PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

Project Category:	Small-sized
Country:	Namibia
Title of Project:	Community-based integrated farming systems for climate change adaptation
Type of Implementing Entity:	National Implementing Entity (NIE)
Implementing Entity:	Desert Research Foundation of Namibia (DRFN)
Executing Entity:	Namibia University of Science and Technology (NUST)
Amount of Financing Requested:	USD 750,000

Short Summary

The overall objective of the conceptual project, to be carried out over a period of 3 years, is to implement priority adaptation actions and practices to strengthen the adaptive capacities and enhance resilience of vulnerable farming systems and communities to climate variability and climate change.

This will be achieved through implementation of the following components and activities:

- Component 1: Enhancement of the adaptive capacity of small-scale crop farmers in view of temperature variability
- Component 2: Introduction of good crop production management systems and efficient irrigation technology systems
- Component 3: Sustainable bush thinning and re-seeding of degraded grazing areas
- Component 4: Knowledge and skills management

The project is intended to be carried out in 2 of the 14 regions of Namibia. The components pertaining to crop farming will be implemented at two sites in the Omusati region, covering 600 ha of crop area and benefiting 132 small-scale farmers. Two constituencies in the Omaheke region will be the target of Component 3, encompassing an area of 200,000 ha of rangeland and benefiting 1,500 households. Component 4 is aimed at all 4 project sites.

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List of acronyms

AF:	Adaptation Fund
AMTA:	Agro-Marketing and Trade Agency
CBO:	Community-based Organization
CDM:	Clean Development Mechanism
CPPP:	Country Pilot Partnership Programme
CPP ISLM:	Country Pilot Partnership for Integrated Sustainable Land Management
CRI:	Climate Risk Information
DAPEES:	Directorate of Agricultural Production, Extension and Engineering Services
DoF:	Directorate of Forestry
DRFN:	Desert Research Foundation of Namibia
ENSO:	El Niño-Southern Oscillation
FAO:	Food and Agriculture Organization
FSNAP:	Food Security and Nutrition Action Plan
GCM:	Global Climate Model
GEF:	Global Environment Facility
GRN:	Government of the Republic of Namibia
ICT:	Information and Communications Technology
INDC:	Intended Nationally Determined Contribution
IPCC:	Inter-governmental Panel on Climate Change
ISLM:	Integrated Sustainable Land Management
MAWF:	Ministry of Agriculture, Water and Forestry
MET:	Ministry of Environment and Tourism
M&E:	Monitoring and Evaluation
NAB:	Namibia Agronomic Board
NCCC:	Namibia National Climate Change Committee
NEWFIU:	Namibia Early Warning and Food Information Unit
NGO:	Non-governmental Organization
NPC:	National Planning Commission
NIE:	National Implementing Entity
NUST:	Namibia University for Science and Technology

PFG:	Project Formulation Grant
PT:	Project Team
SAAMIIP:	Southern Africa Agricultural Model Intercomparison and Improvement Project
SIDA:	Swedish International Development Cooperation
SSF:	Small-scale Farmer
TAG:	Technical Advisory Group
UNDP:	United Nations Development Programme
UNFCCC:	United Nations Framework Convention on Climate Change
V&A:	Vulnerability and Adaptation

1 Project background and context

1.1 Climatic, environmental and socio-economic situation

Namibia is located in south-western Africa, covers a land area of 825,418 km^2, and has a 1,500 km coastline along the South Atlantic Ocean (MET, 2011a). It has a population of 2.1 million people (NPC, 2011; MET, 2011a).

Namibia is an upper-middle income country with a per capita GDP of USD 4,677.87 (Trading Economics, 2015) and about 70% of the population depend on agriculture. Despite Namibia being classified as a middle income country, it has one of the highest income inequalities in the world, with a Gini coefficient of 0.60 (ibid.). In addition to this, 27.6% of the population are classified as poor, and 13.8% as severely poor (World Health Organization, 2013). Poverty levels and the unemployment rate are highest in rural areas, especially among women and youth. Such groups are also highly vulnerable to the impacts of climate change, thus suffering double and in severe cases triple effects (MET /UNDP, 2014).

The country is situated at the interface between different climate systems. The northern part of the country is influenced by the intersection of warm tropical winds from Angola and colder air from the western shores that is associated with the northward flowing Benguela current. The southern part lies at the interface of the mid-latitude high pressure zone and the temperate zone (MET, 2011). This geographic location leads to highly variable climatic conditions that are manifested in the form of heat waves, droughts and erratic and low rainfall.

The rainfall decreases from the north-eastern parts of the country towards the south and west, ranging from 700 mm to less than 50 mm per annum (DRFN, 2015). Overall, 69% of the country is regarded as semi-arid (250 mm to less than 500 mm annual rainfall), 12% is hyper-arid (less than 50 mm), 16% is arid (above 50 mm to less than 250 mm) and only the remaining 3% in the north-east is semi-humid (Barnard, 1998; MET, 2014), receiving the minimum rainfall considered viable for dryland cropping. Mean annual temperatures in the interior of the country are mostly between 20^{o}C and 25^{o}C, but range from below freezing in winter to above 40^{o}C in summer. The rate of evaporation is very high, causing water deficits in all regions of the nation (MET, 1992). In the northern parts of the country annual evaporation on open water sources is estimated to be at 2.6 m (420% in excess of rainfall) and 3.7 m (1750% in excess of rainfall) in the south of the country (MET, 2014).

The highly variable climatic conditions, and especially the erratic rainfall, are amongst the main risks for food security in the country as was indicated in Namibia's 3rd National Communication to the UNFCC (MET, undated). Extra climatic stressors such as heat and recurrent droughts further exacerbate food insecurity.

Depletion of soil nutrients and soil degradation are common in the northern regions of the country (DRFN and SIDA, 1992). At the sites where the proposed project is located, dryland cropping is already very minimal and thus highly prone to climate risks such as high rainfall variability and climate related induced droughts (MET, 2014). Due to both anthropogenic pressures and climate

factors, some of the practices adopted for pastoral production have contributed to bush encroachment, overgrazing and desertification (Mendelsohn, 2006). The rural livelihood-based economy has progressively become unreliable, vulnerable, and in some cases maladaptive as a result of climate risks and uncertainties (MET, 2002). Although droughts are known to be recurrent and their severity has been expanding sporadically (Mendelsohn, Jarvis, Roberts, & Robertson, 2009), there is now consesus that the incidence and scope are largely due to climate change factors. Some regions in Namibia have experienced drought conditions over the past four years (NEWFIU, 2015), which have worsened some of the impacts and effects of this natural variability. For example, the year 2013 was Namibia's driest year in the past 30 years, while rainfall variability was the highest in the 2015 rainfall season (ibid). Global climate change remains arguably the most serious impediment to Namibia's development aspirations and a limiting factor towards low emission carbon development (INDC, 2015).

1.2 Climate change models and scenarios

Inter-governmental Panel on Climate Change (IPCC) findings indicate that Southern Africa is amongst the most vulnerable regions to climate variability and change, due to multiple climatic stresses and low adaptive capacity. It is now indisputable that climate change will have a grave effect on agricultural production, threatening the sustainability of agro-pastoral farmers by reinforcing existing stressors such as poverty, HIV and AIDS, with increasing heat stress, droughts, and increasing temperature events which could lead to more reduction in livestock and crop productivity in the near future.

The UNFCCC recognises that Namibia is one of the developing countries that are most vulnerable to the adverse impacts of climate change due to the following:

Temperature changes

Figure 1 below is from the Southern Africa Inter Crop Comparison project (2014) for Namibia at two weather locations, depicting changes from the current climate (1980–2010) to near-future (2010–2040), mid-century (2040–2070) and end-of-century (2070–2100). Thes minimum and maximum temperatures baseline trends, both minima and maxima, show an increasing trend over 1980–2010 (approx. 0.5◦C per decade).

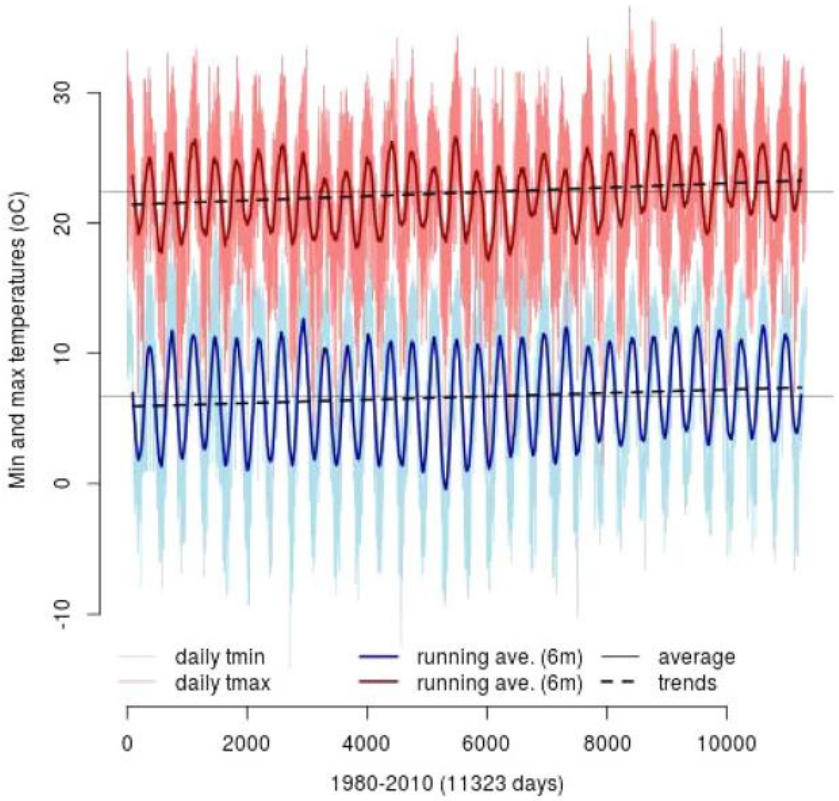

Figure 1: Long-term projection of temperature for Namibia

Over the long-term Namibia has experienced a mean decadal temperature increase of 0.2ºC (Reid et al. 2007). This is estimated to be about three times the global mean (*ibid*). The IPCC Third Assessment Report (IPCC, 2014) states that climate change scenarios indicate a future warming of 0.2 to 0.5 °C per decade across Africa. This warming is greatest over the interior of semi-arid margins of the Sahara and central Southern Africa. Hudson and Jones (2002) predicted a 3.7°C increase in summer mean surface air temperatures and a 4°C increase in winter by the 2080s. In Namibia itself, predictions for temperature increases by 2100 range from 2 to 6°C (Drikx, 2010).

Changes in precipitation

Most precipitation prediction models project that by 2050 the interior of Southern Africa will experience significant decreases during the growing season (IPCC 2012). In Namibia, rainfall reduction is expected to be greatest in the north-west and central regions. Particularly strong reductions in precipitation are expected in the central areas around Windhoek and in the surrounding highlands (Midgley et al., 2005). Both rainfall and temperature in Namibia are sensitive to the El-Niño Southern Oscillation (ENSO) effect, and rainfall is below average during El Niño conditions. Future rainfall is projected to become even more variable than at present (GRN, 2002). The north-western part of the country has experienced persistent droughts over the past four years, while the north-central parts have experienced both droughts and floods in recent years. Figure 1 illustrates the unpredictability of rainfall in Namibia (Drikx, 2010).

Changes in evaporation

An increase in evaporation rates due to temperature increases is expected, amounting to about 5% per degree Celsius of warming (Government of Namibia 2002). Thus, Namibia is predicted to experience severe water deficits. This will affect dry-land crop production and livestock production which are the main sources of livelihood for the poor rural population.

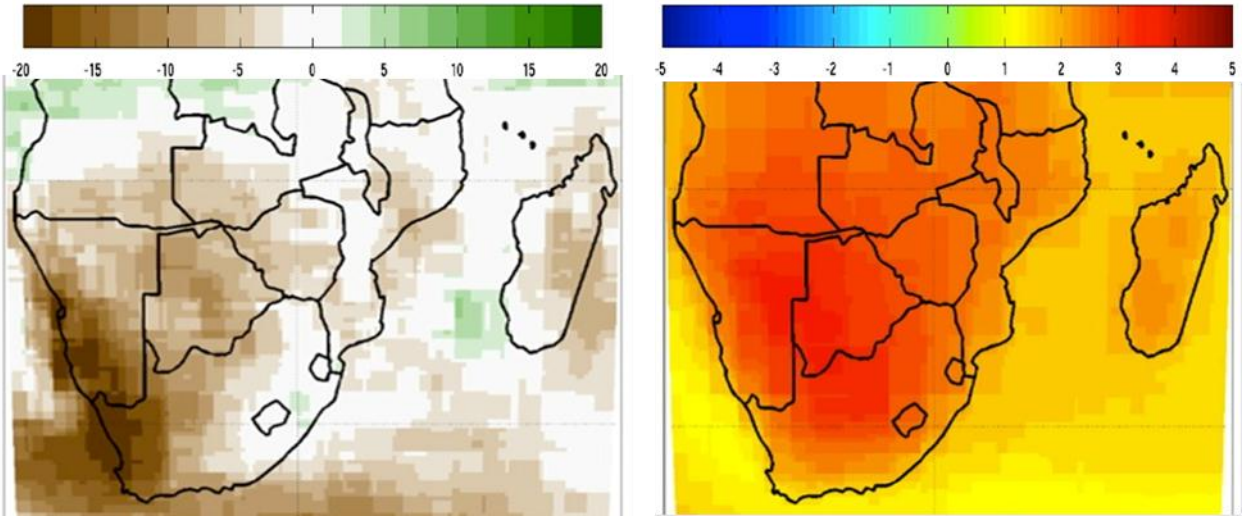

Figure 2: a) unpredictable precipitation b) Mid-Century (2040-2069) RCP 8.5, Compared to 1980-2009 period, Median of 20 CMIP5 GCMs

Combined effect

The uncertainty shown by the GCM rainfall rate (mm per day) projections emphasizes the need to consider the combined impacts of natural variability in the amount of rainfall received during each growing season for rain fed farming systems in semi-arid regions of southern Africa. A very strong agreement is shown for increased temperature projections (+1.5 to +3.5 C), whereas projected changes in precipitation are variable, with some GCMs projecting increases and others decreases. Hence the vulnerability of the country to the foreseeable adverse environmental and socio-economic impacts of climate change that are outlined under the proposed adaptations for "food security and the development of the sustainable resource base" relates to practices that can improve nutrients in soils, soil and land management, and post-harvest production. Land management for livestock systems includes the need for fodder flow systems and bush thinning.

1.3 The climate change-induced problem

Climate change has been and will have profound impacts on peoples' livelihoods, economic growth and ecosystems, particularly in developing contexts and economies (Tarr, 2009). However, the effects and impacts of climate change on economies and societies will vary greatly over the world, and each country's circumstances, such as initial climate, socio-economic situation and growth prospects, will define and shape the extent of climate change effects on societies, both in economic and environmental terms (Stern, 2006). Developing countries are most vulnerable, particularly those in Africa, largely because of their geographic exposure, relatively small

economies, prevailing low levels of household incomes, and greater reliance on climate sensitive sectors such as rain-fed agriculture, ecosystems or nature-based production activities (e.g. tourism) (Namibia National Climate Change Strategy and Action Plan, 2014). Observational data for Namibia's projections in rainfall are consistent with the contemporary understanding of how climate change will affect the Southern African region and are captured in regional climate models, especially in that:

- Increases in temperatures, heat waves and thermal heating, coupled with increases in regional atmospheric dryness, especially during mid- to late summer, will increase over much of the country.
- Winter rainfall is likely to be reduced in the southern and especially south-western parts of the continent, and by implication, southern Namibia (DRFN, 2009; MET, 2011).
- In addition, both the rainfall and temperature in Namibia are very sensitive to the ENSO effect, showing periods of much below rainfall averages (ibid).
- The Inter-governmental Panel on Climate Change (IPCC) Third Assessment Report suggests that by 2050, temperatures over southern Africa will be 2-4°C higher than the 1961-1990 baselines (IPCC, 2001).

Although climates across Africa, including Namibia, have always been erratic, the continent is expected to face even greater droughts, floods, rising sea-levels, food insecurity, loss of biodiversity and depletion of the water supply. It has been predicted with a high degree of certainty that Namibia will become hotter throughout the year (with an expected increase in temperatures of between 1°C and 3 5°C in summer and 1°C to 4°C in winter in the period 2046-2065 (Dirkx et al., 2008). Maximum temperatures have been getting hotter over the past 40 years, as observed in the frequency of days exceeding 35°C (Dirkx et al., 2008; MET, 2011). Frequencies of days with temperatures below 5°C have been getting less, suggesting an overall warming (Dirkx et al., 2008).

The proposed project will seek to reduce the impacts and risks of combined effects of natural variability and increasing climate-induced heat waves, temperatures and change on crop and livestock production cycles in two regions of Namibia. Particularly, this project will address two aspects, namely the impacts of: **(i) increasing temperature and higher water evaporation on crop production** and **(ii) bush encroachment on land productivity (and livestock production)** that are exacerbated by a combination of increasing atmospheric carbon dioxide and unsustainable land management (human) practices due to inability and limited capacity to adapt the past arid production practices to drastic and complex changes.

In Namibia, climate change affects both livestock and crop production under rain-fed conditions. Both crop and livestock play an important role in the livelihoods of local and indigenous agro-pastoral communities. These have been declining by about 33% on average every year in the last few farming seasons (NEWFIU, 2015). This has been evident especially in the 2011/2012, 2012/2013 and 2013/2014 farming seasons; such declines are mainly attributed to high ambient temperatures and below normal rain throughout the country (MET, 2015). The year 2014 recorded the worst drought situation in 30 years and the GDP contribution from agriculture recorded significant negative changes with livestock farming recording the highest decline of 37.6%. As a

direct result of these climate-induced vulnerabilities, household food security and nutrition situations are compromised, compelling households to supplement food deficiencies with government drought relief. Drought relief, while desirable as a relief measure in the short term, it is neither a sustainable option nor a long-term adaptation option. Furthermore, relief measures are likely to cause maladaptation as farmers will lose skills to make their living and compromise the ability for proactive adaptation planning. As climate change is induced by the accumulation of carbon dioxide in the atmosphere in combination with natural variability in Namibia, ideal conditions for the growth of woody trees and shrubs are promoted, which negatively impacts the productivity of the drylands (MET, 2015). As a result, those impacted by climate change in Namibia are unable to cope with existing conditions while trying to respond to the climatic changes.

