation cost	*USD*	*0*	*640000*	*0*	*0*	*0*
Operating and maintenance costs	USD	0	9000	9000	9000	9000
Solar dryers and storage facilities & Delivery	USD	0	280000	0	0	0

[195] https://www.tabledebates.org/research-library/how-much-food-do-smallholders-produce
[196] *The production estimate at the level of the three provinces was obtained by multiplying the national production by a weighting coefficient of 14% (3/22).*
[197] *Gunasekera et al. (2017). Postharvest loss reduction in Asia-Pacific developing economies. Journal of Agribusiness in Developing and Emerging Economies,7(3)303-317*

Solar dryers and storage facilities	USD	0	88125	0	0	0
Total		**0**	**1 017 125,00**	**9000**	**9000**	**9000**

Table 3 13: Distribution of investments for storage facilities construction

3.2.1.3. Estimated projected project revenues of the storage facility construction

- *Avoided costs*

The post-harvest food losses and waste is estimated to be responsible for the emission of 4.4 gigatons of greenhouse gases (GHG) per year[198]. The construction of the sheds will drastically reduce postharvest losses, and the present investment will avoid greenhouse gas (GHG) emissions whose monetary value has been estimated as follows:

Over 5 years: $ 510 923.46

Avoided costs	***Unit***	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Quantities of GHGs saved	*t CO2e/year*	-	*127 372,20*	*127 610,87*	*127 850,20*	*128 090,20*
Carbon price	*USD/ton*		*1*	*1*	*1*	*1*
Valorization of the quantities of GHGs saved	*USD*		*127 372,20*	*127 610,87*	*127 850,20*	*128 090,20*
Sub-total 1			***127 372,20***	***127 610,87***	***127 850,20***	***128 090,20***

Table 14: Valorization of the quantities of GHGs saved over 5 years

On 20 years, estimated avoided costs are $2, 588, 669.53.

- *Added benefits*

The project saves nearly 66 to 75% of the postharvest losses generally observed in the baseline scenario - without the availability of a shed. Therefore, in the situation with the project, the quantities generally sold will be more significant, assuming access to market is facilitated. The value of the estimated sales of the farmers benefiting from this project is as follows:

Over 5 years: $2,296,794.21

Added benefits		*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Net revenue in Baseline scenario	*USD/Year*	*0*	*408 974,59*	*409 973,23*	*410 975,03*	*411 980,00*
Additional benefit due to reduced postharvest losses	*USD/Year*	*0*	*163 128,49*	*163 523,89*	*163 920,55*	*164 318,45*
Total added benefit:		***0***	*572 103*	*573 497*	*574 896*	*576 298*

Table 15: Estimated value of sales over 5 years

Over 20 years, the total benefits are estimated at $11,712,026.11.

3.2.1.4. Profitability of the storage facility construction

Over 5 years

[198] https://www.aphlis.net/fr/news/29#:~:text=Les%20pertes%20et%20le%20gaspillage,aliments%20qui%20finalement%20sont%20perdus

The internal rate of return (IRR) of the project in the first 5 years is 4% when the market discount rate is 5%. This indicates that if farmers were to get a loan to finance this production, they would owe the bank five times more in interest than the interest generated by the project. An investment of $1.00 yields $0.89. At this rate, the wealth created by this output of the project over the five years is far less than the value of the investment, resulting in a negative net present value (NPV).

This option is not financially viable, and the most appropriate funding instrument is a grant, justified by the high potential for positive externalities created by the project. In this case, the IRR would be 13%, an increase of nearly 225% compared to the "loan financing" situation, and nearly three times the discount rate. In this new configuration, $1 of the grant would generate an additional margin of nearly $0,09 resulting in a net profit (S-NPV) of $165,122.49.

Over 20 years

This option's returns over 20 years are much more financially and economically satisfactory. Nevertheless, there are considerable differences between these two categories of indicators. In reality, the IRR taking into account the externalities of the project (S-IRR), increases by 32% compared to a situation without externality (IRR). The profitability index taking into account externalities (S-BCR) also increased by 23%, and the net wealth created (S-NPV) increased by 53%.

Indicators	Over 5 years	Over 20 years
IRR	4%	27%
S-IRR	13%	32%
BCR	0,89	1,72
S-BCR	1,09	2,11
NPV	(214 141,19)	1 324 348,41
S-NPV	165 122,49	2 022 902,99
Payback Period	5	5
First value above 100%	110%	110%
S-Payback Period	4	4
First value above 100%	101%	101%

Table 16: Summary table of financial and economic indicators of the project

3.2.1.5. Profitability sensitivity analysis of storage facility construction

The efficiency of the project is very sensitive to changes in the discount rate. Any increase in the discount rate makes the project financially unviable. On the other hand, its economic profitability remains positive, with a discount rate close to 15%.

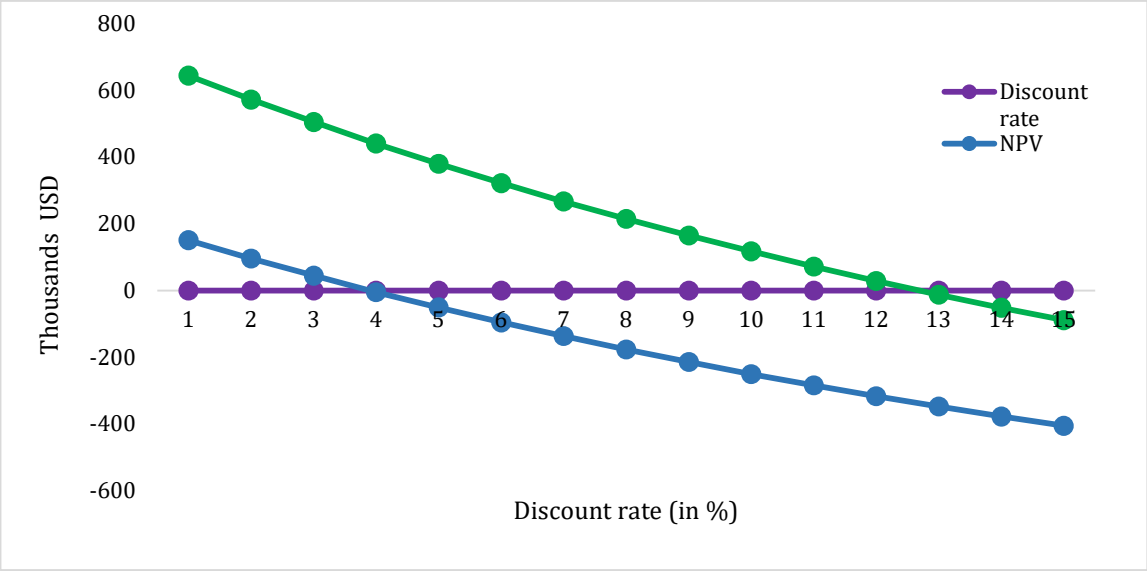


Figure 16: Hard construction sensitivity test

3.2.2. Prefabricated storage sheds option

3.2.2.1. Basic assumptions of the analysis

The assumptions guiding the economic and financial analysis of the prefabricated storage sheds option are the same as the hard construction option:

