PROJECT PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT INFORMATION

Project Category:	Regular
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 5,000,000

Executive summary

This comprehensively expanded version of an earlier proposal will assist vulnerable small-scale communal farmers in two regions of Namibia to implement adaptation actions and practices that strengthen their resilience and that of their farming systems to climate variability and change. The two regions, Omusati and Omaheke region, were selected to be models for climate change adaptation for other regions of the country. The proposed 5-year project has a budget of USD 5,000,000 and will be executed by Namibia University of Science and Technology (NUST) with the Desert Research Foundation of Namibia (DRFN) as the Implementing Entity.

The project approaches adaptation of the agricultural and natural resource-based sector in Namibia to climate change in a comprehensive manner that increases production efficiency and brings value-added products to market effectively, by investing in techniques, technologies and in people. At the community level, cross-cutting concepts are integrated to make communal farming systems more adaptive to climate change and variability. The project is expected to benefit indirectly approximately 22,658 or 13.5% of the total population in the selected constituencies of which 46.5 % are women, and 40% children. The primary focus of the proposed project is to strengthen the adaptive capacities of vulnerable communities, including women-headed households, and enhance resilience of their farming system to climate variability.

The proposed project has three major components that complement and strengthen each other:

- Component 1 entails improved ecosystem management by implementing climate-smart management and rehabilitation techniques that improve the fodder flow and ecological services provided by natural rangelands, thus making local pastoral and dry-land cropping communities more resilient against climate variability and change.
- Component 2 entails the implementation of climate-smart production, management and value-addition techniques in local and regional crop and animal (wild game and livestock) production systems and value chains, to enhance the adaptive capacity of communities vulnerable to climate variability and change along the whole value chain.
- Component 3 aims to strengthen the knowledge and skills of vulnerable communities required to adapt and become more resilient to climate change and variability, and the (operational) capacity of institutions to deliver services effectively, by building their capacity along the whole value chain(s) that they are involved in, as well as improve the capacity of institutions serving the farming sector to provide more effective services.

Special care is taken to include marginalised communities in these interventions. If these interventions are successful in helping local communities in the two model regions adapt to climate change successfully, they can be rolled out to other regions of Namibia with a fair chance of success. In terms of impact, the proposed project is categorised as Category B, meaning that there are hardly any adverse environmental or social impacts. The project is also congruent to national developmental strategies and policies, and is considered to meet all the major outcomes of the Results Framework and the Environmental, Social and Gender principles of the Adaptation Fund. Furthermore, the project takes the Sustainable Development Goals into consideration, in particular Goal 15, which pertains to “managed forests, combat desertification, halt and reverse land degradation and halt biodiversity loss” and with special emphasis on Goal 5, regarding gender equality and empowerment of women-headed households.

Abbreviations and acronyms

AF:	Adaptation Fund
AF RF:	Adaptation Fund Results Framework
AFOLU:	Agriculture, Forestry and Other Land Uses (sector)
AMTA:	Agricultural Marketing and Trade Agency of Namibia
CA:	Conservation Agriculture
CPP-ISLM:	Country Pilot Partnership for Integrated Sustainable Land Management
DA:	Designated Authority
DAPEES:	Directorate of Agricultural Production, Extension and Engineering Services
DoF:	Directorate of Forestry
DRFN:	Desert Research Foundation of Namibia
EE:	Executing Entity
ESG:	Environmental, social and gender
FA:	Farmers' Academy
GCM:	Global Climate Model
GDP:	Gross domestic product
IPCC:	Inter-Governmental Panel on Climate Change
IPM:	Integrated pest management
ISLM:	Integrated Sustainable Land Management
LEDA:	Local Economic Development Agency
MAWF:	Ministry of Agriculture, Water and Forestry
MET:	Ministry of Environment and Tourism
NCA:	Northern Communal Areas
NDP:	National Development Plan
NGO:	Non-governmental organization
NIE:	National Implementing Entity
NPC:	National Planning Commission
NRMPS:	Namibia National Rangeland Management Policy and Strategy

NTA:	Namibia Training Authority
NUST:	Namibia University of Science and Technology
PC:	Project Component
PL:	Project Leader
PSU:	Projects Services Unit
RC:	Regional Council
SMEs:	Small and medium-sized enterprises
SRM:	Sustainable rangeland management
UNFCCC:	United Nations Framework on Climate Change Convention
VCF:	Veterinary Cordon Fence

Contents

Tables

Figures

Annexures

Project background and context

This proposal is an expanded and updated version of a proposal submitted to the AF earlier, called “Community-based integrated farming systems for climate change adaptation”. It was necessary to significantly change, adapt and expand the earlier proposal based on the inputs of various stakeholders and communities received in 2017 and 2018.

The originally AF-endorsed concept proposal (financing requested US$ 0,75 million, category small project) was developed into a full proposal (financing requested US$ 5 million, category regular project) using an NDA-endorsed and AF-provided PFG. The decision to upgrade the project from small to regular was strongly encouraged by the NDA to further strengthen Namibia’s climate adaptation activities.

This is a resubmission of the fully-developed project document NAM/NIE/Agri/2015/2.

1. Socio-economic, climatic and environmental background

Namibia is located in south-western Africa and covers a land area of 825,418 km^2 along the southern Atlantic Ocean. It is one of the least densely populated countries on earth, with a population of 2.3 million people of which about 70% depend on agriculture for a livelihood, even though the agricultural sector employs only 31% of the workforce (NPC, 2017). Agriculture contributed 3.9% to gross domestic product (GDP) in 2014 and is a vitally important economic sector to the country.

Despite Namibia being an upper-middle income country with a per capita GDP of USD 6,000.04 in 2015 (Trading Economics, 2015) and annual GDP growth being 3-4% over the last decade, wealth is very unequally spread. It has one of the highest income inequalities in the world, with a Gini coefficient of 0.57 (NPC, 2017). In 2015, about 18% of the population was classified as poor and 11% as extremely poor (ibid.), while 28.1% of the labour force was unemployed (ibid.). Poverty and unemployment are highest in rural areas. Rural unemployment was 30.2% in 2014, while 32.0% of women and 39.2% of the youth was unemployed (ibid.). The rural population is therefore highly vulnerable to climate change and needs support to adapt to a worsening climatic impact.

The country’s climate is predominantly semi-arid as it is situated at the interface between different climate systems. The northern part of the country is influenced by the intersection of warm, moist tropical winds from the inter-tropical convergence zone (ITCZ) and cold, dry air from the western, Atlantic 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. This geographic location leads to highly variable climatic conditions that are manifested in the form of erratic and low rainfall with frequent heat waves and droughts.

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, 12% of the country is hyper-arid (less than 50 mm annual rainfall), 16% is arid (above 50 mm to less than 250 mm), 69% is regarded as semi-arid (250 mm to less than 500 mm), and only the remaining 3% in the north-east is sub-humid (Barnard, 1998; MET, 2014), receiving the minimum rainfall considered viable for dry-land cropping. Mean annual temperatures in the interior of the country are mostly

between 20°C and 25°C, but range from below freezing in winter to above 40°C in summer. The rate of evaporation is very high, causing water deficits in all regions. In northern Namibia, annual evaporation from an open water source is about 2.6 m (420% more than rainfall) and 3.8 m in southern Namibia (1 750% more than rainfall) (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 United Nations Framework on Climate Change Convention (UNFCCC) (MET, 2015). Extra climatic stressors such as heat and recurrent droughts further exacerbate food insecurity, estimated to affect 25% of the population (NPC 2017).

In semi-arid areas, degradative processes tend to dominate regenerative processes. In Namibia, anthropogenic pressure accelerates natural environmental degradation, by what can also be called "inappropriate resource utilisation". Soil degradation and depletion of soil nutrients are made worse by "soil mining" on crop fields (DRFN and SIDA, 1992), i.e. cultivating without fertilisation or soil amelioration and without proper crop rotation, and mulching in the off-season. At the sites where the proposed project is located, dry-land cropping is already marginal and highly prone to climate risks such as high rainfall variability and climate-induced droughts (MET, 2014). Some of the practices adopted for pastoral production, such as continuous grazing (animals too long on the range), overgrazing (too many animals on the range) and the suppression of fierce, late-season fires have contributed to bush encroachment and desertification (Mendelsohn, 2006).

The rural agriculture-based economy has progressively become less reliable and more vulnerable due to maladaptive resource utilisation, enhanced by climate risks and uncertainties (MET, 2002a). Droughts are recurrent but their severity has been expanding sporadically (Mendelsohn, Jarvis, Roberts, & Robertson, 2002) and there is now consesus that their increased incidence and scope is largely due to climate change factors. Some regions of Namibia have recently experienced drought conditions that have worsened some of the impacts and effects of this natural variability (NEWFIU, 2015). 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.). Hence, 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).

2. Climate change models and scenarios

The Inter-Governmental Panel on Climate Change (IPCC) finds that southern Africa is amongst the most vulnerable regions to climate variability and change, due to multiple climatic stresses and low adaptive capacity (IPCC, 2001). 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, Human Immunodeficiency (HIV) and Acquired Immunodeficiency Syndrome (AIDS), with increasing heat stress, droughts, and rainfall variability which could soon lead to more reduction in livestock and crop productivity.

The UNFCCC recognises that Namibia is one of the developing countries that are most vulnerable to the adverse impacts of climate change due to expected rises in temperature, increased rainfall variability and an increased water deficit.

2.1 Changes in temperature

Temperature is expected to increase in southern Africa due to climate change. Figure 1 depicts changes over a period of 30 years (1980-2010) with both maxima and minima baselines showing an increasing trend of approx. 0.5ºC per decade.

Over the long-term Namibia has experienced a mean decadal temperature increase of 0.2ºC, estimated to be about three times the global mean (Reid *et al*., 2007). The IPCC Third Assessment Report states that climate change scenarios indicate a future warming of 0.2 to 0.5 °C per decade across 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 (. (IPCC, 2001). This warming is greatest over the interior of semi-arid margins of the Sahara and central southern Africa.

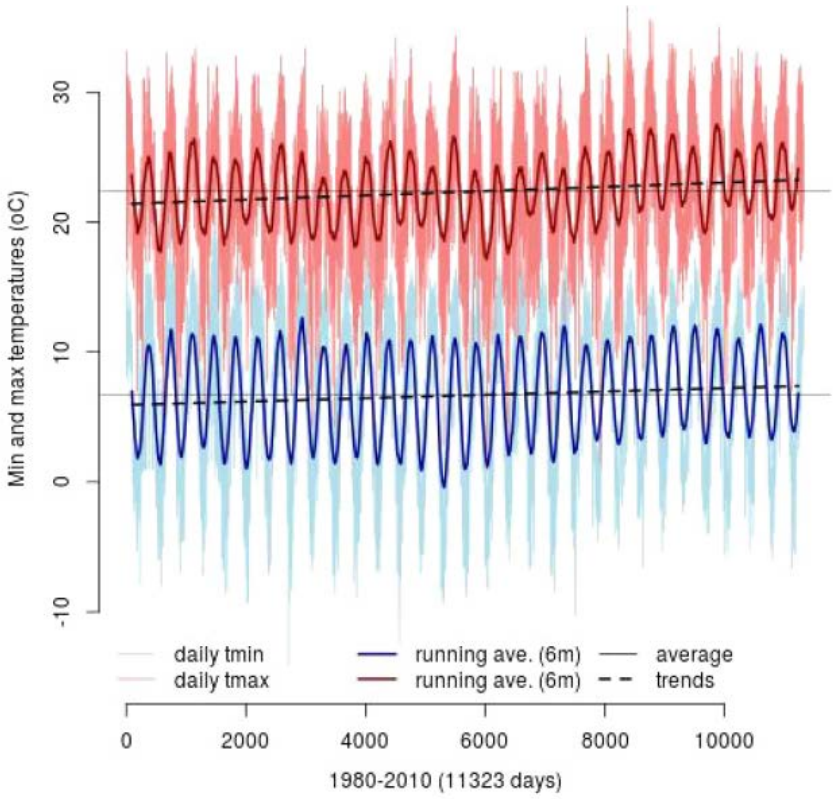


Figure 1: Long-term projection of temperature (min.: blue, max.: red) for Namibia

In Namibia itself, predictions for temperature increases by 2100 range from 2 to 6°C (Dirkx *et al.*, 2008). 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 (ibid.). Maximum temperatures have been getting hotter over the past 40 years, as observed in the frequency of days exceeding 35°C (ibid.; MET, 2011). Frequencies of days with temperatures below 5°C have been getting less, also suggesting an overall warming (Dirkx *et al*., 2008).

2.2 Changes in precipitation

Rainfall in Namibia 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, forcing a decline of 33% on average every year in the productivity of indigenous agro-pastoral communities and shrinking the contribution of livestock production to agricultural GDP by 37.6% in the last four years (NEWFIU, 2015).

Namibia, already a semi-arid country, is predicted to become more arid due to climate change. Most precipitation prediction models project that by 2050 the interior of southern Africa will experience significant decreases in rainfall during the growing season (IPCC, 2001), although some models show little change in total seasonal rainfall. 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 effect. Rainfall in south-western Africa is generally below average during El Niño conditions, which are expected to happen more frequently.

Future rainfall in Namibia is projected to become even more variable than at present. The north-western part of the country has experienced persistent droughts over the past 6 years, while the north-central parts have experienced both droughts and floods in recent years. Figure 2 illustrates the unpredictability of rainfall in Namibia (Dirkx, 2010).

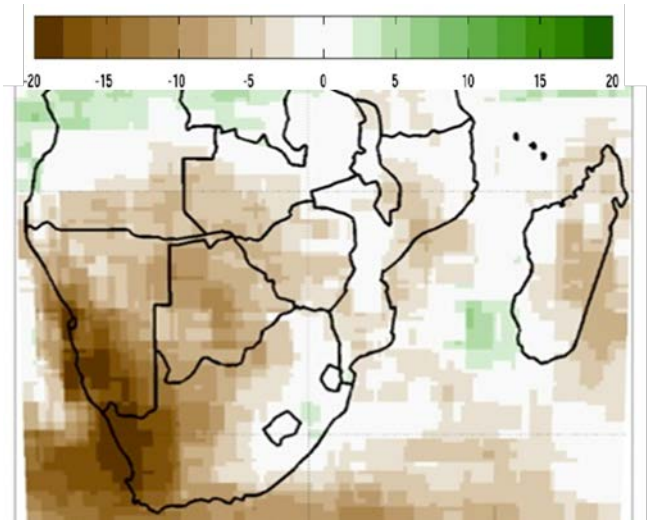


Figure 2: Unpredictable precipitation in Namibia

2.3 Changes in water deficit

An increase in evaporation rates due to temperature increases is expected, amounting to about 5% per degree Celsius of warming (MET, 2002b). 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.

2.4 Combination of effects

The uncertainty shown by the Global Climate Model (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 dry-land (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^{o}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 is expected to increase, making it more difficult to achieve food security and the development of the sustainable resource base. This project therefore proposes management practices that can improve soil health and fertility, rangeland condition and productivity and sustainably increase crop and livestock production, while emphasising local economic development activities such as post-harvest processing and value addition to agricultural produce, to improve environmental and social resilience to climate change and secure rural livelihoods.

3. The climate change-induced problem

Climate change has already had and will have even more profound impacts on peoples' livelihoods, economic growth and ecosystems, particularly in developing countries and economies. The effects and impacts of climate change on economies and societies will vary greatly over the world. Each country's circumstances, e.g. initial climate, socio-economic situation and growth prospects, will define and shape the extent of climate change on its society, both in economic and environmental terms (Stern, 2006).

Developing countries are most vulnerable, particularly those in Africa. Their geographic exposure, relatively small and non-industrialised economies, prevailing low levels of household incomes, and greater reliance on climate sensitive sectors such as rain-fed agriculture, livestock production and natural resources-based production activities (e.g. tourism) increase the vulnerability of developing countries to climate change effects. Namibia is particularly exposed (MET, 2014). Observational data for Namibia's projections in rainfall are consistent with the contemporary understanding of how climate change will affect the southern African sub-continent 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 sub-continent.
- The 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).
- 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).
- Both rainfall and temperature in Namibia are very sensitive to the El-Niño Southern Oscillation effect, showing periods of much-below average rainfall (ibid.).

Although climates across the southern African sub-continent, including Namibia, have always been erratic, the region is expected to face even more droughts, floods, rising sea-levels, food insecurity, loss of biodiversity and depletion of the water supply. 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. Table 1 below summarises projected adverse effects of climate change on the inhabitants of Namibia (MET, 2011; MET, 2012)

Table 1: Adverse effects of climate change on crop and livestock farmers

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 lower rangeland carrying capacity and worsening rangeland condition, 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 further marginalisation of women in agriculture, the exploitation of vulnerable groups in society and inequities in access to land and productive assets • Increased resource conflicts and gender imbalances
Rising temperature: • Prolonged dry and hot spells during the rainy season	• 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 lowered food production
Increased atmospheric CO_2 levels	• Increased growth rates of woody plants compared to herbaceous plants (grasses), resulting in a landscape-level wave of bush encroachment, enhanced rangeland degradation 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	• Increased erosion • Dune activation • Lowered crop and pasture production due to decreased soil stability, fertility and health • Worsening rangeland condition and decreased productivity

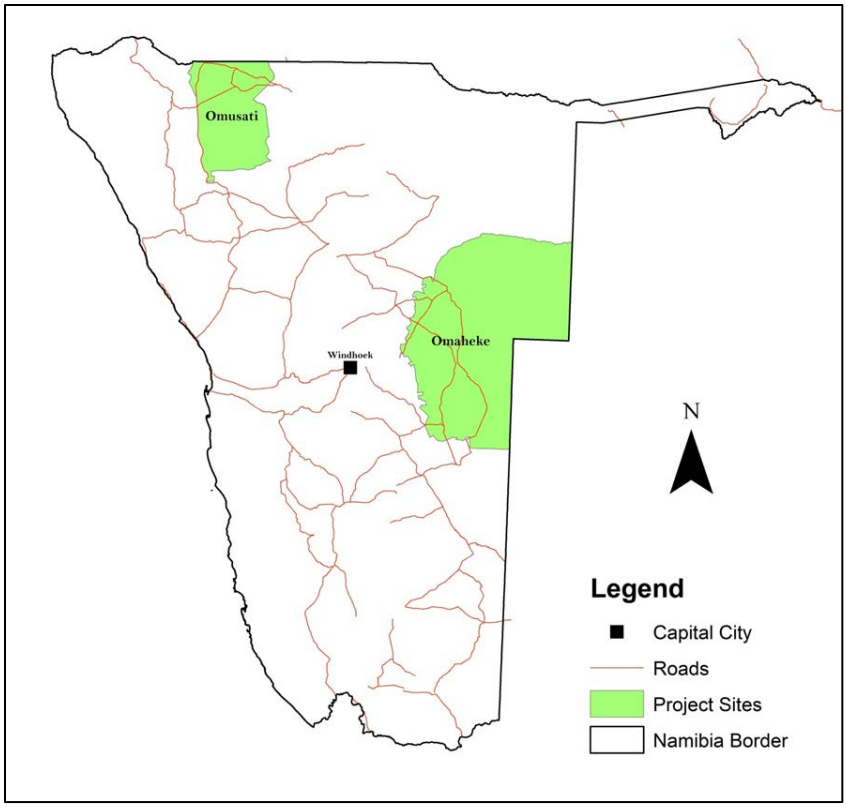
All of the above effects will result in wide-ranging conditions of desertification, land degradation and drought (DLDD) intertwined with and exacerbated by human factors, if not addressed as proposed in this project. DLDD is projected to be enhanced by climate change, thus increasing the vulnerability of people (especially in rural areas) and eroding their livelihoods.

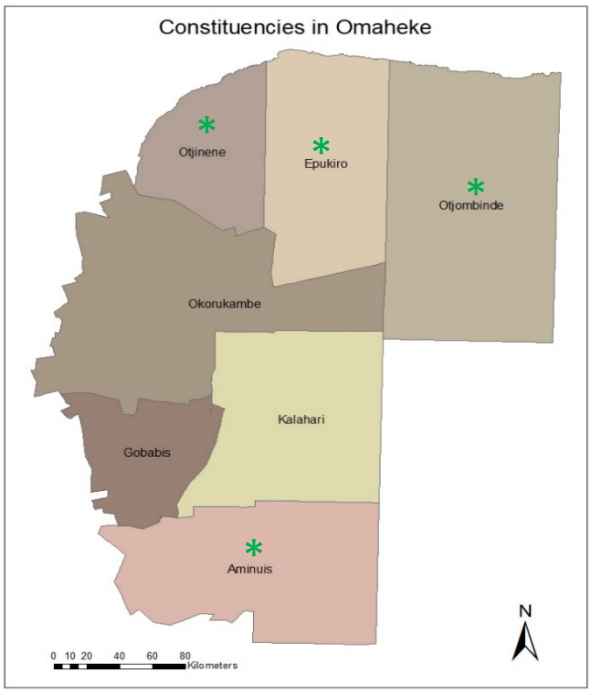
Three National Communications submitted to the UNFCCC by Namibia since the early 2000's emphasised the vulnerability of the agriculture and natural resource-based sectors to climate change. These vulnerability assessments found that agro- and pastoral small-scale rural farmers (called "communal farmers" in Namibia and henceforth used in this proposal) are at highest risk in all of Namibian society, thus actions that focus on communal farmers are rated amongst the highest adaptation requirements.

Bush encroachment and the associated weakening of the grass sward - which is a huge problem in Namibia - is caused mainly by the suppression of hot fires by farmers and the reduction in browsing pressure caused by human selective replacement of mega-browsers (e.g. elephants, rhinos) from the farming landscape with grazing/browsing livestock species (e.g. cattle, sheep and donkeys). But these anthropogenic impacts are made worse by the "fertilisation effect" of increased atmospheric CO_2 on woody plants, which favours their development at the expense of herbaceous plants. In a similar manner, many other degradative processes in the Namibian landscape are the result of anthropogenic impacts exacerbated by climate change. Addressing them requires an integrated, holistic approach as espoused in this proposal.

4. Project location

The project will be implemented in two of the 14 regions of Namibia, namely in the Omusati and Omaheke regions (Figure 3). Omusati is completely within a communal area, the so-called northern communal areas (NCA), while Omaheke is predominantly, but not exclusively, communal area. As such, these two regions are made up mostly of agro-pastoral small-scale rural farmers most at risk of climate change.





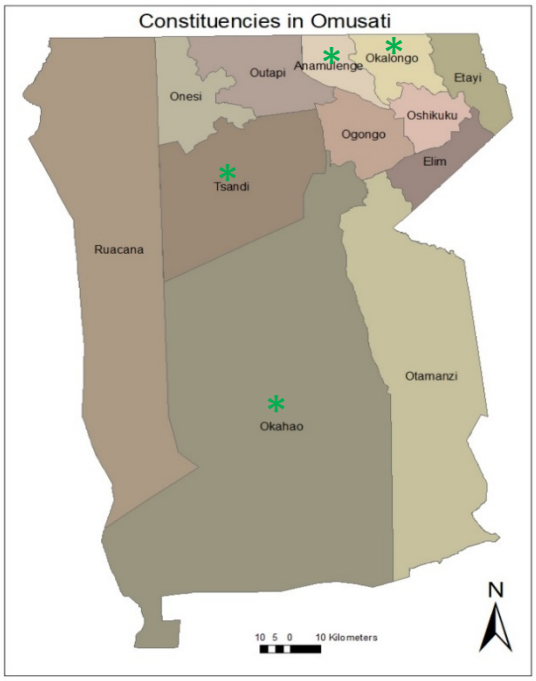


Figure 3: Project sites in Namibia * a) in Omaheke and b) in Omusati

These two regions were chosen not because they are any more or less affected by climate change than Namibia's other 12 regions, but because of additional factors that make these two regions ideal role models for the proposed adaptive interventions. Omusati region was chosen because it is one of the most densely populated rural regions of Namibia. Interventions that work well in an area with high anthropological pressure can reasonably be expected to work as well in a less anthropologically-stressed area. Omaheke region was chosen because it exports the largest part of Namibia's cattle growth potential and the proposed interventions aim to retain this cattle growth potential locally. Interventions in these two regions can thus easily be up-scaled and replicated elsewhere. Considering the availability of resources, it made sense to work in fewer rather than more regions of Namibia, and in those with the best chance of replicability nationally.