Bush encroachment, which is a second element to be addressed under this project, is both a climate stimulated process and an additional stressor with huge implications on food insecurity. Bush encroachment causes a total loss to the environment and an economic loss in terms of land productivity. Climate-induced bush encroachment interacting with other human stressors exacerbate prevailing natural problems like variable dry environment, limited arable land, and increasing heat waves and temperatures. These further affect food security and nutrition, limit efforts to maintain living standards and improve livelihoods, despite efforts by government to improve them. Losses related to increased drought events caused by newer climate risks, if included in the loss figure calculated above, could be much bigger than the current projection, and will have a drastic negative impact on the entire country economy (DRFN, 2015).

Namibia, being a highly drought-prone country and already naturally vulnerable to climate impacts, thus cannot afford or cope with any other added climate stressors (e.g. global inadequacy to support adaptation needs and actions) (De Klerk, 2004; INDC, 2014).

Table 1 below summarises projected adverse effects of climate change on the inhabitants of the **Omaheke and Omusati regions** of Namibia, where the proposed project specific sites are located.

Table 1: Adverse effects of climate change on crop and livestock farmers
(adjusted from MET, 2011; MET, 2014)

Specific changes related to climate change	Specific adverse effects of changes
Declining rainfall - Frequent droughts - Increased rainfall variability (spatial and temporal variability within one rainfall season)	- Decline in ecosystem productivity impacts livestock forage, leading to lowering rangeland carrying capacity, causing livestock deaths and low livestock numbers, further impacting food and livelihood securities; resulting mainly in loss of livelihoods and loss of income - Increased migration of agro-pastoralists to regions that receive relatively higher rainfall in a particular rainy season, leading to in-country climate migrants, exacerbating social problems including gender based violence and inequities

	on access to land and productive assets - Increased resource conflicts and gender imbalances
Rising temperature - Prolonged dry and hot spells between rainfall events	- Increased seedling mortality of crops and pasture following a prolonged dry spell - Wilting of crops resulting in lowered yields - Decreased harvests/outputs - Loss of potential incomes (from selling crop surpluses) - Increased food insecurity due to inability to produce food during dry spell
Increased atmospheric CO_2 levels	- Increased growth rates of woody plants (primarily C3 photosynthetic pathway) compared to herbaceous plants (grasses, mainly C4 photosynthetic pathway), resulting in a landscape-level wave of bush encroachment and drastically reduced grazing capacity and meat production - Decreased food and livelihood safety nets provided by livestock, which are sold or traded to fill food gaps - Compromised natural (re-)vegetation and cumulative losses for wildlife and livestock adaptation corridors
Land and soil degradation due to reduced plant cover (and soil organic matter) - Low plant cover due to insufficient growth - Reduced carrying capacity for livestock production - Low soil fertility - Low soil nutrients	- Increased erosion - Dune activation - Lowered crop and pasture production
	- All of these, if not addressed as proposed in this project, will result in a wide-ranging condition of DLDD (i.e. desertification, land degradation and drought) intertwining with and exacerbated by human factors, that are made ineffective due to complex climate factors, thus overall leading to increased vulnerability of the inhabitants of the two selected regions.

All three National Communications submitted to the UNFCCC by Namibia emphasised and highlighted the vulnerability of the following five sectors: agriculture, water, tourism, health and coastal areas. Thus proposed strategies and options include those that support:

- Food security and the development of the sustainable resource base,
- Sustainable water management,
- Human health, and
- Infrastructure adaptation

The vulnerability assessment found that agro and pastoral small-scale rural farmers are at high risk, thus actions that focus on these groups are rated amongst the highest adaptation requirements. Hence this project is specifically selected to **address adaptation actions within the agricultural sector** in two specific regions in response to:

- High temperatures and increasing heat waves in summer
- Severe exposure to frost (in winter)
- Rainfall decreases and water shortages

by addressing explicit adaptation actions with options chosen from the vulnerability and adaptation assessment applicable to these geographical and agro-ecological zones and regions, which are:

- Adopting micro-drip irrigation to address water shortages and inefficient irrigation systems
- Implementing comprehensive conservation production practices to deal with low outputs and post-harvest losses
- Applying integrated farming to address declining land productivity caused by bush encroachment
- Implementing climate smart practices under integrating farming to improve livelihood and food insecurity - frequent droughts reduce soil cover by grasses and herbs that otherwise protect the soil from erosion. This increases vulnerability of ecosystem services (e.g. nutrient recycling, etc.) and cause a decline in perennial component of pasture.

1.4 Underlying causes of the climate change-induced problem

Inherent physical vulnerability

The inherent vulnerability of food security in the country due to highly variable climatic conditions, especially the erratic rainfall, has already been described in Paragraph 1.1.

Anthropogenic pressures on already fragile dryland ecosystems

Namibia has a total land area of approximately 825,000 km^2 and an estimated population of 2.1 million, with an annual growth rate of 3%. Namibia is the driest country south of the Sahara, with average rainfall varying from above 600 mm in the northeast to less than 25 mm in the Namib Desert to the west. Rainfall is erratic both temporally and spatially leading to large localised

differences in precipitation and large fluctuations from one year to the next. Drought is a regular occurrence, which is predicted to worsen with the regional projections on climate change.

Maladaptive mono-crop, inappropriate irrigation and unsustainable land use practices

Major justification for the proposed small-scale crop irrigation project (in Omusati region) includes induced risks such as that:

- Heat waves desiccate summer crops, leading to lowered yields, economic losses and food insecurity
- Frequent frosts cause decreased winter crop yields, economic losses and food insecurity
- The use of flood irrigation is associated with high evaporation, which reduces water use efficiency

The induced risks and vulnerability for livestock farmers in (Omaheke region) are that:

- High levels of bush encroachment cause a decline in pasture production, thus lower the carrying capacity for cattle production, and consequently lead to income losses and food insecurity
- Frequent droughts reduce soil cover by grasses and herbs which otherwise protect the soil from erosion. This increases vulnerability of ecosystem services (e.g. nutrient recycling) and causes a decline in the perennial component of pasture.

Bush encroachment and inappropriate animal husbandry

Bush encroachment impacts about 26 million ha of woodland savannas in Namibia (MET, 2014), with the result that average carrying capacity has declined from 1 large stock unit (LSU) per 10 ha to 1 LSU per 20 or 30 ha. The concomitant economic loss of more than N$ 700 million per annum has had a direct impact on the livelihoods of 65,000 households in rural subsistence farming families and 6,283 commercial farmers and their employees.

In communal areas, climate-induced bush encroachment interacting with other human stressors exacerbate prevailing natural problems like variable dry environment, limited arable land, and increasing heat waves and temperatures. This situation affects food security and nutrition, and limits efforts to maintain living standards and improve livelihoods despite efforts by government to improve them. If losses related to increased drought events caused by newer climate risks are included, the loss figure quoted above could be much bigger and implies a drastic negative impact on the entire country economy. These aspects and dynamics will be exacerbated by the projected adverse effects of climate change (DRFN, 2015). In addition to this, limited alternative sustainable land use practices that are climate smarter and lack of knowledge in rangeland management and animal production also hamper the capacity of livestock farmers to cope with the impacts. Although communal farmers had long-term knowledge that allowed them to adapt to living and farming in the arid lands of Namibia, new stressors from climatic risks are stressing their adaptive capacities to the extent that they are unable to cope given the frequencies and scope of the risks. They are now faced with a lack of appropriate alternative knowledge to enable them to adapt to these risks

while still making a living out of livestock and to sustain the range land conditions without causing additional human damages to the lands. Consequently, there is a slow onset of higher land degradation, which if not addressed now is likely to negatively impact the ability of future generations to make a living out of this land

A number of potential risks have been considered and partially analysed in the formulation of the project concept. They appear in Table 2 below.

Table 2: Background information, actor impact and mitigation measures

Background information	Active sectors	Impact & projections	Mitigation measures
Omaheke region			
• The region is known as cattle area • San people hunt & gather for daily survival • 72% of population live in rural areas • Rain is poorly distributed & unreliable • Small irrigated gardens are cultivated	• Livestock farming • Tourism • Wildlife conservation	• Shift in vegetation zones & distribution of plants • Decrease in water availability • Increase in temperature • Prolonged droughts & persistent dry spells • Increase in seasonal rainfall • Invasive species spotted	• Apply selective debushing • Quantify pasture composition before and after debushing, and for rested and non-rested grazing areas • Apply methods for rangeland resting • Estimate and apply carrying capacity for livestock production
Omusati region			
• Extreme salinity of the soil • Hand-dug wells & boreholes • Providing drinking water for people & livestock • Frequent flooding of the “lishana” systems Angola • Water resources heavily dependent on climatic	• Small-scale crop & livestock farming • Wildlife • Fishing	• Increase in temperature • High evaporation • Floods • Projected long periods of droughts • Pests invasion	• Build earth dams to capture rain water for micro irrigation activities • Plant tres to serve as windbreaks • Apply pest control mechanisms • Improve access and use of manure/soil fertilisers to reduce salinity • Offer micro finance

conditions in southern Angola			to initiate self-help projects that will strengthen livelihood options • Training farmers on smart agriculture

Proposed solutions to the barriers

The desired state at the end of the project is to have increased the resilience of the natural and human agricultural systems and to have strengthened the adaptive capacities of vulnerable farming communities to climate variability and climate change, particularly with improved livelihood options and better-adapted ecosystems.

Specific problems to be addressed regarding small-scale irrigation farmers are:

- High temperatures and heat waves in summer
- Frequent exposure of crops to frost in winter
- Inefficient irrigation systems used
- Post-harvest losses

and for livestock farmers:

- Bush encroachment
- Loss of soil cover and nutrients

The following sections present key barriers to achieving all of the above.

Insufficient diffusion of climate-resilient irrigation and water conservation management measures and practices

At present, farmers have limited access to physical water infrastructure that is required to maintain resilient rural livelihoods in a changing climate. Increasing the water storage capacity of soils, improving the management of irrigation system, and introducing more efficient/alternative irrigation techniques and conservation practices are highlighted as key measures to increase the adaptive capacity and resilience of rural farming systems in Namibia.

In some of the small-scale pilot initiatives undertaken under the local community it was noted that thorough site assessment should be done as part of the project implementation to enable farmers to quickly adopt and apply while practicing the adaptation actions as opposed to training prior the implementation. This include for instance adopting the adaptation option for micro- drip practices, which is known for being the most water efficient method under irrigation. Water drops right near the root zone of a plant in a dripping motion.

A combination of climate smart and efficient technologies including installing the systems properly can steadily reduce the loss of water through evaporation and runoff. Therefore, this project will support all major aspects of irrigation such as irrigation system design, system maintenance, erosion control, and irrigation scheduling training for farmers.

For bush thinning; cost-effective mechanical de-bushing applications will be applied. The project also considers feasible charcoal production mechanisms as a means to improve sustainable harvesting of wood from unproductive bush thickets. The environmental and social impacts and risks of these will be further detailed in formulating the full project proposal using a Project Formulation Grant (PFG).

Insufficient knowledge of and access to climate-resilient crop and livestock farming practices

Farmers have inadequate information, knowledge and awareness of alternative crops and diversification of crops, which combined with traditional knowledge can provide a number of adaptation benefits, including an economic buffer in case of crop failures, and recognized benefits for soil fertility and nitrogen fixing. With improved farmers' information on sustainable practices, such as soil management in combination with inter/multi-cropping, resilience can be enhanced to enable adaptation activities across the entire spectrum of the project sites. Firstly, at present, there are incomplete efforts on the ground, on a too limited scale to promote the full comprehensive diffusion and wide scale uptake of these practices on a critical scale. In addition, there are still inadequate uptakes of a number of drought-tolerant species, which taking into account the projected climate risks will be appropriate in the foreseeable future. Redressing the lack of adequate knowledge that farmers have water efficient irrigation practices and management is also ideal as an adaptation activity.

Secondly, despite various past initiatives, awareness about and technical capacity to implement adaptation measures such as early maturing crops and drought resistant crop varieties, resilient cropping and livestock rearing systems, intercropping (the practice of growing two or more crops simultaneously in the same field), adaptive management of shifting growing seasons, soil fertility management and animal husbandry is still limited. Whereas farmers used to apply traditional knowledge to adapt to natural aridity, the intensity, scope and extent of the changing weather conditions are such that they are unable to catch up speedily enough. In addition, human management impacts the ecological restoration in the particular project sites and landscapes.

Access to relevant climate information that enables farmers to timely prepare for climate change and reap benefits from adaptation measures

In order to counter inherent natural variability and vulnerability factors, a number of development initiatives have been applied in Namibia. However most of those focussed on small-scale pilots without much replication or upscaling to address regional scopes. Further, while some of the development assistance such as improved and diversified livelihood options and access to water resources has contributed to reducing the underlying vulnerability of poor farmers, the degree of their exposure to climate risks were not properly addressed, due to partial and incomplete climate

risk information. With the recent completion of the vulnerability and adaptation (V&A) assessment under the third national communication, adaptation options and actions have been better assessed giving better perspectives for adaptation intervention at specific sites. Hence this project will use the results of the V&A assessment and adjust them with in-depth localised and site-specific information to improve relevant and timely access to information for proactive decision making that will benefit farmers.

Uncertainty surrounds future climate change impacts and future socio-economic development constraints to be addressed by specific identified optimal adaptation options. However, it is anticipated that uncertainties will decline over time as more climatic and socio-economic data becomes available.

Adaptation measures currently outlined in Namibia's policy documents are designed in a flexible adaptive management manner so that suitable adaptation options that could be adjusted or reversed to micro-level actions as new information becomes available. This is particularly important for adaptation options that have long-term implications, or measures that need to be taken over longer life span, such as infrastructure and soil management practices that could easily alter the soil characteristics towards declining fertility. Another aspect that will be considered in this project relates to suitable management, interpretation and use of regional-national-local and micro data and assessments.

Largely this project will benefit regional social and environmental dimensions of climate impacts, however during the full project formulation there will be detailed assessments on the full scope of environmental and social (including gender) risks and impacts in line with the Adaptation Fund (AF) policy.

Social and environmental inequities including aggregate barriers due to poverty and gender inequalities

Whereas these types of barriers are mostly of anthropogenic nature, they are exacerbated by climate-induced factors, such as limited rainfall that is inadequate to productively cultivate, lack of alternative arable land and a narrow window to plant timely in response to variable rainfall. As pointed out in the IPCC AR4, climate change impacts disproportionately affect vulnerable populations, many of whom are poor. At the specific project sites, the majority of the poor are women and thus their vulnerabilities are de facto doubled if not tripled. Therefore, this project will consider the factors that underlie the distribution of the costs and benefits of adaptation options. The distributional aspect of net benefits will be best addressed when the particular vulnerable groups such as women are targeted on the ground, giving weights to different adaptation costs and benefits according to who receives the benefits and who bears the cost. For example, is likely to enhance the resilience in the long-term, doubling the adaptation benefits for poor people.

1.5 Project location

Regions

The project will be implemented in two of the 14 regions of Namibia, namely in the Omusati and Omaheke regions. Specific sites are indicated in Figure 3 below.

The Omusati region has the second highest population density, next to the Khomas region where the capital city is located. The region is characterized by subsistence farming practices and the communal land tenure system. The oshana system, a broad and shallow but vegetated ephemeral river system, dominates the environment. The high percentage of sand particles (above 60%) determines the texture and accounts for the low water retaining capacity of the soil. Organic matter in the topsoil is low (1 to 5%), the nitrogen content is too low for horticulture, while the pH is neutral (FSNAP, n.d). Due to high evaporation in the oshana system, the soils are saline. Sodium and gypsum is commonly found in the soils.

In contrast, the Omaheke region is among the least populated regions. Livestock farming is the maim livelihood, but the rangeland is heavily degraded due to bush encroachment.

Table 3: Household population information in selected regions

Region	Total household population	Average household size	% of female unemployment	Female % of population
Omusati	46,919	4.8	47.1	51
Omaheke	17,613	3.8	39.1	48

The two regions were carefully selected following a number of elaborate participatory processes that commenced with the national development-led process leading to the policy on climate change in 2011; the strategy and action plan in 2014, as well as the V&A assessments finalised in 2015. The locations and sites were selected on the basis of observed temperature extremes, frequency of drought episodes, and the impacts of climatic parameters on food and livelihood security. An additional criterion for selection was the potential to access ground and surface water resources which is a vital prerequisite for small irrigation; this led to the selection of Etunda and Epalela in the Omusati region.

The direct beneficiaries of the project will be subsistence farmers in rain-fed areas, and specifically vulnerable groups whose access to arable land is severely threatened by soil erosion and land degradation. Special emphasis is placed on women and female-headed households within the vulnerable groups.