3.2.2.2. Investment Costs of the prefabricated storage sheds option

*The total investment expenditure to supply and install small-scale processing, hard storage sheds, and irrigation technologies is **$ 984 469.60**. The disbursement of this amount is spread over 5 years, with a peak in the second year of project implementation. The table below shows the budget lines for this investment:*

		Years				
Investment budget lines	**Unit**	**1**	**2**	**3**	**4**	**5**
Construction and installation cost	USD	0	450 000,00	0	0	0
Transport & custom/Tax & installation/O& M	USD	0	150000	0	0	0
Solar dryers and storage facilities		0	296 344,60	0	0	0
Solar battery and Inverter		0	88 125,00	0	0	0
Total		**0.00**	**984 469.60**	**0**	**0**	**0**

Table 17: Distribution of investments in prefabricated storage hangars

3.2.2.3. Estimated projected project revenues of the prefabricated storage sheds option

- *Avoided costs*

In addition to the avoided costs identified for the hard construction option, this new option provides another additional avoided cost due to the renewable or recyclable premanufactured materials. According to the International Energy Agency, cement production is a significant contributor to global carbon emissions, estimated at around 7%. The Global Concrete & Cement Association reports that producing one ton of cement generates approximately half a ton of CO2. The World Steel Association estimates that steel production accounts for about 8% of CO2 emissions, with the production of one ton of steel resulting in the emission of 1.85 tons of CO2.[199] *In light of these figures, choosing a prefabricated storage shed may be a more sustainable option in terms of reducing CO2 emissions and environmental impact.*
The valorization of the quantities of GHGs saved is a follows:

Over 5 years: $ 511 604.47

Avoided costs	***Unit***	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Quantities of GHGs saved (crop)	*t CO2e/year*	*0*	*127372,1989*	*127610,8671*	*127850,1985*	*128090,1954*
Quantities of GHGs saved (renewable materials)	*t CO2e/year*	*0*	*164.00*	*168.10*	*172.30*	*176.61*
Sub-total		***0***	*127372,1989*	*127610,8671*	*127850,1985*	*128090,1954*
Carbon price	*USD/ton*		*1*	*1*	*1*	*1*
Total 1		***0***	*127 536,20*	*127 778,97*	*128 022,50*	*128 266,81*

Table 18: Valorization of the quantities of GHGs saved over 5 years - Prefabricated storage sheds option

Over 20 years, the total cost avoided is estimated at $*2,592,858.85*

- *Added benefits*

The added benefits are the same as the hard construction option.

3.2.2.4. Profitability of the prefabricated storage sheds option

Over 5 years

This project's output internal rate of return (IRR) over the first 5 years is 6% with a market discount rate of 5%. This indicates that if farmers were to take out a loan to finance this output, Hardly they will realize a profit margin. Indeed, $1 invested would probably generates a profit of $0.03. The project, therefore, generates neither a loss nor a gain. Indeed, $1 invested would probably generates a losses. The wealth created by the project over the five years is far less than the investment, with a negative NPV of $61,233.31. Despite these unsatisfactory results, they are still better than those obtained with sheds built-in hard.

Like the hard construction option, a grant remains the most appropriate financial instrument to finance the prefabricated sheds. Indeed, in the case of grant funding, the IRR would be 15%, an increase of nearly 150% compared to the "loan financing" situation, and more than fourth times the discount rate. In this new configuration, $1 of the grant would generate an additional margin of nearly $0.26, resulting in a net profit (NPV) of $493,075.24.

199 https://www.international-construction.com/news/how-to-reduce-carbon-emissions-from-construction-materials/8014100.article#:~:text=According%20to%20the%20Global%20Concrete,tons%20of%20CO2%20is%20emitted

Over 20 years

*The project's profitability over 20 years is much more financially and economically satisfactory. However, there are considerable differences between these two categories of indicators. In fact, the IRR, considering the project's externalities (S-IRR), increases by **21%** compared to a situation without externalities (IRR). The profitability index taking into account externalities (S-BCR) also increased by 22%, and the net wealth created (S-NPV) increased by 30%.*

Indicators	Over 5 years	Over 20 years
IRR	6%	27%
S-IRR	15%	33%
BCR	1,03	3,55
S-BCR	1,26	4,33
NPV	61 233,31	4 968 855,50
S-NPV	493 075,24	6 502 354,76
Payback Period	5	5
First value above 100%	117%	112%
S-Payback Period	4	4
First value above 100%	107%	103%

Table 19: Summary table of financial and economic indicators of the project - Prefabricated storage sheds option

3.2.2.5. Sensitivity analysis of the prefabricated storage sheds option

The project's profitability is still very sensitive to changes in the discount rate, but much less than in the hard construction option. The project is financially unviable for any discount rate above 5% but remains economically viable even for discount rates above 15%.

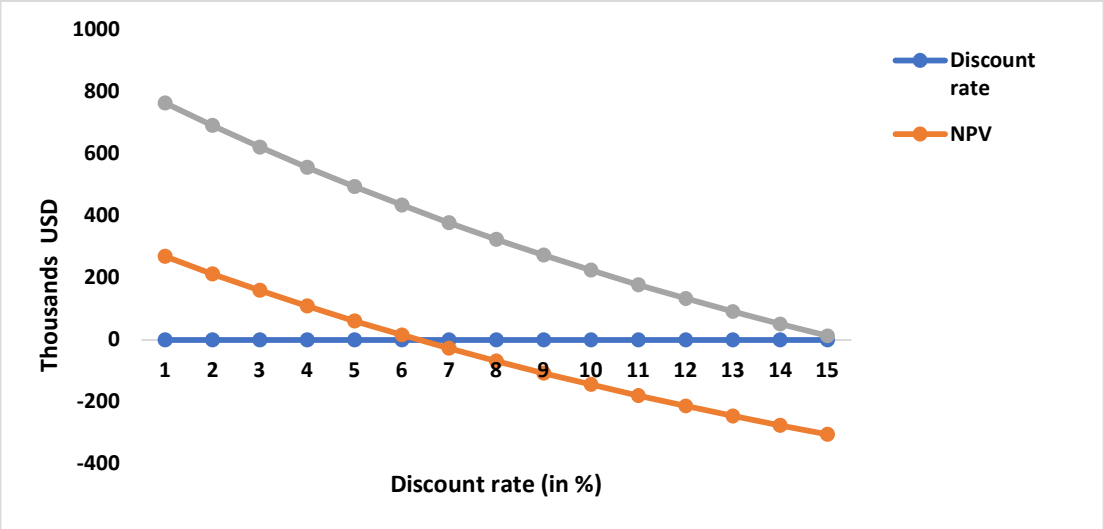


Table 20: Prefabricated storage sheds sensitive test

4.CONCLUSION

The economic and financial analysis presented in this report builds a strong investment case for the ASSA project using the Adaptation Fund grant. Overall, the project is economically viable but financially not profitable in the short term (up to 5 years). Long-term financial viability improves but is still lower than economic profitability. Considering the low financial reflows expected from the investments and the high positive socio-economic externalities, grant instrument seems to be the most relevant financial instrument. The objectives of the ASSA project are best achieved through public interventions and use of international climate finance. This also aligns with the project's implementation provisions that position the Papua New Guinea (PNG) government as the implementing entity and the typology of beneficiaries with a focus on smallholder farmers in the three targeted provinces as the primary beneficiaries.