The Omusati region in the north-western part of the country has the second highest population of all regions in Namibia except for the Khomas region where the nation's capital city is located, but it has the highest density of people living in rural areas and being dependent on agriculture and natural resources. Any adaptation strategy developed in an area with such high anthropological pressure has a good chance of also being effective in areas with lesser anthropological pressure, i.e. lesser human population density in rural areas. An adaptation strategy successfully developed in Omusati region thus has a better chance of also being successful in a less-populated region such as Hardap or Karas region in the southern part of the country, than the other way around. If the proposed project can devise successful adaptation strategies for high-pressure Omusati region, these could serve as a template (or role model) for the rest of the country. This is a highly cost-effective approach to climate change adaptation.

A different reasoning applied to the selection of the Omaheke region in the central-eastern part of the country for the proposed project. Every year, Namibia exports 150,000 – 300,000 weaner cattle (varying with rainfall and grazing conditions) to South Africa to be grown out in feedlots there (Meat Board, 2017). Retaining this growth potential by growing out weaner cattle in Namibia will enhance job creation and economic development. Cattle feedlots are also more polluting than cattle ranching. So overall, exporting weaner cattle to another country is not a climate-smart option for Namibia, forced upon us by declining rangeland productivity due to the conflagration of inappropriate resource use and climate change-inflicted damage. If these cattle could be grown out locally, it would contribute immeasurably to reduce rural poverty and improve livelihoods. Of all 14 regions of Namibia, Omaheke exports most weaner cattle to South African feedlots, more than the other 13 regions together. Omaheke region is thus most affected by this imprudent practice and hence has most potential for its reversal into a climate-smart, locally-based solution.

Climate changed induced impacts in the two regions are associated with prolonged droughts, intense rainfall events following droughts, and increased temperatures. In Omusati region, dominated by crop production with some livestock production, high temperatures leads to reduced crop yields, and inundation of crops from intense flooding. Yields of maize and pearl millet declined with 44% to 70% in 2013 and 2014 (GIEWS /FAO, 2015). Naturally rangeland production is low during drought years resulting in high grazing pressure on scarce grazing resources. More bare soil patches are exposed to intense temperatures and erosion leaving lesser fertile patches behind. The interaction of natural-climate change impacts and human-induced impacts resulting from over-cultivation with limited diversity of crops, overgrazing and continuous grazing deplete soil nutrients and aggravate land degradation in both regions.

Adding large numbers of growing cattle to the Omaheke region, which is already experiencing rangeland degradation due to over-grazing, is a conundrum. The proposed project will test several possible solutions and upscale those that work well to other regions in Namibia.

In addition to the above considerations, the communal systems differ substantially between these two regions and thus offer an opportunity to develop different climate-smart solutions to the same basic problem. The communal system in Omusati region is predominantly of the traditional type of open access to the commonage. A community of people, organised into a number of small settlements and villages under the authority of a tribal or traditional institution (e.g. a headman, chief, king or queen) have equal access to certain common resources such as grazing lands, forests and water. In earlier times when anthropological pressure was less, open access to common natural resources was a rational strategy that ensured the survival of the entire community, but in modern times, with the explosion of the human population, it is no longer a viable strategy. Every individual wants to benefit maximally from the finite common resource and it is mercilessly exploited, inevitably leading to its rapid degradation and making everyone poorer (the so-called “tragedy of the commons”). This predatory effect is most strikingly seen in drastic rangeland degradation leading to declining land and livestock productivity and increased rural poverty. Water points are no longer controlled by committee, but by individuals who exclude others.

Notably, this system is changing in Omusati region because it is no longer viable. Common resources are increasingly “privatised” but often monopolised by powerful, influential members of society at the expense of the less influential, more vulnerable members of society such as women-headed households. Proposed interventions will focus not only on technical solutions to natural resource use, but also on more equitable access to resources even by the most vulnerable in society.

In the traditional communal system in the Omusati region, every family also has its own, “privately-owned” resources such as crop fields and the homestead area. These small areas are under complete managerial control and reflect the production potential of its owner/manager.

Communal resource use is quite different in those parts of the Omaheke region that are “communal land” (the larger part of the region). Historically a village community will share a water point at a centre of a rangeland of about 8 to 10 km radius, and each household would have a semi-permanent use of a section of the rangeland. In the last 35 years households in most villages have put up fences around these portions in such a manner that it is now privately used. However, some parts of these rangelands are used in common with minimal joint-management in most cases. From the mid-1980s some households moved out of the multiple-household villages (unrelated multiple families existing of various households) and occupied virgin lands and established extended-family villages. These extended-family villages are in most cases fenced-off on the periphery and at times subdivided in camps for better livestock and rangeland management. Often, fences are used to control access to grazing land and water points are locked for private use.

It stands to reason that climate-smart solutions developed for traditional, open-access communal systems will differ from those developed for individualised communal systems. For example, the

principles of SRM as expounded in Namibia's National Rangeland Management Policy and Strategy (NRMPS) of 2012 (MAWF, 2012) will apply to both areas, but the practical implementation of these principles will probably be radically different from Omusati to Omaheke. The implication for adaptation to climate change is that more solutions can be developed for the same problem, hence presenting Namibian farmers with a range of solutions from which to pick those that are most applicable to their local conditions. Again, this is a very cost-effective and versatile approach to climate change adaptation.

Additionally, a number of elaborate participatory processes that commenced with the national development-led process leading to the policy on climate change in 2011, the climate change strategy and action plan in 2014, as well as the V&A assessments finalised in 2015 pointed out the vulnerability of the Omusati and Omaheke regions to climate change. 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, Epalela and Olushandja in the Omusati region and Otjinene, Eased and parts of Epukiro in the Omaheke region.

The physical characteristics of the Omusati and the Omaheke regions are remarkably similar even though they are 500 km apart. Both are in the large Kalahari basin that extends through the centre of the southern African sub-continent into middle-Africa in the tropics. Its soils are mainly aeolian, ferralic, coarse sands (arenosols) blown in many eons ago and often very deep. The high percentage of sand particles (above 60%) determines the texture and accounts for the low water and nutrient retaining capacity of the soil. Organic matter in the topsoil is low (commonly less than 1%), the nitrogen and phosphorus content is too low for horticulture, while the pH is near-neutral to slightly acidic (FSNAP, 2013). The sandy soils of the Kalahari basin prevent it from desertifying when degrading because soil erosion is extremely limited, mainly due to wind erosion. Water infiltration remains high irrespective of vegetation cover, so soil moisture conditions remain favourable despite degradation.

The Omusati region is further characterized by the oshana system, a broad and shallow but well-grassed ephemeral river system that floods regularly. The flood water comes from the north, the mountain highlands of sub-tropical southern Angola. Due to high evaporation in the oshana system, its soils are often saline. Sodium and gypsum is commonly found in these soils, often forming a shallow hardpan that restricts root penetration and limits crop yields. The farming system is mixed, with cattle, goats and grain crops such as pearl millet (known locally as "mahangu"), sorghum and maize dominating. Although the soils are marginal for cultivation at best, they are easy to work with primitive hand tools and limited animal draft power, which is why so many people settled here. (Table 2).

Table 2: Household population information in selected regions

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

In contrast, the Omaheke region is one of the less densely populated regions of Namibia (Table 3) and is mainly a beef cattle producing region.

Table 3: Omaheke region agricultural activity

Agricultural activity	Number of households	Households (%)	Population	% Population in agriculture
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
Total	**6,834**	**100**	**34,854**	**100**

About 42% of the population in its communal areas are female-headed and are most vulnerable to changes in livestock production brought by climate change and variability. The dominant vegetation type is a well-wooded, mixed camelthorn-Terminalia savanna that is supremely suited to browsing and grazing animals. Since grazing cattle have replaced most other animals, the grass component of the savanna is over-utilised and largely destroyed and the woody component has taken over. The region is heavily degraded due to bush encroachment, more so in its north-eastern communal areas (e.g. Epukiro, Otjinene and Otjombinde) than elsewhere (e.g. Aminuis) (Table 4), for which reason the proposed project will focus on the more densely encroached parts of Omaheke region in the north-east. There is some crop production potential in the omiramba, rather narrow ephemeral and even fossil river courses covered in nutrient-rich (eutric), moisture-retaining fluvisols, that drain the region towards the east.

Table 4: Bush densities in the Omaheke region

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

The proposal is designed to enable for easy replication and upscaling taking into account communities' needs and local situation. The viability of replicability and upscaling in other regions depends on the following enabling conditions:

a. Willingness of local communities to participate: This reflects on the identification of the demand, the necessary attitudes and beliefs of the local participants to adopt climate-smart technologies and improve their livelihoods. This often requires a heart change – a change in beliefs about oneself, community and environment that will support a committed effort toward a common good.
b. Acceptability: the intervention / innovation should fit within a culturally acceptable framework. In this proposal, the proposed interventions are designed to strengthen existing knowledge, skills and potentially viable livelihood options.

c. “Blue-green” interventions: the project environment ought to support the interventions for an indefinite period of time. Thus upscaling is feasible where interventions are in-tune with the receiving environment in terms of its sustainable use of natural resources (e.g. water, grazing lands, forest resources and others).
d. Income improves where there is demand for surplus production of goods and services. Hence market potential is critical when identifying solutions to meet communities’ needs for climate change adaptation measures.
e. Equitable benefits: a sense of equality among community members irrespective of sex, culture, tribal or political affiliation is a pre-requisite for cooperative behaviour among members.
f. Institutional (government/community based) support: Although development activities run more smoothly when there is government support, there are times when great gains are made within local structures. For that the local socio-political climate and community structures should be supportive of the proposed interventions..
g. Ownership potential: community consultations should be open and elaborative to ensure inputs from communities in the design and implementation of the project. In this proposal community organisations initiated some of the interventions, site selection and thus strongly looking forward to be active implementers of the proposed actions. This sense of ownership will guarantee success.
h. Existing infrastructure: this is also a strong point of this proposed project as most of the interventions are existing in the communities albeit at small-scale, but with huge potential for upscaling.

A. Project objectives

The overall objective or goal of the proposed project is to assist vulnerable rural communities in two model regions of Namibia (Omusati and Omaheke, Figure 3) to implement adaptation actions and practices that strengthen their adaptive capacities and enhance resilience of their farming systems and value chains to climate variability and change over a project period of 5 years. These "vulnerable rural communities" are small-scale communal farmers who were identified as "highly vulnerable" to climate impacts by various vulnerability assessments[1]. They are residing in the Omusati and Omaheke regions of Namibia, chosen to model and demonstrate climate adaptation in a proposed project that has three major components and 12 outcomes.

The Omusati region in the north-west was chosen for this proposal as it is Namibia's most densely populated rural area. Climate change adaptive interventions that are successful here, are likely to also be successful in Namibia's other regions where anthropogenic pressure on the land is not as high. Omaheke in the central-eastern part of the country was chosen because it is the country's largest beef cattle producing region. Unfortunately, much potential beef income earnings are exported as weaner calves and the resultant beneficiation does not accrue to Omaheke's communal farmers, but elsewhere. This needs to change without putting additional pressure on the land and hence, increase climate vulnerability. If trialled successfully in these two regions, adaptive practices can be up-scaled to the rest of the country. The overall objective is aligned to the expected impact of the AF's goal, viz. to achieve resilience at the community, national and regional levels to climate variability and change.

In both the chosen model regions, anthropogenic factors accelerate the rate of degradation of natural resources, enhanced by the impact of climate change. The proposed project will seek to reduce the impacts and risks of combined effects of natural variability and climate change-induced increases in rainfall variability, temperature and water deficit by proposing more adaptive management of dry-land cropping, irrigated horticultural and extensive livestock and wildlife ranching systems and more sustainable ecosystem management in these predominantly communal regions of Namibia. Hence, 10 of the proposed project's 12 outcomes are directly related to adapting to climate change. Please refer to Figure 4.

[1]: For example, in Namibia's "*National Climate Change Strategy and Action Plan 2013-2020*", compiled by the Ministry of Environment and Tourism.

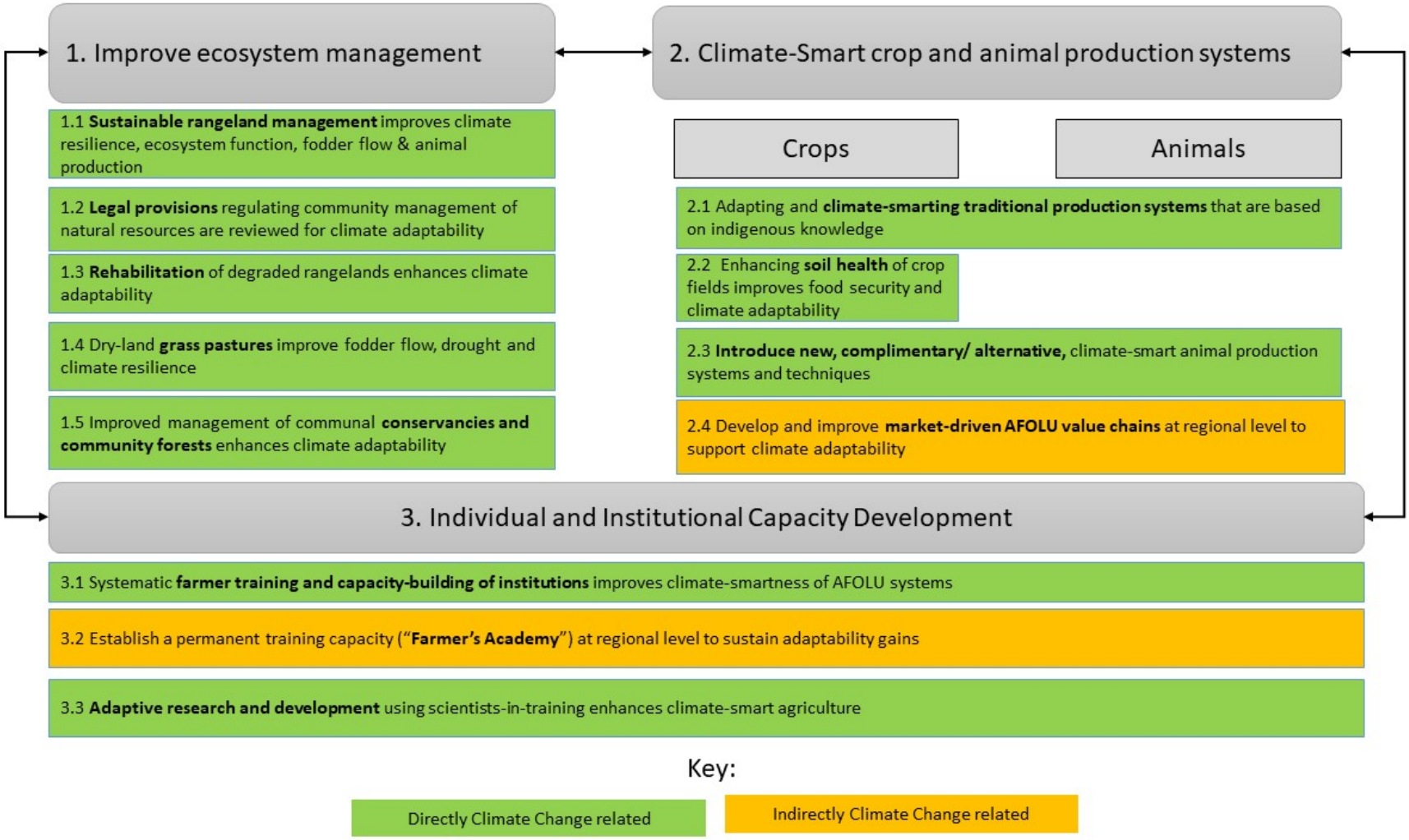


Figure 4: Project Components flow indicative of direct or indirect linkage to climate change

However, maintaining or even increasing the physical production of agricultural produce (the "push" factor) in the face of climate change, on its own, is not enough to improve livelihoods of people and reduce the vulnerability of rural societies. Produce must be marketed effectively to earn farmers an income and if possible, processed to add more value to raw products (the "pull" factors). Hence, increased value addition and improved marketing are essential to secure economic and societal gains and are important components of the proposed project, which has two outcomes that are only indirectly related to climate adaptability but are needed to "push", support and sustain adaptability advances.

"Pushing" and "pulling" agricultural and natural resource-based production along is best achieved by building the capacity of individual producers and of institutions serving the agricultural sector and its producers. Such progress is best supported by a conducive legal, policy and regulatory framework, and hence these aspects are described as distinct project outcomes in the proposed project.

Conventionally, "push" factors are factors such as climate-smart production techniques, restored and more productive environments, adaptive livestock and crop management etc. that enable agricultural production and "push" it forward. However, farmers are unlikely to adopt new farming methods simply because they are climate-smart. If farmers cannot sell their produce profitably and do not work in a conducive regulatory framework (that, for example, allows them to implement innovative farming methods), then climate-smart production techniques alone will not be adopted. Factors such as value addition and improved marketing that ensures a fair product price and a conducive regulatory framework are conventionally referred to as "pull" factors that encourage agricultural production and "pull" it forward. That is why the proposed projects follows a comprehensive approach that emphasises the so-called "pull" factors (e.g. more producer income generated) as well as the so-called "push" factors (e.g. more crop and animal production). In our opinion and experience, this integrated approach has the best chance of establishing climate-adaptive production techniques sustainably, because they earn the farmer a better income even once the project has ended. The farmer thus has a self-interest to keep on implementing adaptive approaches as they improve his income-earning capacity. This is achieving real sustainability of project impacts.

During the formulation of this project, several questions were considered to ascertain the degree to which women will participate effectively in project implementation. These questions included:

i. what are the practical implications of the different roles and status of women in the project areas and how will these affect the chance of the project being successful?
ii. what is the strategic potential of the project for improving the status of women and promoting gender equity and how will the project affect women and
iii. how can the project contribute to long-term strategies to achieve gender equity?

These questions assisted in developing sex-disaggregated data (data with demographic information). Qualitative considerations were also made to show different priorities about what should be done, willingness to participate (or not), among others. This helped to determine how the web of social relationships in the project areas creates benefits for women. The project will ensure that new technologies, interventions and systems are accessible to women. The novel design of this project is to include women at all stages such as implementation, monitoring and evaluation to ensure that they have access to benefits that they value and that they are able to manage the resource base in a sustainable manner. In addition, care will be exercised to make sure that additional activities that are seen as being of interest to women do enter their priority areas of concern and do not exclude them from being considered in the project's main activities.

To better achieve the overall objective or goal of the proposed project, three project components (resembling specific objectives) were identified:

1. To improve ecosystem management in the chosen model regions by implementing climate-smart management and rehabilitation techniques that improve ecosystem function and services, biodiversity, climate resilience, carrying capacity and the fodder flow provided by natural rangelands and "forests"[2], thus making local communities more resilient against climate change impacts.
2. To further the implementation of climate-smart production, management and value-addition techniques in local and regional crop and animal (wild game and livestock) production systems and value chains, to enhance the adaptive capacity of vulnerable communities to climate variability and adaptive change along the whole value chain.
3. To strengthen the knowledge and skills of vulnerable communities required to adapt and become more resilient to climate change and variability, and the capacity of institutions to deliver services effectively, by building their capacity along the whole value chain(s) that they are involved in.

The proposed components, activities and outcomes of the project are described in detail in Part II A of this proposal. The first specific objective, to improve ecosystem management, has five major component outcomes that are listed in Table 5. The second specific objective, climate-smart crop and animal production systems, has four major component outcomes and the third, individual and institutional capacity development, has three major component outcomes. As can be seen from Table 5, the specific objectives of the proposed project and its components are well-aligned with the Results Framework (RF) of the AF and all 7 outcomes of the AF RF are addressed by the 12 component outcomes in the proposed project.

[2]: These two regions of Namibia are too arid to harbour true forests. However, they have dry woodlands that are managed as forests, therefore the term "forest" is used conveniently and in the wider sense.

Table 5: Alignment of project outcomes with AF RF outcomes (*: numbers refer to AF RF numbering system)

Project component	Component outcomes	Relevant outcome of AF RF
1. Improve ecosystem management	1.1 *Sustainable rangeland management* improves ecosystem function, biodiversity, climate resilience, carrying capacity, fodder flow and animal production	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	1.2 *Legal provisions* regulating community management of natural resources are evaluated for climate adaptability	7. Improved policies and regulations that promote and enforce resilience measures
	1.3 *Rehabilitation* of degraded rangelands enhances resilience and climate adaptability of pastoral and ranching systems	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	1.4 *Dry-land grass pastures* improve fodder flow, animal production, drought resilience and climate adaptability	4. Increased adaptive capacity within relevant development and natural resource sectors
	1.5 Improved management of *communal conservancies and community forests* enhances climate adaptability	1. Reduced exposure at national (regional) level to climate-related hazards and threats
2. Climate-smart crop and animal production systems	2.1 Adapting and climate-smarting of *crop and animal production systems* that are based on traditional knowledge improves the resilience of communities to climate change	4. Increased adaptive capacity within relevant development and natural resource sectors
	2.2 Enhanced *soil health* of crop fields improves food security and climate adaptability	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	2.3 Introduction of *complimentary/ alternative*, climate-smart crop and animal *production systems* and techniques	4. Increased adaptive capacity within relevant development and natural resource sectors AND 6. Diversified and strengthened livelihoods and sources of income for women and other vulnerable groups in targeted areas or enterprises (Indicator 6.1.1)
	2.4 Develop and improve *market-driven AFOLU value chains* at regional level to support climate adaptability	2. Strengthened institutional capacity to reduce risks associated with climate-induced socio-economic and environmental losses
3. Individual and Institutional capacity development	3.1 Systematic *farmer training and capacity-building of institutions* improves the climate-smartness of AFOLU systems	3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
	3.2 A permanent training capacity at regional level ("*Farmer Academy*") sustains adaptability gains	2. Strengthened institutional capacity to reduce risks associated with climate-induced socio-economic and environmental losses
	3.3 Adaptive *research and development* enhances climate-smart agriculture and adaptation to climate variability	3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level

B. Project components and financing

The project consists of 3 components with their 12 individual activities presented in Table 6 below.