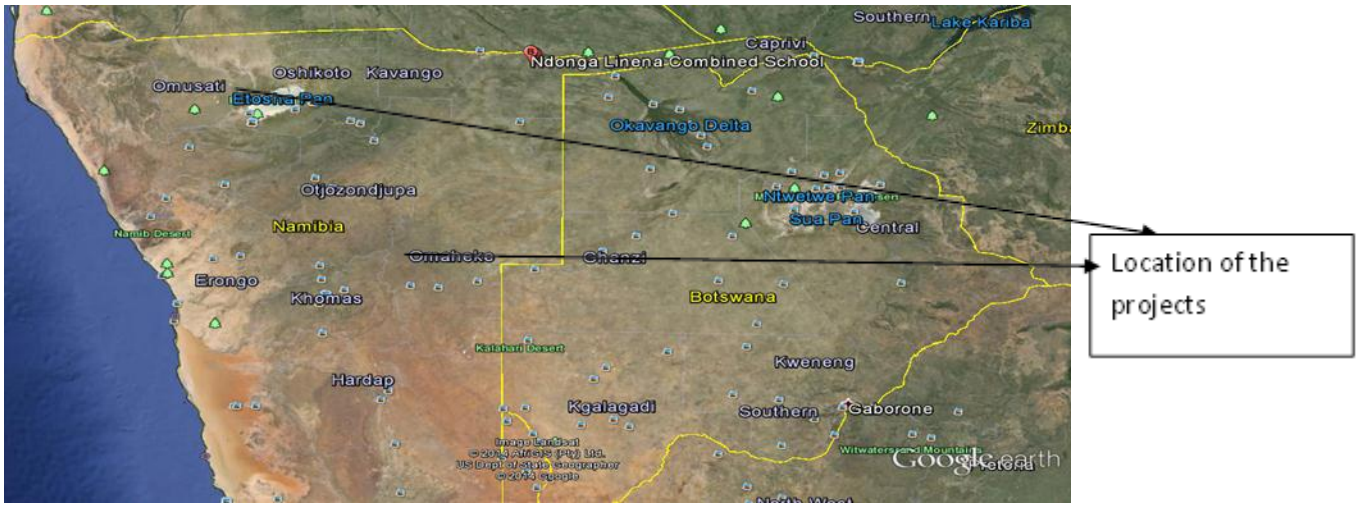

Figure 3: Map depicting the proposed project sites

Specific sites – Omusati region

The beneficiaries of small-scale irrigation project components will be the two communities of Etunda (a government-funded irrigation scheme) and Epalela (households who have initiated irrigated crop production). In total 67 small-scale irrigation farmers will benefit from the project outputs.

The Epalela community-initiated irrigated crop production started their irrigation activities in the 1990 using the water from Olushandja/Etaka earth dam and the Calueque – Oshakati Water Canal. There are 65 small-scale irrigation farmers at Epalela, farming under the umbrella name Olushandja Horticulture Producers' Association (OHPA). These small-scale farmers are responsible for irrigation development and management at their individual plots.

Specific sites – Omaheke region

The selected projects sites are the Otjinene and Epukiro constituencies.

In Omaheke region the main agricultural production is livestock (63%), followed by crop production (18%) and poultry (16%). Hence this project will focus on livestock production because it is the main driver of the people's welfare and food security. 42% of the population in Otjinene and Epukiro constituencies are female headed and are most vulnerable to changes in livestock production brought by climate change and variability.

Table 4: Omaheke region agricultural activity and total population

Agricultural activity	Number of households	Households (%)	Population	% population in agriculture
Total	6,834	100%	34,854	100%
Livestock	4,292	63%	21,300	61%
Crop	1,204	18%	6,628	19%
Poultry	1,063	16%	5,476	16%
Other	275	4%	1,450	4%

The two project sites are selected because of the high occurrence of bush encroachment. Bush encroachment is facilitated by increasing atmospheric carbon dioxide and continuous overgrazing of grasses by livestock which puts woody plants at a competitive advantage. These two constituencies have the highest bush densities among the eastern communal areas of Namibia in the Omaheke region (see Table 5) and thus will be the focus areas for this project.

Table 5 Bush densities in the Omaheke region

Constituency	Number of bushes per ha
Aminuis	2,750
Epukiro	8,117
Otjinene	7,735
Otjombinde	2,883

Table 6 lists the possible direct or indirect institutional project actors and beneficiaries. The cost effectiveness of the proposed project is closely linked to the approach of increasing local resilience through empowerment of local and community-based institutions.

Table 6: Institutional project beneficiaries and actors

Irrigation	De-bushing and re-seeding
Ministry of Agriculture, Water and Forestry	Ministry of Agriculture, Water and Forestry
NamWater	Regional Councils
Agro-Marketing and Trade Agency (AMTA)	Farmers association (unions)
Namibia Agronomic Board (NAB)	Higher education institutions
Regional Councils	Farmers
Farmers association (unions)	Ministry of Regional and local government
Higher education institutions	Water Point Committees at the project site
Farmers	Farmers cooperatives
Ministry of Regional and Local Government	
Water Point Committees at the project site	
Farmers cooperatives	

2 Project objectives

The overall project objective is ***to implement priority adaptation actions and practices to strengthen the adaptive capacities and enhance resilience of vulnerable farming systems and communities to climate variability and climate change***. Specifically, the project will support:

- Enhancement of small-scale crop and livestock farmers' adaptive capacity to cope with higher temperature, heat waves and decreasing rainfall, and associated variability while securing their food and livelihoods
- Introduction of water efficient irrigation technologies for small-scale farmers to increase their production activities
- Reduction of bush encroachment and enhancement of the productivity of grazing areas prone to climate risks, and pasture re-seeding with climate smarter annual and perennial grass species
- Strengthening knowledge and skills for adaptive crop, livestock and rangeland ecosystem management

The project objective is aligned with the objective presented by the AF to ***"Reduce vulnerability and increase adaptive capacity to respond to the impacts of climate change, including variability at local and national levels".***

The project is also fully aligned to the overall AF policy directives and principles, in that project activities on site that are specifically funded by AF resources will complement ongoing implementations which are directed to overall adaptation approaches in the country. For instance, the National Policy on Climate Change (MET, 2011a) recognises that the national developmental planning process should be participatory and inclusive of all key stakeholders (national, regional and local) as well as public, private and civic; thus it promotes integration and coordination of programmes of various sectors to better provide critical foundations that can further enhance systemic adaptive capacity whilst pursuing sustainable development. The policy against which the specific support and objective of this project is drawn encompasses five objectives:

- Objective 1: develop and implement appropriate adaptation strategies and actions that will lower the vulnerability of Namibians and various sectors to the impact of climate change
- Objective 2: develop action and strategies for climate change mitigation
- Objective 3: integrate climate change effectively into policies, institutional and development frameworks in recognition of the cross-cutting nature of climate change
- Objective 4: enhance capacities and synergies at local, regional and national levels and at individual, institutional and systemic levels to ensure successful implementation of climate change response activities
- Objective 5: provide adequate funding resources for effective adaptation and mitigation investments on climate change and associated activities (e.g. capacity building, awareness and dissemination of information)

3 Project components and financing

The project will be divided into the four components presented in Table 7.

Table 7: Summary of project components, expected concrete outputs and outcomes

Project components	Expected concrete outputs	Expected outcomes	Amount (USD)
Component 1: Enhancement of crop farmers' adaptive capacity to temperature variability	1.1 600 ha covered with shade nets	Average profitability increased by more than 60%	62,450
	1.2 132 trained small-scale farmers; other actors trained in post-harvest aspects; access to packing, storage and Information and Communication Technology (ICT) system		62,450
Subtotal: Component 1			***124,900***
Component 2: Introduction of good technical crop production management systems and efficient irrigation technology systems	2.1 132 small-scale farmers can use crop management and irrigation system	Production management effectiveness of 132 farmers' capacities for crop and irrigation strengthened; 600 ha efficiently irrigated with water consumption reduced by 30-40%	15,500
	2.2 Water saving efficient drip irrigation introduced to 132 small-scale farmers; that covers 600 ha		234,300
Subtotal: Component 2			***249,800***
Component 3: Sustainable bush thinning and re-seeding of degraded grazing areas	3.1 200,000 ha sustainably and selectively de-bushed, allowing grass growth and species diversity.	Enhanced livelihoods of about 1,500 households through sustainable diversification	75,000
	3.2 Debushed area re-seeded to cover soil with high root biomass and with higher species diversity		74,000
	3.3 Sustainable production of charcoal as source of additional income		37,926
Subtotal: Component 3			***186,926***

Component 4: Knowledge and skills management	4.1 Community mobilisation climate risk management and preparedness planning	Timeliness and quality of climate risk information (CRI) disseminated to farmers enhanced (through use of short-term weather forecasts, medium-term seasonal forecasts, and longer-term climate scenario planning); Knowledge, understanding and adaptive capacities of farmers and extension officers improved	10,850
	4.2 Dissemination and strengthened disaster risk management for climate-induced risk		20,850
	4.3 Building to farmers and students related to risk management for climate-induced risks		31,850
Subtotal: Component 4			***63,950***
1. Project Activities Cost (A)			626,576
2. Project Execution Cost (B)			65,668
3. Total Project Cost (A+B)			
4. Project Cycle Management Fee (C)			58,756
Amount of Financing Requested (A+B+C)			**750,000**

4 Projected calendar

The project calendar appears in Table 8 below.

Table 8: Project calendar

Milestones	Expected Dates
Start of project implementation (Inception workshop)	February 2017
Mid-term review (if required)	December 2018
Completion of project implementation	January 2020
Terminal evaluation	August 2020

PART II: PROJECT / PROGRAMME JUSTIFICATION

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

5 Project components

5.1 Component 1: Enhancement of crop farmers' adaptive capacity to temperature variability

Component 1 in the Omusati region targets two irrigation communities using water from the Kunene River in Angola, namely:

- 132 small-scale farmers at the community-based Etunda Irrigation Scheme. About 67 farmers are fully supported by government.
- 65 small-scale farmers at Epalele, a purely community initiated irrigated crop project.

It is deemed that this project component will not create environmental and social risks, since it is aimed at strengthening community resilience to climate change at an existing enterprise.

Component 1 will render the following outputs:

Output 1.1: 600 ha will be covered with shade nets

Seasonal shifts in rainfall, temperature and humidity (heat wave and frost) give rise to production and quality problems, including pressure from pests, diseases and weeds. These cannot currently be predicted with much certainty. Temperature extremes, especially heat waves, will have negative impacts.

Very little work has been done with shade cloth for field production of vegetables in Namibia, although a few growers have successfully incorporated shade cloth into their production systems. Certainly, leafy green production could benefit, potentially extending the production of lettuces through the summer. Research has shown that the potential for shade cloth can improve quality in peppers and tomatoes, allow for the summer crops such as lettuce produce more, and improve the production of repeat blooming in summer months.

There are a number of different types of shade cloth available. The most common colours are black and green. However, white or aluminized shade cloth may offer additional cooling. Other colours such as red may benefit specific crops by filtering different wavelengths of light. However, to cut down light can impact significantly on photosynthesis. Normally vegetable crops require shade between 20% and 40% of light reduction, with about 30% being the most common recommended practice.

The following systems will also be integrated with the use of shade cloth:

- Conservation tillage to conserve soil moisture.
- Good crop rotations for maximising the benefits of nitrogen-fixing species (e.g. legumes preceding a wheat crop). These two mentioned systems will be integrated to shading system.

Activities under Output 1.1 include:

Activity 1.1.1: Design and co-finance technically and environmentally appropriate shade nets.

Activity 1.1.2: In consultation with irrigation role players or actors, revise/develop a good irrigation management system (including conflict resolution).

Activity 1.1.3: Organize training sessions on relevant know-how and the technological means to manage the system.

Activity 1.1.4: Organize awareness raising events for community members on climate risks, resilient water use, participatory management of the water systems and irrigation management.

Activity 1.1.5: Produce a technical report on the effectiveness, success and challenges in enhancing the sustainable small-scale irrigation system. Establishment of a robust M&E framework at the inception phase of the project will capture the use, effectiveness in terms of enhancing water access, and irrigation management.

Output 1.2: 132 small-scale farmers will be trained on post-harvest; develop packing, storage and ICT system

Postharvest losses may be both the physical losses (weight and quality) suffered during handling production operations and also the loss of opportunity as a result of producers being unable to access markets or only having lower value markets due to sub-standard quality or inadequate market information.

Weight losses are normally expressed as loss in dry matter, i.e. this does not include any changes in weight due to changes in moisture content. The weight losses are estimated in two ways, 1) by collecting and weighing at different production level; e.g. grain that is scattered or spilt at harvest, during threshing, transport etc., and 2) by determining what weight of grain remains after a postharvest activity, e.g. after farm storage where pests may have consumed some. For example, in Southern Africa 10% of the potential crop is lost during harvesting and a further 10% is lost during threshing, then another absolute loss during harvest accounted for 15%; then the cumulative loss in all stages accounted for 35%.

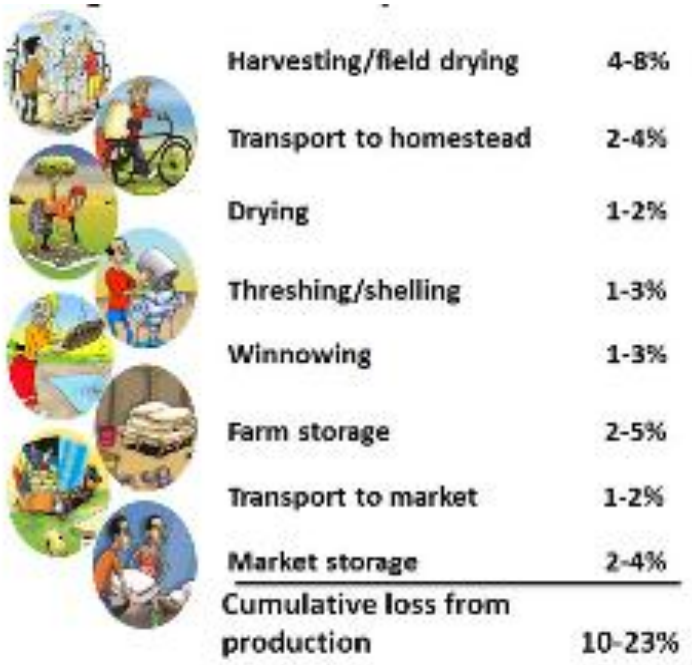

Figure 4: Weight loss in the postharvest chain for cereal grains in Sub-Saharan Africa

Grain quality may decline due to poor handling that allows:

- ***Contamination with foreign matter:*** Foreign matter accumulates during the early stages of postharvest handling when there is insufficient care at harvesting, drying and threshing and then the accumulation of filth may continue due to the activities of insects and rodents.

- ***Mechanical damage during handling:*** Breakage may happen at any point during postharvest handling and storage, but is especially a problem during threshing. For example, many farmers thresh maize by placing maize cobs in a sack and beating them with sticks. This results in a high proportion of broken grain.

- ***Insufficient drying:*** Grain soon after harvest will start suffering quality decline due to attack by moulds. Moulds may develop on the surface of grain that is above the safe moisture content, which under hot tropical conditions is around 14%. High moisture content is also favourable for the development of insect infestation and for grain discolouration, which is typical in Namibia.

- ***Insufficient protection during storage:*** Poor storage arrangements can allow the entry of water, access of insects and rodents, and chemical browning reactions that lead to grain discoloration.

To handle the above mentioned problems, the following activities will be performed:

Activity 1.2.1: Organize sessions and trainings targeting small-scale irrigation relevant know-how and technological means to manage the post-harvest handling.

Activity 1.2.2: Design local made packing and storage facilities to reduce post-harvest losses, apply managerial and technical interventions such as introduction of harvesting techniques and improved marketing systems.

Activity 1.2.3: Appoint ITC enabled agricultural extension worker to support small-scale production and the marketing side. Provide information to farmers on market prices for commodities, advance weather information so farmers can plan well, farming best practices, and supplier directory. Institute mobile survey-based collection of farm data, do data analysis and provide Geographic Information System (GIS) data.

The four thematic areas that ITC will support are illustrated in Figure 5 below.

Figure 5: Thematic area where ITC is able to support

5.2 Component 2: Technical good crop production management systems and introduction of efficient irrigation technology systems

The main outcome of Component 2 is increased diversification and resilience of the most vulnerable small-scale irrigation farmers in Namibia; this includes improved technical crop production management systems and efficient irrigation technology. Namibian small-scale farmers face multitude challenges that include high investment costs, poor planning and lack of maintenance of their implements, inefficient and inappropriate irrigation systems that never considered the impact of climate change induced risks, and extension services that are not trained specifically on irrigation technologies and climate related risks. In summary (i) Poor initial planning led to poor operations; (ii) Farmers did not see the benefits of investing in better irrigation systems due to lack of awareness and resources, and (iii) infrastructure was not maintained.

Therefore, Component 2 comprises promotion of climate-resilient agricultural methods that will have two outputs, namely technical crop production management systems and efficient irrigation technology.

Output 2.1: Strengthening better crop management and irrigation for small-scale irrigation farmers

In the first fold of the methods under this component will include improvement of plant density by optimizing plant population and row spacing; drought-tolerant crop varieties (such as groundnut, sorghum and pearl millet); and also better weed; surface mulching to reduce water evaporation, improvement of soil quality by means of maintaining the soil cover to protect the soil physically from sun, rain and wind, and to feed soil microorganisms; and integrated nutrient management for improving the physical, chemical and biological characteristics of the soil. Soil conditions in Namibia is already in deteriorated state in general from recurring drought- and flood-induced erosions and are likely to be exacerbated under intensifying impacts of climate change unless these resilient agricultural methods are implemented effectively. Investments on enhancing water efficient irrigation will improve the situation.

Activities under Output 2.1 include:

Activity 2.1.1: Organize training events on a range of climate-resilient farming methods targeting group and extension workers; including drought-resilient crop varieties, optimization of plant population, weed control and crop and surface mulching.

Activity 2.1.2: Establish participatory demonstration plots in small-scale irrigation farmer sites and undertake field trials of drought resistant crops and drip irrigation techniques to enable local dissemination and transfer of adaptation know-how.

Activity 2.1.3: Organize exchange visits and farmers' field school involving project and non-project community members; students, government institutions, agricultural extension officers and Non-governmental Organizations (NGOS) will benefit.

Activity 2.1.4 Produce at least one technical report capturing lessons learnt on the effectiveness of drought-resilient farming methods.