The overall budget allocation for the project is solid, with the majority of the grant going to investments (52%).

Capacity building, technical assistance and knowledge management represent 11% of the total investment, which is critical to ensure the sustainability of the project by guaranteeing that local authorities and the beneficiary community in the three participating provinces develop the necessary capacity to sustain the investments and the related results and benefits after the implementation period and project closure.

The CBA shows financial viability in the long term, closer to the 10-year mark with financial returns not expected during the lifespan of the project (see table 21). Most of the equipment provided for the ASSA project will have a sufficient life span to allow an appropriate return on investment over a long period of time and this requires effective maintenance and maintenance.

For a discount rate of 5% the indicators are given in the table below:

Table 21. Breakeven of the investments

	Total investment	*S_NPV*	*S-BCR*	*Payback Period (Years)*	*S-Payback Period (Years)*
Output 2.2: Hard construction	*1 044 125.00*	*380 395.98*	*1.19*	*5*	*4*
Output 2.2: the storage facility construction	*984 470*	*493 075*	*1.26*	*5*	*4*
Output 1.1 construction of sheds for improved seed multiplication	*867,000.00*	*539 409.77*	*1.32*	*5*	*4*

For outcome 1.1, the development of improved seed multiplication sheds is a well justified investment in the short and long term. The economics and finances of the project improve over time with better economic and financial indicators.

For Output 2.2, the prefabricated sheds option presents the best offer in both short and long term. Equally, longer term investment will be required, over the implementation period of the project, in order to achieve a positive return on investment in addition to the high positive socio-economic impacts.

Bearing this in mind, the Adaptation Fund's financial contribution to this project, in the form of a grant, is set to achieve significant results and benefit a larger number of stakeholders.

Annex 6: Summary of consultation for the ASSA project

The ASSA project in Papua New Guinea is dedicated to enhancing the food security and resilience of communities through the adaptation of small-scale agriculture. To ensure that the project is comprehensive and inclusive, we have engaged with a variety of stakeholders throughout the entire project development process, from the initial concept to the final proposal. Our consultations have been vital to the success of the project, and we are pleased to provide a brief summary of the key consultations that have taken place so far.

Stakeholders' consultation during project origination : In October 2020, the ASSA project was identified as a priority for investment in three provinces in Papua New Guinea as part of the government's Climate Resilient Green Growth (CRGG) project. This project, which runs from 2019 to 2022, is funded by the Australian Department of Foreign Affairs and Trade (DFAT) and implemented by the Global Green Growth Institute (GGGI), the CCDA, the DPLGA, and the DNPM. In order to identify the priorities for the ASSA project, we consulted with various stakeholders in the provinces of Enga, Milne Bay, and New Ireland, including members from the public sector, communities, and the private sector. Details of this consultation are provided under section 2.8 of the Funding Proposal.

Stakeholders' consultations at the Project Concept Note stage: During the period from May to December 2021, the CRGG project carried out consultations and assessments at the provincial and sectoral levels in three provinces to compare the project to other investment opportunities. This resulted in a letter of support from DAL being issued, requesting that GGGI proceed with developing a concept note for the Adaptation Fund. In response, GGGI and CCDA transformed the project idea into the AF Concept Note template in December 2021, which was subsequently reviewed and approved by the NDA in January 2022. Details of this consultation are provided under section 2.8 of the Funding Proposal. Details of this consultation are provided under section 2.8 of the Funding Proposal.

Validation workshop for the ASSA Concept note : for the ASSA concept note was held on January 7, 2022, and attended by the head of CCDA, representatives from DAL, DoWH, GGGI, UN Women, and SPC. The main points discussed at this workshop were:

- *Strengthen the analysis of barriers that will be linked to the proposed activities and mention the problems/barriers that prevent the type of proposed activities from occurring*
- *to elaborate on ecosystem degradation and its impacts on the resiliency of farmers that will establish a solid background for the output on enhancing ecosystem service through NBS.*
- *to provide more details on the envisaged capacity-building training.*
- *to simplify the structure for a simplified M&E process.*
- *to restructure the budget and costing in order to free the PMC.*

A validation workshop for the ASSA concept note was held on January 7, 2022, and attended by the head of CCDA, representatives from DAL, DoWH, GGGI, UN Women, and SPC. The main points discussed at this workshop were:

- *Strengthen the analysis of barriers that will be linked to the proposed activities and mention the problems/barriers that prevent the type of proposed activities from occurring*
- *to elaborate on ecosystem degradation and its impacts on the resiliency of farmers that will establish a solid background for the output on enhancing ecosystem service through NBS.*
- *to provide more details on the envisaged capacity-building training.*
- *to simplify the structure for a simplified M&E process.*
- *to finalize the budget*

Inception Meeting for the development of ASSA full funding proposal was a hybrid meeting held in-person at CCDA Meeting Room and Virtual via Zoom Link on Tuesday 20th September 2022. The objectives of the meeting were to: (i) provide an overview of the ASSA project; (ii)present work plan and milestones and list of stakeholders; (iii) collect feedback and comments; (iv)Appoint focal points.

Stakeholder Engagement at the provincial level : This section presents key insights from the stakeholder focus groups for the ASSA program that took place from December 8-13, 2022. The focus groups aimed to gather information on trends, drivers, and engagement practices of stakeholders such as farmer groups or associations, vulnerable groups, women's associations, SME groups, and local and provincial governments. Other key stakeholders were also invited to lead discussions on crops, project activities, and the involvement of various stakeholders in the management of agricultural sector activities. These focus groups addressed the selection of crops for the project and the preparation of different actors for the project's implementation. They also identified challenges and opportunities to improve the marketing of the selected crops and access to agricultural markets. Value chain mapping, a qualitative approach, and an analysis of constraints and opportunities for project implementation were conducted through personal interviews with provincial authorities and focus group discussions involving key value chain operators, including SMEs, traders, and others. These focus group discussions were held separately with women's groups and with farmers and farmer-sellers, using several main questions to facilitate open-ended discussions.

This report is based on responses and information received from stakeholders in the three provinces covered by the ASSA project to a survey conducted by GGGI. In total, more than a dozen stakeholder consultation workshops were held, forming the basis for focus groups with all stakeholders and other key actors. These focus groups were predominantly attended by women's and farmers' associations, small and medium-sized enterprise groups, and the local and provincial governments of the provinces included in the ASSA project. The survey for these focus groups was organized around themes and topics relevant to the project's objectives and specific to each category of participant.

Experiences of farmers and farmer groups in agricultural good practices and use of improved seed varieties

It is important to understand the level of knowledge and experience of the population or farm household when developing new projects to support farmers in adapting to climate change. Most participants in this study answered affirmatively when asked about the level of experience of organizations in seed multiplication in different communities. Some organizations, such as the Pilikambi Women's Empowerment Association and the Hela Opener International Glorious Nature Association, use sweet potato vines for seed propagation. Other organizations grow carrot seeds in nurseries before transplanting them to main planting sites, while English potatoes, sweet potatoes, and garlic seeds are multiplied in farmers' gardens and then shared with other community members for planting. Seeds for carrots, broccoli, cauliflower, bulb onion, garlic, lettuce, zucchini, and other crops are purchased from suppliers such as the Brian Bell Group (an agricultural supplier) in Enga province.