Table 6: Project components, outputs, outcomes and budget

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
1. Improve ecosystem management	**Rangeland condition improves due to sustainable rangeland management (SRM), improving ecosystem services such as soil moisture, biodiversity, productivity and grass-based carrying capacity on 400,000 ha of communal rangelands. About 22,000 ha of degraded rangelands are rehabilitated, availing the wood of encroacher bush for sensible utilisation and value addition. Dry-land grass pastures are established on 5,000 ha to strengthen the fodder flow to livestock, take grazing pressure off natural rangeland and provide a drought fodder bank. Feedback to regulators on the conduciveness of policy and legal framework. Improved sustainability of charcoal production and management of conservation areas.**	**SRM improves rangeland condition and ecosystem services such as productivity, enhancing climate resilience, biodiversity and livestock production. Improved rangeland is better able to adapt to climate change, becomes more drought resilient, provides a more reliable foundation for agro-pastoral farming systems (especially where degraded rangeland is restored) and strengthens livelihoods. The legal and policy framework is made more conducive to encourage climate-smart adaptations. Rangeland-related sectors such as conservation and charcoal are made more sustainable.**	**1,286,757**
1.1 *Sustainable rangeland management* improves ecosystem function, biodiversity, climate resilience, carrying capacity, fodder flow and animal production	Principles of SRM as espoused in National Rangeland Management Policy and Strategy (2012) applied to 100,000 ha of open-access rangeland in Omusati communities supplying slaughter cattle, and 300,000 ha in Omaheke producing weaner cattle for export. SRM includes deferred grazing, drought preparedness, the management of fire and poisonous plants and increased drought reserves. Improvements such as rangeland condition score, standing biomass, fodder quality etc. are measured.	More adaptive management of communal rangelands by resident communities improves ecological functioning and services such as carrying capacity (important in pastoral systems!) and nutritive value, increases biodiversity, reduces impact of climate change and improves drought resilience. Women and vulnerable communities are targeted.	
1.2 *Legal provisions* regulating community	Evaluate the impact of existing acts, laws and policies relevant to climate change adaptation in	Identify and address unintended consequences and strengthen desired impacts of the existing legal	

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
management of natural resources are evaluated for climate adaptability	communal areas to evaluate if intended outcomes were achieved, identify flaws (e.g. "pasture poaching") and propose corrections. Advocate for changes required and advise lawmakers on intended changes and processes to strengthen resilience and adaptation of communal farmers to climate change and associated risks.	framework so that it provides a more conducive framework to communal agriculture, conservancies and community forests and for climate change adaptation. Advocated improvements in policy and legal framework will provide conducive conditions for climate change adaptations and strengthen resilience.	
1.3 *Rehabilitation* of degraded rangelands enhances resilience and climate adaptability of pastoral and ranching systems	20,000 ha of degraded rangeland in Omaheke and 2,000 ha in Omusati will be rehabilitated including control of soil erosion and poisonous plants, selective thinning of encroacher bush and over-seeding with desirable indigenous, perennial grass species. Accumulated wood of thinned encroacher bush will be charcoaled in a sustainable manner acceptable to the regulator (Directorate of Forestry, Forest Stewardship Council-FSC) at 7 sites and includes the development of an efficient, semi-mobile industrial-scale charcoal kiln.	Judicious bush and erosion control followed by re-introduction of locally extinct grasses rehabilitates rangeland condition and productivity, thus improving ecosystem function, services and resilience. Re-structuring of existing, barred and unsustainable charcoal enterprises to obtain regulatory approval opens up a new industry. Improving charcoal process efficiency with help of NUST engineering experts leads to more efficient utilisation of natural resources (encroacher wood) that serves as a role model for other areas.	
1.4 *Dry-land grass pastures* improve fodder flow, animal production, drought resilience and climate adaptability	1,000 ha of dry-land (rain-fed) grass pastures established in Omusati to support cattle destined for local slaughter and 3,000 ha in Omaheke to retain 15,000 previously exported weaner calves and grow them out to slaughter locally. Grass leys integrated into crop rotation, grass/legume pasture mixes tested, drought fodder bank enlarged (hay).	Dry-land grass pastures are widely used to augment fodder flow, intensify livestock production and provide hay for a drought fodder bank, hence improving climate resilience. Pastures take grazing pressure off natural rangelands, making it easier to rehabilitate them and improve ecosystem services (e.g. fodder flow).	
1.5 Improved management of *communal conservancies and community forests* enhances climate adaptability	Management plans for communal conservancies and community forests compiled (new) and revised (existing) to ensure that they are climate-smart. Communities assisted with implementation. Eco-tourism activities and re-forestation with valuable timber species introduced. Applied in existing (e.g. Uukwaluudhi Core Conservancy) and new areas (e.g. Omaheke/Otjozondjupa bi-regional conservancy, Gam area).	More adaptive management of conservation areas (existing and new) improves adaptation to climate change, improves sustainable forest management, diversifies options and creates employment that is especially suited to women and marginalised groups. Resource conservation is better integrated with agriculture at the landscape level. Very suitable for women (e.g. tourism) and marginalised communities (e.g. re-forestation).	
2. Climate-Smart crop and animal production systems	**Local crop, forest and animal production of 230 individual farmers (plants) and 20 communities (animals) is improved by adapting traditional**	**Rain-fed crops, irrigated horticulture, livestock and game production becomes more efficient and achieve higher and more sustainable yields**	**900,701**

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
	systems to climate change impacts, and the impacts are quantified (measured and compared to baseline). Grass leys introduced to at least 2,000 of dry-land crop fields. Complementary and alternative crop and animal production systems investigated and introduced if feasible. Market-driven AFOLU value chains inventoried, developed and improved at regional level, backed by regionally preferential procurement.	**due to climate-smart management, supported by increased processing, value-addition and improved marketing of produce, resulting in better livelihoods and more employment opportunities.**	
2.1 Adapting and climate-smarting of *crop and animal production systems* that are based on traditional knowledge improves the resilience of communities to climate change	The management and production efficiency of 130 dry-land crop farmers (100 in Omusati, 30 in Omaheke), 100 irrigating horticulture farmers (75 in Omusati, 25 in Omaheke), 10 pastoral communities supplying slaughter cattle in Omusati and 10 pastoral communities that are growing out weaners on pasture in Omaheke is improved by 15% as measured by yield/ha, fertility rate, mortality rate, growth rate, etc. Include chicken and goat production systems, often the only source of wealth of poor communities. Compile fodder flow plans for 10 pastoral communities each in Omusati and Omaheke based on contributions from natural and artificial pastures and stockpiles, to improve livestock nutrition management. Teach communities to track changes in system output themselves to measure progress, or lack thereof ("local-level monitoring").	The implementation of various improved and climate-smart production techniques (e.g. soil improvement, grass ley crop rotation, rainwater harvesting, producing own vegetable seedlings, fertilisation based on soil analyses, conservation agronomy, integrated pest management; mineral supplementation of livestock based on organ analyses, parasite control, breeding and selection of female replacements, etc.) improves efficiency of production and yield, resulting in more marketable products of higher quality, and thus sustainability. Improved fodder flow management, especially at critical times of the year (e.g. dry season) or production cycle (e.g. mating periods) increases the productivity, fertility, survival of livestock. Hence, the livelihoods of rural people and their resilience to climate shocks and frequent droughts improves.	
2.2 Enhanced *soil health* of crop fields improves food security and climate adaptability	Improve agronomic practices such as manuring, analysis-based fertilisation, crop rotation with grass leys, mulching, conservation agriculture practices and hedge rows for windbreaks to improve soil fertility and stability measurably on at least 2,000 ha of dry-land crop fields.	Organic matter and fertility of crop field soils is improved, weed and pest cycles are interrupted and hence reduced. This increases crop yield per hectare, as does the use of more adapted cultivars, and improves food security of vulnerable communities living in marginal cropping areas. Hedge-row protection of fields improves soil stability in crop fields (e.g. reduces flood damage	

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
		in Omusati region, and wind erosion) while also providing extra browse fodder.	
2.3 Introduction of *complimentary/ alternative*, climate-smart crop and animal *production systems* and techniques	Investigate, evaluate (by feasibility study), trial and initiate the establishment of suitable, adapted alternative or complimentary livestock production systems, especially: • a small-scale dairy-ranching industry (Sanga cows crossed with Jersey bulls, by AI) on dry-land grass pastures with a collective cold chain, • processing of goat meat and marketing through formal channels to raise production and product quality, • growing of different sub-tropical fruit.	New and diversified income streams provide farmers with options that promote climate adaptation, resilience, regional economic development and reduce vulnerability. Dairy-ranching serves a well-populated market with fresh milk and processed dairy products and is a climate-smart intensification and diversification strategy. Goat meat is currently only sold informally. Processing and formal marketing will secure and transform this sector. Introduce other sub-tropical fruit than mango e.g. avocado, kiwi etc.	
2.4 Develop and improve *market-driven AFOLU value chains* at regional level to support climate adaptability	Inventory and description of local/regional AFOLU value chains to facilitate understanding and focus interventions. Assist and develop local processing entrepreneurs (e.g. butchers, millers, wood users) and institutions (e.g. abattoirs, mills) to develop and expand value chains of crop, forest and animal products, including input supplies, processing, storage, downstream linkages, value addition, cooperative marketing and other "pull" factors. Regional governments facilitate preferential procurement and import substitution at regional level.	The changing mind-sets and practices of communal farmers from: • subsistence farming and investing in animals (growing their herd), to • production-oriented, increasing herd off-take, using financial instruments "commercialises" these two communal areas, increasing the adoption of tested climate-smart techniques. Appropriate strategies and the capacity to overcome challenges are synchronised with regional authorities and national stakeholders to improve livelihoods, reduce rural poverty and climate-smart the AFOLU sector in Omusati and Omaheke.	
3. Individual and Institutional capacity development	**Knowledge, skills and information to enhance sustainable, climate-smart and profitable production is transmitted to at least 5,000 individuals, and improved and expanded value chain management to at least 20 institutions so that value addition, processing and marketing are improved. A permanent training capacity (the Farmers' Academy) is established in the regions and linked to community-based**	**Informed producers, competent institutions and robust value chains are more sustainable, resilient to climate change risks, food-secure and better-off. Permanent training institutions support and sustain climate adaptation gains post-project and can easily be up-scaled to other regions of Namibia. Exposure of communities, scientists and professionals at an early stage increases awareness and**	**2,049,729**

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
	agricultural resource persons (CARPs). At least 550 scientists-in-training and 9 young professionals are exposed to and actively participate in climate change interventions and solve local problems.	**knowledge of climate adaptiveness, securing a more sustainable future.**	
3.1 Systematic *farmer training and capacity-building of institutions* improves the climate-smartness of AFOLU systems	More than 5,000 farmers (at least 30% women, 10% marginalised and vulnerable, 5% training-of-trainers) trained in sustainable and climate-smart resource management, surplus-oriented farming and value-addition in over 600 meeting-days. All training materials compiled into training kits that are distributed widely. On-farm and on-station demonstration plots established and maintained in participating communities of two regions. Regular dissemination of relevant production, marketing and climate risk information using popular and available print, verbal, visual and electronic media. At least 20 regional and national institutions that serve farmers in Omusati and Omaheke (e.g. abattoirs, AMTA, charcoal and producers' associations, farmers' organisations, forest and conservancy management committees) trained in operational, strategic and business management and providing farmers with effective services, involving the NUST School of Business. Input supply, processing, value addition and cooperative marketing initiated and promoted at institutional and regional level. New markets explored and penetrated by relevant crop, horticultural, livestock, rangeland and forestry products. Innovative strategies devised to overcome marketing and offtake bottlenecks.	Systematic training based on local experience and incorporating much experiential and practical learning (i.e. participatory, hands-on skills development on demonstration plots) and the regular dissemination of relevant information via public media strengthens awareness, creates ownership and builds capacity of farmers, extension and institutional workers, entrepreneurs and trainers to adapt to climate change, which improves their livelihoods and sustains climate risk reduction interventions. Improved capacity to manage institutions, processes and value chains properly and realise long-term strategic objectives provides quality support to producers, enhances offtake, value addition, profitability and sustains adaptability gains post-project.	
3.2 A permanent training capacity at regional level ("*Farmer Academy*") sustains adaptability gains	9 full-time Field Facilitators from participating communities trained to assist with project implementation at community level, channel information from and to communities and morph into "community-based agricultural resource	Field Facilitators based in participating communities link project implementers with beneficiaries. As CARPs, they link up with the FA, farmers' associations and regional authorities post-project to help sustain capacity-building and	

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
	persons" (CARPs) post-project. A permanent farmers' training institution ("Farmers' Academy") established at regional level, embedded within and co-funded by Omusati and Omaheke Regional Councils (RC), concentrating on content and delivery while using existing RC infrastructure. Accredited by Namibia Training Authority (NTA), links and updates CARPs, maintains demo plots and info dissemination, etc.	climate-smartness beyond project end. The FA maintains training and information dissemination beyond project end and may expand into other services (e.g. artificial insemination of dairy cows). A successful regional role model can easily be up-scaled to national level.	
3.3 Adaptive research and development enhances climate-smart agriculture and adaptation to climate variability	At least 550 scientists-in-training at NUST exposed to climate change interventions during 35 field excursions to Omusati and Omaheke where they actively participate in climate adaptation activities and integrate this experience into their academic learning. At least 9 young professionals trained to MSc and PhD level by researching climate adaptation problems in the field and developing applicable, adaptive solutions.	The next generation of Namibia's natural resource specialists gains invaluable practical experience of climate adaptation in the AFOLU sector, better preparing them for a sustainable future. They also learn how to interact with farmers, improving their "soft skills". Capacity in applied research to solve practical problems is built in NUST and its post-graduate students, in accordance with its strategic objectives. This engages NUST with industry and makes it more relevant to agriculture and conservation by establishing a bond between academia and industry.	
Project Activities Cost (A)			**4,237,187**
Project Execution Cost (B) – charged by EE			**371,108**
Total Project Cost (A+B)			**4,608,295**
Project Cycle Management Fee (C) - charged by NIE			**391,705**
Amount of Financing Requested (A+B+C)			**5,000,000**

C. Projected calendar

Table 7 below depicts the high-level project calendar. A more detailed calendar appears in Part III, Section H.

Table 7: Projected calendar

Milestones	Expected Dates
Start of Project	April 2019
Mid-term Review	April 2022
Project Closing	September 2024
Terminal Evaluation	December 2024

PART II: PROJECT JUSTIFICATION

A. Project components

The following three project components with their 12 activities are based on the expert knowledge assembled by Namibian agriculturalists and natural resource experts at NUST, on extensive consultations with administrators, agro-industries, representatives and stakeholders in 2017 and on wide-ranging meetings with grassroots communities in 2018. Six of the 12 constituency communities in Omusati region (all of which is communal area) and the four communal constituency communities in Omaheke region (half communal and half commercial area) were consulted in 2018. Minutes of these meetings as well as gender representation are attached in Annexure 3. Traditional authorities were strongly represented during these community meetings, while all regional administrative structures (e.g. regional governors, constituency councillors) were intimately involved as well. Their letters of endorsement of the proposed project (some still under the old title) are attached in Annexure 4 and 5.

The exact sites at which the proposed interventions will be located are not yet known, for which reason the environmental impact assessment is in a general form. Intervention sites will be identified during project start-up, if this proposal is successful. However, two sites that are certainly targeted for intervention even at this early stage are the farm Skoonheid in the Omaheke region where San communities were resettled so they can receive special development attention, and north-western Omusati region where marginalised Ovahimba and Ovatjimba people are concentrated. Some of these development priorities were identified before Namibia's independence[3] already and were formalised, promoted and expanded on by Dr Libertine Amadhila[4], a recent Deputy Prime Minister. The proposed project will ensure that these marginalised communities benefit specifically from it in areas of importance to them, as mentioned in the subsequent text.

1. Component 1: Improve ecosystem management

The most important component of the proposed 5-year project is *Component 1: Improve ecosystem managemen*t as it forms the foundation for strengthened climate change adaptation and resilience. Its objective is to further the implementation of climate-smart SRM by vulnerable communities that will improve the condition of the rangeland ecosystem on which their pastoral activities are based, improving ecological functions, services and biodiversity. The condition of other natural and agricultural resources (e.g. forests, crop fields) will also improve as a result of

---

[3]: CHIGOVERA, A., 1983. *The Constitutional and Legislative Protection of the Rights of Indigenous People: Namibia.* Country Report of a research project by the International Labour Organisation and the African Commission on Human and Peoples' Rights, AU Commission, Windhoek, Namibia.

[4]: AMADHILA, L., 2013. *Making a Difference: Memoirs of Dr. Libertine Amadhila.* University of Namibia Press, Windhoek, Namibia.

sustainable land management, improving the resilience of communities to climate variability and change and hence reducing the vulnerability of pastoral people to climate change and reducing rural poverty. This component is perfectly aligned with Outcomes 1, 4, 5 and 7 of the AF Results Framework. All 10 communal communities consulted in 2018 identified decreased ecosystem functioning, especially decreased grazing, increased bush encroachment and desiccation of the rangeland as one of their top-three concerns. They all complained that a perpetual fodder deficit limited their livestock production while a very noticeable decrease in rangeland condition made them more vulnerable to drought.

In both regions where the proposed project will be located, Omusati region and the north-eastern communal parts of the Omaheke region (called “Omaheke” for short in subsequent descriptions), small-scale communal farmers are dependent on pastoral and/or extensive production of beef cattle and other livestock such as goats. Omusati farmers apply mixed cropping with grain crop production, but Omaheke farmers are virtually completely dependent on cattle. Maladaptive rangeland management in both regions has caused severe rangeland degradation, resulting in a dramatic drop of grazing capacity and significantly reduced cattle productivity. Maladaptation includes management aspects such as continuous grazing during the vegetative growing season (the rainy season) that weakens and kills the most palatable perennial grasses and reduces seed production by annuals, overgrazing by too many cattle on the range for too long, a grazer:browser ratio heavily skewed in favour of grazers, the virtual exclusion of severe late-season fires that kill bush and inhibit its encroachment, and non-evacuation of livestock from drought-affected areas (applying livestock pressure during drought). Natural factors such as droughts (which causes higher mortality amongst grasses than woody plants) and rising atmospheric CO_2 levels (which favours the growth of C_3 woody plants over that of C_4 tropical grasses) enhance the degradative effects of inappropriate management. Yet there are many things that rangeland managers can do at the local level as the global effect is by no means overpowering.

Both regions are in dire need of ecosystem repair. Rangeland degradation destroys the grass layer of a savanna and causes the woody component to explode and dominate the grass layer which in turn causes the water level in the soil to drop. Natural fountains, springs and wetlands dry up or are drained and the water level in wells and boreholes falls (Bockmühl, 2009; Christian, 2010). Fortunately, the soils of both regions consist predominantly of coarse Kalahari sands so that rainwater infiltration remains high and desertification is not as likely an outcome of rangeland degradation as in other regions of Namibia with more finely textured soils. The poor grass sward of bush-encroached rangeland hampers livestock (cattle, sheep) production.

Namibia’s climate is predicted to become hotter and rainfall to become more variable. The country will experience fewer rainy days in a season although not necessarily less rainfall (models deviate in their prediction of the amount of rain). Rainfall events will be fewer and individual rain showers more energetic (i.e. harder rainfall). Droughts will become more frequent and more severe.

For natural rangelands, these expected changes increase the risk that woody plants will be advantaged above herbaceous plants (e.g. grasses), resulting in bush encroachment that is an ecological response to the overgrazing of rangelands and increased carbon-dioxide in the

atmosphere, based on the competitive advantage of woody over herbaceous plants in a savanna. Selective bush-thinning followed by over-seeding with desirable indigenous grass species re-establishes the grass-dominated savanna ecosystem, improves shallow soil moisture conditions and aquifer re-charge and improves rangeland productivity to sustain large herbivores and associated species. Woody plants have a greater hygroscopic potential (ability to absorb soil water) and lower wilting point than grasses, reducing the grass-based carrying capacity of pastoral and extensive livestock production systems. Bush encroachment is expected to increase with global warming, driven by increased atmospheric CO_2 concentrations that "fertilise" C_3 plants (e.g. woody plants), giving them an advantage over C_4 plants (e.g. sub-tropical grasses) (Norby et al. 1999, Kimball et al. 2002, Nowak et al. 2004). These expected negative impacts of climate change on bush encroachment will magnify the negative impacts of anthropological contributions to bush encroachment (e.g. suppression of hot fires, tilting the balance of browsing and grazing herbivores, reducing the competitive ability of the grass sward by mal-adaptive grazing systems, etc.) and are expected to make bush encroachment in Namibia much worse.

Perennial grasses will be better able to cope with extended periods of warmth and fewer rainfall events but more-or-less the same rainfall amount, than annual grasses. Their growing season will become longer and if it rains adequately, they could produce more fodder than before. Annual grasses will suffer with climate change as they must grow anew from seed each year. Fewer and less frequent rainfall events (i.e. less follow-up rain after germination) and more violent rainfall events increase the risk that germination and establishment of annual grasses will be impeded, shrinking annual grass production. Since the grass sward of a degraded savanna is dominated by annual grasses, this will cause more problems for Namibia's graziers. If the rangeland in these two regions of Namibia could be repaired to close to its original condition, when the great majority of all grasses were perennial, it would increase resilience of the ecosystem and its people (pastoralists and ranchers). Perennial grasses do not need to grow from seed each year as their tufts are already present on the range, even if dormant. A perennial grass tuft can utilize even the slightest rainfall to immediately produce green forage, whereas an annual grass first has to germinate and will only establish and produce forage if follow-up rainfall events are conducive for establishment. Fewer rainfall events further apart are predicted for Namibia under climate change and it would thus be advantageous to have more perennial grasses on the range. Also, late rains (falling late in the hot-wet season, when temperatures are already declining) will happen more frequently. These rains cannot be utilized by grasses as the lower night-time temperatures inhibit growth. But as the late moisture will be transferred by the soil to the next growing season, perennial grasses produce a green flush early in the next season without a drop of rain, whereas annual grasses cannot produce any forage with late rain. In this manner, promoting perennial over annual grasses increases forage production and makes pastoralists and ranchers less vulnerable and more resilient to climate change and drought.

Upon degradation, Namibia's rangelands first change their grass sward composition from perennial to annual grasses, and then become bush encroached if desertification (bare ground) can be avoided. These degradation tendencies will be reinforced by global climate change and must be counteracted. Perennial grasses must be protected and stimulated by adequate rest from grazing during the growing (rainy) season (so-called "planned grazing") so that they can dominate

annual grasses. Encroacher bush should be reduced (by various biological, manual, mechanical and chemical means) to become less competitive and allow perennial grasses to flourish and dominate the rangeland. In very degraded sites, encroached by perennial herbaceous noxious plants such as *Sida cordifolia* (exotic, "mallow") and *Dichapetalum cymosum* (indigenous, "gifblaar"), the re-establishment of perennial grass sward will be aided by the (manual, chemical) removal of such noxious plants in selected patches.

The proposed adaptation activities in terms of rangeland management of this project are aimed at strengthening the perennial grass sward by planned grazing and vigour-resting in summer (rainy season) of communal and individual grazing areas, re-seeding degraded rangelands with perennial climax grass species and thinning encroacher bush judiciously to achieve an optimum (rather than maximum) density, rather than clear-felling or "de-bushing". In this way, the grass-based carrying capacity of grazing areas will be maintained or even improved. This will improve livestock production from the rangeland (if other factors affecting animal husbandry remain equal), offering pastoralists and extensive livestock farmers an opportunity to improve their livelihood. These activities also result in an increase in biodiversity as a greater diversity of herbaceous plants and fewer but more diverse woody plants offer more habitats to a more diverse range of animal species.

Planned grazing means that some grazing during the rainy season will be deferred to winter, leading to the accumulation of standing grass biomass at the end of the growing (rainy) season. This "standing hay" is at once a fodder bank for dry times (i.e. improves drought resilience) and a source of fuel for the kind of planned, late season, fierce fires needed to contain encroacher bush.

The grass production of natural rangelands should be augmented by planting pastures of perennial grasses under dry-land (i.e. rain-fed) conditions ("cultivated pastures"). Artificial pastures can be established by sowing ploughed land, but can also arise from less intensive cultivation of existing grass-dominated rangeland areas, thus lowering the risk of establishment failure. Pockets of rangeland with superior grass production can be managed like pastures by removing competing plants (e.g. encroacher bush while leaving tall shade trees, removing weeds and annual grasses), protecting them from unplanned grazing (e.g. by fencing to control access) and fire (e.g. surrounding them with a fire break, or grazing them down before the advent of the burning season), levelling them for hay production (e.g. remove stones, fill holes, etc.) and fertilising them when rainfall is adequate to enhance fodder production. "Fast-tracking" cultivated pastures like this may also be more feasible in areas where farmers are resource-poor and don't have practical knowledge of cultivating the soil or the implements needed for such.