Output 2.2: Water saving efficient drip irrigation introduction to 132 small-scale farmers; that covers around 600 ha

The aim of this output is to improve inefficient irrigation projects encountered, that can help to inform strategies for sustainable future management and water use in the Namibian agricultural sector by (i) Identifying cost-effective, sustainable and profitable irrigation (ii) exploring the role of farmers in design, management and maintenance, and (iii) ensuring that irrigation contributes its maximum potential to a vibrant agricultural sector. It is important to note this output aligns with the Comprehensive Africa Agriculture Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) which has identified land and water management as a priority, and that it is intended to extend the area under sustainable land management and reliable water control systems.

Activities under Output 2.2 include:

Activity 2.2.1: Install water saving drip irrigation and solar pumping systems.

Activity 2.2.2: Improve production systems by putting sustainable systems in place. Presently, there is a lack of consistent use of improved seeds, low use of organic and inorganic fertilisers, crop protection is not well developed, and integrated pest management practice is not applied.

Activity 2.2.3: Instruct farmers on irrigation technology and encourage them to regularly contribute money to facilitate ownership.

Activity 2.2.4 Produce at least one technical report capturing lessons learnt on the effectiveness of drought-resilient farming methods.

5.3 Component 3: Sustainable bush thinning and re-seeding of degraded grazing areas

This component will benefit 1,500 households of Otjinene and Epukiro constituencies, representing 50% of the 1,400 and 1,600 households in Otjinene and Epukiro respectively. It is important to note that the sample represents about 10% of the total population of the Omaheke region.

The primary rationale for selecting these two constituencies was climate variability and change factors. However, the secondary reason was intensity of bush encroachment causing drastically reduced land and soil productivity, which accounted about **8,119 and 7,735** bushes per ha for Epukiro and Otjinene respectively.

Learning from the community-based adaptation (CBA) strategy documented by the Namibia Small Grant, which is supported by the GEF, it is intended to ensure local stakeholder level participation prior to implementing any concrete investment activities under ***Component 3***. Thus, just before the commencement of Component 3 there will be participatory community-based assessments, which are essential for community-based organizations and village stakeholders to verify and confirm the specific locations and site-specific design elements of livestock adaptation measures in the community context. These assessment activities will not only assist to ensure that the AF outcome alignments are adhered to, but that the project investment activities will be carried out in compliance with national standards particularly to comply with the Environmental Management Act No 7 of 2007 and associated regulations. As the proposed activities will not alter any existing land use, there would be no clearing of virgin lands as production systems will be integrated in the existing landscape of the project sites. However, where de-bushing and re-seeding is to be undertaken, full scope of precautionary principles as well as national botanical guidelines will be adhered to including the principle that only indigenous species will be used.

Output 3.1: Selective bush thinning on 200,000 ha to allow grass growth and species diversity (estimated that about 50% of population in targeted constituencies will benefit; i.e. about 1500 households)

Climate-related shocks and economic stresses in rural households have been identified as the most important cause for a decrease in the numbers of livestock. The major factors determining the functioning and dynamics of savannas are the following:

Primary determinants, such as rainfall, soils and nutrients, are functions of a specific geographical region and are to a certain extent beyond the farmer's control. Rainfall, together with soil moisture balance, has an overwhelming effect on vegetation structure, composition and productivity.

Rather than a gradual annual increase in bush numbers, the general view is that woody plants establish in large numbers during certain years, and at varying intervals. Prolonged denudation of soils caused by droughts and grazing, followed by above-average rainfall years with frequent rainfall events, favour mass tree recruitment.

Secondary determinants act within the constraints imposed by primary determinants. They can often be directly modified by management. The exclusion of occasional hot veld fires, replacement of most of the indigenous browsers and grazers by livestock, injudicious stocking rates, poor rangeland management practices, and artificial water points are regarded as the major causes of bush encroachment. In the past, **high-intensity** fires played a major role in maintaining open savannas. However, with the introduction of cattle farming, veld fires were suppressed and this is regarded as a major factor contributing to bush encroachment. Although fires kill tree seedlings and saplings, mature woody plants are seldom killed but are encouraged to regenerate and grow actively. High-intensity fires are regarded as a prerequisite for effective burning. These fires depend largely on the amount and structure of the fuel, its moisture content, the prevailing atmospheric humidity, and wind speed. Thus, fire is not effective where high bush densities occur, but it can serve as an effective management tool for modifying the structure of the woody layer and as an aftercare treatment. Together with an increase in domestic livestock (grazers) and a **decrease in game numbers (browsers)**, the pressure on the grass layer has increased, the competitive advantage of a vigorous perennial cover has declined, and a more favourable environment for the woody component has been created. Although some research findings indicate that the seeds of Acacia mellifera, for example, are not transferable from one season to another, factors like seasonal dormancy, hard-seededness and the presence of allelochemicals have caused the seed content in the soils to gradually built up, resulting in several hundred seeds per square metre. Furthermore, the absence of ungulates in tandem with the suppression of fire creates favourable conditions for bush encroachment.

Activity 3.1.1 Assess the existing pastures across all significant pasture zones identified on the farm. This procedure assists you to assess the current pasture base, outlines what improvements can be made and when to consider introducing new species. Collect additional information on new and alternative pasture species, including their seasonal growth patterns.,

Activity 3.1.2 Cutting (bush thinning) to increase plant tillering, using high density, short-term grazing or cutting to prevent undesirable annual grasses from reseeding and maintaining perennial grass and clover cover to limit germination of annuals in autumn (follow the grazing management tactics to increase, maintain or decrease individual species).

Activity 3.1.3 Address soil health and soil fertiliser content for the most responsive and desirable species.

Activity 3.1.4 Use tactical herbicides to control weeds (e.g. low chemical rates in a spray-graze, allowing desirable pasture species to recruit through setting and dropping seed before grazing or cutting).

Output 3.2: 200,000 ha will be re-seeded with grass cover; estimated about 50% of the population targeted constituencies will benefit (that is about 1500 households)

Changes in rainfall, runoff, infiltration, temperature and evapotranspiration will bring concomitant changes in structure and function. Midgley *et al.* (2005) expect grassy savanna to lose its spatial dominance to desert and arid shrub land vegetation types. They predict that arid vegetation types will increase their cover by up to 20% by 2050 and up to 43% by 2080, in the absence of a CO_2 fertilization effect. There will be changes in species suitability for specific areas and particularly shifts in the ranges of C3 and C4 species. C4 species will probably retreat in a north-easterly direction with C3 species (including bush) filling this gap. If the fertilization effect of higher CO_2 in the atmosphere is taken into account, the predicted C3/C4 shift is even more dramatic, as C3 species are generally advantaged by CO_2 stimulation; bush encroachment will likely increase towards the north-east of Namibia (where the project area is).

Activity 3.2.1 Reseeding and maintaining perennial grass and clover cover to limit germination (following the grazing management tactics to increase, maintain or decrease individual species)

Activity 3.2.2 Manipulate the species mix to achieve the right pasture composition.

Activity 3.2.3 introduce high root biomass of some grasses and the overall greater average root biomass of diverse plots that promote the retention of N by preventing leaching

Activity 3.2.4 (1) Test for a “fertility effect” - the positive effect of plant diversity on soil fertility (Zak et al., 2003) - using additional measures of fertility; and (2) Determine the additive of species traits (“additive fertility effects”), the interaction of species traits (“interactive fertility effects”), or both. Because plant growth is an integrated measure of soil nutrient availability, seedling bioassay is used to assess how plant diversity influences the fertility of soil beneath species-poor and species-rich plant communities.

Output 3.3: Sustainable production of charcoal as source of additional income

Encroacher bush is currently seen as a huge problem, but it is possible to change this into an opportunity. Firstly, there is the option (already applied to some extent) of using bush for fire-wood and charcoal. Secondly, technology has advanced to such an extent, and is becoming more affordable, to convert bush into electricity and/or bio-oil and/or biochar, by the process of pyrolysis. Thirdly, there may be future opportunities under the UNFCCC Clean Development Mechanism

(CDM). It is quite likely that the CDM Executive Board will in future allow the use of biochar (which is a way of extracting carbon dioxide from the atmosphere and burying carbon in the form of very stable soil organic matter for hundreds to thousands of years, while at the same time improving soil quality) as a methodology under the CDM. Implementation of energy efficient technologies and measures, and use of renewable energy in farming operations could be financially supported by using either the compulsory (i.e. CDM) or voluntary carbon mechanisms.

Activity 3.3.1: Production of charcoal or wood that benefit farmers as additional income.

5.4 Component 4: Knowledge and skills management

Component 4 will increase the timeliness and quality of CRI accessed by farmers. Enhanced quality of CRI entails the effective use of short-term forecast information, medium-term seasonal forecasts, and longer-term climate scenario planning, the national mechanism to disseminate early warning information have changed considerably. However, there are still significant shortcomings in the current information dissemination framework and farmers' capacity to interpret and respond to CRI and seasonal forecasts remains severely limited. This component focuses on establishing and strengthening institutional capacity to disseminate CRI, both short-term and long-term, in an efficient and timely manner while at the same time, building the capacity of the farmers, and NGOs who support them, to interpret such information. Efficient and timely delivery of improved climate information, in turn, will have a positive cascading effect to the effectiveness of the other three components as it will trigger adaptive behavioural change for improved water conservation, crops and post-harvest practices. Outcome 4 will be achieved through the following outputs:

Output 4.1: Community mobilisation,climate risk management and preparedness planning

This output will ensure availability and communication of climate-related risk, vulnerability and hazard information to local organizations and farmers. The aim is to enable informed planning and investment decisions about appropriate risk reduction measures, and communicate which actions can be taken in advance of impending climate hazards to reduce human, material and livestock losses by extreme events.

Given the unpredictability of extreme weather events and the intensity and frequency of changes between dry spells and intensive rainfall, the need for accurate risk and hazard maps is paramount to enable effective investment decisions in different risk reduction measures and to prevent catastrophic losses for the most vulnerable groups in affected communities.

Activities under Output 4.1 will include:

Activity 4.1.1: Synthesize available information on future climate (in collaboration with the CRI Sub-committee at national and regional level).

Activity 4.1.2: Organize a training or event, inviting a regional expert on participatory vulnerability assessments, targeting local NGOs, and regional and local affairs entities.

Output 4.2: Information dissemination and strengthened disaster risk management of climate-induced risk

This output focuses on strengthening the nascent framework at the local level for disseminating climate and disaster risk information. In the initial 3-4 months, awareness generation workshops will be held with the proposed project communities of the project regions, which will help the communities to understand the climate related risks and hazards as well as the techniques available for minimising the risks involved. These introductory workshops will involve vulnerable community members, including youth and women.

This output has a strong capacity building element through knowledge management and information sharing. By virtue of the project executing entity being a Higher Education Institute a strong focus will be on involvement of students through: (i) internships and (ii) research projects (from both undergraduate and postgraduate students).

Production of information packages (e.g. maximising yield per ha) is proposed. Seeing information and knowledge as components of adaptive capacity would encourage actors to put more emphasis on giving community with a wider range of information, appropriate to circumstances and future scenarios; giving community the tools to useful information for them; and **turning information into knowledge** by supporting communities' ability to use the information for decision-making.

Activities under Output 4.2 will include:

Activity 4.2.1: Finalize operational procedures for the CRI in coordination with the Ministry of Environment and Tourism (MET) climate change action research team and MAWF to align with the national climate change strategy and action plan.

Activity 4.2.2: Organize a national level workshop on communication strategies of CRI; and organize regional training on CRI tailored for agricultural use.

Activity 4.2.3: Organize community level trainings on interpreting publicly available weather forecasts broadcasted through TV and radio; seasonal forecasts, agro-meteorological bulletins, communal hazard maps and early warning information.

Output 4.3: Capacity building to farmers and students related to risk management for climate-induced risk

Students will be attached for six months to the project as interns as part of the work integrated learning curriculum of NUST. The benefit of the internship with communities for six months would be:

- Obtaining work experience and transferable skills that fit within Namibian socio-economic situation and cultural setup. Students who will be attached should be candidates who understand the culture and custom of society so that good trust and relationship can be created
- Students will earn course credits - through practical teaching experience students become more competitive and capable to solve climate related problems

- Gain practical experience by applying methods and theories learned in classes: Many people learn best by being hands on. But everyone can benefit from practical exposure of what they have been learning in class, put to action; whether it's in agricultural research lab and marketing development meeting, specifically related to climate change.

Additional advantages of this type of linkage will be: (i) professional ideological education - it makes clear the specialty orientation; (ii) specialty understanding and practice - it strengthens and stabilizse students' thoughts about their specialty; (iii) curriculum experiment - it helps students master the methods and means of doing basic experiments and trains their action ability and basic skills; (iv) course practice - through combination of theory and practice it consolidates students' mastery of theories; (v) curriculum design - it promotes the cultivation and training of the ability to solve social practical problems with the application of specialized theories; and (vi) training at practice base - it helps students participate in special training platform which combines real agricultural production, study and research, further trains students' comprehensive ability to analyse and solve problems and cultivates their ability to be a team player.

Activity 4.3.1: Develop a module on climate change, irrigation management and post-harvest handling that targets farmers and students.

Activity 4.3.2: Student attachment - in this component two levels of student researchers will be involved, namely undergraduate for 6 months and postgraduate for a minimum 2 years and a maximum of 3 years project involvement.

B. Describe how the project/programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.

6 Economic, social and environmental benefit

The targeted primary beneficiaries are about 132 small-scale irrigation farmers at Etunda and Epalela in the Omusati region and about half of the 3,000 households at the Otjinene and Epukiro constituencies in the Omaheke region.

Omusati region

At Etunda Irrigation Scheme the primary beneficiaries will be about 67 of the 90 small-scale irrigation farmers (SSIF), who are currently applying conventional farming. The selection of farmers will be largely on the basis of climate related impacts and other factors such as vulnerability. At Epalela, that is Community Initiated Irrigated Crops, about 65 subsistence farmers will be primary beneficiaries.

Both farming communities are mainly using water supplied from the Kunene River in Angola or rainwater from flood plains within the Cuvelai system. The on-going farming activities of the small-scale irrigation farmers are affected by (i) high temperatures and heat waves in summer, (ii) frequent exposure of crops to frost in winter, (iii) limited rainfall and (iv) post-harvest losses due to increased heat waves and drought.

Small-scale farmers will benefit from the project through additional investments in natural and productive capital that includes improved water saving irrigation system, post-harvest management, crop and irrigation management, early warning systems and also from better understanding of climate change.

Omaheke region

This is predominately a livestock farming area, with specific problems related to (i) bush encroachment and (ii) loss of soil cover and nutrients. The Epukiro and Otjinene constituencies were selected as **project** targets due to the presentence of the highest bush densities among the eastern communal areas of Namibia in the Omaheke region; which is accounted for 8,119 and 7,735 bushes per ha respectively. This project will benefit about half of the 3,000 households of the two constituencies, being 1400 and 1600 for Epukiro and Otjinene constituencies respectively; and which represents about 10% of the total population of the Omaheke region.

6.1 Economic benefits

Economic benefits of the project can be broadly categorized into two types: reductions in potential losses of agricultural produces or assets (e.g. livestock or built structure) imposed by additional climate risks; and enhanced/diversified income opportunities especially for the marginalised group that includes women and youth farmers.

Within the context of the proposed AF project, farmers in Namibia have historically faced economic losses primarily in the form of crop losses due to climate anomaly during the cultivation or due to post-harvest losses, livestock losses (or its productivity) due to higher bush encroachment and fodder, and losses of crop, livestock and infrastructure. Presently, losses from these shocks are unexpected and extremely difficult to buffer for most vulnerable farmers due to multiple factors as described in the Underlying Causes section. A suit of interventions proposed in the project will equip them with a range of options that increase their resilience to and reduce potential losses from such shocks.

6.2 Social benefits

General

Expected social benefits from the project are multiple and interrelated with economic and environmental benefits that will be brought about by the project. Most importantly, a dedicated component focuses on increasing resilience to climate change through better irrigation farming systems that include introduction of technology and for the second site better range land management on the existing source of livelihood. It is important to note that Namibian farmers are already highly vulnerable to the current climate variability, let alone the future climate variability that is predicted to be larger.

It is also important to note that natural disasters not only destroy economic assets, but also impact social cohesions as the lack of economic viability accelerates outgoing migration trends in search for income earning opportunities. CRI dissemination networks as well as heightened awareness will also increase the preparedness of vulnerable communities.

Women and vulnerable communities

Historically rural women are constrained by unequal access to productive resources and services and inadequate or inaccessible infrastructure. The limitations rural women face in turn impose huge social, economic, and environmental costs on society as a whole and rural development in particular in Namibia, as a result agricultural productivity lags behind. Thus from this project women and vulnerable communities will benefit from higher access and participation; as the main target of this project will be to women and vulnerable communities.

Economic empowerment is important as a means of guaranteeing families' secure livelihoods and overall well-being. Women and vulnerable communities' economic empowerment can have a positive impact and interconnected with, their social and political empowerment, through their increased respect, status, and self-confidence and increased decision-making power in households, communities, and institutions. While there is a strong "business case" for addressing women and vulnerable communities' economic empowerment

This project will enable women and vulnerable communities' greater access to productive resources, and enable greater integration.

Women are crucial in translating agricultural production into food and nutrition security, and the well-being of, their families, their communities which improve capabilities of the society

6.3 Environmental benefits

In terms of the Environmental and Social Policy of the AF, this project is classified under Category C, i.e. the implementation of the project adaptation activities will not cause any environmental and social harm. Furthermore, the project sites have been selected on existing land use practices which are to be improved with adaptation measures and options, thus no land use change is likely to occur due to the project activities.