However, not all organizations have extensive experience in seed multiplication. The Denewa Ginuman Resources Owners Association is one such organization, relying on locally sourced seeds for their farms and plantations. Despite this, farmers' organizations like the Denewa Ginuman Resources Owners Association are often involved in initiatives aimed at improving the resilience of their communities. In summary, many of the organizations surveyed in the villages and districts have a strong tradition of multiplying seeds for crops such as English potatoes and sweet potatoes in areas such as the Pilikambi watersheds and Surunki region.

When asked about the availability of drought-resistant varieties of crops like rice, coconut, coffee, sugarcane, sweet potato, and others, most organizations responded negatively. They reported having no drought-tolerant crop varieties

and also mentioned a lack of varieties that are excessively tolerant to water or heat for the same crops. For instance, a representative of the Pilikambi Women's Empowerment Association stated during an interview group:

> *"Early-maturity sweet potato varieties did not perform well in the Pilikambi area. Early maturity sweet potato vines take 2 months to bear tuber in warmer and other parts of the Enga Province but in the Pilikambi area, it takes around 1 year which is the same with native varieties".*

On the other hand, a few organizations do possess drought and water-tolerant crop varieties like bananas, coconuts, coffee, and sweet potatoes. Conversely, some organizations do not have excessively heat-tolerant crop varieties, believing that the majority of their crops, which are grown in the interior forest zone, are able to thrive without them.

When it comes to participation in projects aimed at improving community resilience in specific districts or provinces, several associations mentioned that they are already involved in promoting climate resilience awareness in their provinces.

During consultation sessions and interviews with farmers' organizations, women's associations, district and provincial authorities, and other key stakeholders, crops were ranked based on their importance as identified by the frequency of mention in the answers provided by participants. The graph below summarizes the responses of participants from the various provinces involved in the project.

According to Figure 6.1, sweet potato is the most important crop for smallholder farmers in Papua New Guinea, with over 28% ranking it as such. Coffee comes in second, with approximately 17% of farmers ranking it as their second most important crop. Cassava, rice, yam, and coconut follow in third place. This preference for sweet potato could be due to the fact that it is widely grown and consumed in the PNG Highlands, and is considered the primary food crop in the region. Additionally, sweet potato cultivation is often considered "women's work" in Papua New Guinea, as women play a key role in its production from planting to harvest.

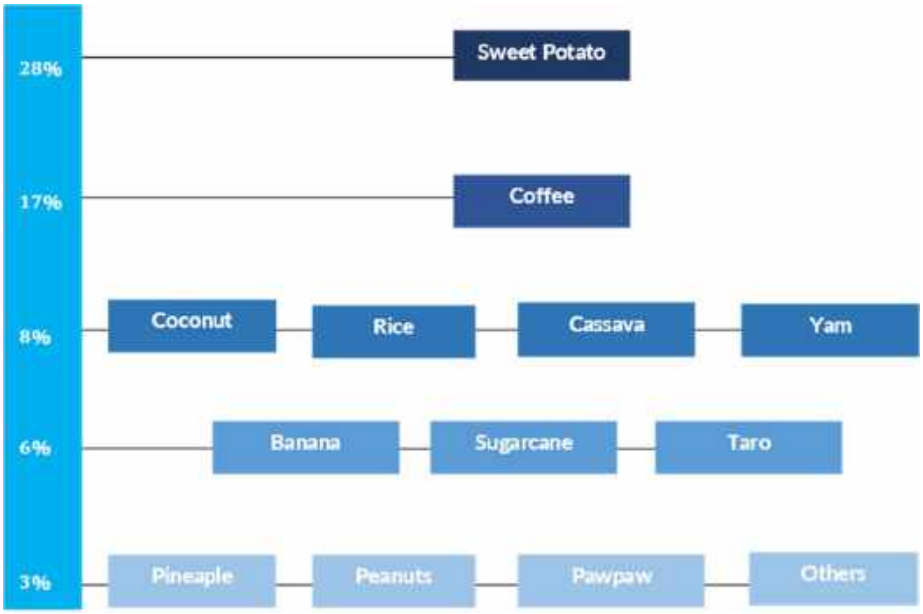


***Figure 6.1**: Crop ranking from most important to least important for all provinces selected for the ASSA project*

In the three provinces selected by the ASSA project, the farmers' organizations identified sweet potatoes, cassava, taro, and yam as the most important food crops, and therefore recommended that the project focus on them. These crops were followed by banana and rice in terms of importance to the farmers (Figure 6.2).

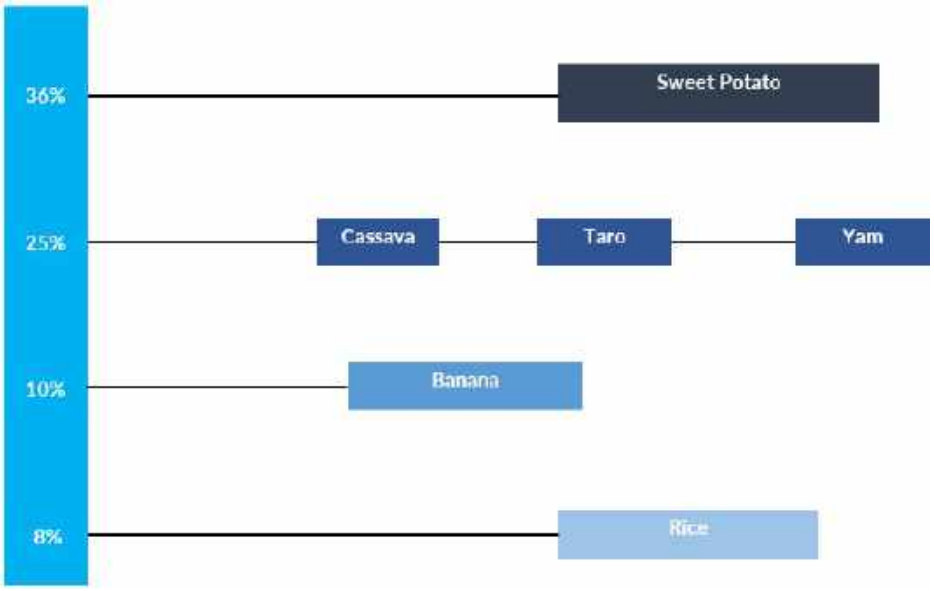


Figure 6.2: *Ranking of staple food crops from most important to least important*

Involvement of key stakeholders in agricultural sector development, road infrastructure development in rural areas, and ecosystems conservation

Several farmers' associations in the focus group communities were found to contribute to the maintenance of agricultural roads, with women members being responsible for this task. They reported receiving assistance from their husbands and other family members in this community work. Local authorities also played a role in the implementation of the project and provided valuable input during the survey and consultations on crop selection in the selected provinces.

According to the focus group participants, a few key actors, including local and provincial authorities, are involved in the development of the agricultural sector at the local level. In Enga province, for example, the Provincial Department of Agriculture and Livestock has recently been working to increase the sector's resilience to climate change, as it is a major source of employment and food security for the province's population. Additionally, local authorities in the surveyed provinces are also involved in the development of rural land transport infrastructure.