Cultivated pastures should be grazed during the rainy season when they are usually more productive than rangeland grass swards. This is because pastures are usually established on more fertile soil, most competition to grasses (i.e. by woody plants, weeds) has been removed by cultivation and they can even be fertilised. Shifting grazing pressure from natural to artificial pastures during the vegetative growing (rainy) season relieves grazing pressure on natural rangelands, allowing them the recovery from grazing needed by their perennial grasses to recuperate from grazing by recovering their vigour. Surplus grass from cultivated pastures can be

hayed and forms part of the drought fodder bank, thus enhancing the ability of farmers to survive drought (improves resilience).

Cultivated grass pastures will be established in the crop fields of communal farmers, not in open-access rangelands. Activities that require “cultivation” of the soil are private activities in communal areas that belong in the crop fields of individual farmers and not in open-access or shared grazing lands. Traditionally, the farmer has complete management control over his fields, which means that s/he can control the establishment as well as utilisation of pasture grasses. In contrast, communal grazing areas offer open access to everyone, there is no individual control over grazing and hence communal rangelands are quickly degraded (“tragedy of the commons”). It now makes sense for a farmer to plan the grazing of his pastures, whereas a “first come – first served and the devil for the rest” attitude prevails with grazing open-access natural rangelands (the “curse of the commons”). It also gives the farmer an opportunity to implement a crop rotation system based on grass leys that improves the fertility and structure of dystrophic aeolian sands, but this aspect will be discussed later.

In Omusati region, there is a further optional space to establish cultivated pastures under management control and that is in the “ekove”. In Oshiwambo-speaking communal areas, farmers are allowed to privatise a sizeable area of rangeland (10-50 ha in extent is common) and keep it for further extension of the farming enterprise, primarily for his/her children. Most ekoves are fenced and grazed, so they are an ideal target for establishing improved grass pastures while maintaining the expansion/inheritance option.

Shifting grazing pressure from natural to artificial pasture in summer, during the vegetative growing (rainy) season gives rangeland grasses a chance to recover at the time of year they need resting most, and also causes grass to accumulate standing hay (“foggage”) on the range. When the livestock is returned from artificial to natural pasture during the dormant (dry) season (winter), they find a lot of standing hay on the range, when normally it would have been bare because everything was grazed up in summer. Livestock will therefore be able to retain their body condition better during winter, leading to improved fertility, stronger offspring at birth, more mother’s milk and hence better survival of offspring and faster growth rates – in short, it increases livestock production and reproduction.

Standing hay on the range (“foggage”) at the beginning of winter also improves the chance that some areas might still have a significant cover of grass towards the end of winter. This protects rangeland soils from the harsh winter sun and winds and improves soil condition. It can also fuel the late-season, fierce fires needed to contain bush encroachment if winter grazing is well-planned, giving farmers a natural tool to contain encroacher bush.

The current baseline in both the Omusati and the Omaheke region is that the grass sward of natural rangeland is in extremely poor condition. Its productivity (the “carrying capacity”) is low as its species composition is poor, consisting mainly of annual grasses and ephemeral herbs and forbs with hardly any perennial or climax grasses left in the sward. For example, a survey in the Omusati region in the summer of 2012 (Rothauge, 2014) showed that the herbaceous dry matter

yield in an area of open-access grazing near Amaupa was only 361.4 kg/ha. In a nearby part of the Uukwaluudhi conservancy area near Okaholo, herbaceous yield was nearly four times higher at 142.9 kg/ha due to better rangeland management in the conservancy. That was because at Amaupa, grasses made up only 59.3% of all rangeland plants while grasses constituted 72.6% of all rangeland plants at Okaholo. The grass sward itself contained only 5.0% perennial and 0.1% climax grasses in open-access Amaupa, compared to 32.4% perennial and 9.7% climax grasses at better-managed Okaholo. The latter area itself was not yet in ideal condition either as it is assumed that a savanna grass sward in good condition in Namibia should consist of about 90% perennial grasses of which 50-67% are also climax grasses, but it shows that improved rangeland management results in better, more productive rangeland. Perennial climax grasses offer herbivore animals better nutrition throughout the year than short-lived annual grasses. Improved rangelands are better able to buffer climate variability, i.e. are more resilient and are an indispensable component of adapting pastoral systems to climate change.

Improving the perenniality of the grass sward of a rangeland also has qualitative advantages. The same Omusati survey found that the nutritive value of a degraded (i.e. annual) rangeland grass sward was comparable to that of one in better condition during the four months of the rainy season only, but that it was significantly worse during the 8-month dry season. In summer, the crude protein content of both the degraded grass sward at Amaupa and the one in better condition at Okaholo was 7.2% and matched the growth requirements of cattle (7% crude protein). In winter, it fell to below the maintenance requirement of cattle (5% crude protein) to 4.0% in annual grasses but only to 4.6% in perennial grasses. In terms of the energy required by cattle, as measured by the digestibility of organic matter, the energy required by growing cattle (55% DOM) was matched by grasses in both degraded and better swards in summer (58.5% DOM for annual and 55.3% DOM for perennial grasses) but the maintenance requirement of cattle for energy (45-50% DOM) was met better by perennial grasses in winter (48.3% DOM) than by annual grasses (45.1% DOM). Grass swards in good condition support animal production better during the rainy and the dry season than degraded grass swards and thus are an adaptive advantage that improves peoples' resilience.

However, both the quantitative and the qualitative baseline do not measure the fact that annual grasses only grow when it rains, for a limited time of 3-4 months a year, while perennial grasses can grow for up to 8 months a year. This means that quality fodder is available in greater quantity and for a longer period if a rangeland grass sward is perennial than when it is annual. Improved rangeland management results in more nutritive grasses in greater quantity that enable grazing animals to be better fed and better able to withstand climate shocks and variability. Animal production systems become more resilient and are better adapted to climate change and are more productive.

To achieve these desirable outcomes through improved ecosystem management, the following activities are proposed:

1. Implement SRM to improve ecosystem function, biodiversity, climate resilience, carrying capacity, fodder flow and animal production.

2. Evaluate legal provisions that regulate community management of natural resources for climate adaptability.
3. Rehabilitate degraded rangeland to enhance resilience and climate adaptability of pastoral and ranching systems.
4. Establish dry-land, cultivated pasture of indigenous climax grazing grasses to improve fodder flow, animal production, drought resilience and climate adaptability.
5. Improve the management of communal conservancies and community forests to enhance climate adaptability.

1.1 Implement sustainable rangeland management

Better managed grazing lands are very important in climate change mitigation and adaptation. By implementing sustainable rangeland management (SRM), communal grazing lands will be better managed, produce more grazing of higher quality, emit less C and sequester more and their ecosystem services will function better. For example, the provision of high-quality grazing is one of the most important ecosystem services in Namibia's communal areas whose inhabitants are predominantly pastoralists (in the Omusati region) and extensive livestock ranchers (in the Omaheke region), and is supported by higher levels of shallow soil moisture. However, communities are nearly always out of fodder. The perpetual fodder deficit in communal areas of Namibia was a top-three concern in all 10 communities consulted in the process of compiling this proposal. By own admission, it resulted from unsustainable rangeland management and communities agreed that if they could only apply SRM, the fodder situation would improve. The reasons for not implementing SRM varied from "not knowing what SRM is" to a policy framework that was not conducive to SRM (see next action). The proposed project therefore intends to introduce SRM to communities and have it apply to vast areas of grazing lands, hence improving ecosystem services and resilience to climate change. Such intervention is also emphasized by the various official Regional Development Profiles[5] as a key economic priority to get agriculture, specifically livestock production to become more productive and enhance rural livelihoods.

The principles of SRM are detailed in Namibia's National Rangeland Management Policy and Strategy (NRMP&S) of 2012. In summary, they are:

a) Know the resource base and its adaptation to the environment
b) Manage for effective recovery and rest of grasses
c) Manage for effective utilisation of grasses and shrubs
d) Improve soil condition
e) Address bush encroachment
f) Plan for droughts
g) Monitor the resource base regularly to observe changes and trends
h) Plan for appropriate farm infrastructure

[5]: For example, the Omaheke Regional Development Profile: Omaheke Regional Council, 2015. *Omaheke Regional Development Profile.* ORC, Gobabis, Namibia.

Communities will be trained in these techniques and mentored to apply them within their grazing lands, so that a total of 400,000 ha of communal grazing lands are better managed. Currently, there are no such efforts (= baseline) although the Rangeland Coordination Unit in the Namibian Agricultural Union (for commercial farmers) has set up a working group to discuss the rangeland management challenges faced by communal farmers (not their constituency). This initiative is only at the beginning. The NAU project is due to end in 2019, thus making it essential to continue its initial efforts and expand on them.

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 of climate change. 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 stretching their adaptive capacities to the extent that they are unable to cope given the increased 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 rangeland condition without causing additional anthropological damage to the land. Consequently, there is a slow build-up of accumulative land degradation and declining livestock output, which if not addressed now is likely to negatively impact the ability of future generations to make a living out of this land. Hence, the implementation of SRM according to the NRMPS is an urgent priority.

The communities in Omusati region targeted for intervention are those supplying the cattle abattoir in the regional capital Outapi with slaughter cattle. These farmers will have more motivation and means to implement SRM than those not supplying the abattoir as suppliers will be able to relate their inputs and management to the money they make from cattle sales. Since SRM will improve cattle productivity and fertility after a delay period of a few years, there will be a positive feedback loop between successful implementation of SRM and cattle sales, facilitating the shift in mind-set from subsistence to surplus farming that this project is attempting to achieve in a climate-smart manner. The cattle abattoir is expected to become operational early in 2018, in time for this proposal if the application is successful. This also means that the targeted communities could not yet be identified but provision has been made for this activity to apply to 100,000 ha of open-access communal rangeland in Omusati region.

In the Omaheke region, 300,000 ha of rangeland are targeted for this intervention. Omaheke cattle farmers are already oriented towards surplus production as they have been selling about 150,000 weaner cattle to South African cattle feedlots for many years. The intention of this proposal is to retain at least 10% of the exported weaners (about 15,000) annually in the Omaheke region to grow out locally and be slaughtered in Namibia. If kept solely on rangeland (which is not the intention; see “cultivated pastures”), these 15,000 young cattle will be slaughter-ready in 2-2½ years, so there will be 30,000 additional growing weaners on the range each year. At an average carrying capacity of 10 ha per large stock unit, these 30,000 cattle will require 300,000 ha of “additional” rangeland. If rangeland condition and productivity could be improved by SRM, 30,000 cattle could successfully be kept on 300,000 ha without causing more rangeland

degradation. This innovative approach has not been tried in Namibia before. At around 100 cows per farmer, the proposed project is targeting about 300 cattle farmers. The project team did not yet target specific communities for this intervention for the real danger of creating expectations which, at this early stage, we don't know if we will be able to meet. Obviously, every one of the 4,000-plus cattle-raising households in Omaheke wants to benefit from this intervention, so selection criteria will be developed in close cooperation with regional authorities such as the Omaheke RC, regional farmers' associations and the Namibian National Farmers' Union (whose constituency is the communal farmers) if the proposal is successful.

This intervention includes erecting a number of 30 m x 30 m = 900 m^2 grazing exclusion plots (also called "benchmarks", see section 1.3 for detailed description) in which the local vegetation can develop to its full potential, in some of the participating communities' rangelands, to gauge the restorative potential of the range. In winter, these benchmarks are clipped or burned to encourage fresh growth in the next rainy season. This not only demonstrates what is possible with more adaptive rangeland management but serves an invaluable demonstration purpose to show locals the potential of their better-managed range (educational purpose), in accordance with the "monitoring" objective of the NRMP&S.

1.2 Evaluate natural resource policy and legal framework

"Push" factors that promote agricultural production and the sustainable, climate-smart utilisation of natural resources and "pull" factors that make it worthwhile for producers to produce agricultural products do not operate in a vacuum, but within a legal framework that guides activities into a certain direction: equality of all before the law, no exploitation of people and resources and to the benefit of the individual as well as to society at large. Namibia's framework of laws and regulations is often seen as exemplary, yet the fine detail sometimes is still inadequate, or maladapted, such as when these laws apply to communal farming activities, and causes friction. It is the intention of this project component to identify such legal problems and evaluate them, for the benefit of Namibian society. Applicable policies will be translated appropriately for communities to use and rigorous awareness and capacity building will be carried out. In the proposed project, we are not only investigating the non-applied laws or attempting to change any, but also aim to ensure that the existing laws are applied and implemented appropriately to ensure that they are useful to communities in the quest of adapting to climate change threats. In contrast to the other project components, adjusting a country's laws to a certain situation affects the whole country and not just the two regions targeted for project intervention. In this sense, this project component is in line with the first outcome of the AFs Results Framework, of ensuring that national laws adequately provide for and promote adaptation to climate change and variability and increase the resilience to climate-induced shocks.

When communities were quizzed on how the legal framework assisted or limited their farming activities, all 10 communities pointed out that the marketing system of cattle and goats is skewed against them and that the complete ban on commercial wood utilization in communal areas hindered both their ability to make charcoal and to restore degraded rangelands (which usually require thinning of encroacher bush as a first step). They also pointed out that they did not have

the understanding of the legal framework or the knowledge to suggest improvements but urgently needed such interventions to enable them to flourish. Most communities pointed out that it does not help if they produce more, but the legal framework impedes their ability to market the produce profitably. Another major problem mentioned often was that current laws and regulations do not adequately safeguard the grazing lands of a community so that "pasture poaching" (non-community members driving their cattle into the deferred grazing lands or drought reserves of a community and "poaching" the grass) is common and deters sustainable rangeland management.

One of the apparent flaws of the Namibian legal framework is that few laws are evaluated robustly and in a structured manner for their effect on society and whether they actually achieved the intended impact (= baseline). This may lead to new laws and regulations being written that confuse the citizen or contradict and disharmonise the existing laws. It is the intention of this proposed project to critically evaluate laws that exist and are said to be launched soon for their impact on society and whether they had the intended outcome. In this intervention, the impact of existing legislation that impact Namibia's communal farming and conservation sector (e.g. Communal Land Act no. 5 of 2002 and no. 11 of 2005, Forest Act no. 12 of 2001, Environmental Management Act no. 7 of 2007, Nature Conservation General Amendment Act no. 31 of 1990 and 1996, Traditional Authorities Act no. 25 of 2000, Animal Diseases and Practices Amendment Act no. 10 of 2005, Biosafety Act no. 7 of 2006), policies to come (new, revised Communal Land Reform Act, decisions of the 2nd National Land Conference, activated Soil Conservation Act no. 76 of 1969, etc.) as well as numerous national policies and the impact of various relevant SADC treaties and international conventions to which Namibia is party, will be evaluated and analysed for their positive effect on communal farming, unintended consequences that harm communal farming and areas that are not yet adequately covered by existing acts and policies. Feedback will then be given to the relevant authorities on how to improve the legal and policy framework and advocacy engaged to achieve these goals.

For example, despite a plethora of laws governing communal areas, resident communities still find it impossible to ward off outsiders from driving their livestock into their commonage and depleting their grazing (= baseline). This phenomenon is called "pasture poaching" and demotivates communities from deferring grazing and accumulating standing hay as a drought reserve, because the moment surplus grazing is observed by outsiders, they come in with their "intruding" cattle and remove the grazing surplus. As a result, everyone just tries to graze as much as possible and leave as little as possible behind, with resultant rampant grazing mismanagement and rangeland degradation ("the tragedy of the commons"). This practice makes everyone more vulnerable to climate change and variability, reduces resilience of ecosystems and communities and increases rural poverty. Addressing this problem successfully would enhance climate adaptation and resilience at the local level as the action is aimed at the central (government) level to legislate group rights at village-level rangeland resource use.

"Pasture poaching" has its origin in the vagueness of the various laws that govern communal land use. The main law is the Communal Land Reform Act, 2002 (Act No. 5 of 2002), as amended, which allows communities to define their commonage (core grazing area) but then refers communities to Namibia's legal system to ward off intruders. Namibia's legal system is expensive

so communities generally do not have the money to invoke the law, and cumbersome, taking years to come to a decision. This, in a matter where a few days' grazing by intruding cattle can completely deplete the winter grazing reserves of a community, or its drought reserve of standing hay, leaving grazing shortages, cattle starvation and destitution in its wake. In the 15 years that this Act has been on the statutes, the provision of protecting the commonage against intruding livestock has been invoked only once, this year, by a non-governmental organization (NGO) assisting a marginalised community (Nyae Nyae) to evict intruding cattle that first invaded their commonage 5 years ago. So, although it is well-intended, this Act is ineffective in practice as far as the protection of group grazing rights is concerned.

Also, the parcelling of communal lands into smaller portions of up to 50 ha of lands per individual, at the expense of group rights, has promoted the expansion of settlements which further encroach on grazing areas for livestock production and subsequently increasing vulnerability to droughts, climate change and variability. The current Communal Land Reform Act, 2002 (Act No. 5 of 2002) does not allow group rights at settlement (village) level, making it difficult for village inhabitants to protect their common grazing areas. An amendment is said to be introduced in the Act, currently under review, to allow for group user rights at community level.

Another set of regulations intended to give user rights over natural resources to local communities are the nature conservation regulations and ordinances that govern communal conservancies. They give the right of ownership over wild game animals to local communities but are completely silent on the grazing lands needed to sustain wild animals. In practice, this legal framework has contributed enormously to the conservation of wildlife in Namibia's communal areas (known as CBNRM: community-based natural resource management), but it does not protect the rangeland needed by wildlife to sustain itself. In the drought of the last 3 years, innumerable livestock farmers invaded communal conservancies and depleted the meagre grazing to save their livestock at the expense of the wild animals, and the conservancies were helpless. They just had to endure the invasion and hope for rain. Now that rains have resumed, it remains to be seen how many invading ranchers will stay in the conservancy to continue picking this low-hanging fruit, thereby seriously compromising the concept of communal conservancies.

A third set of regulations protects forests and forest products in Namibia, viz. the Forest Act, 2001 (Act No. 12 of 2001), as amended. It is the only legal construct that allows resident communities to not only define the borders of their commonage (as also in the Communal Land Reform Act, 2002 (Act No. 5 of 2002), but actually prescribes a workable eviction procedure of intruding livestock. But even this well-intended legal framework is less than ideal: Namibia is by no means a forested country, being semi-arid in nature, and areas that should really be covered by this Act probably amount to no more than 10-15% of its land surface, not even a third of the total communal area. Secondly, the eviction procedure still demands a 30-day notice period before intruding livestock can be impounded, and then at the expense of the resident community and not of the trespasser! Since communities normally don't have money to buy hay for someone else's impounded cattle, they normally don't have any other choice than to allow intruding cattle to keep on grazing their forested land, defeating the aim of the law.

A fourth legal construct that protects the soil and the rangeland growing on it, can intervene to adjust stocking rates of livestock and to assist communities achieve sustainable utilisation is the Soil Conservation Act, 1969 (Act No. 76 of 1969). It contains all the technical provisions needed to protect soil and rangeland, but it is dormant and is not applied in Namibia. It is unfathomable why this should be so, but it is.

The existing legal framework is less of an obstacle in the Omaheke region where most of the common resources have already been privatised, but even in this region, communal farmers struggle under laws that do not address their needs. Technical experts see the lack of legal protection of communal grazing areas as the biggest obstacle in the implementation of SRM in communal areas. Consequently, the legal framework should be exhaustively investigated and improved so that more technical measures can contribute to making communities more resilient and adapted to change. The proposed project intends to collaborate with stakeholders to find a solution to this conundrum that works in practice, e.g. that effectively protects the grazing rights of a resident community and thus encourages it to defer grazing in a planned, systematic manner and to accumulate standing hay for a drought reserve, making the community more resilient to climate shocks and change. While it is acknowledged that many of the natural resource problems of a community may be the result of policy failure, the intended project has to investigate these situations and analyse what the best approach may be. Sometimes, the law may allow a way out or an alternative, hitherto unexplored solution while at other times, the law might have to be amended. This project intends to inform policy makers objectively of the impact of certain policies at the grassroots level and how these could be mitigated if so desired. If farmers' voices are not heard in the policy-making process, than it is unlikely that the resulting policies will suit them. Laws should not be made for people, but with people.

While the focus of this activity is on securing grazing rights, other opportunities to secure access to livelihood assets of other communities in accordance with outcome 6 of the Results Framework of the AF may also arise. For example, the small-scale vegetable producers who are irrigating their gardens out of the open canal near Mahanene are threatened by closure because pumping water out of the canal is illegal. This project intends to investigate if it is possible to avert closure by instituting reasonable payment for water or finding another innovative solution, thus securing the livelihoods of the "canal vegetable farmers".

The output of this activity will be to convince law-makers to harmonise, review and activate the relevant laws to better serve the agricultural and natural resources sector of the whole country, based on detailed case studies performed in the targeted regions of Omusati and Omaheke. It would be good to have the finished product (up-to-date and harmonised laws, policies and regulations) as the finished product, but as law-making is outside the scope of this proposed project, it cannot be the output; only delineating the road to success can be an output. If the proposed project succeeds in this activity, it will create a more enabling framework to adapt to climate change, improve the resilience of the communal sector as a whole and reduce the vulnerability of the Namibian people to climate change; one of its greatest threats.

1.3 Rehabilitate degraded rangeland

If rangeland degradation hinders communities to adapt to climate change and variability, increases their vulnerability to it and decreases their resilience and ability to overcome climate-induced shocks, then logically rangeland rehabilitation should have the opposite effects of promoting climate change adaptation and resilience.

The need to rest perennial grasses adequately during the vegetative growing season (summer, rainy season), to reduce competition by encroacher bush and to allow the occasional fierce late-season fire to burn to inhibit encroacher bush and weeds, followed by over-seeding with desirable perennial grasses has been mentioned already as a prerequisite to recover rangeland condition. This is on condition that soil condition does not have to be repaired first in case the top layer of soil is destroyed.

The proposed project aims to rehabilitate 2,000 ha of rangeland in the Omusati region and 20,000 ha in Omaheke region. The activity is skewed towards Omaheke because Omusati, being a mixed cropping region, has more alternative options to rehabilitation such as displacement of degraded rangelands with cultivated pasture or crop fields, than Omaheke region, which is extremely dependent on cattle ranching. The rehabilitation of degraded rangelands is a key economic priority according to the Omaheke Regional Development Profile (2015).

Rehabilitating degraded rangeland has three major components:

- Improve the condition of the soil by containing soil erosion and ensuring adequate ground cover (mulch),
- Thin encroacher bush judiciously to correct the woody:herbaceous plant imbalance of the degraded savanna or dry woodland, and
- Strengthen the perennial grass sward.

In most cases in Namibia, rangeland degradation is accompanied by bush encroachment. Thinning the encroacher bush selectively releases a lot of harvested encroacher wood which, if used profitably, could pay for much of the rangeland rehabilitation. Therefore, re-structuring Namibia's charcoal industry is part-and-parcel of this topic.

The sandiness of the soil in Omusati and Omaheke regions prevents the worst of soil erosion by water because there is no capping and crusting of the soil to prevent rainwater from infiltrating and to run-off sideways. Hence, rangeland soil moisture conditions are likely to remain favourable for vegetative growth and there is nearly always some degree of plant cover of open rangeland. Soil erosion, predominantly by wind, is more of a problem in cultivated areas where the soil is bare in winter. It will be addressed by promoting the planting of thick (double) hedgerows of indigenous, drought-tolerant fodder shrubs (DTFS) around the crop fields (see section 2.2), especially on those sides exposed to water and wind erosion to stabilize the soil of crop fields.

If severe soil erosion is observed in areas targeted for project intervention, this will be addressed by appropriate measures that address the symptom (contain the spread of erosion gullies by packing them with bush filters to close them over time, brush packing on flat areas that are subject to sheet erosion, etc.) as well as the cause of soil erosion (by applying SRM, as explained previously).