6.4 Benefit summary

Table 9: Benefits, baseline and project impact

Baseline	After the project
Social benefits	
Existing water resource management practices do not consider equality issues and buffer capacities for times of drought or flood	Better social cohesion and community cooperation through climate-sensitive water resource management
Prevalence of diseases in times of drought or flood, due to pollution of limited water resources	Health benefits through improved access to safe water sources and reduction of water-borne diseases
High economic loss and food security compromised due to climate change: For crop farmers due evaporation, heat waves & frost; for crop farmers; for livestock farmers due to bush encroachment	Improved social wellbeing, through improved income that contributes to poverty reduction and food security
Limited awareness of climate change-related impacts, emerging risk patterns and appropriate no-regrets adaptation options	Better enhancement of community networking and information sharing on climate change adaptation capacity for disseminating and interpreting early warning information to mitigate the risks of such hazards
Reactive response to hydro-meteorological hazards which increases the potential need for costly humanitarian relief and subsequent high social inequality	Abated economic and human losses from increasing and intensifying incidents of climate-induced disasters
Economic benefits	
Induced risks for small-scale irrigation crop farmers: Summer crops - as a result of heat waves crops are desiccating, leading to lowered yield and eventually to economic losses, and food insecurity; Winter crops - experiencing frequent frosts, leading to lowered yields, economic losses and food insecurity. The use of flood irrigation is associated with	Crop farmers will increase their income from better adaptation to climate change; thus will improve standard of life rural community and will have better food security.

high evaporation, reducing crop water use efficiency	
Experiencing high bush encroachment, which causes a decline in pasture production. Thus, lowered carrying capacity for cattle production, consequently leading to income losses and food insecurity. Frequent droughts reduce soil cover by grasses and herbs which otherwise protect the soil from erosion. This increases vulnerability of ecosystem services (e.g. nutrient recycling, etc. and cause a decline in perennial component of pasture	Livestock farmers will increase their income from improved rangeland carrying capacity; rural communities will have an improved standard of life and will have better food security Value addition of from debushing will provide additional income that contributes to the better standard of life
Environmental benefits	
- Land and soil degradation due to reduced plant cover and soil organic matter - Low plant cover due to insufficient growth - Reduced carrying capacity for livestock production - Increased erosion - Dune activation - Lowered crop and pasture production All of these will result in a general condition of desertification and increased vulnerability	Better irrigation management will conserve water and reforestation will improve soil fertility, retain moisture, and restore ecosystem resilience and protective ecosystem services - Improved runoff management and infiltration of both rangelands and arable areas will reduce soil erosion and land degradation - Carbon sequestration will be increased through reforestation, watershed area conservation, and the establishment of agroforestry systems - -Dependency of communities and livestock on fragile and remnant natural resources for fuel wood, construction and fodder will be reduced

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

7 Analysis of the cost-effectiveness of the proposed project

7.1 Cost effectiveness of decentralized, community-driven resilience vs. top-down relief planning

'Bottom-up' community resilience, as opposed to top-down government planning, is a framework for understanding and managing complex socio-ecological systems such as the ones represented by the proposed target areas. The local resilience approach emphasizes principles of flexibility rather than stability and is based on the premise that resilient local systems are adaptable, flexible, and prepared for change and uncertainty. Refer to Figure 6 in this regard. In contrast, non-resilient systems are prone to irreversible or catastrophic losses, and irreparable economic damage.

Managing for resilience at the local level realizes the practical opportunities provided by effectively managed ecosystems in supporting the environment and dependent human communities to absorb climatic and economic shocks, regenerate and reorganize so as to maintain key functions, economic prosperity, social well-being and political/social stability: By implementing this project in a community-driven and participatory manner, the impact of the project will contribute to greater abilities of local communities to 'bounce back' from climatic extremes. This, in turn, will reduce dependence on state interventions and humanitarian relief by the central government. Greater community resilience will contribute to greater equality between regions and thereby reduce potential for political/social conflict. In the immediate term, the resilience approach proposed by this project is supporting physiological acclimation by vulnerable ecosystems to climate change, while reducing the magnitude of humanitarian costs associated with rapid ecosystem degradation or collapse. In addition, it facilitates the necessary diversification of dependent communities to alternative food, livestock and income sources. Along these lines, the proposed resilience approach is providing much greater long-term economic benefits than emergency response, disaster relief or retrofitting of critical infrastructure.

The proposed action in this project will be linked to various focal areas, such as regional rural development agenda that consider climate long term resilience of farmers interlinked to the dimension of development, such as social services versus increasing productivity, or subsistence production versus market-oriented production. Rather, it should follow a people-centered and livelihood-oriented approach, based on the specific regional circumstances and needs (see also Figure 6).

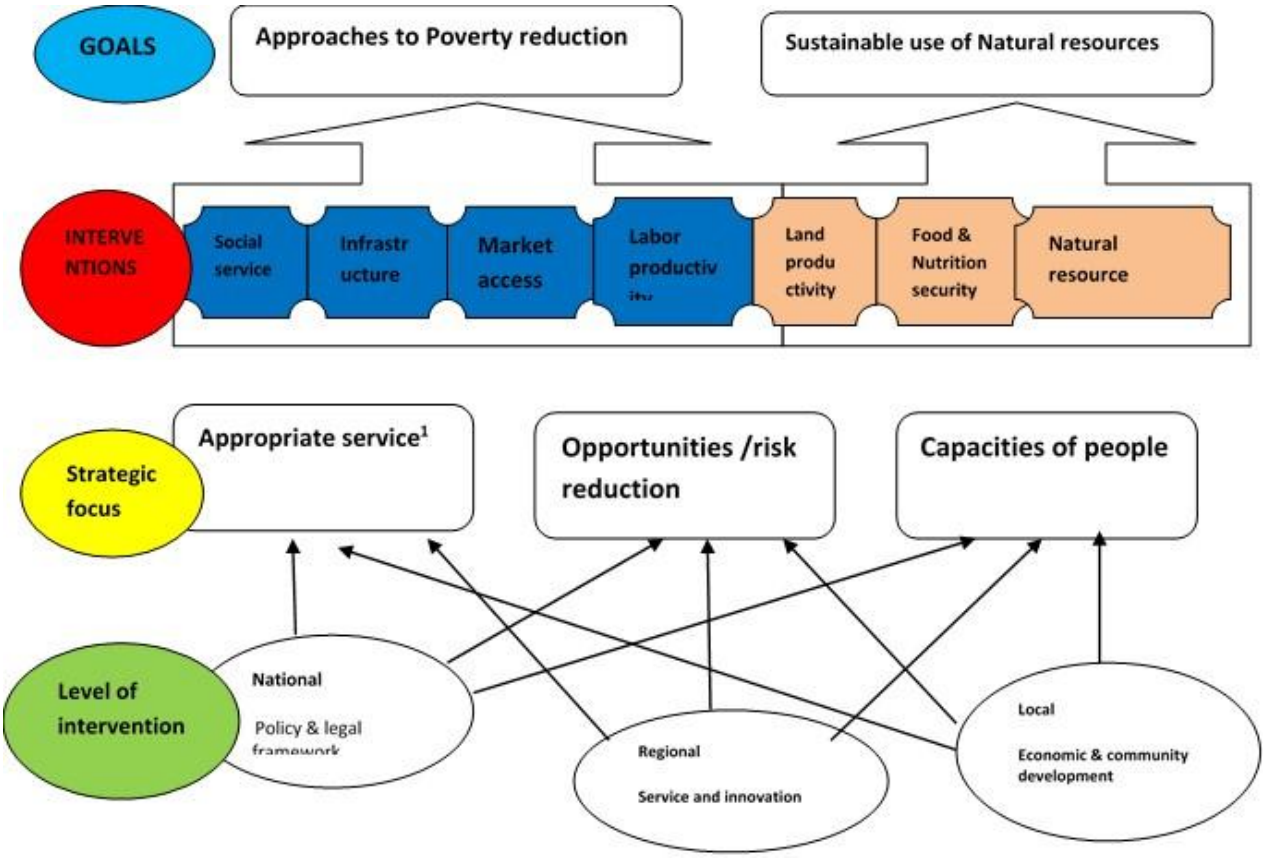

Figure 6: Regional Rural Development concept
Source: Rauch T, Bartels M, Engel A (2001)

Its focus should be on the *region* as the **level of intervention**, but also to get involved in designing *local* level interventions such as farming systems development and community-level organisational development, with proper *national* level interventions, e.g. decentralisation policy or land legislation (see also Figure 6).

The focus should be regional to:

- Ensure solutions with regard to the natural and the socio-cultural and environmental conflict;
- Establish target group specific accessible support and service systems with successful coping strategies to adopt risk;
- Link national (sector) programmes with local needs;
- Provide sufficient flexibility that can ensure effective participation of communities in the design and implementation of regional programmes;
- Provide a forum where regional or local communities can interrelate with government;
- Ensure that programmes are designed with due consideration of the wider spatial context of market systems, service systems and ecological systems and take account of comparative

local advantages, economies of scale, replicability, and synergy effects, and are not simply an addition to local action plans.

An alternative to this community resilience & empowerment approach is a sectorally-driven, top-down approach where adaptation resources are allocated to line ministries and departments and a cookie-cutter adaptation planning is made at the central level. This approach is thought to be less desirable for two reasons from the stand point of cost-effectiveness. Firstly, is the significantly limited outreach of line departments in Namibia. Secondly, a centrally (or sectorally) driven model is likely to have lower return on investments in the medium- to long-term as the design, locations, and local management structure almost always fail to reflect the needs of local community. The mismatch between the needs and government provision leads to loss of interests among community, lack of ownership, and eventual abandonment of the investments. Although this approach would still contribute to building technical capacity of department staff for, for example, climate resilient water infrastructure design, but due to their limited outreach (compared with NGOs and CBOs), the application and replication potential beyond the project target sites is likely to be significantly limited.

7.2 Cost-effectiveness of different technical options

During preparation of this concept proposal, a number of alternative options to achieve the same intended outcome were assessed in terms of not only costs, but also effectiveness and feasibility. Table 10 below presents the comparison of proposed interventions against alternatives that can be considered.

Table 10: Summary of comparison for cost effectiveness

Adaptation Objective	Proposed Measures	Comparison with Alternative(s)
Enhancement of crop farmers' adaptive capacity to temperature variability	Introduction of shade net	Continuously irrigate to protect against heat wave, which is a water consuming strategy For frost use smoke or fire around the field, which cause fire accidents and contribute to burning wood that creates pressure on the resources
Introduction of technical good crop production management systems and introduction of efficient irrigation technology systems	Improved crop management (that includes plant density by optimizing plant population and row spacing); and introduction of drought-tolerant crop varieties. And also introduction of water saving drip irrigation with solar pumping system	*Terraced Irrigation:* this is a very labor-intensive method of irrigation where the land is cut into steps and supported by retaining walls. The flat areas are used for planting and the idea is that the water flows down each step, while watering each plot. This allows steep land to be used for planting crops *Sprinkler System*: this is an

		irrigation system based on overhead sprinklers, sprays or guns, installed on permanent risers. The system is buried underground and the sprinklers rise up when water pressure rises *Rotary Systems*: this method of irrigation is best suited for larger areas, for the sprinklers can reach distances of up to 100 feet. *Centre Pivot Irrigation*: this is a form of overhead irrigation. Steel or aluminium pipes are joined together, supported by trusses, mounted on wheeled towers. The sprinklers are situated on the length of the tower and they move in a circular motion The above theoretically impossible. 1) prohibitive cost (multiple amount of the proposed AF project budget); 2) technology which is difficult to operate and maintain by local communities; and 3) high operational costs to run the diesel pumping station; and 4) all of the above alternatives do not save water and energy at all
Improvement of carrying capacity for open rangeland livestock farming, by reducing bush encroachment on grazing areas, and carry out pasture re-seeding with both annual and perennial grass species	Bush thinning and re-seeding of grazing areas 1. Apply selective de-bushing 2. Apply methods for rangeland resting 3. Sustainable production of charcoal as source of additional income	Feedlot operation is not possible with Namibia stressed with water and feed requirement, which required to be purchased as imported commodities to Namibian farmers. The initial investment cost and operational cost is also very high

7.3 Increasing cost effectiveness through community contributions:

Cost-effectiveness of the proposed adaptive investments can also be enhanced through community contributions (which also have a positive side effect of stronger ownership and sustainability). Communities could contribute by means of voluntary labour and in kind contributions in site selection, planting and patching, mulching, irrigation construction, boundary demarcation and weeding.

7.4 Cost-effectiveness in day-to-day project operations

Operational cost effectiveness of the proposed project is further enhanced through the following characteristics:

- Throughout the project, AF resources will be aligned with the financing and delivery of project outputs that have competitive procurement components to ensure cost effectiveness.
- During the project preparation phase, the project will make an active effort to mobilize co-financing from different sources, which is expected to diversify financial risks and increase financial flexibility.
- A number of project activities will involve local communities and connect directly to local opportunities for the purchase of goods and services.

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

8 Consistency with sustainable development objectives of Namibia

The fourth National Development Plan indicated that the overall objective is high economic growth, employment creation and increased income equality. As a result, agriculture, tourism, manufacturing and logistics are identified as priority areas. Therefore, this project aligns with the national plans and priorities very well.

The climate change V&A assessment report by MET has prioritised four key sectors that are highly vulnerable and important to Namibia's economy and development sectors, these include: agriculture, tourism, health and water. This proposed project addresses agriculture as a vulnerable sector to climate change and variability. Both livestock and crop production systems are very vulnerable and support about 70% of Namibia's population.

The proposed project is fully aligned with the implementation of national policies and programmes that will assist Namibia to meet its obligations under the UNFCCC. Along these lines, it is based on findings from **1st, 2nd and 3rd National Communication to the UNFCCC**, which recommends adaptation measures for the agriculture sector including the use of high-quality, heat stress-tolerant plant varieties suited to local climatic conditions; adjustment of agricultural cropping systems to achieve greater diversification, multiple cropping, inter-cropping and mixed-cropping patterns; improved water management measures, such as water-saving, optimized fertilization, deep fertilization, flood prevention and control of soil erosion; and improvement of genetic strains of crops to adapt to climate change.

The Climate Change Strategy and Action Plan 2013-2020 (MET, 2014) indicates that the Namibia climate change strategy is divided into three aspects namely ***Adaptation, Mitigation and Cross-cutting issues for adaptation and mitigation***. Adaptation is to be addressed through three thematic areas: (i) food security and sustainable resource base, (ii) sustainable water resources,

human health and (iii) well-being and infrastructure, while sustainable energy and low-carbon development and transport will address the aspect of mitigation. Cross-cutting issues will be addressed by the following themes: capacity building, training and institutional strengthening, research and information needs, public awareness, participation and access to information, disaster reduction and risk management, financial, resource mobilisation and management, international cooperation, networking and technology development; and transfer and legislative development.

Adaptation

i. Food security and sustainable resource base

The poor and vulnerable, and especially women and children, will be severely affected. Therefore, under the theme of food security and sustainable resource base, the following will be strategic aims:

Agriculture

- Development of climate resilient cropping/ agriculture/production systems
- Development of climate resilient crop varieties/cultivars
- Diversification of agriculture and livelihoods
- Development of climate resilient livestock breeds
- Adaptation against drought

Forestry

- Conservation, utilisation and sustainable development of forest resources

Fisheries and aquaculture

- Conservation, utilisation and sustainable development of fisheries and aquaculture (including marine and freshwater aquaculture)

Coastal zone

- Conservation, utilisation and sustainable development of the coastal zone and its resources

Biodiversity and ecosystems

- Conservation, utilisation and development of biological resources and maintenance of ecosystems to ensure environmental sustainability

ii. Sustainable water resources

The Climate Change Strategy will therefore undertake the following with regards to water resources:

- Conserve and manage watershed/catchment areas
- Promote integrated development and management of water resources
- Promote conservation and sustainable utilisation of water resources
- Improve trans-boundary cooperation regarding water resources
- Support institutional and human capacity building in water resources management and use

iii. Human health and wellbeing

Poor sanitary conditions due to predicted floods in some areas as well as malnutrition due to reduced crop yields and reduced livestock productivity will increase child mortality. Therefore, the strategy will therefore address the following:

- Adaptation to climate change related health risks
- Assessment of impacts of climate change on human health and well being
- Expansion of health facilities and network to remote areas
- Improve capture, management, storage and dissemination of health information
- Improve access to sanitation and water
- Increase human resources capacity and improve efficiency
- Support action plans against HIV/AIDS

Cross cutting issues for adaptation and mitigation

i. Strengthening institutional capacity

Building human and institutional capacity to address climate change must be a fundamental component of the Namibia climate change strategy; lack of competent technical experts poses a serious capacity bottleneck in specialized fields and climate change is such one field. Hence the strategy will:

- Strengthen human resource capacity building for climate change
- Main-stream climate change in national, local and sector policies, development plans & program
- Strengthen institutional capacity for climate change management
- Mainstream climate change in the media
- Develop and implement educational program on climate change and its impacts
- Promote and facilitate development of educational materials on climate change
- Facilitate and support training of scientific, technical and managerial personnel in climate change
- Develop disaster risk reduction capacity building plans and programmes for climate change.
- Establish Climate Change Resource Centre and Climate Change database

ii. Research and information needs

There is a need to undertake research, especially in order to quantify the likely impacts and development of practical solutions for adaptation and mitigation.