The Enga Provincial Department of Agriculture and Livestock collaborates with the Department of Works and Highways to improve and maintain economic roads, which are vital for farmers' access to markets and for minimizing product loss due to poor road conditions. These economic roads are maintained through co-financing by the local government.

According to the respondents, there is currently no established and operational framework in place for the maintenance of agricultural road infrastructure in rural areas. They also indicated that there is no specific budget allocated for this purpose. However, there is an operational framework in place for monitoring the improvement and accessibility of economic routes for farmers, and the national government does provide a budget allocation to the Enga Provincial government for road infrastructure through its economic management systems.

During the focus group discussions, the question of how farmers' associations contribute to the maintenance of agricultural roads in their communities was raised. Some of these associations, such as the "Hela Opener International Glorious Nature Association," are taking initiative by encouraging their communities to perform basic maintenance tasks, such as cleaning drains and patching roads with hard rock.

The Denewa Ginuman Resources Owners Association, representing farmers in ten wards in Milne Bay, has reported that their community lacks access to farm roads. The condition of these roads has also been worsening due to climatic events, making it more difficult for farmers to contribute to their maintenance. Despite the recognition of the economic and social importance of road infrastructure by successive national governments in the country, access to farm roads in some rural areas remains a challenge.

During meetings with stakeholders, the protection and conservation of the ecosystem were also discussed. Some of the participating associations, such as Porgera Joint Venture (PJV), mentioned that they have included support for nature-based activities to protect agro-ecological systems in their current and future programs.

<u>Preparation of the different actors in the ASSA project implementation process and identification of extension services</u>

The ASSA project emphasizes the participation of the population, particularly community associations of women, farmers, and small and medium-sized enterprises, through focus groups, consultation sessions, and awareness-raising workshops at the district level for the validation of priority activities and actions. All groups or associations that participated in the survey expressed an interest in participating in certain activities based on their expertise. For example, the women's association mentioned their interest in activities related to women's empowerment, knowledge management, and dissemination to decision-makers.

During discussions with key stakeholders, the team identified various extension service providers operating in the districts of three provinces in order to better prepare for certain activities, such as activity 1.2.4. Participants noted that there are farmers who provide agricultural extension services in the selected provinces, as well as small and medium-sized enterprises and input suppliers. A list of cited extension service providers is provided below: Enga Enda Anda Association with 32 affiliated women's associations, Surunki Cooperative Society, Laigam Women in Agriculture, Pilikambi Women's Empowerment, Potelian Women in Green Agriculture, Ambum Café, Voice of Enda Inc, Wapenamanda Coffee Factory, Surunki Honey Ltd, Kandep Integrated District Women, Upper, Upper and Middle Wage Women Association, Vilink Ltd, Enterprising Concept Ltd, Milne Bay Organics, Egwalau WCOA, Bibiko plantation Ltd, PNG Tourism Promotion Authority, The Nature Conservancy, and Divinai and Bou Ward.

Some of these extension, agricultural trade, and small and medium-sized enterprise services are owned by women's organizations, such as the Enga Women Farmers' Association - the voice of women in Enga - which facilitates access to funds reserved for farmers by the Enga provincial government.

"For example, if the government allocates PGK 1 million to farmers, the EEAA[200] evaluates farmers' project proposals to ensure they will have a good return on investment before approving the funds"

Some of these farmers or women's organizations, although recent, have fostered a strong culture of research and development to ensure that farmers can use simple technologies to add post-harvest value. One representative from these organizations stated that their support of women farmers has allowed them to start producing honey, spices, and high-quality turmeric products.

Some of these organizations mentioned that they are working towards becoming autonomous associations by 2030 and have the capacity to produce inputs themselves to meet farmers' expectations. Currently, most of the activities conducted by these organizations are subsidized by provincial governments, which allocate these funds towards farmers' awareness and capacity-building training. Although there are several organizations involved in the development of the agricultural sector, they do not provide products such as fertilizers or other agricultural products to farmers. Instead, they only offer technical advice and assistance. Farmers must purchase fertilizers, chemicals, equipment, and other agricultural products from local agricultural hardware stores to meet their needs.

During the implementation of the ASSA project, stakeholders expressed an interest in being associated with the following activities: (i) distribution of improved seeds and eco-friendly technologies, (ii) training on agricultural climate-resilient practices, (iii) knowledge management and dissemination to policymakers, (iv) women empowerment activities, (v) nature-based activities to protect agro-ecological systems, and (vi) eco-friendly technologies for the processing and storage of food crops. The table below highlights these activities and their potential contributions to the ASSA project. Regarding the activities which stakeholders want to be associated with during the ASSA project implementation, the majority agreed with: (i) distribution of improved seeds and eco-friendly technologies, (ii) training on agricultural climate-resilient practices, (iii) knowledge management and dissemination to policymakers, (iv) women empowerment activities, (v) nature-based activities to protect agro-ecological systems, (vi) eco-friendly technologies for processing/storage of food crops. The following table 6.1 highlights the activities mentioned and how they will contribute to their implementation in the ASSA project.

***Table 6.1**: Mentioned activities and their contribution to the implementation of the ASSA project*

Activities	*Proposed Contributions from farmers' associations to the project activities*
Distribution of improved seeds and eco-friendly technologies	*We will work in close collaboration with the agriculture extension division of the Provincial Government, the Fresh Produce Development Agency, the National Agriculture Research Institute, and potential development partners to distribute improved seed varieties and eco-friendly technologies to farmers within communities and neighboring areas.*
Training on agricultural climate-resilient practices	*We will work closely with the agriculture extension division of the Provincial Government, the Fresh Produce Development Agency, the National Agriculture Research Institute, and potential development partners to provide basic training to farmers within communities and neighboring areas.*

[200] *EEAA: Enga Enda Anda Association / Women farmer association – the voice of Enga women*

Women empowerment activities	*Empower farmers within communities and neighbouring to practice climate-smart agriculture practices, promote post-harvest value chain addition (e.g., banana cake and sweet potato chips processing at the farm gate), and promote diversification of economic crop production.*
Nature-based activities to protect agro-ecological systems	*Support nature-based activities to protect agro-ecological systems if these practices and interventions through the ASSA project.*
Eco-friendly technologies for processing/storage of, copra, and food crops	*Provide support with the application of eco-friendly technologies for the processing/storage of food crops*

Stakeholder Engagement at the national level: The development of this project proposal involved the engagement of various participants at different levels, resulting in the involvement of a diverse number of actors.

Working Session with the Department of PNG's Agriculture and Livestock for Developing ASSA Project

On Monday, 17.10.2022, a discussion with DAL will take place focusing on: (i) climate-resilient crop availability, (ii) extension services, (iii) disasters and nature-based solutions, (iv) connectivity between cooperatives and markets, (v) eco-friendly technologies, (vi) monitoring and verifying the impacts of climate-resilient practices, (vii) a capacity building program on climate-resilient agricultural production for local authorities, and (viii) a knowledge management and dissemination mechanism for DAL.

The following table 6.2 summarizes the main questions and answers that was part of the discussion.