Bush encroachment is one of the first and most obvious symptoms of rangeland degradation in Namibia. Bush encroachment is the opportunistic expansion in range and density of indigenous woody bushes and shrubs in response to various local and global divers. All 10 communities consulted in the process of compiling this proposal listed bush encroachment as one of their top–three concerns that limits their farming activities and perpetuates rural poverty. Firstly, bush depresses grass production which in turn limits the productivity of cattle and goats, the main livestock species of communal farmers in the two model regions chosen for this intervention. Secondly, communities are not allowed to profit off bush-thinning due to a blanket ban on all "commercial" (income-generating) bush-thinning activities in Namibia's communal areas. According to the consulted communities, encroacher bush needs to be thinned in an environmentally sensible manner to allow the grazing capacity of the land to recover while economic value is added to wood harvested from encroach her bush. The control of encroacher bush is also a key economic priority of to the Omaheke Regional Development Profile (2015).

Bush encroachment is not a natural response to climate change, but a reaction to the following drivers, amongst others:

- The virtual exclusion of hot fires effective in killing small and medium-sized woody plants as well as woody saplings and seedlings, by land managers using appropriate fire-fighting technology;
- A grazing monoculture by domestic livestock that weakens the competitive ability of the grass sward to keep non-herbaceous vegetation in check, and to supply the fuel needed to fuel hot fires effective against woody plants;
- The virtual exclusion of browsers from the farm ecosystem, especially mega-browsers such as elephant and rhino, allowing woody plants to establish and grow unchecked by browsing pressure;
- Faster growth by woody plants "fertilized" by rising atmospheric CO_2 concentrations that benefit plants with a C_4 photosynthetic pathway (like woody plants) more than those with a C_3 pathway (like most sub-tropical grasses).

Only the latter driver is a global driver associated with climate change but it is easily overridden by a multitude of local drivers. Bush encroachment is considered a drawback in most African pastoral systems, including in Namibia, because it drastically reduces the grass-based carrying capacity of natural rangelands and thus impacts the size and productivity of cattle herds, the mainstay of most pastoral and extensive animal production systems in Africa, including Namibia. Bush encroachment thus makes rural and ranching people poorer.

Since woody plants compete very effectively with grasses, they take over the rangeland and should be thinned back to a more “original” density as a first step in many rangeland rehabilitation activities, in order to return the land to a savanna state (dominant grass sward with open stand of woody plants) and improve the resilience of the ecosystem and its pastoral people. The induced risk and vulnerability for livestock farmers is that high levels of bush encroachment cause a decline in grass production, thus lower the carrying capacity for cattle production, and consequently lead to income losses and food insecurity. 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. As mentioned before, bush encroachment is particularly bad in the Omaheke region, hence the proposed project plans greater intervention there than in the Omusati region.

Bush encroachment also reduces soil moisture, lowers shallow groundwater levels and impedes aquifer re-charge because woody plants use comparatively more shallow groundwater than grasses, thus desiccating the soil (especially the top layers of soil). It has been determined that the level of water in boreholes drops due to bush encroachment in the catchment, and rises noticeably and for longer periods if encroacher bush is thinned selectively. That is because encroacher bush uses more water than grasses. Hence, thinning encroacher bush and promoting the grass sward will improve soil moisture content, promoting more vegetative (grazing) production and potentially more aquifer re-charge; all valuable ecosystem services to pastoralists and ranchers.. The increase in shallow soil moisture is important to support other ecosystem services such as plant productivity (especially of herbaceous plants), biodiversity (due to more grazing and a more structured habitat), the flow of natural springs and fountains, etc.

Bush encroachment is a major element to be addressed in this project. It is both a climate-stimulated process and an additional stressor with huge implications on food insecurity, and its control is an integral part of SRM. Bush encroachment causes a total loss to biodiversity and an economic loss in terms of land productivity by diminishing vital ecosystem services. 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 could be much bigger than the current projection, and will have a drastic negative impact on the entire country economy (DRFN, 2015). It is therefore of utmost importance to thin encroacher bush to rehabilitate degraded rangelands, in accordance with the Forest Act, 2002 (Act No. 12 of 2001). Bush encroachment is an acknowledged problem in Namibia’s agricultural and conservation sector and judicious bush thinning is promoted in many national policies such as the National Development Policy 5, the National Agricultural Policy, the National Rangeland Management Policy and Strategy (2012), etc.

The project sites are selected because of the high occurrence of dense bush encroachment. In Omusati region, degraded rangeland in the Amaupa area had a bush density of 2,700 bush/ha equivalent to 3,616 bushes standardised to 1.5 m height (so-called bush-equivalent, BE) per hectare. In rangeland in better condition in the neighbouring community of Okaholo, absolute bush density was much lower at 1,967 bush/ha, equivalent to 2,098 BE/ha. These two rangelands yielded 26,490 and 28,404 kg of wood dry matter thicker than 2 cm in diameter, per hectare, respectively. This shows the potential for not only thinning encroacher bush judiciously but also using the mass of thick wood thus created for value-added purposes. However, once encroacher bush is thinned, a second wave of bush encroachment often hits the treated rangeland because of the unnoticed presence of woody seedlings which can now grow up unhindered, released from competition by their elders. At Amaupa, bush-encroached rangeland also contained 1,967 woody seedlings/ha and at Okaholo, 4,133 woody seedlings/ha (Rothauge, 2014). If these grow up because their adult competitors are removed, the rangeland will soon be just as encroached as before bush control, if not more so. Therefore, aftercare should be an integral component of any bush control programme. Depending on the characteristics of intervention sites, aftercare could be by browsing with goats, planned and controlled fires that destroy immature woody re-growth, manual chopping of re-growth or chemical treatment thereof (discussed in more detail later in this section).

Bush encroachment is even worse in the communal parts of the Omaheke region, according to a survey performed in 2015 (Rothauge, 2016). In its Otjombinde constituency, severe encroachment covers vast areas of rangeland used for grazing livestock and averaged 6,933 bush/ha, equivalent to 6,595 BE/ha, exceeding the norm by a factor of 4 to 8 times. The density of woody seedlings averaged 1,367/ha indicating that the next wave of encroachment is just waiting to happen if not prevented by aftercare. The wood yield potential of such areas is immense: at Otjombinde it varied from 7.3 tons of dry wood mass/ha to 24.9 t/ha and averaged 14.1 tons of wood dry mass/ha of which on average 56.7% derived from wood thicker than 2 cm in diameter, suitable to be converted into firewood or charcoal. Selling firewood to cash-strapped communal farmers does not make good business sense. Hence, adding value by turning harvested encroacher wood into charcoal will be explored later in this section.

Once soil is repaired and encroacher bush is thinned, measures aimed at rehabilitating the grass sward can be effected. In grazing areas that have been degraded for a long time, many of the desirable perennial grasses may have become locally extinct. It takes only 2-3 years of continuous grazing to wipe out a strong stand of perennial grasses. Their seeds will remain viable in the soil seed bank for 7-10 years, after which the seed supply will be exhausted. If seedlings of the desired grass species did not establish in this time window, the desirable grass species will have been lost from that region. It is unlikely that grazing that wiped out strong mother tufts will allow weak grass seedlings to establish successfully, so chances are good that no replenishment of desirable grasses will occur from seed in harshly grazed areas. Not because there was no seed, but because seedlings were not allowed to establish themselves.

Re-seeding rangeland with seed of perennial grasses is and innovative approach that has not been tried in Namibia before. One of the practical problems of rangeland rehabilitation is to decide

which desirable grasses grew here before and which ones did not, and thus which species to re-establish by over-sowing. Botanical knowledge amongst most of Namibia's farmers, including communal farmers is rudimentary and few will be able to remember and identify the good grasses that used to grow here. For this reason, it is vital to establish 30 m x 30 m = 900 m^2 grazing exclusion plots (also called "benchmarks") in the different vegetative units and over-sow them with a variety of different desirable grass species. Those that do not establish inside the grazing exclosure are obviously not suited for use in rehabilitation. Those that establish inside the benchmark but fail to establish beyond its fence are ecologically suitable, but cannot withstand the harsh grazing pressure outside the exclusion plot. These species will only flourish once grazing is better managed. Those species that establish inside the exclusion plot and gradually venture outside as well are ideal for immediate re-seeding of larger areas.

Another practical problem of strengthening the grass sward of rangeland to be rehabilitated is that the seed of the desirable grasses is not produced commercially and not for sale anywhere in southern Africa, except for some species whose seed is sporadically on offer (e.g. *Anthephora pubescence, Panicum coloratum*). Even then, it may be of strains developed as pasture grasses for higher-rainfall areas than semi-arid Namibia, i.e. the strain may no longer be adapted to Namibia's semi-arid conditions (that may become even harsher with climate change). That is why most farmers who re-seed use *Cenchrus ciliaris* which is quite a tough grass but is not a desirable climax species and so unpalatable that it is avoided by free-ranging cattle most of the time when more palatable grasses are available. This species is suitable for use as cultivated pasture, where cattle can be forced (by fencing) to graze it, but not for open rangeland where livestock animals are free to select what they want to eat, and when. It is therefore necessary to first collect seed of desirable and locally-adapted grass species in the wild from places where they still grow well and in comparable ecological zones. These seeds then have to be multiplied in enclosures ("grass gardens") to get sufficient quantities to over-sow or broadcast on rangelands depleted of such species in selected project sites. Even the benchmarks established to determine suitability can be used as a source of seed. *Cenchrus ciliaris* will still be grown as an easily adapted species to boost pasture production while diversity of pasture will be improved by the introduction of the locally adapted species that are more palatable.

Next, the seed of many species of desirable grasses experience seed dormancy for a period of 9 to 12 months and do not germinate when sown fresh. Seed needs to overwinter before it will germinate, or receive treatment that the proposed project will experiment with to overcome seed dormancy earlier. The location targeted for these trials is Mahanene Research Station of the Ministry of Agriculture, Water and Forestry (MAWF) in northern Omusati region. The main purpose of this station is to breed and multiply the seed of plant crops (mainly mahango, sorghum, maize and beans) for distribution to farmers in all of the northern communal areas, not just Omusati region. This research station is therefore staffed with (mostly female) technicians experienced in seed manipulation and multiplication and with the necessary equipment. In Omaheke region, Sandveld Research Station (also under the MAWF) can be used to multiply the seed of desirable grasses needed for rangeland rehabilitation. Its staff has huge experience of SRM and the mechanised equipment needed to cultivate grass pasture on a vast scale, for seed multiplication to serve Omaheke farmers.

Once sufficient seed of desirable grasses has been collected, it can be sown into rangeland prepared for the purpose. Judicious bush thinning is an inevitable first step to reduce competition by woody plants. This creates a window of opportunity to facilitate establishment of grass seedlings. The thick wood of controlled encroacher bush can be extracted for value addition as will be described later, but the thorny canopy should stay in place to protect the soil that has suddenly been bared by the removal of the encroacher bush. The felled, thorny canopy also protects grass seedlings emerging underneath it from the harsh climate (e.g. it provides light shade, preserves moisture by mulching and breaks up large raindrops into a fine spray) and grazing, a very important function in an open-access rangeland where over-sown areas are not protected by fences. So, grass seeds should be sown underneath the fallen canopies of felled encroacher bushes. Furthermore, grass seeds should not be sown naked as they are a feed source to numerous small mammals, can be blown away by the wind or swept away after a violent rain storm. Seeds should be sown in a thick slurry of kraal manure that protects them against predation and loss and is also a source of fertility once they germinate. Seed-slurry should be strewn underneath thorny branches (canopies) once the main rains begin. The thorny canopies that protected the emerging seedlings and small grass tufts will disintegrate after some years, exposing the now-established grass tufts to grazing. If the grazing system has in the meantime changed to one more cognisant of the needs of perennial grasses by applying the principles of SRM, they are likely to survive, strengthen the rangeland's grass sward and the resilience of the local ecology and make it easier for the resident community to adapt to climate change and variability.

A strengthened grass sward improves rainwater infiltration into the soil due to the good ground cover, thus improving soil moisture content, a vital ecosystem service that promotes vegetative productivity, biodiversity and aquifer recharge. But the controlled encroacher bush also re-grows, either from seed or from coppice. Woody re-growth has to be checked by aftercare after bush thinning to prevent re-encroachment. Coppice re-growth and woody saplings are a valuable source of highly nutritious and palatable browse fodder for goats and indigenous sheep (who browse more than they graze) and may be controlled by intense browsing pressure. If this is sufficient to control woody re-growth, it may be all aftercare that is needed. Thinned bush or coppice re-growth can also be utilized to make bagged, bush-based animal feed, if conditions (e.g. degree of mechanization of local communities) are conducive. If not, cut stumps would have to be killed (e.g. by chemic al treatment or stem-burning) or the re-grassed rangeland would have to be burned off by a controlled fire within 3-7 years after bush control to kill all small- and medium-sized bushes. Fire is a natural ecological factor in Africa's savannas that keeps the savanna open and recycles minerals to the soil but its planned use for bush control aftercare is fraught with difficulty and potential danger. The planned use of fire, especially for aftercare after initial bush thinning, will be promoted as it is part of the traditional farming knowledge in especially Omaheke region.

The current baseline of rangeland rehabilitation consists of a few very limited initiatives. There are some initiatives to rehabilitate degraded rangeland at Erora in the western Omusati region, mainly by including grass seeds in lick supplements for dispersal through the dung of livestock,

and at Lister in Omaheke where farmers thin encroacher bush, convert it into charcoal and manually re-seed treated areas with grass seeds collected in the wild. Neither initiative applies aftercare after initial bush control. These initiatives will be supported, expanded and the appropriate methods of aftercare developed by the proposed project. The lessons learned will be transferred to other beneficiaries of the proposed project, e.g. the communities that use the 400,000 ha on which SRM will be practised.

The expected outcome is that rangeland of which the condition has been improved, is a better buffer to climate variability, climate change and drought, is more resilient and tolerant of adverse environmental (e.g. wildfires, locusts, etc.) and climatic conditions and is better able to sustain animal (livestock) productivity in the face of adversity and thus better able to secure the income potential of pastoral people, compared to rangeland in degraded condition. These interlinked interventions to thin encroacher bush and strengthen the grass sward as well as improve fodder flow by including cultivated dry-land pastures of indigenous grazing grasses are thus highly climate relevant.

In Namibia, making charcoal is intimately connected with the rehabilitation of degraded rangelands. As explained earlier in this section, judicious thinning of encroacher bush is usually one of the first steps required in rangeland rehabilitation, especially in the densely bush-encroached Omaheke region. This activity results in a lot of wood thicker than 2 cm in diameter ("thick wood") accumulating on the range (see earlier statistics). It can be left unutilised and will oxidise slowly over decades if not centuries, releasing its carbon into the atmosphere and contributing to the global greenhouse effect without building wealth. Or, it can be harvested and converted into value-added products such as charcoal that contribute to the wealth of people and is in accordance with the "Growth at Home" value addition policy of Namibia's Ministry of Industrialisation, Trade and SME Development, before inevitably contributing its carbon to the atmosphere. The UNCCC recognizes that managing woodlands better is essential for climate change mitigation even though wood burning (for fuel wood or charcoal) equates the burning of agricultural wastes.

Namibia is the world's 6th largest exporter of charcoal. Unique amongst the top-six, Namibia makes most of its charcoal from encroacher bush, i.e. surplus woody plants that we want to get rid of for other reasons (repairing the land's grass-based carrying capacity, for instance). No forests are deforested and no tree plantations established to make charcoal, and the land is left in a better condition afterwards than it was in before. In addition, charcoal converts a waste product (removed encroacher bush) into an economic asset of immense proportions that pumps a lot of wealth into rural communities. Importing countries use about 60% of Namibian charcoal to operate industrial smelters, replacing fossil fuels such as anthracite coal and heavy fuel oil, whereas about 40% is used to drive recreational purposes such as barbequing. The former application is intensely climate-relevant as it reduces the emission of fossil CO_2 (mitigation).

The way charcoal is made in Namibia is problematic and not always environmentally friendly. We use small, mobile drum-type kilns that can take about 500 kg of chopped, fresh wood and produce less than 100 kg of charcoal. Usually, the wood-to-charcoal conversion efficiency is less than 20%

but is very dependent on the skill of the operator. However, wood pyrolysis in the drum-type kiln remains a wasteful, inefficient conversion process. The drum is open at the base and its lid is sealed with soil, causing significant soil contamination of the charcoal, which reduces its price. Once the wood has been pyrolysed to charcoal, the origin of the wood can no longer be traced.

Every kiln is operated by its own operator. Operators are generally not trained, not in kiln operation and not in wood harvesting, let alone sustainable harvesting. They basically do as they please. Inspecting them is difficult since empty kilns can easily be rolled from one place to the next, overnight. A regulator/quality controller would not know where to look for the kilns that are to be inspected.

In Namibia, there are up to 10,000 kilns operational at any moment. The harvesting and pyrolysis processes are inherently uncontrollable and the regulator (the Directorate of Forestry, DoF, within the MAWF) does not have the human capacity to constantly inspect 10,000 operations. Hence, DoF has instituted a blanket ban on charcoal-making in all communal areas of Namibia, hampering the ability of communal farmers to restore degraded rangelands and profit from controlling encroacher bush. This issue was mentioned by all 10 grassroots communities consulted in the process of compiling this proposal, as a top-three concern. The communities are therefore in dire need of a re-structured charcoal-making process that enables them to engage in these activities legally; approved by the regulator. Turning thinned encroacher bush into charcoal is also a key economic priority as contained in the Regional Development Profile (Omaheke Regional Council, 2015). DoF still issues wood harvesting, charcoal transporting and export permits to commercial farmers on the assumption that they are more responsible, which is a fundamentally objectionable rationale.

This way of making charcoal is not sustainable and negates the advantages that Namibia has over the other top-six charcoal producers in the world. Namibia's charcoal sector has to be re-structured so that commercial and communal producers alike can participate in it because the process is efficient, harvesting is environmentally friendly and everything is supremely supervisable, thus qualifying for stringent certification such as that of the Forest Stewardship Council (FSC). To this effect, talks between the regulator, DoF, and the initiators of this proposal have been ongoing since 2015 to re-structure the charcoal industry from an uncontrollable, decentralised operation to one that is centralised and thus imminently supervisable (Rothauge *et al.*, 2015). This project proposes to trial the new charcoal model in certain places of the Omaheke region (e.g. at Lister, where people made charcoal before the ban and at some of the villages identified by the Otjinene Community Forest management committee for selective bush control and charcoal production) by separating the wood harvesting process from kiln pyrolysis. All harvesters and operators are to be registered and trained before being allowed to work in the charcoal sector. Wood harvesters deliver wood individually to a central place (the "wood market") which could be an individual farm, a camp (paddock) inside a large ranch or a village in a communal area. At the wood market, the wood is inspected for suitability by DoF or the Forest Stewardship Council (e.g. it may not come from protected species, individuals with a large stem diameter or certain sensitive areas) and if found unsuitable, the responsible wood harvester can be re-trained, penalised or de-registered. The threat of losing one's livelihood should be a strong

motivation to adhere to the rules. Instead of having to supervise constantly thousands of small, mobile kilns regularly moved all over the country, DoF would just have to supervise intermittently a few hundred wood markets that stay in one place for a relatively long period of time. The “wood market” model will make charcoal-making more sustainable and easier to regulate, thus enabling DoF to lift the ban on communal charcoal production. While this makes good environmental and economic sense and improves the resilience of rural communities, it is not necessarily climate-smart. Since all wood harvesters come together at the central wood market on a regular basis, they can be served with health clinics, adult education and literacy courses, etc. and their families can enjoy similar services. This innovative approach has not been tried in Namibia before.

Climate is impacted by the type of kiln. It no longer makes sense to pyrolyse the wood of tens or hundreds of wood harvesters at the central wood market in small, drum-type kilns. Masses of wood will be delivered to the wood market, justifying investment in a large, industrial-scale, semi-mobile kiln with an improved conversion rate and operated by a single, specialised operator or team. If the conversion rate could double to 35-40%, more charcoal could be made from less wood. A kiln large enough to take partial stems is needed, saving a lot of time and effort having to chop stems into smaller logs. A sealed kiln no longer in contact with soil to reduce contamination of charcoal and that allows capture of by-products such as wood tar or heat, to be used in other applications, is a feasible investment option to handle large volumes of wood. About 0.5% of the mass of fresh wood is exuded as wood tar during pyrolysis. With the small, drum-type kiln, this tar seeps through the open bottom of the drum into the soil, polluting it. If captured, it could be used to seal and repel water and insects from wood products and buildings. Such large kilns produce lesser emissions than smaller kilns, which is a climate-smart adaptation and healthier for the kiln operators. The large kiln should not be permanently constructed as it still has to be moved occasionally to fresh harvesting areas.

Such a kiln does not exist in southern Africa and its evolution would be an innovation. This project proposes to design such a kiln in cooperation with the engineering faculty of NUST and test it in the field, to develop a workable prototype. The UNCC recognizes that improved kiln technology is an important aspect of climate change mitigation and adaptation.

Communities will be helped to implement the planned “wood market-based charcoal model” primarily by the local field facilitator, with technical backstopping by other project support staff, subject matter specialists on the project, post-graduate research students supported by the project as well as local DoF and DAPEES officials. The proposed action intends to trial re-structured charcoaling at two sites in Omusati and five in Omaheke (e.g. at Lister) to arrive at a model approved by the country’s regulator (DoF) as well as international role-players such as the Forest Stewardship Council (FSC). However, the improved kiln will obviously not be developed within communities, but by the engineers of NUST (and others who may be co-opted) and post-graduate research students supported by the project with pilot trails and testing performed in participating communities. Very importantly, communities will be helped by project staff to market their charcoal in agreement with DoF by economic and marketing experts within the project, thus making it pay for the communities to adopt the “wood market-based charcoal model” and continue with it even post-project. Organised structures of the targeted communities such as

representatives of farmers' organizations, cooperatives, traditional authorities and other regional role players (such as the Namibian Charcoal Association NCA and constituency development committees) will be part of project implementation, monitoring, evaluation and project closure. Also, the proposed interventions are based largely on existing community projects in the targeted areas.

The expected outcome of this activity is more affordable rehabilitation of degraded savanna woodland through the conversion of wood harvested from thinned encroacher bush into charcoal in a controlled, environmentally-friendly manner. It will reduce the uncontrolled burning-off of encroacher wood as agricultural waste. The climate-change relevance of this activity is that much of the efficiently- and sustainably-produced charcoal will be used to replace fossil fuels, thus reducing emissions from fossil fuels and contributing to climate change mitigation. In concert, the effective conversion of encroacher wood into charcoal, the rehabilitation of degraded rangelands, sustainable rangeland management and the strengthening of the grass sward will promote the sequestration of more carbon in Namibia's communal rangelands, and emitting less C.

1.4 Establish dry-land cultivated pasture of climax grazing grasses

Dry-land cultivated pastures of indigenous climax grazing grasses are an integral part of any intervention that seeks to secure and stabilize the fodder flow to an animal production enterprise. Cultivated pastures are highly productive compared to native pastures (natural rangelands) and versatile, offering pastoralists and ranchers many options. The usefulness of cultivated grass pastures to augment the fodder supply of natural rangeland, contribute hay to a drought fodder bank, as an intensification technique and a diversification option that strengthens climate change adaptation and resilience was exhaustively discussed in the introduction to this section. Of special importance in the Namibian context is the possibility of shifting grazing pressure from native to cultivated pastures, thus easing the utilization pressure on native pastures and creating a window of opportunity to rehabilitate them as described before (bush thinning followed by in-sowing of grasses and SRM). However, only one of the 10 grassroots communities consulted in the process of compiling this proposal mentioned cultivated grass pastures as a possible climate-smart adaptation. They simply did not know about this technology. However, they all agreed to the vital importance of cultivated pastures when the concept was explained.

The common Namibian pasture grass *Cenchrus ciliaris* can be used for this purpose. It establishes fairly easily from seed, the seed is grown commercially and can be bought in shops, it is a highly productive and fairly drought-tolerant grass but not very palatable. However, the latter aspect can be managed. One way is to use the cultivar "Biloela" which is not as tough and stalky as the natural variety. This grass also makes good hay due to its upright growth habit. The proposed project also intends to trial other species of indigenous perennial grasses for their suitability for cultivation. Another way of managing the palatability of *Cenchrus* growing in pastures is by applying short-duration, high-intensity strip grazing to keep the grass at a palatable, immature growth stage.