- Collect data and model climate change at national, regional & local levels
- Monitor ecosystem and biodiversity changes and their impacts
- Conduct climate-proof research
- Undertake research on sea level rise
- Establish a centre for research and training on climate change
- Conduct inventories on traditional / indigenous knowledge and coping practices
- Undertake studies on the cost of adaptation and mitigation
- Study macroeconomic and sectoral impacts of climate change

iii. Public awareness, participation and access to information

'Knowledge-based economy and technology driven nation' was included in the fourth National Development Plan. In order to effectively address adaptation and mitigation, the public needs to be aware and have access to accurate, up-to-date information in order for them to effectively participate in climate change issues. The strategy therefore will undertake the following:

- Awareness raising and public education on climate change
- Promote and facilitate development of public awareness materials on climate change
- Facilitate access of climate change information to the public
- Promote public participation in addressing climate change and development of adequate responses

The government acknowledge that there is a need through the project, to break down existing barriers to adaptation, including: 1) lack of information at all levels, awareness, required skill and its management of climate risks, 2) weakness at local and national capacities to develop climate change strategies and adaptation measures and its dissemination and replication mechanisms, 3) poverty and the lack of resources to invest in soil and water preserving assets at the community and household levels that can improve livelihood of the community, 4) lack of alternatives to short-term and sustainable coping strategies, and, 5) institutional fragmentation which resulted to poor coherent strategy and projects that are complementary

As a result, the "***Namibian Climate Change Strategy and Action Plan"*** was developed as a tool to guide to tackle to the above mentioned challenges. The components and activities proposed under this of this project concept are clearly consistent with the government national and sectoral strategies related to climate change for ***Adaptation, Mitigation and Cross-cutting issues for adaptation and mitigation***. That applies to Component 1 (enhancement of crop farmers' adaptive capacity to temperature variability), Component 2 (technical good crop production management systems and introduction of efficient irrigation technology systems), Component 3 (bush thinning and re-seeding of grazing areas) and Component 4 (knowledge and skills management) that all

contribute directly to the "***Namibian Climate Change Strategy and Action Plan;*** as is presented below in Figure 7.

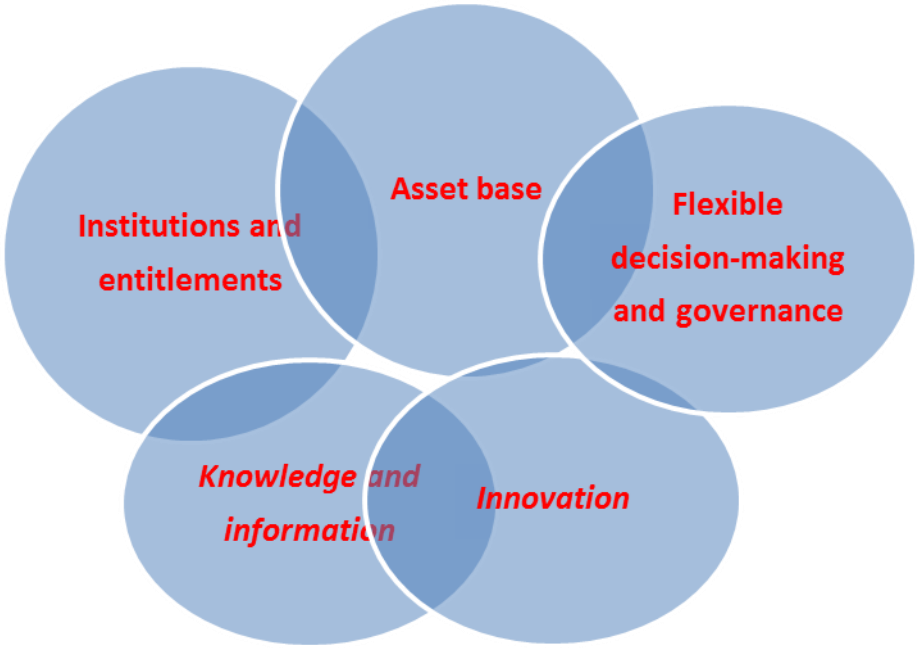

Figure 7: Graphical demonstration of adaptation reasoning

E. Describe how the project / programme meet relevant national technical standards, where applicable.

9 National technical standards

The Project activities will be carried out in compliance with national standards. The proposed interventions will adhere to national technical standards that are in force, particularly related to the operation and value addition. Through its training activities aimed at technical services the project will promote the knowledge and understanding of such standards. The following legal and policy framework will be complied with:

- ***Environmental Management Act, 2007 (Act No. 7 of 2007):*** the scale of the project and associated impacts are small and will not have significant negative impacts on people and the environment. There would no land clearing as production systems will be integrated in the existing land scape of the project sites.

- **Water Resources Management Act, 2013 (Act No. 11 of 2013):** The project would not require the drilling of new boreholes for the abstraction of ground water. Existing high yield boreholes will continue to be used for cattle watering purposes. The volumes of water to be used for irrigation will be minimal as efficient water use technology will be employed. Therefore, environmental impact assessment will not be required.

- **Soil Conservation Act, 1969 (Act No. 76 of 1969):** Soil pollution will be minimised as organic fertilisers (chicken manure) will be applied. The layout of the production system creates the conducive micro climate for crop growth through the use of natural and fruit trees as wind breaks and thereby prevent wind erosion. This is aligned with the requirement of the Act.

- **Agricultural Pesticide Act, 1973 (Act No. 3 of 1973):** Approved pesticide will be used in line with the requirement of the Namibian Agronomic Board.

- **Forestry Act, 2001 (Act No. 12 of 2001):** The project will not cut down trees and will indeed conserve protected trees such as Acacia erioloba and Boscia albitrunca that occur in the project area.

- **Communal Land Reform Act, 2002 (Act No. 5 of 2002):** The selection of project sites was done in consultation with local communities and traditional authorities. The latter are the custodians of the communal land and have jurisdiction over the use and allocation of land.

- **Health Act, 1977 (Act 63 of 1977):** Regulations promulgated under the Act govern, among others, the hygiene aspects of food premises and the transport of produce. Training and skills development intervention will ensure occupational health and safety standards of the workplace (project site).

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

10 Synergies and complementarities amongst various initiatives

At present, there is no other project which focuses on adaptation actions to projected risks and impacts as a result of climate change in the selected communities. Furthermore, there is no single initiative that is focusing on an integrated farming, ecosystems-based approach to reduce the vulnerability of local farmers. Thus, while this project will benefit from a number of synergies and complementary actions, it is the only one in the proposed sites that will implement a range of adaptation actions that directly responds to the recent V&A assessments and deals with the selected options.

The Ministry of Agriculture, Water and Forestry (MAWF), Directorate of Extension and Engineering Services launched a project entitled “Integrated Initiative in Support of Urban and Peri-Urban Horticulture Development” in Namibia Funded by the MAWF. The project technical specifications include:

1. Integrated production and protection management techniques
2. Micro-garden system
3. Micro-irrigation techniques
4. Cultivation of improved and adapted varieties

and has the ultimate goal of contributing to food security by improving access to high quality fresh horticulture produce at household level all year round; and also of promoting employment and

income for the less endowed population in the Urban and Peri-Urban environment. In addition to this, the project aims at:

1. Efficient water usage less insects and disease
2. Require little physical effort, weak/old and young can do it
3. Require limited space

Another initiative of government under the MAWF is to encourage the development of irrigation based agronomic production in Namibia (known as Green Scheme) with the aim of increasing the contribution of agriculture to the country's Gross Domestic Product and to simultaneously achieve the social development and upliftment of communities located within suitable irrigation areas, but to also promote the human resources and skills development within the irrigation sub-sector to possibly enhance cross-border investment and facilitate the exchange of relevant and limited resources with neighbouring countries. This aims to establish a commercially viable environment through effective public-private partnership, stimulate private investment in the irrigation sub-sector and settle small-scale commercial irrigation farmers.

Another bigger and multi-sectorial five-year project (2008-2012) initiative known as CPP ISLM works towards combating land degradation by using integrated cross-sectoral approaches, which would enable Namibia to ensure environmental sustainability as well as the protection of dry land ecosystems and their functions. The CPP-ISLM is a partnership programme between eight Ministries, namely the MET; MAWF; Ministry of Lands and Resettlement; Ministry of Regional and Local Government and Housing and Rural Development; Ministry of Mines and Energy; Ministry of Finance, Ministry of Fisheries and Marine Resources; and the National Planning Commission (NPC). The implementing partners include the GEF, United Nations Development Programme, the European Union (EU), German Technical Cooperation (GIZ), NGO communities such as the Namibia Nature Foundation (NNF), all aim at overcoming barriers to combating land degradation and its effects.

The Innovative Grants Mechanism (IGM) component was a small-scale pilot investment that financed tangible produce and practical results from the use of natural resources and its products. However, while it included those that contribute to improved land management it did not specifically target nor implement concrete adaptation measures as proposed in this project. The grant facility supported pilot community-based projects which broadly addressed the following:

- Income generating activities linked to sustainable land management that improve livelihoods through job creation
- Food security and capacity building in ISLM
- Activities that promote public-private partnerships in ISLM for sustainable livelihoods and activities that preserve and restore biodiversity in areas under greatest land-use pressure
- Actions for improving market access and performance of natural resources and products from improved land management
- Activities that mainstream biodiversity priorities into land use planning and policy-making

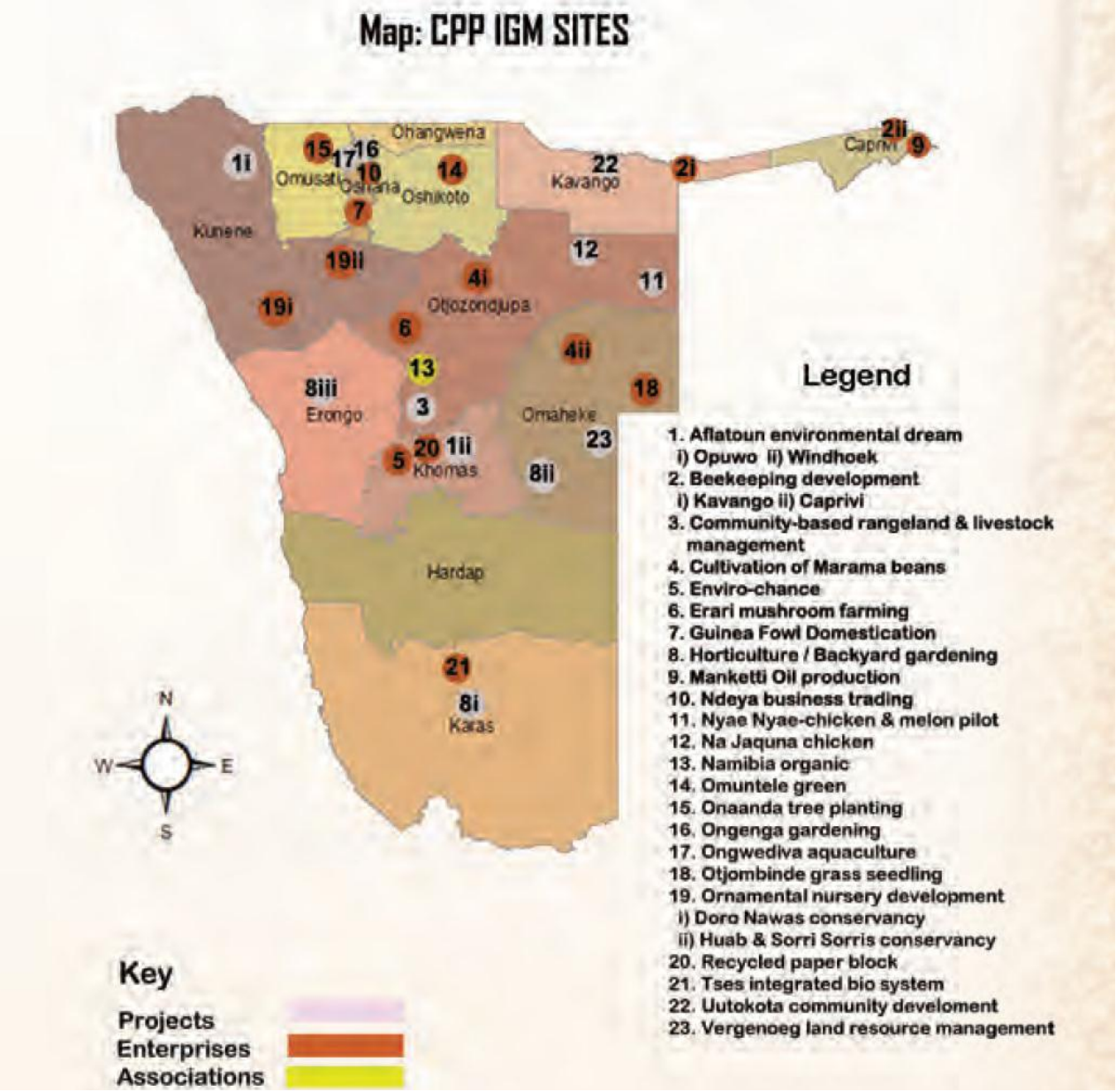

Figure 8: Similar CPP-ISLM project in Namibia

The project proposed here will overlap with the “Urban and Peri-Urban Horticulture Development” of MAWF; however, this project is focusing on rural communities to enhance climate resilience, which will make the two complementary in nature. In the two project regions there is no such project initiatives at all so far. The CPP-ISLM project will be used as the best model for designing this project; lessons will be learned from the CPP-ISLM reports and visits to the existing projects will enable implementation to be coordinated with those projects.

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

11 Learning and knowledge management

- **Technical Reports:** Reports will be produced that record the process followed to implement the project, including planning, organising, controlling and coordination of the project. All practices that had a significant impact on the project, the technical processes applied, the cost economics of the project and the impact on the communities will be included, as will the economic, social and environmental benefits achieved. of the project. Lessons arising from execution of the project will be identified and recorded.
- **Pamphlets:** Production and distribution of pamphlets will also be among the strategies for disseminating the lessons learned on the project.
- **Regional events:** There are number of annual regional events in Namibia that will serve as platforms for disseminating project information and lessons learnt; these include farmers' days, the Ongwediva trade fair and the Windhoek trade fair will.
  - **Publications:** The publication strategy will include the use of magazines, newsletters, scientific publications and conference proceedings.
- **Mass media (radio services):** One of the most effective information dissemination strategies for reaching people on the ground is radio, as it is used widely in Namibia
- **Facebook, WhatsApp and twitter:** For wider project information dissemination the social media will be also applied. These are especially useful for the youth participating in the project to provide updated information.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation

12 Stakeholder engagement and involvement

The project interventions and sites were selected based on a number of innovative elements of Namibia's participatory planning processes. That commenced with the elaboration and formulation of the policy on climate change adopted in 2011, followed with in-depth stakeholder engagements and involvement in the development of the national climate change strategy and action plan adopted in 2014; which were then followed by detailed V&A assessments in preparation for Namibia's third national communication. The NCCC Strategy and Action Plan offer a comprehensive national framework for Namibia to climate proof different economic sectors and the livelihoods of all individuals. The development of the National Climate Change Strategy and Action Plan is therefore a result of a multi-pronged consultative and interactive process involving national, regional and local stakeholders. The MET led the first two phases, namely the consultative meeting involving stakeholders at national, regional, and local levels, and the final validation meetings which were clustered in specific geographical regions. To ensure sustainability of the information, strategies and processes followed, due diligence was ensured by the members of the Namibian National Climate Change Committee (NCCC), a multi-sectoral platform that includes private, public and civic organisations. They ultimately ensured that the policy, strategy and V&A assessments were aligned to the major national development processes. The NCCC also ensured

that the global and regional climate change impacts were considered within the nationally-led processes.

Following on such elaborate processes, the agriculture sector (which is the focus of the proposed interventions) was carefully selected from the direct inputs of the Omaheke and Omusati regional and local stakeholders as contributions to the policy and strategy development process. To ensure that there is direct buy-in and current socio economic local data, a refinement process is proposed to help with the selection of beneficiaries on the ground. This is to ensure that the proposed beneficiaries are ground truthed and that the stakeholders have another opportunity to refine the project interventions. This will be finalised during the PFG implementation.

The DRFN which is accredited as the National Implementing Entity (NIE) for Namibia by the AF; has been a critical facilitator in this process functioning in close partnership with the MET, which is the Designated Authority of the AF. A number of participatory meetings which were aimed at developing and refining the concept took place.

In summary, the development of this project proposal started in 2011 (climate change policy) and intensive interactive consultations have taken place over a period of five years, culminating in the specific elaboration of this project, and consisted of a great variety, diverse and multiple numbers of stakeholders in the country. These included government ministries, agencies, Members of Parliament, NGOs inter-governmental organizations (IGOs), Harvest losses information, private sector representatives, regional councils, local authorities; Community based Organisations (CBOs) and other civil/civic society organisations. The inputs gathered during those consultations form the basis of the project. A final round of consultations is foreseen during the PFG (in 2016) phase, which is not only necessary but also very ideal so as to avoid an extended time lag between the on-site consultation with stakeholders and beneficiaries and project implementation. This round will also include a very important project element to verify and validate the social and environmental risks and impacts in accordance with the eight performance standards of international funding institutions.

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

13 Funding justification

13.1 Small-scale irrigation farmers

13.1.1 Component 1: Enhancement of crop farmers' adaptive capacity to temperature variability

Baseline situation

The proposed project component: Small-scale Irrigation Farmers builds on the capacity provided by the Green Scheme to small-scale farmers. The Green Scheme Policy of 2008 makes provision for inclusion of "small-scale farmers (SSFs) on irrigation land developed by the State". The Green Schemes are contracted to private entities (service providers) that are contractually obliged to provide capacity to the small-scale irrigation farmers. The Green Scheme Policy makes the following pronouncements:

Service provision to the small-scale farmers

According to the Green Scheme Policy of 2008, "under this arrangement, the service provider is obliged to provide services to the small-scale farmers." According to Article 5 of the contract agreement between the Ministry and the service providers, "the services provided in terms of irrigation water and mechanisation services shall be charged at a cost only tariff as agreed upon between the service provider and the Project Steering Committee. Charges on input materials, including but not limited to seed, fertilisers and pesticides, shall be at a cost price plus a 5% handling fee (cost price to include transportation costs to the project). The service provider shall purchase on behalf of the project agricultural produce from the S/MSFs at the market price prevailing at farm gate, as announced by the Agronomic Board of Namibia, less 5%".

Government assistance to small-scale farmers

According to the Green Scheme Policy of 2008, "the small-scale farmers who excelled in Farming in the State agro projects at the expiry of their contracts will be assisted and supported to acquire their own land for farming. Such farmers who qualify will be assisted in accessing finance for agricultural inputs, marketing, plant, and machinery."