***Table 6.2:** Summary of the main questions and answers during the discussion*

Questions	*Answers*
*Does (DAL) have a national catalog of improved heat, drought, and excess water-tolerant crop varieties? **(Document requested)***	*The National Agriculture Research Institute (NARI) has a documented catalog.*
What is the origin of the climate-resilient varieties promoted in the country? (Developed by national agriculture research institutes and/or promoted by foreign seed companies) (Document requested)	*No company is promoting the climate resilient varieties (both DAL and NARI). (NARI has been conducting research on climate-resilient crops such as the famous African yam that was distributed widely in most provinces around the country for the past 5-10 years. Mr. Rajansinge of NARI is the one looking after the climate change section in NARI)*
Which mechanism is used by (DAL) to disseminate improved crops and information related to cropping practices to farmers? (Document requested)	*Regarding the mechanism used are documented by NARI*
Is the feedback from farmers on whether the varieties released are effective or not the same mechanism?	*Most of the extension functions are given to the provinces with the link to the districts, with link to local organizations, links to the works, provincial and district technicians. Any kind of dissemination of information and technology is an opportunity. DAL only provide training related to technology, and on the field, they let local technicians continue extensions.*
Any experiences in the dissemination of resilient crops for upland and lowland communities?	*Following the 2007 drought period, NARI established a germplasm collection of local food crops, and developed drought and pest resistant varieties for affected and vulnerable farmers and rural communities. In the highlands of Papua New Guinea, drought-*

	resistant sweet potato tubers have been distributed to affected communities. Sweet potato is the staple food crop in the highlands. All these activities are documented.
What are the major barriers to the adoption of resilient crops and how can we enhance the adoption rate of improved or resilient crops?	*Some Barriers in adoption of resilient crops are:* • *introducing a crop that is not people's staple food. E.g., African yam was introduced in the highlands where the staple food is sweet potato.* • *Supporting policy at Government level.* • *Lack of transport infrastructure.* • *This failure is due to people preferring their staple crop. There is a need to do research on staple food that is climate resilience.*
Issues related to Extension Services for Climate Resilient Agriculture	
Does (DAL) have a list of extension service providers, cooperatives, and input suppliers for each province?	*There is a list detained by the Department of Commerce and Industry. National Agriculture Research Institute, Fresh Produce Development Agency, and Enga Enda Anda Association (women association with around 30,000 women members - 6% of the total population) are key extension services/stakeholders working closely with Enga Provincial Government. Extension service is the primary function of all provincial governments. In Enga, the Agriculture and Livestock Branch continues to play a key role in distributing new crop varieties, conducting awareness, and other extension services.* *https://www.aciar.gov.au/project/asem-2017-026* *https://www.aciar.gov.au/media-search/blogs/climate-smart-agriculture-a-food-secure-png* *https://www.aciar.gov.au/media-search/blogs/accessible-weather-forecasts-advisories-key-png-farm-resilience*
Estimated percentages of farmers that have currently access to extension services and input suppliers? (Document requested)	*DAL does not have this information. It should be detained by the committee board and available in the provincial level*
Are you aware of any project that supports extension services provided to farmers' organizations? Do the extension services provision continue after the closure of the project? What are the lessons learned from each experience? (Document requested)	*There are two main known projects that are the EU STREIT project and World Bank PPAP project (https://www.worldbank.org/en/results/2014/12/02/papua-new-guinea-productive-partnerships-in-agriculture-project). The lessons learned: Technology set-up should always have O&M training done with any infrastructure set-up and have a regular service plan.*
Is DAL aware of any project that promoted resilient technologies in a rural area with climate field schools? What are the lessons learned from each experience? (Document requested)	*No information given. DAL is not directly connected to what's happening in the field. There are lessons learned and they will be shared by DAL:*
Are there manuals on resilient agronomic packages for sweet potatoes, taro, coffee, and rice in PNG official and local languages? (Document requested)	*There are manuals in the DAL library but that have not been updated on recent activities.*
Issues related to disasters/Nature-based solutions	
Are there any previous or ongoing initiatives to identify and map degraded areas of the provinces targeted by the proposed project at the national level?	*DAL is not aware of any degraded areas.*
Does DAL have nature-based documented solutions evaluated for the mitigation of landslides induced by	*nature -based solutions evaluated for the mitigation is still a gray area. One mitigation solution is supplying seedlings after flooding. Reforestation on the other end is introduced as part of large-scale*

heavy precipitation, flooding, and coastal erosion? What are the cost and efficiency of those tested solutions?	*logging, also the use of native trees for reforestation, and Chinese technology. Maybe the disaster office might have information on this. No information about the cost. Maybe check with forest department reforestation.*
Sustainable relationships between stakeholders and actors	
Are there networks or platforms (digital or non-digital) facilitating exchanges between all actors (producers, sellers, buyers, equipment suppliers, etc.) or between stakeholders along the agricultural value chain? (Documented success story requested)	*Digicel coverage: 85% of the 2G population, 50% of the 3G population and 26% of the 4G population in Papua New Guinea. The Network coverage does not cover every area. Most of the farm roads and tracks are under the provincial government under the provincial works unit.*
Connectivity between cooperatives and markets	
Are there national strategic and policy documents including climate-resilient standards for farm roads and tracks?	*Department of Works and Highways (DoWH) is still developing climate-resilient codes and standards for national roads. Farm roads or feeder roads are not considered unfortunately.*
Does DAL have resilient farm roads? If yes, what resilient design standards and local construction materials were used for them?	*Not really*
What is the mechanism established for maintaining climate-resilient roads or farm tracks? Which institutions engage in farm road maintenance?	*The maintenance of these road is done at the provincial level and not the national level.*
Eco-friendly technologies	
Are there any documents on guidelines in local language(s) for farmers' organizations on the operation, maintenance, and management of postharvest and storage technologies? (Document requested)	*There are manuals on quality control of the postharvest technologies especially for rice.*
What are the lessons learned from previous initiatives related to processing and storage technologies diffusion? (e.g., solar-powered dryers, solar-powered storage facilities)	*If government gives projects, sometimes it is for the farmers to rely on the government if there are any problems. Farmers adapt technology the moment using it.*
Monitoring and verifying impacts of climate-resilient practices	
Are there any manuals, methods, and tools to track changes in behaviors and environment? (National framework document requested)	*The manuals, methods and tools should be developed for the provincial level, but there is a climate change management act that have not been nationalized.*
Is there a unit collection of the outputs from the project management units?	*The Policy branch and statistic unit are responsible for data collection, monitoring and reporting.*
Are there any reports of training of trainers at the provincial level on climate resilience? (Documented Methods for the training requested)	*There are reports available on training*
Capacity building program on climate-resilient agricultural production for local authorities	
Have there been any gender-sensitive training programs on climate-resilient agriculture in targeted provinces? (Name of the programs requested)	*Yes, there training programs*
Are there any specific rates of women participating in the training?	*No valid info provided*

Knowledge management and dissemination	
Are there similar projects to the ASSA project? Does DAL have evaluation reports of those projects? (Reports on similar projects requested)	*There are small-scale projects that have rolled out*
What are the names of those projects? (Data requested)	*No name provided*
Does (DAL) have relevant means used to publicize information to stakeholders and actors in agriculture?	*DAL has filed project reports, evaluation reports, and annual reports. There is a publication unit.*
Are there any changes that can be implemented to improve the dissemination of the information?	*The goal is to network with every farming family to assist them better and collect the right information. (Cooperatives Network)*

Working Session with the Department of PNG's Department of Works

Discussion with DoWH occurs on Tuesday 18.10.2022. The following table 6.3 summarizes the main outputs of the discussion mentioned above.