The proposed project intends to establish 1,000 ha of cultivated pasture in Omusati and 3,000 ha in Omaheke region, for a total of 4,000 ha of rain-fed pasture of indigenous climax grazing grasses. This innovative approach has not been tried in Namibia's communal areas before (= baseline). The current baseline is zero; there are no cultivated grass pastures in these communal areas. The intended beneficiaries are the ones supplying the Outapi abattoir with slaughter cattle (Omusati region) or growing previously-exported weaner cattle out at home (Omaheke region), because these farmers need fodder augmentation the most. Pastures are to be established in privately-held fields or ekoves to enable managerial control over their establishment and utilisation, which should follow guidelines set out in a document (Rothauge, 2013) developed under practical conditions in northern Namibia. Ideally and to save on fencing costs, grazing management should use solar-powered electric fencing to implement strip grazing.

Ideally, pastures of forages should consist of a mixture of grasses and legumes to prolong their life and maximise soil enrichment. The problem is that there is currently a dearth of suitable forage legumes adapted to semi-arid conditions. This is especially so for the Omaheke region and the research facilities of the Sandveld Research Station will be used to try and develop a forage legume for this region. In Omusati, it may be possible to use some of the established forage legumes such as lablab (*Lablab purpurea*), vetch (*Aeschynomene americana*), pigeon pea (*Cajanus cajan*) and other species that were screened and showed promise in an earlier development intervention in Namibia's northern communal areas in the 1990's (Sweet, 1998). Mahanene Research Station will be used to re-test these species and grow them in demonstration plots to be used during capacity building.

Integrating small areas of highly productive cultivated pastures into a rangeland-based system of extensive livestock production has multiple adaptation and resilience advantages:

- If the pasture is large enough to accommodate the farmer's cattle herd, or a part of it, for the summer, livestock fertility and product ion will increase due to better and a more constant level of nutrition.
- The herd is near the homestead as pastures are in the crop field next to the homestead, and not far away in the commonage. Better super vision reduces losses and improves performance.
- If the pasture is so small that it can only accommodate a few head of cattle for the summer, priority grazing should be reserved for animals that contribute significantly to household security, viz.:
    - The cows that are milked to feed the family, or
    - Bulls needed for mating during the rainy season or that need to be protected against poisonous plants (e.g. *Dichapetalum cymosum*) on the rangeland, or
    - Draft oxen whose body constitution and strength is built for the next season of field cultivation. After poor rainy seasons, with inadequate fodder production, the strength of draft oxen when they are supposed to plough fields in early summer is so poor that they don't have the strength to plough. Consequently, they are left on the range until after the first rains have caused a flush of green grass that improves the condition of the oxen. Invariably this results in ploughing that is late, misses

the first rains and may coincide with the main rains, when many fields are so soggy wet that they can no longer be ploughed. Late cultivation reduces crop yield, whereas grass pastures used in this manner facilitates early (dry) cultivation that improves food security of staple grains.

- In dry-land cropping regions, perennial grass pastures can be integrated into the local crop rotation as a grass ley, thus contributing to improved soil organic matter content, soil fertility and soil stability (less exposed to wind erosion during winter when crops are not grown, more protected against flooding during the rainy season). This application is highly climate-relevant because of its positive impact on crop field soil, which is also a vital ecosystem function for dry-land crop farmers.
- The proposed project intends to demonstrate that cultivated grass pastures can supply the needed additional forage, thus removing the temptation to drive forage-deprived Omusati cattle into forage-rich southern Angola and avoiding the ripple effect of negative implications this has for the Namibian beef trade.

The climate-relevance of this action is that the augmented fodder supply takes pressure off the rangeland, especially during the growing season, facilitating rehabilitation and restorative measures. If less ground is bare because more ground is covered with grass, more carbon will be stored in grass roots than before. World-wide, 60% of soil carbon is stored in grass roots and any activity that promotes grasses (especially perennial grasses) therefore mitigates global climate change.

1.5 Improve management of communal conservancies and community forests

The principle behind the creation of communal conservancies and community forests in Namibia is to co-utilise these natural resources with agriculture, i.e. wildlife and forest resources are conserved while the area is also used for agricultural activities. Forests are no longer felled and wildlife exterminated to make way for agriculture, but agriculture is integrated as best we can into the sustainable use of these natural resources. Income is diversified by utilizing forest and wildlife products and can be further grown and diversified by including tourism, especially eco-tourism activities. Communal conservancies and community forests are managed by a management committee appointed by the relevant community. A management plan is drawn up to guide management of these resources, often based on measured inventories. However, those of the 10 grassroots communities consulted in the process of compiling this proposal who ***did have*** a community forest or communal conservancy in their area indicated that their management plans did not include rehabilitation of degraded rangelands or ecologically-sensible charcoal-making in their approved management activities, nor did they include re-forestation or eco-tourism activities. This presents ample scope to revise existing management plans and include these essential activities hitherto ignored.

The two regions of Namibia selected for this proposed project, Omusati and Omaheke, have five communal conservancies (one in Omusati and four in Omaheke) and three community forests (all in Omaheke) between them. During field trips for proposal preparation, it became apparent that

the Uukwaluudhi Core Conservancy in Omusati and the transregional Ondjou Conservancy (covering parts of Omaheke and Otjozondjupa regions) were not optimally managed in terms of biodiversity and for attracting tourists. The three conservancies in the Otjombinde constituency of Omaheke region (Omuramba uaMbinda, Otjombinde and Eiseb) are weakly developed and managed. Talks with the traditional authorities and current management committees indicated a need to help the community to implement, even review, the existing management plan of the conservancy with options for public-private partnership investments. Participating communities further need assistance, training and market development to be able to implement the management plans of their communal conservancies.

Similarly, an ongoing project to manage Namibia's forested lands, NAFOLA has created three community forests in north-eastern Omaheke region by mobilising the relevant communities, inventorying the stock of forest and its products and devising an appropriate management plan. However, NAFOLA will end in 2018, probably before all management plans are completed and certainly before communities have been mentored to apply them, thus potentially negating the whole worthwhile effort. Most forest management plans do not include any tourism activities and these should be developed as a matter of urgency. As in communal conservancies, tourism opportunities in communal forests create new employment very suitable for women and marginalized, vulnerable communities.

This project proposes that communities in Omusati and Omaheke with conservancies or communal forests be assisted to implement the relevant management plans, which can be revised and updated as needed. Conservation of natural ecosystems including Namibia's dry woodlands ("forests") improves ecosystem services and is a climate-smart adaptation that increases the resilience of rangeland-based farming systems. It is a valuable diversification strategy as wildlife production and eco-tourism are emphasized as key economic priorities of the various Regional Development Profiles. It is an accepted fact that in arid, variable and marginal environments, wild animals are more adapted and productive than domestic livestock. They have the potential of securing livelihoods better and making ecological and social systems more resilient to unexpected shocks than domestic livestock. And this statement is valid before the benefit of tourism is added onto the equation. Evidence of this is provided by Namibia's successful and vibrant community-based natural resource management sector, which includes communal conservancies and communal forests (although the latter are not yet used for eco-tourism – this is a gap the proposed projects intends to close). Natural and agro-tourism is a key economic priority identified in the various Regional Development Profiles and planned interventions may be linked to other activities already on-going in this field (e.g. the planned tourist lodge in the Uukwaluudhi Core Conservancy).

Some of the outputs of this activity will be a feasibility study concerning a new nature reserve, improved management plans and implementation of plans and if possible, the first steps towards eco-tourism opportunities. The climate relevance is that better managed natural systems emit less carbon into the atmosphere; even more so if they are conservation systems that can act as carbon sinks. The proposed conservation activities are also very suitable for women (e.g. tourism) and marginalised communities (e.g. forests).

2. Component 2: Climate-Smart crop and animal production systems

The targeted regions, Omusati and Omaheke, are virtually completely dependent on agricultural and forestry activities for their income. As these activities are not yet production-oriented, these two regions are poor. It is a national priority to commercialise communal farming, also and especially in the targeted regions. This requires the upgrading of local crop and animal (both domestic livestock and wild game) production systems by introducing modern technologies that can be built on the existing traditional knowledge, without adding new environmental stressors so that these new technologies are climate-smart from inception. Also, management of the new (and existing) system has to improve to keep them functioning optimally and climate-smart from the start, and to avoid degradation that has later got to be restored at great cost. All the 10 grassroots communities consulted in the process of compiling this proposal indicated that a lack of modern and climate-smart production techniques for livestock and crops was one of their top-three concerns regarding their farming systems, after the perpetual fodder deficit and bush encroachment.

In terms of project results, the desired outcomes of the proposed management systems and technologies that make local crop and animal production systems more climate-smart create a production buffer for rural people that enables them to better absorb, withstand and overcome shocks to their farming systems such as those imposed by a changing climate, i.e. it increases their resilience and lessens their vulnerability (such as assistance from outside their system). Rain-fed crops, irrigated horticulture, livestock and game production becomes more efficient and achieves higher and more sustainable yields due to climate-smart management, supported by increased processing, value-addition and improved marketing of produce, resulting in better livelihoods and more employment opportunities. To achieve these outcomes, the following activities are proposed:

1. Adapting and climate-smarting crop and animal production systems that are based on traditional knowledge, to improve the resilience of communities to climate change.
2. Enhance the health of soils in crop fields, to improve food security and climate adaptability.
3. Introduce and trial complimentary and/or alternative climate-smart crop and animal production systems and techniques.
4. Develop and improve market-driven AFOLU at a regional level to support climate adaptability.

This component is connected to and follows on improved ecosystem management. It is concerned specifically with the farming applications of improved ecosystem management for crop and livestock production. In the Namibian context, crops and livestock are produced under dry-land, i.e. rain-fed conditions in relatively extensive conditions. Lack of control over the environment means that such extensive systems are inherently greatly exposed to environmental change and shocks which weaken their resilience, therefore, the urgent need for adaptation methods. This component is thus of particular relevance to achieve outcomes 2, 4 and 5 of the AF's Results Framework.

2.1 Adapting and climate-smarting traditional production systems

In the two targeted region, as in other parts of Namibia, communal farming systems are based on traditional knowledge and contain little new or modern knowledge, technologies and capital. This limits outputs to a low level, miring rural populations in poverty and inducing them to flee the land for urban centres. Uncontrolled rural-to-urban migration has overtaken Namibia, adding greatly to its environmental burden, developmental challenges and human misery. To turn this undesirable state around requires the application of modern, adaptive technologies and the development of new ones as well as the implementation and management thereof. If these new technologies and management systems contribute significant new income streams to rural areas and create additional employment, they will be adopted by rural people without ado as they will reduce suffering in the affected areas. This is the greatest degree of sustainability a project can achieve, of making such a positive impact that participants accept its activities and ingrain them in their daily routine. To monitor progress (or lack thereof) in plant and animal production, benefitting farmers will be taught how to measure the most important indicators themselves and track the trend of production over the years ("local-level monitoring").

The project proposes that the management and production efficiency of 130 dry-land crop farmers (of which 100 in Omusati and 30 in Omaheke), 100 irrigating horticulture farmers (of which 75 in Omusati and 25 in Omaheke), 10 pastoral communities (potentially) supplying the Outapi (Omusati) abattoir with grown-out slaughter cattle and10 pastoral communities growing out weaner calves to slaughter on pasture in Omaheke is improved considerably, 15% higher than baseline. The intention is that the implementation of a variety of improved and climate-smart production techniques (e.g. soil improvement, grass ley crop rotation, rainwater harvesting, fertilisation-on-analysis, producing own vegetable seedlings, conservation agronomy, integrated pest management; mineral supplementation of livestock based on organ analysis, parasite control, breeding and selection of female replacements, etc.) improves efficiency of production and total yield. This means that fewer resources will be used to produce more product, which leaves a smaller environmental footprint and means more money in the pockets of local crop and animal farmers, if able to market their increased production profitable (see section 2.4). Production increases should be achieved in a climate-smart manner by emphasizing ***efficiency*** rather than ***the maximizing of output***.

One of the envisaged techniques for the 130 dry-land crop farmers is Conservation Agriculture (CA), which is a climate-smart way of adapting crop cultivation to climate change and variability to achieved strengthened resilience. With CA, cultivation practices are more sustainable and ecologically conscious. Crop yields rise despite fewer inputs of fertilizers and pest control remedies. This set of cultivation techniques was recently adopted as operational policy by the MAWF but it still needs to be implemented in practice (= baseline). Currently in Namibia, CA is mainly concerned with ripping crop fields that have a shallow hardpan. Ripping is done in the same furrows year after year to keep these riplines open for rainwater infiltration, and by travelling in the same lanes each season. Ripping is followed by fertilisation and early sowing of crops to maximise the use of rainwater and preserve soil moisture. Furrowing assists this objective as rainwater accumulates in the furrow while the crop is planted on the ridge. Crop rotation with

legumes that fix atmospheric nitrogen in the soil and break the lifecycle of pests and diseases, leaving crop residues on the field as a mulch to protect the soil and regular weeding is also encouraged.

This is a laudable policy that is a vast improvement on traditional methods of cultivation crop fields, but it does not go far enough to build soil fertility and improve the sustainability of crop yields. Under this activity, the proposed project plans to assist MAWF to implement CA by amongst other training the trainers (Directorate of Agricultural Production, Extension and Engineering Services (DAPEES) extension workers) to know about CA and how to assist farmers to implement it, as well as training the farmers themselves and mentoring them to implement CA (see section 3.1). Secondly, the proposed project intends to supplement CA with complimentary cultivation techniques that are needed to develop its full potential, on 100 crop farms in the Omusati and 30 in the Omaheke region. An example is minimum tillage and integrated pest management (IPM). It may not be necessary to rip a field every year if the hardpan is adequately fragmented and minimum tillage may be applied for several seasons before the field needs to be ripped again. Minimum tillage and retaining crop residues as a soil mulch invariably increase the amount of weeds and pests attacking the crops, therefore a good system of IPM needs to be implemented. Very importantly, soil health needs to be improved by increasing its organic matter content (see section 2.2).

Also, new crop species are needed. Currently, crop fields in Omusati and Omaheke regions are mono-cropped to grains such as mahangu, maize and sorghum. Apart from all the deleterious effects of mono-cropping on soil fertility and pest build-up, it provides a monotonous, potentially incomplete staple diet to rural inhabitants. New crops are needed to diversify the cropping programme and better supplement the human diet. Research and development facilities of the Mahanene and Sandveld Research Stations of the MAWF in Omusati and Omaheke region will be used for these trials and have already been negotiated. One crop in particular, viz. sunflowers will play a crucial role in climate change adaptation and rural development of communal cropping areas. Sunflowers are deeper-rooted plants than grain crops that penetrate and open-up a fragmented (ripped) hardpan better than grain crops and facilitate root penetration of crops that follow on it, thus enhancing crop yields and food security. Sunflowers are beset by quite different pests and diseases than grain crops and are thus highly effective at breaking the lifecycle of grain pests and diseases, improving crop yields. Sunflowers are more drought-adapted with a shorter growing period than maize and sorghum and thus better adapted to marginal growing conditions in Namibia, expected to become even more marginal with climate change. Lastly, sunflowers are a potential source of a new village-based processing industry that does not need a cold chain or expensive equipment, viz. pressing oil out of the shelled seeds to be used as cooking oil by people; an activity that is supremely suited for women. There already are rudimentary oil press facilities in many northern villages used to press oil from marula kernels that can be used for sunflowers, too. The residue (sunflower seed cake) as well as shelled sunflower husks are valuable feed supplements for all kind of livestock animals, but especially the small-holder dairy cattle planned for the Omusati and Omaheke region (see later in section 2.3).

Currently, sunflowers are grown only by a few farmers in communal areas. Ms Twerimuna Hange-Tjaronda, the treasurer of the Epukiro Crop Farmers' Cooperative in the Omaheke region, is already planting sunflower and processing cooking oil for domestic use and for occasional sales. This system can be optimized (made climate-smart), expanded and up-scaled to many more women farmers and crop producers.

The Omusati and Omaheke regions also need new varieties of staple crops that farmers have been growing there all along. The proposed project will link local crop farmers to seed breeders and suppliers to introduce new cultivars that are more drought adapted, have a shorter growing period or enhanced pest resistance to 100 crop farms in the Omusati and 30 in the Omaheke region and will facilitate the trialling of these cultivars at regional research stations of MAWF such as Mahanene and Sandveld.

Dry-land crop production will be facilitated in selected sites under the Epukiro Crop Farmers' Cooperative, Otjombinde Crop Farmers' Cooperative and Vizamehi Crop Farmers' Cooperative in Otjinene constituency in the Omaheke region. In Omusati region, specific sites have not been identified yet as nearly every farmer engages in dry-land cropping. The Omusati region also has a rapidly expanding sector of farmers who irrigate fruit and vegetables from dams (Calueque, Olushandja) and open canals extending from these dams. Nearly 100 producers have organised themselves into the Olushandja Horticulture Producers' Association. They described technical production issues, lack of processing and inadequate marketing as their major challenges to the project team during proposal preparation. Omaheke region has far fewer farmers who irrigate horticultural crops, but they expressed similar challenges.

One of the greatest concerns of the Olushandja Horticulture Producers' Association is insufficient diffusion of climate-resilient irrigation and water conservation management measures and practices to their members. Water in the Olushandja dam is limited and unbridled growth in this part of the Omusati region will lead to water deficiency and resource conflicts. Changes in weather and temperature are expected to reduce the yield of horticultural crops, making it more difficult for women to feed their dependants.

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 systems, and introducing more efficient/alternative irrigation techniques (especially micro-drip irrigation, which is known for being the most water-efficient irrigation method) and conservation practices are highlighted as key measures to increase the adaptive capacity and resilience of communal horticultural systems in the Omusati and Omaheke regions of Namibia. 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.

In addition, maladaptive mono-cropping (e.g. tomatoes after tomatoes after aubergines, all related plants that harbour pathogenic soil nematodes), inappropriate irrigation and unsustainable land use practices currently limit climate change adaptation. Major justification for the proposed small-scale crop irrigation project with 75 farmers in Omusati and 25 in Omaheke region includes innovative actions such as:

- Heat waves desiccate summer crops, leading to lowered yields, economic losses and food insecurity. Shading to reduce evaporation of soil water and transpirative water loss from vegetable plants, especially seedling nurseries and increasing the water retention capacity of the soil by increasing its content of organic matter will be considered. Organic soil ameliorants can be produced by composting plant wastes, a method not observed amongst Olushandja farmers thus far.
- Frequent frosts cause decreased winter crop yields, economic losses and food insecurity. This could possibly be addressed by better choice of adapted cultivars and hedgerows of bushes that protect against cold air currents at night.
- The use of flood irrigation is associated with high evaporation, which reduces water use efficiency. Efficiency can be vastly improved by micro-irrigation, as discussed.
- Soil cultivation is not adapted to physical nor climatic conditions as is the lack of proper crop rotation that enriches the soil. One unconventional option is to grow lucerne under irrigation in a 3-year rotation with vegetables. Lucerne is a deep-rooted crop that opens the soil structure for more shallow-rooted vegetables following it. Lucerne is also a very valuable fodder crop whose hay fetches a high price as it is excellent animal fodder, and it can be used in the system of dairy ranching to be developed in Omusati region. Growing this legume in a medium-term rotation will enrich the soil with nitrogen and improve the resilience of the horticultural system as well as of its producers. Rotating vegetables with lucerne is an innovative approach that has not been tried in Namibia before.

The beneficiaries of horticultural production intervention in Omusati region will be communities of Etunda (a government-funded irrigation scheme), Olushandja / Epalela. The Epalela community-initiated irrigated crop production started their irrigation activities in the 1990's 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. In Omaheke region, beneficiaries will be at selected sites in the Otjinene, Otjombinde and Epukiro constituencies, especially the Okarui Horticulture Women group and elsewhere on sites with available groundwater such as around Otjinene, Omauezonjanda (Epukiro Post 3) and Eiseb 10.

In terms of improving livestock production, improved fodder flow from natural rangeland and cultivated pastures will ***only*** support the productivity and fertility of grazing livestock ***if*** it is not inhibited by animal husbandry factors such as a high parasite load, exposure to infectious diseases, poor genetic dispensation for growth and fertility, improper breeding management (e.g. inadequate male-to-female ratio, infertile and sub-fertile breeding males, too big a mating area, poor body condition of cows during the breeding season caused by mineral and vitamin

deficiencies, etc.), inadequate nutrition (especially mineral and vitamin deficiencies, which will be determined by analysis of organ samples collected seasonally from local livestock animals) and poor adaptability to the environment. Interestingly, one of the 10 communities consulted when this proposal was drawn up mentioned that their area became noticeably hotter than before, an experience typically linked to climate change in Namibia. The community was worried that cross-breeding their indigenous Sanga cattle with exotic breeds like Simmentaler cattle may reduce, rather than enhance environmental adaptability of crossbred cattle. It is apparent that there is a need to address such basic livestock production issues in the proposed intervention, to enable communities to make climate-smart choices and implement them correctly.

These and other husbandry factors will be addressed by the proposed project so that adaptive SRM and ecosystem management translates into increased animal production. This may include developing stud breeding of superbly adapted indigenous breeds so that these genes can be spread amongst a wider benefitting farming community. The areas targeted primarily for intervention are 10 pastoral communities that supply the Outapi abattoir with slaughter cattle (Omusati region) and those that grow out 15,000 weaner cattle (in Omaheke region). However, goat and chicken production systems will also be improved by introducing new, modern and adaptive management techniques. This is important for very small farmers or poor and marginalised communities, since the poorest communal farmers do not keep cattle but still have goats. Since nearly 30% of livestock-based households are headed by women, this activity will contribute to greater women empowerment and gender equity as well.

The current baseline is that the productivity of cattle and goat herds in Namibia's communal areas is severely inhibited mainly by the following husbandry aspects:

- too many intact males,
- the largest and strongest bulls are castrated to become draft oxen,
- inadequate replacement of old and unproductive cows with heifers,
- macro- and micro-mineral deficiencies,
- venereal diseases and a high parasite load,
- involuntary selection of goats for single rather than multiple offspring (depressed fecundity),
- poor husbandry practices (e.g. keeping animals in overnight kraal for too late in the morning and kraaling too early in the evening, interfering with livestock's crepuscular feeding habits of being most active foragers at dawn and dusk; kraals are not cleaned and build up a parasite load, etc.).
- In a study of meat marketing in the northern communal area, Kruger[6] estimated that the take-off from local cattle herds varied from 4% p.a. in remote areas to 8% near large towns, which compares poorly to the 20-25% herd take-off achieved routinely in

[6]: KRUGER, A.S., 2014. *Study on Informal Trade of Beef Cattle in the Northern Communal Areas of Namibia*. Final Report, Livestock Market Efficiency Fund, Millennium Challenge Account Namibia, Windhoek, Namibia.

Namibia's commercial cattle herds. Similar data for goats, chickens and other livestock does not exist at all (= baseline).

These husbandry practices will only be effective if based on an adequate flow of livestock fodder of sufficient quality from source to animal. The various fragmented sources of fodder available to a pastoral community (from natural rangelands: by implementing SRM, deferred grazing, drought reserves and rangeland rehabilitation; from artificial pastures: grass/legume pastures, grass ley rotation, and from stockpiles: drought hay reserve, drought-tolerant fodder shrubs) have to be combined sensibly into a comprehensive fodder flow plan for every participating community (10 each in Omusati and Omaheke) that schedules fodder supply: how much is available and when, of what quality? Stocking rates of animals can then be based on the fodder flow plan to prevent over-stretching the available fodder. Livestock production cycles can be synchronized with expected fodder flow schedules to ensure adequate nutrition of animals at critical stages of their production cycle (e.g. shortly after giving birth to ensure good milk flow to the new-born). Buying and selling decisions can be based on fodder availability and livestock production cycles to ensure timeous expansion and shrinking of the herds and making best use of fluctuating product prices (which tend to be cyclic too and thus can be integrated into the fodder flow plan) to sell or buy in animals. Currently, such fodder flow plans do not exist (= baseline), nor are they linked to potential investment decisions.