The Small-scale farmers should migrate elsewhere once their capacity is built. However, the government has this far not provided land to SSFs who are performing well.

SSFs are experiencing non-climate-induced challenges listed below:

Sharing of farm implements, machinery and equipment between the commercial and the SSFs components as well as with the other projects in the surrounding areas;

- Old implements and equipment;

- Lack of spare parts for the implements in the local market;
- Distance to the market;
- Delay of input materials by the suppliers;
- Lack of cold and packing/ storage facilities at the projects and
- Unfavourable environmental and climate conditions.

The climate-induced risks include unfavourable environmental and climate conditions that are manifested by high temperatures, heat waves, increased rainfall variability, flash floods and crop pests - all which make crop production highly vulnerable and thus threatening livelihoods.

Adaptation alternatives

Introduction of the use of shade-cloth to enhance crop farmers' adaptive capacity to temperature variability.

13.1.2 Component 2: Technical good crop production management systems and introduction of efficient irrigation technology systems

Baseline situation

MET (2014) chapter for Namibia's 3rd UNFCCC report has highlighted the key risk factors for the 2014 growing season as follows:

- Potential dry spells can affect agricultural production
- Increasing food prices can put pressure on vulnerable groups relying heavily on food markets
- Seasonal water scarcity during the dry season can pose a serious health risk.

The baseline situation in Namibia is characterized by a climate-induced pressure on natural resources, which in turn leads to unsustainable agricultural practices and environmental degradation. The effects of dry spells, drought and erosion push many poor farmers into ecologically sensitive areas, where they apply unsustainable agricultural practices to survive and make at least short-term economic gains.

Adaptation alternative

After the project, the most vulnerable farmers will have access to additional adaptation options which will diversify their livelihood assets and increase long-term resilience from climate-induced shocks and stresses. Farmers will have access to the tools and know-how for conservation agriculture, efficient post-harvest processing and storage techniques to ensure safe handling and storage of agricultural produce during extreme climate events (droughts, floods, rains), and diversification of livestock production to buffer the effects of flooding and drought. These measures will be implemented on the basis of participatory assessments and community-based experimentation, ensuring that they correspond with communal priorities and capacities. The impact of the improved access to drought-resilient seed varieties through establishment of community-based seed banks and demonstration plots is likely to be reinforced with available CRI that is promoted.

13.2 Communal livestock farmers

13.2.1 Component 3: Bush thinning and re-seeding of grazing areas

Baseline situation

This component will focus on **Otjinene and Epukiro constituencies, Omaheke region**. The Rangeland Management and Bush Encroachment Forum promotes de-bushing and the re-establishment of a Savanna ecosystem (landscape). Several commercial farmers on Namibia's freehold lands have started with selective de-bushing which has led to increased grass production, higher species diversity and abundant soil surface cover. For better management of pasture regrowth, rotational grazing plays an important part. There is, however, no such project implemented in communal areas of Namibia, where the land use is shared by multiple households in villages.

In the Omaheke region, particularly the Otjinene and Epukiro constituencies, the majority of farmers have fenced off parcels of land and graze inside and outside these parcels but with no particular attention to managing the soil cover, productivity and grazing species diversity.

Adaptation alternative:

The debushing and soil cover management component will de-bush selectively, enhance soil cover and pasture species diversity, thus re-establishing a Savanna ecosystem that is productive to livestock farmers, furthermore, value will be added by wood and charcoal production.

13.3 Small-scale irrigation and communal livestock farmers

13.3.1 Component 4: Knowledge and skills management

Baseline situation

The climate change issue with regard to irrigation, crop and rangeland management is not well established among farmers in Namibia. Redressing the situation requires a lot of work to be done in capacity building, and collection, analysis and interpretation of reliable data

Irrigation, crop and rangeland management among the farmers that integrate climate change issue is not well established in Namibia, which require a lot of work to be done around capacity building with reliable information data collection, analysis and interpret further is the lacking component in Namibia farming community or role players which require strengthening.

An early warning system is envisaged by the government to alert the population under threat of an imminent disaster; this will, however, not provide sufficient lead time to undertake protective actions. Furthermore, a suitable system requires the following components to work together: (1) Hazard monitoring and detection; (2) Issuance of warning signals; (3) Multi-level dissemination of risk and warning signals; and (4) Preparedness at the local level to interpret warning signals and take timely and appropriate actions. In this chain, the effective and efficient dissemination of

hazard information on the local level is especially critical, and is a common weakness in many early warning systems. If this part fails, innumerable human and material losses can follow.

Adaptation alternative

This component proposes to enhance the timeliness of CRI through establishing and strengthening organizational framework. Farming communities and role playes will be trained to receive and interpret information.

As a second measure to enhance the effective dissemination and use of CRI, a CRI sub-committee will be established at the project local community. This sub-committee will act as a platform on which government agencies and CBOs/NGOs, while they work with their village counterparts of farmer's groups, can efficiently and effectively share CRI that are seasonal in nature.

These activities will be supplemented by a series of awareness raising and training events targeting farmers themselves so that they are better able to interpret emerging CRI. The participatory establishment and analysis of climate risk and hazard maps, and the process of updating them along with the project progress, will enable decentralized preparedness and risk mitigation planning.

As a third aspect of this this component, student will conduct research on production management, irrigation management and rangeland management in the face of climate change.

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

14 Sustainability of the project outcomes

The project is deemed sustainable in all aspects namely:

- **Financial sustainability**: The project is designed to include development of an exit and sustainability strategy which will build its reputation through evidence of success and as such will attract funding from development partners and especially the government of Namibia. There are also strong income generation and entrepreneurial aspects which will make the project outcomes financially sustainable.
- **Policy level sustainability:** There is an increasing realization that climate and land use change challenges require a range of local and regional strategies and technological interventions. The proposed project will provide an opportunity to kick-start such an approach, which moves beyond academia (science-based) into a more implementation-based policy-informing process, aimed at the ultimate improvement of livelihood opportunities.
- **Environmental sustainability:** The project looks at water use efficiency and rangeland species diversity. Operations will be sensitive to environmental sustainability. Amongst others the following will be incorporated: water-use efficiency: low water usage in irrigation system; organic or low pesticide application, the use of solar energy for water pumping, and soil fertility

management. Selective debushing will retain indigenous protected trees species; improve soil cover and rangeland and pasture species diversity.

- **Technical sustainability:** Various inputs that are locally available will be sourced for most of the projects, which guarantees right quality and quantity outputs, especially focusing on avoiding delays of project implementation and maintenance of systems put in place. There is a high degree of technical soundness of all the project components and as such high production levels are expected, the project will not lead to conflicts with local social systems or technology that is in place. The programme seeks to build on local knowledge.

The programme will be geared towards establishing a strong partnership between private, academic and research institutions. The involvement of the final beneficiaries and business communities in the initial stages of the research will be a roadmap towards technology transfer among the sectors. A research agenda is planned on the three pillars: (1) Final beneficiaries (technology users); (2) Researchers (technology developers); and (3) Policy makers. The involvement of all stakeholders at all levels of the program will ensure gender balance with highest priority given to young women.

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

15 Environmental and social impacts and risks

Based on the current project concept, it is judged that the project should not impose adverse environmental or social impacts and is thus provisionally categorized under Category C. Notwithstanding, during full project formulation the NIE will screen the proposed project to identify and assess possible risks that may be associated with the project, and include the screening results in the full project proposal.

The basis for the current judgement as Category C is contained in Table 11 below.

Table 11: Checklist of 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	All programme activities will be compliant with Namibian and international laws. Refer to Par. 9 for specific Namibian laws.	
Access and equity	Skills transfer, training and other project benefits will be accessible to all potential beneficiaries in the identified target areas through a transparent, equitable processes	
Marginalised and vulnerable groups	The project specifically targets and also capacitates vulnerable communities. Within these communities, efforts will be made to fully include women, the elderly, people living with disabilities and people living with HIV/AIDS	
Human rights	The project will respect and promote human rights. Activity protocols will recognise, *inter*	

	alia, equality, freedom of expression and association, education and access to information.	
Gender equity and women's empowerment	The project will ensure full and equal participation of both men and women	
Core labour rights	The project will comply with Labour Act #11 of 2007; Labour Amendment Act #2 of 2012	
Indigenous peoples	Beneficiaries are all indigenous peoples. The project will respect their rights and responsibilities set forth in the United Nations Declaration on the Rights of Indigenous Peoples	
Involuntary resettlement	Irrelevant - no resettlement will occur as a result of the project	
Protection of natural habitats	Components 1 &2 entail improvement of cropping that already exists. No new land clearing will be done. Component 3 is aimed at restoring (to an extent) the original natural rangeland vegetation and soil properties that existed before bush encroachment took place. It wil also aim at maintaining the restored condition.	
Conservation of biological diversity	Component 3 promotes restoration of rangelands, while maintaining genetic diversity of local landraces. Components 1 &2 deals with irrigated crop farming on areas already used for that purpose.	
Climate change	The purpose of the project is to build resilience to climate change.	The possible production of charcoal from thinned bush may contribute to increased production of greenhouse gas.
Pollution prevention and resource efficiency	Irrigation methods to be introduced will be water efficient and result in water saving. Solar power will be used for pumping water. Post-harvest practices to be introduced will reduce crop waste. Procured goods and services that purport to be environmentally friendly will be preferred	Ditto.
Public health	Only positive impacts are foreseen on the nutritional status of vulnerable communities. No negative impacts on public health are expected from project activities.	
Physical and cultural heritage	No programme activities will be implemented in important cultural sites identified by the communities; or compromise cultural practices in the target areas.	
Land conservation	Debushing, reseeding and altered rangeland	

	management will positively contribute to land conservation (Component 3).	
Soil conservation	Debushing, reseeding and improved rangeland management will positively contribute to soil conservation (Component 3). Soil in cropping areas will be improved, and fertilisers or pesticides that may lead to adverse environmental effects will not be used.	
Water conservation	Irrigation methods to be introduced in place of flood irrigation will be water efficient and result in water saving. No new boreholes will be drilled in areas where stocking capacity is improved.	

PART III: IMPLEMENTATION ARRANGEMENTS

Please note: These implementation arrangements are concepts only and will be further developed during full formulation of the project.

A. Describe the arrangements for project / programme implementation.

16 Arrangements for project implementation

Stakeholder involvement

The methodological approach that will be used for the implementation of the proposed action is very critical for the successful implementation of the project. The agreed approach will be discussed with a variety of stakeholders.

The project will work in close collaboration with institutions involved in crop farming initiatives in the country so as to avoid duplications. Examples include:

- DAPEES in MAWF provides advisory and training services to farmers, provides seeds and implements to small-scale farmers; contributes to the implementation of effective drought preparedness planning and a responsive drought management system. The Directorate also regulates and manages irrigation of crops in the country. In addition, the Directorate of Water Resource Management in MAWF deals with environmentally sustainable water use and management for the current and future generations.
- NamWater is the bulk water supplier of the country and thus will be consulted on irrigation water provision.
- AMTA is a specialised Agency of MAWF with a mandate to coordinate and manage the marketing and trading of agricultural produce in Namibia. AMTA manages the Fresh Produce Business Hubs (FPBHs) and National Strategic Food Reserve (NSFR) infrastructure, and uses this infrastructure for food storage to ensure food safety and security in Namibia. Thus AMTA encourages surplus crop production.
- NAB promotes the agronomic industry and facilitates the production, marketing and processing of controlled products in Namibia. The Board also sources funding to enhance small-scale agronomic production and marketing.
- Both the Omusati and Omaheke Regional Councils have an interest in the climate change activities linked to developmental activities taking place in the region.

The project will also work closely with institutions involved in livestock production and rangeland use farming initiatives in the country so as to avoid duplications. Examples include:

- The MAWF established the Namibia Rangeland and Bush Encroachment Forum in 2013 to promote sustainable rangeland management. The Forum is tasked to implement the National Rangeland Policy and Strategy through awareness campaigns and public private

partnerships. The National Rangeland Policy and Strategy was approved by the Namibian cabinet in 2012.

- The Directorate of Forestry (DoF) in the MAWF is mandated to promote sustainable use of Namibia's forest resources, and implements this through a number of projects: forest and veld management, community forestry, nurseries and distribution of seedlings. Thus DoF will be a key partner overseeing the debushing process.
- DAPEES provides training and extension services to livestock farmers; it will provide training on rangeland management as part of the extension services delivery.
- The Omaheke Regional Council has an interest in the climate change activities taking place in the region, and collaborates with the Regional Drought Emergency Management Unit under the Omaheke Regional Governor's Office.

The fully developed project proposal will have meticulously considered a number of implementation scenarios, consciously knowing that community projects continue to fail because of challenges associated with the 'prisoner's dilemma' and 'free-rider problems'. Hence it is difficult to sustain newly created organisational set ups with new rules and procedures, to ensure the long-term existence and economic viability of such entities. Our discussions with targeted communities, academics and players in the NGO sector should need to create a "producer cooperative" approach is the most appropriate. In the absence of defined and functional village-based producer cooperatives, the existing active community based committees are the most functional organisations that create rules of governance and manage water infrastructure and finances at the village level.

Building on existing national programmes

Since 1995 the Government of the Republic of Namibia has embarked on community-based programmes to empower rural communities, such as conservancies (focusing on wildlife), and community forestry and village water point committees. This proposed action will specifically build on the existing village committees.

Organisational framework for implementation of the proposed action

The NIE is contracted by the AF to execute the oversight role for projects/programmes funded through the AF. In this capacity the NIE plays several roles which include overall project M&E as well as administration of the funds received through the AF. Furthermore, the NIE played a critical role during the development of the concept proposal through guidance and advice as well as quality assurance of the conceptual and project design. Thorough discussions and consultations will be continued during full project formulation.

In executing projects listed below, NUST and other partners have demonstrated their technical, managerial and administrative capacity to complete both small and large projects.

1. Preventative rangeland management (workpackage of biota): the aim of this project was to undertake research and publicise results on strategic trampling, patch burning and eco-friendly parasite control, all applied by farmers; supponsered by BMBF Promotion no.: 01 LC 0624A2 with the projct value of EUR 996,08, and its project life was 01/01/2007 to 30/04/2010
2. Participatory action research between agriculture students of NUST and the resettled community at Vasdraai. The aim of this project was to undertake/facilitate small-scale eco-friendly trials by resettled farmers and share the results. Farmers became more aware of the environmental consequences of their actions and learnt alternative approaches, while students and extension workers learnt how to improve their interactions with farmers; know as Country Pilot Partnership Programme (CPPP)-UNDP; project value Euro 12,370; the project life was 20/05/2010 to 23/12/2010
3. Contribute towards improving the livelihood for Emerging Commercial Farmers (ECFs): Under Namibian Farmers Support Programme; under Agribank Namibia on the behalf of Farmer Support Programme (GIZ). Aiming to contribute towards improving the livelihoods for emerging commercial farmers; with project value EUR 48,000; first phase 01/03/2009 to 31/6/200; and second phase 30/3/2011 to 30/08/2011;
4. Agronomic benchmarks and timber provision of woodlands (workpackages of The Future Okavango). The aim of this project was to undertake research and publicise results on agronomic benchmarks and timber provision of woodlands; sponsored by BMBF Commission no.: 01 LL 0912 A; with project value EUR 200,000; and its project life was 01/09/2010 to 31/08/2015.
5. SAAMIIP: aiming at developing the compatible integrated regional assessment of climate change and its impacts, the study area is sub divided into respective regions in the continent so that proper African regional situation strategy of adaptation mechanisms can be adopted; this project involved more than ten research institutions in Southern Africa, with project value of USD 400,000; its project life cycle was from April 2012 to March 2014; and it was sponsored by US-AID and UK-AID

The Project Team (PT) will have the following core staff:

- National Project Manager
- M&E Officer (responsible for tracking of results indicators)
- Financial and Administrative Assistant;
- Data Assistant;
- Sector Specialists (agriculture, water engineer, livestock, forestry and soil conservation).

The National Project Manager, M&E Officer and the finance and data assistants will be stationed at the project site. Five sector specialists will be stationed in township-based project offices to facilitate smooth local implementation and backstopping of the project.

To assist the PT on technical matters, a Technical Advisory Group (TAG) will be formed to provide guidance and advice on technical questions related to water management, soil management, range land management and crop management. The TAG will further advise on general agriculture, forestry, food security and risk information/communication. The main purpose of the

TAG is to identify technical strengths and weaknesses of the project, take stock of available and required technical know-how under different project components, and provide technical backstopping and quality control throughout the project period. The TAG will include representatives from local farmer organizations and NGOs, technical staff from government departments (such as the Department of Meteorology and Hydrology, the MAWF, the Livestock Breeding and Veterinary Department), and other UN agencies such as the FAO; the latter's involvement in this TAG is especially important.