***Table 6.3**: Summary of the main questions and answers during the discussion*

Questions	*Answers*
Is there a policy that promotes the integration of climate-resilient road, infrastructure standards and codes at the national level (e.g., the Department of Public Works Climate Resiliency Policy).	*DoWH does not have policies that foster the incorporation of climate resilient roads. The roads leading directly to the farms are private roads.*
What can be the definition of resilient roads in the context of PNG?	*DoWH is currently working on this. Clear definition and standards are not yet clearly defined.*
Are there ecological options available and tested to improve the connection of agricultural road networks in rural areas? If so, can we get more information on their effectiveness and cost?	*Not much work has been done but some of the roads have been built to be climate resilient. The roads are built with concrete.*
What are the local materials that can be valued in resilient farm road construction?	*No local materials used. The raw materials are imported.*
Does DoWH hold guidelines, including norms and standards for climate-resilient farm road or climate-resilient road implementation? If there are guidelines, does DoWH already implement farm roads following those standards and norms?	*There are no resilient farm roads in PNG*
Is DoWH aware of any past or ongoing projects on climate-resilient roads? Can we have access to the evaluation reports of those projects? What can be the main lessons learned from the implementation of these projects? (Documents will be shared if any)	*One project funded by the World Bank and second project funded by ADB? (Both ongoing projects)*
What are the key lessons learned?	*-Project cost awareness regarding climate resilient road construction.*

	-8% to 15% increase in cost over standard roads. -Maintenance cost is lower than standard roads.
Are DoWH's technical capacities strong enough to implement climate-resilient farm tracks? Is there any documented experience related to that?	*The DoWH is confident about their technical capacities to implement those roads.*
Can DoWH provide lessons learned from resilient road implementation in rural areas including farm roads?	*Discuss with the local government*
Is there any knowledge management framework for losses and damages induced by climate events on the road and actions/investments to attenuate them? (Document Requested)	*The Road Access Management (RAM) is the one who would detain this information.*
Is there any established and operating framework to maintain the road infrastructure in rural areas? (Reports requested)	*Measures are taken to lessen the environmental risk caused by the implementation of roads and there are branches of the DoWH that monitor these measures as an environmental department.* *The maintenance of roads is the responsibility of the government at the local level.*

Validation workshop for the ASSA FFP

The Climate Change and Development Authority (CCDA) has guided the joint effort of the Department of Agriculture and Livestock (DAL), Global Green Growth Institute (GGGI), UN Women, and Pacific Community (SPC) in the development of a Full Funding Proposal (FFP) worth approximately USD 10 million, which will be submitted to the Adaptation Fund (AF) in early January. The proposed project, titled Adaptation of Small-Scale Agriculture for improved food security of resilient communities in Papua New Guinea (ASSA), aims to enhance the sustainability of major agricultural commodity value chains through the adoption of climate-smart practices, improving produce quality, increasing market access, and creating green jobs for women and youth in vulnerable communities in three provinces: Enga, Milne Bay, and New Ireland. The project is based on the endorsed Concept Note on the adaptation of the agricultural sector, including forestry.

The main goals of this proposal are: (I) to integrate climate-resilient agriculture practices into the standard farming techniques of Papua New Guinea, in order to increase the productivity, resilience, and food security of smallholder farmers who are most vulnerable; (II) to improve the ability of smallholder farming communities that are vulnerable to access postharvest processing, storage technologies, and profitable markets; and (III) to promote the adoption of climate-resilient cropping, processing, and storage practices through capacity building and knowledge management. In response to the Adaptation Fund's encouragement for the Papua New Guinea government to submit a proposal through the Secretariat of the Pacific Community (SPC), a technical team consisting of the SPC Climate Finance Unit, GGGI PNG, UN Women, DAL, and international and national consultants was established in September 2022. The team held a kickoff meeting on September 20, 2022, to begin drafting a project proposal, which will be submitted to the Adaptation Fund in early January 2023.

The meeting was attended by at least 30 in-person participants from key institutions such as the Climate Change and Development Authority, the Department of Agriculture and Livestock, Provincial Teams from the pilot provinces of Enga and Milne Bay, the Global Green Growth Institute, the Pacific Community's Climate Finance Unit and Land Resource Division, UN Women, the National Research Institute, and Freelance Development & Climate.

The validation workshop meeting, held on December 20, 2022, aimed to present the Adaptation Support for Smallholder Agriculture (ASSA) project proposal to relevant stakeholders in Papua New Guinea and obtain their validation for submission to the Adaptation Fund in January. Some of the specific topics covered included: (I) the current

version of the ASSA project structure and activities; (II) the findings of the gender and environmental assessments; (III) the revised budget; and (4) the proposed implementation arrangements.

Global Green Growth Institute: The GGGI's representative in the country, emphasized the value of the ASSA AF project for Papua New Guinea and expressed gratitude to the Australian government for supporting the Climate Resilient Green Growth project from which the ASSA project originated. He also recognized the strong partnerships formed between the GGGI, the Secretariat of the Pacific Community, UN Women, national partners, and the Fiji Development Bank while preparing the full funding proposal.

The Pacific Community: The Secretariat of the Pacific Community's Climate Finance Unit thanked all stakeholders for their efforts and availability during the Christmas season. He also noted that the Adaptation Support for Smallholder Agriculture (ASSA) project will be the first Adaptation Fund project for SPC since its accreditation last year, and will showcase their ability to provide diverse types of climate financing.

Key updates from the full design proposal and related discussion

The international consulting presented the process followed since the Adaptation Support for Smallholder Agriculture (ASSA) concept note was approved by the Adaptation Fund. The presentation provided an overview of the ASSA project, including the sectors covered (agriculture, road, forestry), the implementing and executing entities (the Secretariat of the Pacific Community and the Government of Papua New Guinea, respectively), the geographic locations, and the indicative budget (up to 10 million USD). The project's main objective, which remains unchanged from the concept note stage, is to enhance the sustainability of major agricultural value chains through the adoption of climate-smart practices, resulting in improved quality, increased access to markets, and the creation of green jobs for women and youth in vulnerable communities. Key updates to the full proposal design include no fundamental changes from the initial concept approved by the Adaptation Fund and components similar to and aligned with the unchanged specific objectives from the concept note. Differences between the concept note and the full proposal are based on inputs from stakeholder consultation and engagement with beneficiaries at the national and sub-national level (such as the inception meeting, bilateral meetings with the Department of Agriculture and Livestock and the Department of Women's Affairs, and fieldwork in the three provinces) to inform the full proposal with on-the-ground information. These initial insights, along with helpful comments from the Adaptation Fund Board, technical review by SPC, UN Women, and GGGI, have helped to refine aspects of the proposal such as the climate rationale, activity descriptions, crop selection, adaptation measures, implementation arrangements, and budget.