Good fortification of a community's fodder flow will safeguard the productivity of their livestock animals, ensuring that they have enough food themselves and can earn an adequate income from them. It is aimed to improve livestock production by 15% due to improved feeding above the baseline determined at the start of the intervention. This improves livelihoods and lessens vulnerability to unexpected shocks due to climate change. Fodder flow planning is especially important in the Omaheke region, where the project aims to retain 15,000 weaner calves in the region until slaughter at 2-3 years of age, resembling 10% of the number of weaners usually exported to South African feedlots for grain-based finishing. Extra grass-based fodder will have to be found for 30,000 additional mouths (15,000 weaners/year that grow out to slaughter over a 2-2½ year period), coming from the 300,000 ha of rangeland under improved management, the 20,000 ha of bush-controlled and rehabilitated rangelands and the 3,000 ha of dry-land cultivated grass (/legume) pastures established under this proposal. If successful, the economic activities associated with raising an extra 15,000 cattle to slaughter each year, including input supplies and processing of beef cuts, will stimulate local economic development in the Omaheke region tremendously, enrich local livelihoods and make communities much more resilient against climate shocks.

The climate change relevance of this particular intervention has many facets. Producing more grass-fed beef probably increases the output of methane from ruminant digestive processes, which is damaging in terms of global warming. However, these grass-fed cattle would have been raised on grains in a feedlot if not diverted to pasture. Cattle feedlots and their supply chain of human-staple grains, as well as their manure disposal system have a much larger environmental footprint than free-roaming grazing cattle, thus probably balancing the direct negative effect of extra methane produced per unit of cattle on pasture. Also, it should be considered that Namibia's

rangelands were teeming with huge numbers of wild game animals before these were replaced by domestic cattle, so it is not as if this intervention is adding new methane to the atmosphere; it is merely replacing wild game-methane with domestic cattle-methane. Plus, few other organisms than ruminant animals can convert plant fibres into high-quality human food. Grass-fed beef is also claimed to have nutritional benefits over grain-fed beef (e.g. high content of omega-3 fatty acids) while not competing with human staple grains (maize) in a country that doesn't produce enough grains to feed its human population.

Fodder flow plans should not concentrate only on feed quantity and availability but should also include the quality of available fodder. It may be that a particular nutrient may be lacking at a particular time and then needs to be supplemented. As mentioned previously, organ analyses of blood, milk, liver etc. will be used to identify possible macro- and micro-mineral deficiencies following protocols developed during previous interventions (Rothauge, 2014) but other qualitative parameters will be derived from feed analysis. If supplementation is needed, the project will promote and initiate the most feasible methods, e.g. thorn tree pods and locally-grown sunflower seed rather than expensive, imported soybean meal-based supplements.

If possible during implementation, new fodder resources will be included in fodder flow planning for participating communities. For example, a lot of attention has recently been paid in Namibia on developing bush-based animal feeds to bridge fodder gaps (e.g. during droughts) and even to grow surplus cattle out to slaughter on it. The GIZ-funded "Support to De-Bushing in Namibia" project started investigating in 2016 if cleared encroacher bush could be converted into animal fodder while the UNIDO-funded "Enabler Bush: Sustainable Solutions for Development of Bush Value Chains in Namibia" project intends to optimize potential bush-based animal feed production processes during its 2018/19 implementation period. Bush leaves have high nutrient value but are very difficult to harvest so that they are currently not a readily-available source of bagged fodder, but this may change in the near future. If the efforts of these projects have matured to yield credible, applicable results by the time of implementation, they can be included in the proposed fodder flow as bush leaves can be obtained from felled encroacher bush or from woody plants harvested for charcoaling (see section 1.3). In fact, even the coppice re-growth of felled bush can serve as a valuable source of high-quality browse fodder if the cut stump is not killed chemically.

This activity includes the climate-smart management of wild game animals in communal conservancies, by correcting game species composition and the grazer:browser ratio in accordance with the available resource, obtaining accurate count totals of population sizes, implementing a sustainable harvesting/culling policy, implementing as much rotational grazing as possible in an open (unfenced) area by manipulating the provision of drinking water and planned veld burning, expanding the tourism potential of conservancies, improving the management capacity of its staff, etc.

The expected outcome of these interventions is higher yield of crops and animal products, and farm products of higher quality. This enables farmers to potentially earn more income from the same amount of physical inputs. The improved production and management efficiency will save

resources and create buffering capacity, making the local community more resilient to climate change.

A very important component of any livestock and pastoral system in Namibia is its drought resilience. Multi-year droughts are a serious setback that are virtually impossible to prepare for, but shorter droughts (over one or two growing seasons) can be overcome relatively easily if farmers are adequately prepared.

The traditional drought coping mechanism of communal farmers consisted mainly of moving their animals into new regions that were less inhabited, as well as chopping down tree canopies to provide forage as a last resort. Moving into less inhabited areas is hardly an option anymore in especially Omusati but also Omaheke region as settlements occur virtually everywhere. New drought responses are needed.

A drought occurs when the total seasonal rainfall received, or its distribution across the season, is so poor that the forage yield is less than expected and too little to sustain the present population of animals, theoretically forcing farmers and pastoralists to de-stock or suffer livestock losses. This forces farmers, who generally are not prepared for droughts, to buy emergency roughage feeds at a time that they are in high demand and their price sky-rockets. Most of this drought reserve feed is imported at great cost (procurement and transport costs) from South Africa. Simultaneously, the farmer's livestock are losing body condition and become unmarketable, or have to be marketed at a discount, subjecting the farmer to highly unfavourable terms of trade. All 10 grassroots communities consulted in the process of compiling this proposal listed "drought" as a recurring major concern that was linked to the perpetual fodder deficit (construed as a "man-made drought") and bush encroachment that impacts the grass sward of savanna rangeland negatively. Coping with drought is a national priority for Namibia and also expounded in Regional Development Profiles.

There are a number of potential technical solutions to the drought dilemma which are already an integral part of this proposal:

- The fodder flow plan will quantify the extent of the fodder deficit and inform the farmer/community to make a good decision based on real data.
- The farmer or his community could create their own drought reserve of "standing hay on the rangeland" (foggage) by deferring grazing and planning grazing better. This is part of the implementation of SRM advocated in section 1.1 but is made impractical by a non-conducive legal framework that tolerates "pasture poaching" and will therefore be reviewed (section 1.2).
- Similarly, the application of Namibia's National Drought Policy and Strategy of 1997 under these conditions will be reviewed with an eye on suggesting and implementing improvements.
- Farmers in drought-prone areas should grow dry-land cultivated pastures of grass to enable them to hay surplus grass and store it away for use in dry times, as advocated in

section 1.4. Together with other opportunistically-made hay, this forms a community drought fodder bank if safely stored.

Then there are additional measures to improve drought resilience that have not yet been mentioned but are related to proposed initiatives of this proposal:

- Grass pastures may themselves fail due to drought so that more drought-tolerant plants should be cultivated for severe emergencies. DTFS planted around fields (see section 2.2) will supply small amounts of additional browse but for a serious drought, more substantial plantations of DTFS are required. Since indigenous DTFS are very hardy, such plantations can be located in very arid areas, on poor soil or where the landscape is s cared (e.g. by gully erosion) and dehydrated. Importantly, such plantations have to be protected against utilization during the vegetative growing (rainy) season to allow them to accumulate bulk for the dry season. Currently, there is not a single plantation of DTFS in all of Namibia's communal areas (= baseline).
- Currently, other development projects are working on a drought early warning system. Once it has been perfected, participating communities in Omusati and Omaheke should be involved in it while the broader public in these regions should also be informed accordingly (see section 3.1 on the dissemination of information).
- Communities will be assisted with timeous marketing of "surplus" livestock to reduce drought exposure and rangeland degradation. This will tie in with generally improved and accelerated marketing (see section 2.4).
- Integrate drought preparedness into related activities such as SRM and fodder flow planning so that problems are not tackled in a fragmented manner but comprehensively.

The expected outcome of all this fodder banking and drought preparedness is to enable participating communities to overcome the effects of a one-year drought with relative ease and without having to discard their agricultural "capital" (e.g. breeding females, seed stock). Few measures will enable communities to survive a multi-year drought without pain, but the proposed measures will contribute to mitigating even a serious drought. The participating communities will serve as role models whose plans can be up-scaled to other communities and other regions. The climate relevance of improved drought preparedness is obvious and as droughts (especially smaller ones) are expected to become more frequent due to climate change, this activity is a vital component of the proposed project.

2.2 Enhance the soil health of crop fields

The climate of Namibia is expected to become harsher with global climate change. Conditions for the growth of cultivated crop plants will become less conducive. This negative impact can be buffered to an extent by improving the health of soils in crop fields. So-called “conservation agriculture” (CA) and minimum tillage systems contribute to improved soil health, amongst others.

Namibia’s version of CA concentrates on breaking hardpans, inter-cropping instead of crop rotation and fertilisation when originally, CA is about renewing the (microbial) life of the soil, which stabilises crop yields so that crop farmers become less vulnerable to climate change and variability and achieve strengthened resilience. Inherent improvements in soil fertility means that less fertilizer is required, while successful CA also implies that less labour is needed for weeding and preparing the field than with traditional cultivation practices. Labour availability is an important consideration in most communal areas including Omusati and Omaheke regions as young people are increasingly fleeing their rural areas of origin and flood to the towns and cities to try and make a better living there. This leaves predominantly old people to till the land back home.

With CA, compost, manure and other organic soil ameliorants are applied liberally to improve soil organic matter content. The single factor in Omusati and Omaheke regions that creates sub-optimal growing conditions for field crops is probably the coarse, sandy soil, which loses nutrients and moisture rapidly to leaching, creating acidic and vastly dystrophic growing conditions. Worse, soil organic matter is oxidised every time the soil is tilled, exposing its organic matter and associated microbial life to the sterilising effect of Namibia’s intense solar radiation.

A 2011 survey that compared the soil of crop fields in the northern communal areas to rangeland soils based on the analysis of 19 physical and chemical properties (Rothauge, 2014) found that the concentration of major plant nutrients in cultivated soil was often lower than in the surrounding rangeland soil. Very importantly, the organic matter content of rangeland soil in Omusati region was inherently low at 1.26% but still significantly higher than that of nearby crop fields on the same soil type, which contained only 1.01% organic matter. This indicates that the soil of crop fields was “mined” by annual cultivation without artificial addition of soil ameliorants and plant nutrients in the form of manure or fertilizer. The first priority of proposed crop cultivation interventions should thus be the improvement of soil organic matter content.

Communal crop farmers know that they should apply manure to their crop fields but claim that there is not enough manure for the area to be treated and that they lack transport to cart the manure from kraal to field. Organic matter must therefore be produced *in situ,* for example as pasture grasses*.* It was argued before that cultivated grass pasture destined to feed livestock or a drought fodder bank should be grown in crop fields to ensure managerial control, rather than in open-access rangeland. These pasture grasses should be integrated into crop rotation, achieving a grass ley-based rotation. Since the grasses are perennial, crop rotation has to be multi-year in duration, e.g. it can be a 3-yr rotation between crops (for 3 years) and grasses (for 3 years). In the time that cultivated perennial grasses are growing in the crop fields, they will increase soil

organic matter significantly by way of their root biomass expanding and dying off with the seasons, moribund leaf matter forming the soil mulch and excreta of grazing animals contributing to both soil organic matter and fertility. Changes in soil fertility will be tracked by systematic analysis of soil samples. Perennial grasses will also stabilise the soil and protect it against extreme seasonal flooding during great "efundja"[7] events, protect the soil in winter (when it would have been bare) against the elements (containing wind erosion) and against the sterilising effect of solar radiation. Microbial soil life flourishes in a grass ley-based rotation, enabling CA to attain higher crop yields with fewer inputs. This innovative approach has not been tried in Namibia before and is not part of the current package of MAWF-backed CA measures (=baseline).

When the crop rotation plan requires that grass- and crop-parts of the land are flipped, grasses no longer have to be grown from seed, which is generally more risky than vegetative reproduction. In a climate predicted to have fewer rainfall events spaced further apart, germination from seed will become a riskier, less successful affair. Grass tufts can be dug up from the grass-part of the field, split into smaller tuftlets and the tuftlets transplanted into the crop-part of the field. This is a good example of adaption to climate change. Surplus tuftlets can be sold for a cash income, as can seeds collected from grasses during their multi-year ley period.

Interventions to improve soil health include stabilizing it by planting bush hedges around crop fields, on the inside of the fence. The bush hedge serves as a windbreak that prevents wind from blowing away bare soil in winter, after the crop has been gathered, crop residues consumed and trampled by livestock and the crop field soil is bare and greatly exposed. In some areas of especially Omaheke, crop fields are threatened by gully erosion of the soil, so the hedgerows should be planted on that side of the crop field most threatened by gully erosion. In the Omusati region, the side of the crop field most exposed to "efundja" floods should be specially protected by thick hedgerows to protect and stabiles the soil and prevent it from being swept away. To add another dimension to the bush windbreak, bushes used should be indigenous drought-tolerant fodder shrubs (DTFS) that contribute valuably to the nutrition of animals allowed into the fields to utilise crop residues. As animals are barred from crop fields during the vegetative growing season (summer, rainy season), drought-tolerant fodder shrubs can grow unhindered and accumulate bountiful browse matter that is availed to animals when they are allowed to enter during the dry (non-cropping) season. Livestock can now browse the dormant shrubs, rejuvenating them and gaining quality nutrition in the process.

Much success has been achieved with this method of soil stabilisation (against water erosion), soil protection (against wind erosion) and supplementary fodder in the Kunene region during a recent EU-funded project on containing desertification in the northern Kunene region[8], especially with drought-tolerant fodder shrub species like *Atriplex nummularia* that are more easily grown

---

[7]: "Efundja" is the vernacular term for the great floods that sweep the Cuvelai delta in northern Namibia (including the Omusati region) whenever rainfall in southern Angola is sufficient, ending in the Etosha Pan.
[8]: ROTHAUGE, A., 2018. *Adapting to Climate Change in Arid North-Western Namibia by Combatting Desertification.* Final project report, Project CC&E/NA/2014/135365, Delegation of the European Union to Namibia, EU House, Windhoek, Namibia.

from cuttings than from seed. This work is especially suited to women gardeners. DTFS will be grown in local nurseries that offer employment opportunities to SME entrepreneurs. There is a nursery owned by DAPP (Development Aid from People to People)/Humana at Outapi in the Omusati region that can also be used for the multiplication of DTFS, as agreed to during negotiations during the project proposal preparatory phase.

These proposed interventions will be applied to crop fields of 100 crop farmers in the Omusati and 30 in the Omaheke region. It is intended to establish at least 800 ha of grass ley pastures in Omusati and 1,200 ha in Omaheke region. Soil health will be monitored continuously over the project period.

The expected output of these interventions is improved soil health in crop fields, facilitating both a higher crop yield and thus improved food security, and more fodder for animals, supporting increased livestock production. Healthy soils with a high carbon content are highly relevant to climate change adaptation, and the proposed intervention will decrease the pressure on the farming system, making communities less vulnerable to climate change impacts.

2.3 Introduce adapted complimentary or alternative production systems

Any good development strategy and drought preparedness strategy contains options for the participants. This proposal too seeks to develop alternative production systems that are better adapted to local conditions than current strategies which they could replace, or complimentary production systems that are well-adapted to local conditions and should also be implemented to spread risk, increase output yet do not over-utilise any natural resource. New and diversified income streams promote climate adaptation, resilience and regional economic development while reducing vulnerability.

In the crop production sector, diversification into growing tropical and sub-tropical fruits and nuts in large orchards will be encouraged by the proposed project. The MAWF fruit research station Mannheim to the south of the NCA is an example of what fruit can grow in a suitable environment, for example mango, avocado, kiwi fruit, nuts and bananas. Mangos already grow in nearly every home garden in Omusati region but are not produced commercially, while other types of tropical and sub-tropical fruits and nuts are not grown.

Two complimentary livestock production systems stand out as logical intensification options in the two targeted regions of Omusati and Omaheke, namely small-holder dairy-ranching and formal goat meat production. Dairy-ranching with Sanga cows crossed with Jersey bulls on dry-land grass pastures to serve a well-populated market with fresh milk and processed dairy products is a climate-smart intensification and diversification strategy. Goat meat is currently only sold informally. Selling it through formal outlets will secure and transform this sector and vastly improve the livelihoods of poor and marginalised communities, whose last option in terms of livestock production is always goats. The project proposes the rigorous investigation and evaluation of these two production systems (and others that might come up during implementation) mainly by way of feasibility study. If found suitable, the project further proposes that such production

systems should be initiated, including by co-funding of relevant institutions. The current baseline is that these production systems do not exist in the Omusati and Omaheke regions.

The development of a small-scale, pasture-based dairy ranching industry was a development need expressed by the Governors of both the Omusati and Omaheke region during consultations that took place in the preparatory phase of the proposal. It can be a climate-smart diversification option if correctly structured.

Natural rangelands in the Omusati and Omaheke regions do not contain enough nutrients nor enough bulk to enable cows to produce more than the 5-7 litres of milk daily required by their calves. Often, more than half this milk is extracted by humans for their own consumption, stunting the growth and development of the calves. Only once cows produce 10-15 litres of milk/day will a dairying enterprise become viable. This requires enhanced nutrition of the dairy cow.

Intensive dairying achieved by feeding cows concentrates or full feeds out of the bag so they produce 25-30 litres of milk/day and can be milked 2-3 times daily in an expensive, high-tech parlour is completely infeasible in Namibia as we have neither the concentrate feeds nor the technology to support such enterprise. However, a dairy enterprise of intermediate intensity and technology, based on foraging cows on cultivated pasture for 80% of their daily nutrient needs and supplementing with local concentrates (e.g. mahangu for energy and sunflower oil cake for energy and protein) for the remaining 20% of nutrient needs is feasible. Such a semi-intensive system of “dairy ranching” is feasible on pastures that provide improved nutritional bulk to cows milked once a day and whose calves are allowed to suckle for a restricted period (mostly also only once per day), enabling the farmer to also produce beef from the dairy herd. Before the advent of large-scale industrialisation in South Africa and super-intensive dairying, semi-extensive dairy ranching was practised successfully and profitably in regions of South Africa too marginal for more intensive production systems (Rothauge,1993). It is the system envisaged for the Omusati and Omaheke regions.

All milk that is sold formally in Omusati and Omaheke regions currently is imported from outside these regions. Currently, no milk is produced by a dairy for sale in Omusati region although some farmers produce fresh milk (hand-milked) and sell it raw (no pasteurization or cold chain) informally, as do a few farmers in Otjinene and Eiseb in the Omaheke region who produce raw milk for sale along the road side (mainly) and in small cuca (spaza) shops. Their cows are beef cows that produce milk off the natural rangeland which exposes them greatly to adverse environmental impacts and climate change. Due to being milked, the calves of these cows are runts and the cows themselves often exhibit delayed and reduced fertility due to the extra stress of being milked. Dairy farmers need to establish grass pastures to support their fledgling dairy enterprise. Roughly, it requires 1 ha of dry-land grass pasture to provide one dairy-ranched cow with enough fodder in summer (green pasture) and winter (hayed surplus pasture) to produce milk for a 250-day lactation period, annually. This component is therefore aimed at providing the small area of grass pasture needed by current dairy-ranching enterprises and expand if the outcome of activity 1.5 indicates the feasibility of such an industry. This is in addition to the 5,000 ha of grass pastures established to support beef production as described earlier in Section 1.

A few elements of vital importance to a dairy-ranching industry in Namibia's communal areas are the following:

- Adequate nutritional base: the ability to supply copious amounts of cheaply-produced forage supplemented with locally-produced concentrates. The role of cultivated pastures in fodder provision has been stated oft before, as was the need to grow "new" crops like sunflowers or grain-legumes to provide the concentrate supplements for dairy cows.
- Given the depressing effect of heat on cows and milk production and the expectation that this stressor will increase (Williams *et al.*, 2016), it is proposed to cross well-adapted local Sanga cows with Jersey bulls and milk the F1 (first cross) females. The baseline cows are already present in Omusati and Omaheke. Of all dairy breeds, the Jersey is the most heat tolerant (Scholtz *et al.*, 2013), most aggressive grazer (i.e. extremely suited for pastoral systems), has a small frame that limits feed requirements and produces high-quality milk ideal for further processing into value-added dairy products, in keeping with the general approach of this proposed project. Artificial insemination (AI) would be cheaper than to introduce a large number of bulls. However, AI would require its own particular infrastructure.
- A practical milking system that can easily be applied to rural, communal areas with inadequate infrastructural development. An individual and mobile milking system per cow (e.g. milking bucket-and-claw suspended from a belt over the cow's back) seems more appropriate than an elaborate parlour system, especially if it can be operated from a solar-powered battery as rural electrification has not reached many of the areas of expected implementation.
- An effective, possibly collective cold chain is of vital importance in any commercial dairy system. Given that many areas in Omusati and Omaheke are still without electricity and that there is little prior experience of dairying, the cold chain that gets fresh raw milk to the factory and the processed products to the consumer is of vital importance. Ways to circumvent this problem at the farm level will have to be devised, potentially involving pick-up rounds by parastatal agencies tasked with marketing, e.g. AMTA (the Namibian Agricultural Marketing and Trade Agency).
- Compared to developing the cold chain, the further processing of raw milk into pasteurised milk and dairy products (some of them speciality products that serve unique local needs such as Oshikandela and Omaere) is relatively straight-forward and has current role models in Namibia's commercial sector.
- The Omusati region is Namibia's most populated rural are and very close (less than 100 km) to Namibia's most expansive and densely populated urban area, the Oshakati/ Ongwediwa/Ondangwa metropolis. Milk and fermented milk products are part of the traditional foods of the inhabitants and there is a rich market on the doorstep of the Omusati region. In Omaheke, the market is much smaller but no less real.

The proposed project will investigate how a pasture-based dairy-ranching system can be realised, drawing on the experience of the small, existing commercial dairy sector. As a next step, the

proposed project intends to set up model or demonstration units so that we can learn vital lessons before scaling-up and rolling-out to the producer. It is unlikely that a completed dairy-ranching industry will exist by project end but we should be well on the way towards this goal in 5 years' time.

The other attractive alternative livestock production system proposed is to replace, or at least augment the informal goat marketing system in Namibia's communal areas with a formal system of processed goat meat marketing. In Namibia's communal areas, even the poorest farmer who does not have cattle, has goats. But goats are marketed only informally, potentially missing a valuable and reliable source of income for the poorest of poor communal producers. On the other hand, Namibians like consuming goat meat but it is not available at all on shop shelves or at abattoirs (= baseline). There seems to be a total disconnect between goat production, consumer demand for goat meat and its supply, to the detriment of communal goat producers. And unlike with grain starches, where rural people switch from mahangu to maize meal when they migrate to urban areas, the demand for goat meat by urbanites remains high.

The proposed project intends to investigate this apparent disconnect and what can be done about it, so that consumers who want goat meat (demand) can be satisfied by producers who can market their goats profitably along formal channels (supply). This innovative approach has not been tried in Namibia before. Farming with goats is a good adaptation strategy to climate change and variability as goats are browsers and their main feed source, browsed forage, is expected to increase due to rangeland degradation accelerated by climate change. Increasing the proportion of (browsing) goats in a communal herd at the expense of (grazing) cattle hence improves the resilience of such communities to better withstand the challenges of climate change. Initiating the formal marketing of goat meat was also suggested by many of the 10 communities consulted when the proposal was drafted as a possible way out of their dilemma of increased vulnerability to environmental shocks such as drought and climate change while potentially having beneficial impacts on aftercare after initial control of encroacher bush.