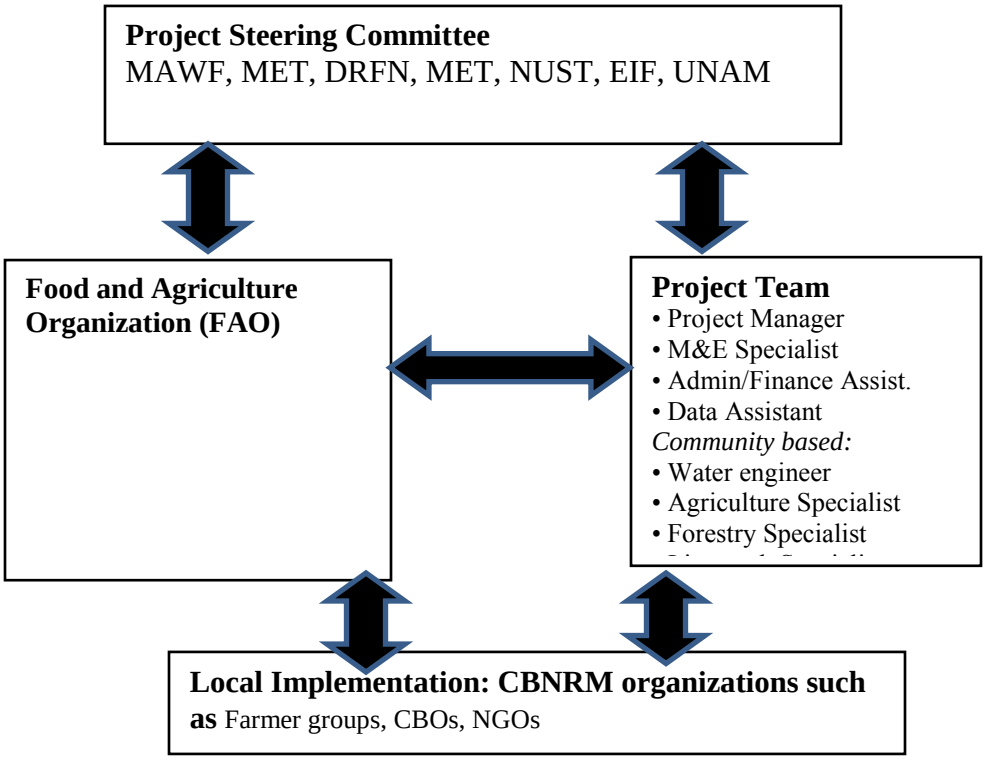

Figure 9: Organigram of the proposed project organization

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

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

17 Risk management

Table 11 presents the identified risks and associated mitigation measures.

Table 12: Risk analysis and proposed mitigation measures

Risk types	Main risk factors	Mitigation measures
Political	Political interference may hamper implementation	The action will be implemented within national goals and priorities, thus adhering to national and regional legislative frameworks. Political buy-in would be solicited during community mobilization in Component 1, as well as by exposure trips and policy briefs.
Implementation delay	External factors may delay project implementation	The project is a high priority of the Government, and will receive support where difficulties are encountered
Socio-economic	Lack of partner buy-in (no commitment / interest from partners beyond the initial phase)	This will be dealt with from the on-set of the initiative through forming strategic partnerships with clear incentives from all involved stakeholders. Cooperation principles will be identified through institutional procedures and capacity development for the components. The participating parties will operate within a signed MoU and hence have already agreed on common vision and collaboration.
	Impractical technology options	Technology is demand based and identified by the users, hence fostering ownership over process. This will be addressed through Component 2.
Physical	Geographical barriers to share S&T data	The proposed technology model will be adapted and will from the on-set identify common unifying approaches, while recognising physical (Geographical) elements.
Financial	Failure to achieve financial sustainability by the end of the project. Failure to attract third party funding beyond initial phase	During expansion will address this risk through developing an exit strategy from the beginning of the action. The community water point committees would also add to sustainability of the action.
Human capacity	Lack of proper/ strategic leadership in management team	The PM of the action has vast experience in dealing with similar actions and as such has appropriate skills at project design, management and implementation levels. Appropriate templates and reporting structures and procedures will be put in place to ensure smooth project management in accordance to project objectives and goals.
	Poorly experienced/ qualified staff recruited for the project in later years	It is envisaged that the initiative participants will also benefit from the comprehensive capacity development programme planned through this initiative hence addressing the staff quality risk, while operating on results based principles would boost the reputation.

	Inadequate trainers	International and local industry experts will be used as resource persons while building capacity in local trainers. The capacity development will appropriately address this risk.
Quality	Compatibility of technology and quality results	Address quality control and assurance issues through ensuring that relevant national stakeholders are involved in the process from the beginning of the project to facilitate the technology identification and transfer process.

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

18 Monitoring and evaluation arrangements

The following M&E documents will be prepared:

- Quarterly reports: Quarterly monitoring reports will be prepared
- Annual report: Annual reporting templates will be developed by the NIE. The PM will be responsible to collate and submit annual programme implementation/progress reports to the NIE, in order to track progress according to programme objectives and outcomes. This annual report will also include: i) lessons learnt; ii) a breakdown of direct beneficiaries in terms of gender and minority group membership; iii) knowledge management; iv) skills transfer accounting; and v) a financial/expenditure report.
- Periodic field survey report: All field surveys, visit and demonstrations and any experimental testing will be documented and monitored
- Mid-term assessment report: An independent mid-term review of the programme will be conducted by external consultants to evaluate progress on implementation since inception, giving particular attention to achievement of programme outcomes. The ToR for this review will be developed by the NIE, who will also provide the funding for the review. Recommendations will be provided to improve performance, as appropriate, as well as suggestions as to how any changes would be accommodated in the workplan would be a key deliverable of this process.
- Terminal Evaluation Report: An independent terminal evaluation, financed by the NIE, will be conducted by external consultants upon completion of the programme according to specific ToR developed by the NIE in consultation with the AF. The focus of this action will be to assess overall programme achievements and the impacts and sustainability of key results. Follow-up actions will be suggested that contribute to sustainability.

19 Budget for monitoring and evaluation plan

To enable a rigorous financial and resource planning framework which fully meets the AF standards, as proponents NUST will need PFG funds to complete this task, hence the budget for M & E is one of the activities to be done with the PFG.

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

20 Results framework

Table 13: Summary of project results framework

Project strategy	Indicator	Baseline	Target	Source of verification	Risk & assumption
The overall project objective is ***to implement priority adaptation actions and practices to strengthen the adaptive capacities and enhance resilience of vulnerable farming systems and communities to climate variability and climate change***	% of households in target site implementing climate change adaptation livelihood measures introduced by the project (crop and livestock farmers' able to increase adaptive capacity to cope with temperature variability)	Current agricultural practices among subsistence farmers are based on historical climatic conditions and trends and are unsuited to increased drought conditions that are becoming increasingly frequent prone to temperature variability	By the end of the project cycle; about 132 small-scale irrigation farmers; and 3,000 households will benefit from and implement climate-resilient agriculture or livestock practice	Project evaluation and technical reports Field surveys	Climate-resilient farming practices introduced by the project demonstrate large enough difference compared to non-climate-resilient practices
	% of farmers using CRI to adjust their livelihood behavior	Currently CRI on sudden onset of disasters is delivered only by TV/radio and the level of interpretation and response is low. The outreach and understanding of information on slow onset of disasters are even lower.	All households in target report that they have changed their livelihood behaviour based on CRI produced by the project	Periodic field surveys Quarterly and annual project reports	Seasonal CRI such as bulletins is produced and disseminated in a timely manner for farmers to adjust their behaviour
	% of farmers & students who have developed capacity to interpret CRI produced by the project	Currently capacity is low.	All households in target location, report that they have been capacitated to interpret CRI produced by the project	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested in training and willing and capable to absorb and apply training and capacity strengthening

OUTCOME 1: On average profitability will increase by more than 60% **Core AF's outcome indicators** **Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors	Number of small-scale irrigation farmers reporting increased their profitability	Project targeted site of small-scale irrigation farmers profit is very low	Project targeted site of small-scale irrigation farmers will increase their profitability by at least 60%	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested in training and willing and capable to absorb and apply training and capacity strengthening
Output 1.1: 600 ha will be covered with shade nets	Area put under shade net.	No small-scale irrigation farmers use shade net in the project area.	600 ha will be covered with shade nets; that equivalent to 132 farmers beneficiaries	Project evaluation and technical reports Field surveys Project evaluation	Beneficiaries interested to take up the technology and continue to maintain; and also good cooperation among stakeholders
Output 1.2: 132 small-scale farmers will be trained on post-harvest activities ; furthermore will able access to packing, storage and ICT system	Number of small-scale farmers trained	There is no training on existing farming system, packing, and storage and ICT systems.	132 small-scale and other actors project beneficiaries will be trained	Register record and level of satisfaction feedback report	Beneficiaries interested in training and willing and capable to absorb and apply training and capacity strengthening

OUTCOME 2 Increase capacity of 132 farmers on crop and irrigation management; furthermore 600 ha irrigated using efficient irrigation systems; as a result water consumption reduced by 30-40% **Core AF's outcome indicators** **Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors	Number of small-scale irrigation farmers applying crop and irrigation management. % of water saved by efficient irrigation systems	Project targeted site of small-scale irrigation farmers management capacity is very low High water consumption from inappropriate inefficient irrigation systems	132 small-scale irrigation farmers 30-40% water saving	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested in training and willing and capable to absorb and apply training capacity strengthening Beneficiaries interested to take up and maintain efficient irrigation systems
Output 2.1 Strengthening better crop management and irrigation for small-scale irrigation farmers	Number of small-scale irrigation farmers reporting increased their management capacity	Project targeted site of small-scale irrigation farmers' management capacity is very low	Project targeted site of small-scale irrigation farmers of 132 management capacity will be increased	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested in training and willing and capable to absorb and apply training capacity strengthening
Output 2.2 Water saving efficient drip irrigation introduced to 132 small-scale farmers; that covers 600 ha	Water saving by about at least 30-40% from efficient irrigation systems	High water consumption from inappropriate inefficient irrigation systems	Water will save by at least 30-40% from efficient irrigation systems	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested to take up and maintain efficient irrigation systems
OUTCOME 3 200,000 ha de-bushed and re-seeded with grass cover ; estimated about 50% of the population targeted constituencies will benefit (that is about 1500 households) ***Core AF's outcome indicators***	Area de-bushed and re-seededg	High density of bush encroached area and low grass growth and species diversity	200,000 ha land size; that is equivalent to 1500 household beneficiaries	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested to take up bush thinning and maintain grass growth and species diversity

Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors					
OUTPUT 3.1 Selective bush thinning to allow grass growth and species diversity	Area de-bushed	High density of bush encroached area	200,000 ha	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested to take up bush thinning and maintain grass growth and species diversity
OUTPUT 3.2 Re-seeding of grazing areas to cover soil with high root biomass and good root biomass with higher species diversity	Area reseeded	Low grass growth and species diversity	200,000 ha	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested to take up re-seeding and maintain grass growth and species diversity
OUTPUT 3.3: production of sustainable production of charcoal as source of additional income	Mass of charcoal/wood produced	There is no/little charcoal/wood production	To be determined	Periodic field surveys Quarterly and annual project reports	Beneficiaries interested to take up charcoal/wood production
OUTCOME 4: Timeliness and quality of CRI disseminated to farmers enhanced through use of short-term weather forecasts, medium-term seasonal forecasts, and longer-term climate scenario planning; furthermore capacity of farmers and extension officers increased ***Core AF's outcome indicators*** ***Outcome 3: Strengthened awareness and***	% of farmers using CRI to adjust their livelihood behavior	Currently CRI on sudden onset of disasters is delivered only by TV/radio and yet the level of interpretation and response is low. The outreach and understanding of information on slow onset of disasters are even lower.	All households in target, report that they have changed their livelihood behaviour based on CRI produced by the project	Periodic field surveys Quarterly and annual project reports	Seasonal CRI such as bulletins is produced and disseminated in a timely manner for farmers to adjust their behaviour

ownership of adaptation and climate risk reduction processes at local level					
OUTPUT 4.1 Community mobilisation climate risk management and preparedness planning	Number of community climate risk communication products in active use by mobilized farmers and actors(such as authorities, NGOs and CBOs) to improve planning decisions and prioritize investment actions	No active climate risk mobilization initiative by farmers, authorities, NGOs and CBOs to improve planning decisions and prioritize investment actions	To be determined		Beneficiaries interested in mobilisation and willing and capable to absorb and apply training capacity strengthening
OUTPUT 4.2. Dissemination and strengthened disaster risk management for climate-induced risk	Number of climate risk communication products in active use by farmers and actors (authorities, NGOs and CBOs) to improve planning decisions and prioritize investment actions	No active climate risk communication products in active use by farmers and actors (authorities, NGOs and CBOs) to improve planning decisions and prioritize investment actions	Climate hazard maps and risk scenarios are available in each project site Climate hazard maps updated at least twice during the project lifecycle	Field survey in availability and application of hazard maps, use of instruments Local communities report on disaster risk preparedness plan Quarterly and Annual Evaluation Report, project evaluation and technical report	Beneficiaries interested in mobilisation and willing and capable to absorb and apply training capacity strengthening
OUTPUT 4.3 Capacity building to farmers and students related to risk management for climate-induced risks	Number of farmers and actors trained related to climate risk management	No training on climate risk hazard related	Regular contact and trustful relationship with communities & stakeholder & Revised guidelines of operational management	Copies of training agenda/manual and copies of publications	Beneficiaries interested in training and willing and capable to absorb and apply training and capacity strengthening

21 Milestone time framework

Table 14: Milestone time framework for the project implementation

Component, output, activity	Description	YEAR 1				YEAR 2				YEAR 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1	**Enhancement of crop farmers' adaptive capacity to temperature variability**												
	Inception workshop												
Output 1.1:	**600 ha will be covered with shade nets**												
Activity 1.1.1	Design and co-finance a simple network of technically and environmentally appropriate and shade net.												
Activity 1.1.2	In consultation irrigation role players or actors, revise/develop good irrigation management system (including a conflict resolution).												
Activity 1.1.3	Organize sessions and trainings targeting on relevant know-how and technological means to manage the system												
Activity 1.1.4	Organize awareness raising events and community members on climate risks, resilient water use, and participatory management of the water systems and irrigation management												
Activity 1.1.5	Production of a technical report on the effectiveness, success and challenges in enhancing sustainability												
Output 1.2:	**training on post-harvest; packing, storage and ICT system**												
Activity 1.2.1	Organize sessions and trainings targeting small-scale irrigation on technology and post-harvest handing management												
Activity 1.2.2	Design local made packing and storage facilities												
Activity 1.2.3	Design ITC enabler to support small-scale production and marketing												
Component 2:	**technical good crop production management systems and introduction of efficient irrigation technology systems**												
Output 2.1:	**Strengthening better crop management and irrigation management for ha irrigation farmers**												

Activity 2.1.1	Organize training events on a range of climate-resilient farming methods												
Activity 2.1.2	Establish a participatory, demonstration plots in both project farmers site												
Activity 2.1.3	Organize exchange visits and farmers' field school												
Activity 2.1.4	Produce at least one technical report capturing lessons learnt												
Output 2.2:	**Water saving efficient drip irrigation introduction**												
Activity 2.2.1	Introduction of water saving drip irrigation with solar pumping system												
Activity 2.2.2	Introduction of production systems improvement												
Activity 2.2.3	Training on irrigation technology												
Activity 2.2.4	Production of technical report												
Component 3	**Bush thinning and re-seeding of grazing areas**												
Output 3.1:	**Selective bush thinning to allow grass growth and species diversity**												
Activity 3.1.1	Manipulation using fertiliser application, grazing management and strategic herbicide application												
Activity 3.1.2	Cutting (bush thinning) to increase plant tillering												
Activity 3.1.3	Address soil health and soil fertiliser content												
Activity 3.1.4	Use tactical herbicides to control weeds												
Output 3.2	**Re-seeding of grazing areas to cover soil with high root biomass and good root biomass with higher species diversity**												
Activity 3.2.1	Reseeding and maintaining perennial grass and soil cover												
Activity 3.2.2	Manipulate the species mix to achieve the right pasture composition.												
Activity 3.2.3	introduce high root biomass of some grasses and the overall greater average root biomass												
Activity 3.2.4	Test for a "fertility effect "												
Output 3.3	**Production of sustainable production of charcoal or wood**												
Activity 3.3.1	Production of charcoal or wood that benefit farmers as additional												
Component 4	**Knowledge and skills management**												
Output 4.1	Community mobilisation climate risk management and preparedness planning												

Activity 4.1.1	Synthesize available information												
Activity 4.1.2	Organize a training												
Output 4.2	Dissemination and strengthened disaster risk management for climate-induced risk												
Activity 4.2.1	Finalize operational procedures for CRI in coordination with the MET & MWAF												
Activity 4.2.2	Organize a national level workshop on communication strategies												
Activity 4.2.3	Organize community level trainings on interpreting publicly available weather forecasts broadcasted												
Output 4.3.	**Capacity building to farmers and students related to risk management for climate-induced risk**												
Activity 4.3.1	Develop module that target to farmers and students												
Activity 4.3.2	Registered students' identification and attachment to the project												

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

MINISTRY OF ENVIRONMENT AND TOURISM
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
23 DEC 2015
PRIVATE BAG 13306
WINDHOEK, NAMIBIA

A. Record of endorsement on behalf of the government[1]

Teofilus Nghitila, *Environmental Commissioner,* *Ministry of Environment and Tourism,* *Namibia*	**Date:** *23 December 2015* ***Signature:***

B. Implementing Entity certification

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 namely National Development Plan 4, National Policy on Climate Change for Namibia 2011 and National Climate Change Strategy and Action Plan 2013-2014 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.	
S Aldrich Implementing Entity Coordinator	
Date: 23 December 2015	Tel.: +264811220671 E-mail: schreuderaldrich@hotmail.com
Project Contact Person: Dr M Schneider	
Tel. :+264812460379, or +26461377500 E-mail: martin.schneider@drfn.org.na	

Project title: Community – based integrating farming system for climate change adaptation

Executing entity: Namibia University of Science and Technology (NUST)

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

ADAPTATION FUND

Letter of Endorsement by Government

Ministry of Environment and Tourism

23 December 2015

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

Subject: **Endorsement for the project "Community – based integrating farming system for climate change adaptation"**

In my capacity as Designated Authority for the Adaptation Fund in Namibia, I confirm that the above concept national project 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 the Namibia.

Accordingly, I am pleased to endorse the above concept project proposal for support from the Adaptation Fund. If approved, the project will be implemented by the Desert Research Foundation of Namibia (DRFN) and executed by Namibia University of Science and Technology (NUST).

MINISTRY OF ENVIRONMENT AND TOURISM
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
23 DEC 2015
PRIVATE BAG 13306
WINDHOEK, NAMIBIA

Sincerely,

Teofilus Nghitila
Environmental Commissioner