Some guidance from the Adaptation Fund Board included the need for further development of project-level indicators and budget distributions to the output level, a cost-effectiveness analysis with alternative adaptation options, a more elaborated afforestation program to ensure ecological resilience, and further elaboration on the knowledge management component. Inputs from GGGI, SPC, and UN Women emphasized the need to improve the country-level context, crop selection, adaptation measures, and institutional arrangements, as well as to strengthen monitoring, evaluation, and learning activities, develop an environmental and social management plan and gender action plan, and consider a broader list of key stakeholders as implementation partners (such as PNGFA, CEPA, KIK, and CIC). Insights from public consultation highlighted the need to promote a diversified economic base at the rural level through a wider range of crops, to include post-harvest processing and value-adding actions, and to increase awareness and provide incentives to maintain women's involvement in operations and the maintenance of resilient road infrastructure.
To address these comments, a menu of eligible crops has been included in the project, prioritized based on their sensitivity to climate and resilience attributes as selection criteria. This process will be community-led and the menu will be validated by key experts before being disseminated. Other changes include the inclusion of a wider range of postharvest processing and value-adding options, such as solar dryers, tailored to the selected crops. A new result framework has been integrated into the funding proposal, and a cost-benefit analysis is ongoing for different options for making roads resilient. The afforestation activities have also been clarified to ensure ecological resilience, and the knowledge management and learning component has been strengthened.

The Secretariat of the Pacific Community (SPC) expressed concern about the limited budget and the number of planned actions in the ASSA project. They suggested drawing on lessons learned from the National Research Institute, where climate-resilient crops and cropping strategies, such as drought and heat tolerance, are available and could help reduce costs during implementation. Freelance Development & Climate (FDC) added that the list of crops included in the project is meant to provide flexibility for communities to choose from, based on criteria such as their contribution to resilience. However, SPC also pointed out that the project should consider the overlap with other programs that invest in cash crops and road construction.

Overview of the ASSA project structure and related discussion

After the presentation of the ASSA project structure, an open discussion took place where participants asked questions and made suggestions.

The Adaptation Support for Smallholder Agriculture (ASSA) project proposal identifies certain crops as being highly impacted by climate change. In order to address this issue, a few of these crops were pre-selected to be included in the project's activities in order to find solutions and narrow down the number of crops to be focused on during implementation, while still allowing flexibility for communities to choose crops. However, some participants pointed out that rice, which is a staple crop in Papua New Guinea and is promoted by government policies, may not be relevant to the project, which targets non-resilient communities. Instead, they suggested focusing on native crops with potential to be adapted to adverse climate risks, such as sweet potatoes and Irish potatoes, which are widely grown and consumed daily. Caroline added that improving access to markets through the rehabilitation of farm roads could promote equity and support the project's objectives. To connect the theory of change for Milyn Bay and New Ireland, some investments in seed transportation may also be necessary.

Overview of the revised budget and discussion

The revised budget overview outlined the allocation of funds among various outputs. The largest portion of the budget, about one-third, was designated for Output 2.3, which aims to improve connectivity between cooperatives and markets through a climate-resilient farm road network. Output 2.2, focused on eco-friendly technologies for seed saving, postharvest processing, and storage, received the second-highest allocation, comprising nearly half of the budget.
There were some concerns raised about the budget distribution. It was noted that the allocation for Component 1 was insufficient given the project's focus on addressing food insecurity. Participants also pointed out the presence of other infrastructure building and rehabilitation projects in Papua New Guinea funded by the World Bank and the Asian Development Bank, as well as a Global Climate Fund concept note on resilient infrastructure in development. It was agreed that the ASSA project should prioritize food security and climate change resilience for communities, and as such, Output 2.3 should be removed from the proposal. Its budget should be reallocated to Component 1 and gender empowerment initiatives such as irrigation for women and W+ certification. The Department of Works and Housing, which was involved in the consultative process, should be informed of these changes. Additionally, it was suggested that renewable energy sources be considered to power the treatment facilities.

Proposed Implementation arrangement and discussion

The proposed implementation arrangement was presented by the FDC. It was presented and explained, as well as the relationships between the institutions involved in the implementation mechanism. The Pacific Community (SPC) is the implementing entity of this project and the executive entity will be the Government of Papua New Guinea (PNG) represented by its Department of Finance. Both mentioned entities will then work with the various national and provincial departments relevant to this project including the Department of Agriculture and Livestock (DAL), Department of Works and Highways (DOWH), National Agriculture Research Institute (NARI), and PNG Forest Authority (PNGFA). FDC also mentioned collaboration with international collaborating partners such as the UN Women and Land

Resources Division (LRD) of SPC. FDC introduces the idea to have a Steering Committee with institutions at the political level and Technical Advisory Committee that will support the project implementation in the technical aspect.

After the presentation of the proposed implementation arrangement, participants raised a certain number of questions and suggestions:

- *To improve the sustainability of the project, it must be implemented by provincial institutions.*

- *SPC provided some clarification in terms of project implementation at the provincial level. It indicated that project managers based in each province will lead the coordination and implementation of project activities and will ensure monitoring and reporting at a provincial level. They will also represent the project at the climate provincial unit. SPC looked for an agreement of all stakeholders on the project implementation scheme, especially the Steering Committee and Technical Advisory Committee.*

- *GGGI should be part of the Technical Advisory Committee or the Steering Committee. But clarification will be provided in early January about their position. GGGI insist on the fact that NARI as well as UN Women should be mentioned as key actors supporting the provincial implementing coordination of the project.*

- *The involvement of the private sector in the project implementation arrangement is not well demonstrated and a suggestion was made to position the private sector as one of the stakeholders regarding their involvement in post-harvest processing.*

- *Secretariat of DAL should act as the secretariat of the Steering Committee and NARI will be part of the Technical Advisory Committee*

<u>Next steps and discussion</u>

FDC consultant presented the upcoming steps for the ASSA full proposal design. Below are the following steps to be taken:

- *Have a last revision and comments on the FP to organize the final version.*
- *Have a final check of the FP by the SPC, GGG, UN Women, CCDA and DAL.*
- *Obtain different letters - Endorsement letter from the CCDA, Support letters from DAL, DoF, PNGFA, and UN WOMEN Implementing Entity and Certification from the SPC necessary for the FP submission.*
- *Submit the Full proposal for the ASSA project*

The introduction of the next steps was followed by a discussion of the action plans needed to get a proposal well-structured and delivered on time. As indicated, the implementation arrangement has not yet been discussed, however a capacity assessment needs to be conducted with the PNG Finance Department and this is currently being done by SPC and should be available by mid-January. This assessment is currently being done by SPC and should be available in mid-January. This is to ensure that the reasons given by SPC to the government meet SPC's procurement and financial standards. The PNG government, based on the results of the capacity assessment, must either comply with SPC's funding and procurement procedures or leave things as they are. The implementing entities of this project are responsible for the submission and review of the FP.

***<u>Validation meeting for the ASSA FFP</u>** held on January 4, 2023, with The Climate Change and Development Authority (CCDA) has guided the joint effort of the Department of Agriculture and Livestock (DAL), Global Green Growth Institute (GGGI), UN Women, and Pacific Community (SPC). This lead to the finalized versions of the FFP, GAAP and ESMP considering inputs from CCDA, DAL, UN Women the signature of the LoE by the Designated Authority into the project structure, Implementing Arrangement and Budget.*