In Namibia south of the VCF, including the Omaheke region, goats are exported live to South African markets that require live goats for ritual slaughter and are prepared to pay a premium for live goats which is roughly twice their meat value, thus making it economically impossible to get goat meat cuts on shop shelves. This same scenario does not apply to the NCA north of the VCF, including Omusati region. Even though goats may be taken across the VCF after a quarantine period, they have never been involved in this trade and its producers are not aware of this possibility. On the other hand, the nearly 1½ million people of the NCA should be a large-enough market to sell goat meat to.

Other alternative livestock production systems may also be investigated if they turn out to be potentially viable options in the course of the proposed project period of 5 years. For example, there has lately been mention in Namibia of a possible Chinese demand for Namibian donkeys. Omusati region has the highest population of donkeys (mostly feral) of all regions of Namibia and this may be an option to be explored and investigated more closely.

The deliverable of this component will be a feasibility study that explores how small-scale communal producers can bring their goats to market profitably, given the dual markets that exist for goat meat. If feasible, the proposed project will go further and establish the first stepping stones towards the desired result, which may include establishing demonstration units to learn vital lessons. The climate relevance is that these complimentary or alternative production systems introduce more options and flexibility in the local animal production sector, hence improving resilience especially amongst the poor. It is known from other countries that both dairying and meat processing are activities very suited to women, so that the proposed systems may go a long way to ensure equal treatment and good opportunities for women during this intervention. In fact, any complimentary production system that deviates from the traditional norm offers women and marginalized people a new opportunity and this aspect will enjoy special attention.

2.4 Develop and improve market-driven AFOLU value chains at regional level

This proposed project component aims to develop the value chains of crop, horticulture, livestock and game animal products produced in the Omusati and Omaheke regions to enable farmers and communities to develop higher value products that are easier to sell than products in raw form. The 10 grassroots communities consulted in the process of compiling this proposal did not have a good understanding of the concept of value chains and value addition but they referred to it indirectly as one of their major concerns. Communities referred to value addition indirectly by informing that they could not sell their produce at a time they needed to, could not produce the type or quality demanded/expected, were unable "to do more with" (add value to) their production and were thus losing money. They confirmed that this is a major concern that they wanted addressed by the proposed project. Interestingly, communities understood very well, and indeed volunteered that produce that cannot be marketed as desired will back-up on the ecosystem (e.g. unsold cattle) and cause deterioration of the natural resource (e.g. rangeland degradation), thus making climate change impacts worse. Enhancing and developing value chains is a climate-smart intervention that will enable communities to better adapt to adverse conditions. The greater income earned from the same production output will also enhance the resilience of communities to whether difficult times.

Value chain development itself will bring economic and employment benefits to local communities (as emphasised by the various Regional Development Profiles), but the linkages that can be established with other value chains create endless opportunities. For example, if local butcheries were to sell pre-packaged cuts of meat that are so popular in urban areas rather than whole or half carcasses, someone would need to supply the packaging material and packaging skills. The proposed project will try to foster these linkages, relying on non-agricultural role-players in the wider economy such as astute traders and entrepreneurs generally, local and/or regional and/or national chambers of commerce and industry, or entrepreneur/economic associations, the Ministry of Industrialisation, Trade & SME Development, the Local Economic Development Agency (LEDA), and the Ministry of Urban and Rural Development. In particular, this proposal focusses on three economically vital aspects of farming that are often neglected, but without which farming will be less profitable, less sustainable and forcing producers to make decisions that are not climate-smart. These three aspects are:

- Improve storage of (mainly grain) products to reduce post-harvest losses due to poor storage conditions,
- Add value to agricultural and forestry raw products that are feasible in the communal surroundings of the Omusati and Omaheke regions and make a difference to the balance sheet of local farmers, and
- Improve the marketing of agricultural products to existing and new markets by improved marketing techniques that include more producers than before.

Adding value to raw agricultural produce by processing, improved post-harvest storage and then marketing the products, raw or processed, profitably are the only activities and outcomes of the

proposed project that do not speak directly to the AF's Results Framework and are not directly related to adapting to climate change. However, these are vital components of the proposed project and they do – indirectly – contribute enormously to climate change adaptation and resilience. Emphasising these aspects of agriculture which are not usually associated with "production" ensures that agricultural activities are profitable or at least provide for a decent livelihood. Only agricultural activities that fulfil these needs will be taken up by farmers if introduced by a project and continued beyond project closure. In this sense, this proposed component contributes vitally to the sustainability of the proposed project after 5 years, without relying on continued "outside assistance", because proposed project activities make inherent economic sense. Furthermore, only if farmers produce desired products of the desired quality will they be able to sell (market) them easily. Successful marketing of value-added products prevents the raw products from "backing-up" or accumulating on the farm, in the process degrading the natural resource base. For example, if a local goat farmer, rather than selling a few live goats each year, can sell 20-25% of his flock each year as vacuum-packed cuts to townspeople, he will have fewer goats on the land at any time and they will have a less deleterious impact on the rangeland than before, when the goats just kept accumulating because too few customers want to buy a whole, live goat. Hence, the climate-relevance of this activity is great even if it is not directly reflected in the AF's Results Framework.

In Namibia, we have up to now made the mistake of concentrating on improving the production capacity of small-holder communal farmers and virtually "forgetting" about marketing, or letting marketing take care of itself. The outcome has been a positive response in production, but an inappropriate marketing system that targets markets that are underdeveloped (in the sense of offering too little choice or low prices to sellers) and offer communal farmers such a poor price for their non-standard produce that they prefer not to sell at all, but to rather retain their produce (especially livestock). The result is two-fold: the farmers do not reap financial gain from their production response, become frustrated, demotivated and fall back into a stoic, traditional mind-set that precludes modernisation. Secondly, un-marketed livestock backs up on the rangeland, overstocks and degrades it, reduces the resilience of social and environmental systems and contributes to climate change (via increased fermentation gas release, bare trampled soil, more waste etc.) but not to human development.

It would be inopportune to constrain the sustainability of the proposed project with such a dilemma. Therefore, value addition and improved marketing activities have been included in the proposed project, to help create the framework conditions that entice small-holder communal farmers to adapt to climate change by increasing offtake from the land (crops, livestock, game, horticultural and forest products). This is also in accordance with the national "Growth at Home" strategy, Namibia's guiding document towards industrial development.

Numerous interventions of this proposal aim to increase the productivity of individual animals, measured in terms of a cow's inter-calving interval, the growth rate of young livestock, mortality to weaning etc. Ultimately, what counts in terms of achieving success at a system level is the output of the whole animal system, measured in terms of the reproductive rate of the whole herd(s) of a community, re-mating rate, weaning rate of offspring, meat production per hectare or animal

per year, etc. According to the Jones & Sandland model of animal productivity, system (i.e. herd) productivity may still increase at times (and stocking rates) when individual animal productivity already decreases due to nutritional stress. This model helps explain why farmers stock their herds up in response to environmental and economic stressors despite declining individual productivity which indicates that each animal is already under stress and would indicate that de-stocking is required. Farmers can often make more money even though their animals are no longer faring well IF they have a large number of such animals, compared to when they have fewer animals which are all doing well. Unfortunately, in the process of stocking up, the natural resource base (in Namibia's extensive livestock producing regions, this is the natural rangeland) is degraded and is does not recover linearly in response to a decrease in utilization pressure. This means that even if farmers de-stock eventually, the resource stays degraded and individual animal productivity stays low despite de-stocking animals, making everyone poorer and contributing to climate change. This is the situation at the moment (= baseline), hence the focus of this proposal on restoring and rehabilitating the natural resource (rangeland) and on improved marketing so that more productive livestock does not back-up on the range and again induces degradation.

A recent investigation into specifically the marketing of cattle and beef in the NCA of Namibia (Kruger, 2014) identified numerous marketing challenges that limit offtake of communal produce. Amongst this investigation's most important recommendations are the following:

- Nearly 80% of formally marketed beef in the NCA is imported from Namibia south of the veterinary cordon fence (VCF) and only about 20% is procured locally. That, when local beef producers are complaining about lack of markets for their beef and poor prices at the same time. There is an obvious disconnect between what NCA cattle farmers produce and what they can market. The Omusati region is not helped by not having a functional cattle abattoir, although one is expected to open soon (early 2018?). While the export of beef to Namibia's northern neighbours is always an option, it is inconceivable that the largest domestic market in Namibia (nearly 1.5 million people reside in the NCA) cannot be served by one of the largest regional cattle herds in the country. In the meantime, the number of un-marketed beef cattle backs up in the region, exerts growing pressure on the rangeland and accelerates degradation.
- The VCF severely restricts and distorts "normal" cattle and beef marketing in the NCA. Other investigations (Shilongo, 2014) have identified numerous ways in which this impediment can be overcome without compromising the infectious disease status of Namibia's commercial beef sector. This includes commodity-based trading of beef from infected zones (Van Rooyen, 2014).
- More offtake facilities (e.g. abattoirs) are needed in the NCA to entice supply of produce.
- Offtake from communal cattle herds was low, only about one-third (8.1% p.a.) of what is expected in commercial cattle herds (20-25%). However, there is scope to significantly increase offtake within 5 years by implementing some of the recommendations of this investigation.

The investigation went on to detail some of the required interventions. For example, to ensure food safety greater emphasis will be needed on handling and hygiene standards at abattoirs and other places where cattle are slaughtered. Local producers need to be supported to provide animals of a higher quality to meet the market standards. This includes good rangeland management practices, nutrition and supplementation, as well as general health issues that can influence calving rates and thus productivity. Providing more animals of better quality that can fetch higher prices will improve the financial situation of farmers. Capacity for training and mentoring on improved livestock breeding and husbandry currently provided by DAPEES needs to be strengthened and synergized with other initiatives such as the Meat Board and AgriBank mentorship programmes. Informal vendors require training and mentoring on good business practices to remain profitable and viable, and avoid getting trapped in debt cycles. Market options need to be explored and expanded. Export of live animals for breeding stock to Angola and other neighbouring countries provides an alternative when local conditions become unfavourable for producers. Marketing cooperatives created and supported by the Millennium Challenge Account Namibia (MCA-N) project have provided an important link to the market for many producers, and should be supported to ensure that they continue to grow and become self-sustaining. Lately, some regions of Namibia (especially Omusati) have been thinking of compelling bulk consumers of agricultural produce to first source these from within the region before being given permission to procure them from outside the region, i.e. preferential procurement and import substitution at a regional level. Why should Omusati region import 80% of its formally marketed beef when its own beef farmers claim they cannot sell their cattle because there is no market?

The proposed project intends to act on these recommendations and to implement them with the assistance of various stakeholders so that offtake of agricultural produce in targeted beneficiary communities increases by 15%. Value addition and value chain development is inherently suitable for women and marginalized people and their inclusion will be a special focus of this intervention.

Any AFOLU value chain starts with (farming) inputs. In most communal areas of Namibia, including the two model regions of Omusati and Omaheke, input suppliers are far and few because communal farming is seen as low input, low output. While a big challenge to local farmers, this situation creates business opportunities for local entrepreneurs as well. The proposed project intends to facilitate the supply of farming inputs needed for the implementation of climate-smart crop and livestock production techniques. The principle is not to supply free inputs to farmers other than those operating demonstration plots used for farmer training (see section 3.1), but to stimulate and organise the local retail and small and medium-sized enterprises (SME) sector to provide the required inputs as this is a business opportunity for them. The exact nature of this intervention (of supporting input suppliers) depends on the situation on the ground, as it differs from place to place. In some places, small input suppliers may already exist but require financing to up-scale. In other places, new input providers may need start-up support and the project can facilitate this by linkage to the multitude of economic initiative booster programmes by the Government's various agencies, such as the SME Bank, Ministry of Industrialisation, Trade & SME Development, Decentralisation Policy, Local Economic Development Agency (LEDA), and Ministry of Urban and Rural Development. Most probably in many cases, awareness-raising amongst the more astute traders of an area, training and mentoring of those interested in input

supply, linkage to support organisation and close cooperation with local and/or regional and/or national chambers of commerce and industry, or entrepreneur/economic associations will be required and provided or facilitated by the proposed project.

In terms of horticultural produce, the need to improve storage and packaging of harvested vegetables to improve their marketing, and to develop new domestic markets was impressed on the project team by the Olushandja Horticultural Producers' Association during proposal preparation. The Omusati Governor detailed plans to process surplus tomatoes into paste or relish, a Namibian speciality. Such initiatives will be supported by the proposed project.

The Namibian Agronomic Board's very successful "market share promotion" scheme which compels vegetable and fruit wholesalers to first procure a certain percentage (currently 44%) of stock locally before permission to import is granted, is not applied in the NCA. Its implementation is an obvious strategy that should be pursued as a matter of priority, along with an investigation into how vegetable marketing can be improved and expanded. Improved marketing that may result in better or more consistent prices for producers is a climate-smart adaptation as it reduces the pressure on farmers to extract the last bit of productivity from their natural resources and rather implement more sustainable, long-term production strategies. The proposed project will play a brokerage role in connecting products to markets and develop relevant networks.

The parastatal agency created specifically to assist horticulture producers market their product successfully, AMTA, is also not involved in the trade of fresh produce in Omusati region. The reasons for their devolvement will be investigated by the proposed project and addressed through capacity-building, facilitation and motivation. In other communal regions of Namibia where AMTA is already active, e.g. in the Kavango, it was noticed that existing small-scale vegetable producers could not get their produce to AMTA's storage and marketing facilities for lack of transport. In such instances, the most limiting factors need to be investigated and innovative solutions need to be found together with the relevant farmers and institutions. For example, in other parts of Namibia transport problems were overcome by implementing a collective (group-based) "transport round" rather than every producer trying to transport only his own goods.

As the quantity of horticultural produce in Omaheke is considerably less than in Omusati and the producers much fewer, it is expected that horticultural interventions in Omaheke will focus more on production than on marketing of horticultural produce. However, 100 farmers will be assisted with this activity that will increase offtake by 15%.

The comprehensive development and improvement of market-driven AFOLU value chains is an indispensable component of any agricultural and rural development project as physical production only makes sense if it can be profitably sold to enable the producer to earn a decent livelihood, independent of project interventions. As such, it is a vital part of the proposed project of adapting to climate change in the Omusati and Omaheke regions of Namibia.

3. Component 3: Individual and Institutional capacity development

It is generally recognized that Namibian farmers suffer a lack of knowledge of modern and environmentally sustainable production techniques; more so in the communal farming areas. While none of the 10 communities consulted in the process of compiling this proposal actually mentioned “training, information transfer and capacity building” as one of their top concerns, they all agreed that it was a vital input for them to overcome their farming challenges. When probed further on the potential topics of training, more often than not the answer was “on everything” and loosely in the order of their top production challenges (fodder deficit, rangeland degradation as epitomized by bush encroachment, drought, making charcoal or other products from thinned encroacher bush, improved marketing of farm products, a legal framework that is often not conducive, etc.). The proposed project aims to address these training and capacity-building needs and facilitate a shift in mind-set of farmers from subsistence to surplus production in a climate-smart manner so that rural poverty can be alleviated, livelihoods can improve and resilience to climate change and variability increased.

Communal farming systems, especially those involving extensive livestock production (i.e. pastoral systems) have always been thought of as “low input” systems because pastoral farmers do not have money to inject purchased inputs into their farming system. However, this does not make their system “low in inputs”. A pastoral system requires huge natural resources, a huge environment of grazeable rangeland to be successful and feed its people. This was the case in historic Namibia: pastoralists in what is today the Omusati and the Omaheke region were few and far between. Each community had “unlimited” rangeland at its disposal on which its livestock could graze freely. Communities were well-fed and secure of their food source. Their environment was in good shape, able to absorb and buffer shocks (e.g. changes in temperature, catastrophic wildfires) quite well and sheltered its human user from the worst effects of natural changes.

This is no longer the case in modern Namibia. Human population has increased thanks to better medical care. Communities no longer have “unlimited” rangelands at their disposal as there are more people now, each one with his/her own livestock, so there is less rangeland for everyone. The input of natural resources into the communal farming system is shrinking fast and since people are not adapting their traditional farming practices to the new situation, the environment is degrading fast as well. This is not climate-smart as a degrading environment is not only less productive than before, but also less able to buffer and absorb shocks. The shocks now get passed on to people in full force.

The people concerned need to understand these changes in order for them to cope with the new circumstances. This is where capacity-building and training come in because informed producers, competent institutions and robust value chains are more sustainable, resilient to climate change risks, food-secure and better-off. To cope with the new circumstances requires substituting environmental inputs, which are running out quickly, with inputs of knowledge, which is only limited by our imagination (i.e. it is unlimited). Communal farmers need to learn how to, ideally, produce more from less or, more realistically, keep production stable despite declining environmental inputs, i.e. how to produce efficiently. Learning that happens from experience only

takes time, allows the resource to decline while experience builds up and is painful for the person experiencing the experience. Learning can be speeded up by training so that new techniques are acquired before the resource has run out, saving person and environment a lot of stress pain. The climate relevance of all capacity building interventions is that only informed people can make the proper choices and implement them correctly as required for adapting to climate change. An informed farming population is also the best guarantor of sustainability of project interventions beyond project end.

3.1 Systematic farmer training and institutional capacity-building

The proposed project focusses much of the resources on training and learning of farmers and communities, and of improving the operational and service-delivery capacity of institutions serving the AFOLU sector.

The focus of farmer training is on rangelands, the base of the ecological food pyramid and on the application of this knowledge on pastoralism, extensive livestock farming and dry-land cropping, although the proposed project's other components (irrigated horticultural production, strengthening of institutions, etc.) also receive their due attention. This is climate-smart as it reduces the dependence of the communal farmer on an "unlimited" or large environmental input, making him/her get along well with reduced inputs of natural resources. Efficiency of production is emphasised instead of maximising production. Making do with less, and still doing well, is the new focus. But it has to be taught as this is not the first time in the world, or even in semi-arid areas that this is happening and we in Namibia have a lot of precedents from which we can learn. We also have enough creative capacity to solve our own problems. We just need to apply all this knowledge to enable communal farmers to change from a system low in management and knowledge inputs to a system high in such inputs; from a system high in environmental inputs to one low in such inputs. Reduced environmental inputs are forced on us by environmental degradation accelerated by climate change, while drastically increasing the input of knowledge is voluntary, our adaptive response to changing conditions and variability.

There is an implied fringe benefit in becoming less dependent on huge environmental inputs by replacing them partly with knowledge and management inputs: if everyone needs less of an environment, pressure on it is reduced and a window of opportunity opens to rehabilitate it to a level where it is more productive and resilient than before. That is why the proposed project also has a strong focus on rehabilitation of degraded rangeland. Rehabilitated rangelands, even if not completely repaired, are in a better shape ("condition") than before and better able to withstand environmental and climate shocks. This enables their human user to also be more resilient in the face of climate change. Rehabilitated rangelands are also more biodiverse, offering their human user more choice in adaptive response. Farmers have many more options on rangelands in good condition than on rangelands in poor condition.

The aim of this activity is also to teach communities to track changes in system output themselves to measure their progress, or lack thereof. Such local-level monitoring (LLM)[9] facilitates better understanding of cause and effect and hence of management and climate change impacts, which improves production and management efficiency and increases adoption of new techniques (both production, management and analytical techniques or decision support systems).

Currently in the Omusati and Omaheke regions, the baseline of farmer training and learning is unsatisfactory. Considerable efforts have been invested since Namibia's independence in 1990 in farmer training, also in the two regions selected for the proposed project, but it has been unsystematic, uncoordinated and *ad hoc,* intended more to soothe the conscience of the trainer than to further the knowledge of the farmer sustainably. As a result, too many communal farmers still don't know the basics of agricultural production today.

The following aspects are proposed to change:

- Firstly, training should be made relevant to the farmer so that he/she attends not because it is good politics to attend training, and the food on offer is enticing, but because people realise they can learn to improve their circumstances. Training should be farmer-focussed rather than abstract, practical rather than theoretical, experiential rather than passive and with opportunities to learn skills hands-on on well-maintained on-farm demonstration plots, rather than just observing a practitioner on-station. Where appropriate, training contents should incorporate indigenous knowledge to connect better with existing and adapted sets of information, or at least build on existing indigenous knowledge to make training contents easier to understand.
- Secondly, when this project ends farmer training should not end with it. The 5 years that the project can apply huge resources to farmer training should be used to seek and develop a "perpetual institution" that has an inherent interest (self-interest) in farmer development including training. Such an interest, we believe, is housed in the RC, an elected administrative body responsible to arrange and manage the affairs of a region and whose Governor is appointed by the State President with an explicit mandate to develop the region. The project proposes to link its planned FA intimately to the RC, making use of its excellent existing facilities and thus being able to free its funds to avail trainers, training content and materials. If successful in Omusati and Omaheke regions, this approach can be scaled up to all 14 regions of Namibia (not in the proposed project). In the Omusati region, this effort will be boosted by close cooperation with the Ogongo campus of the University of Namibia (UNAM), itself a "perpetual institution" of training but currently still distant from the regional farming audience, but no such linkage opportunity exists in Omaheke region. NUST and UNAM have agreed to institutional cooperation in a

[9]: LLM was first developed and implemented by KRUGER, A.S., 2006. *Local Level Monitoring for Enhanced Decision-Making: A Farmer's Field Guide.* Final report, Desert Margins Programme, Desert Research Foundation of Namibia, Windhoek, Namibia.

memorandum of understanding signed this year. In addition, all training inputs will be captured in an electronic "training kit" that can be used post-project and by other training providers and stakeholders to ensure that knowledge inputs become embedded and don't end when the project ends.

- Thirdly, farmer training should address the real-life problems of communal farmers in the Omusati and Omaheke regions. This may require research into these particular problems. Applied research and subsequent development is the second primary objective of NUST, the project implementing entity as it is a university of *science and technology* and not of basic research. Its origin was of a polytechnic and applied research is in its heritage.
- Finally, this expertise should be passed on to the next generation through the training of students of agriculture, one of the focal points of NUST, an academic institution of higher learning, so that the next generation has both the knowledge and experience of climate change, adapting to it and mitigating it, and the soft skills to work with farmers and transmit knowledge effectively.

These aspects will be considered in subsequent activities under this component. Most are innovative approaches that have not been tried in Namibia before. The proposed project aims to reach 5,000 farmers of which at least 30% are women, 10% come from marginalised are vulnerable sectors of society and 5% are trainers themselves, e.g. governmental extension officials, over more than 600 training-days. The proposed project intends to establish many participatory on-station and on-farm demonstration plots to assist with practical training and skills development as participating in well-maintained demonstration trials is the best way to teach adult farmers, who are more versed in attaining hands-on skills than attending classroom-type lectures. Where practical and possible, training materials and contents will be accredited with the Namibian Training Authority (NTA) to ensure standards and sustainability.

Farmers have inadequate information, knowledge and awareness of alternative crops/livestock and diversification of crops/livestock, which combined with traditional knowledge can provide several adaptation benefits, including an economic buffer in case of crop/livestock failures, and recognized benefits for environmental rehabilitation. Upon proposal preparation, the project team was informed by nearly every stakeholder consulted that insufficient knowledge of and access to climate-smart crop and livestock farming practices was challenging agricultural production in Omusati and Omaheke region and reducing its adaptation to climate change. With improved farmers' information on sustainable practices, resilience can be enhanced to enable adaptation activities across the entire spectrum of the project sites. 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 several drought-tolerant processes, which considering the projected climate risks will soon be appropriate.

Redressing the lack of adequate knowledge that farmers have is ideal as an adaptation activity, especially if it uses media that are still commonly used by people in rural areas, such as radio. A

recent survey to assess information needs of bush control (Lindeque and Rothauge, 2015), identified radio broadcasts in vernacular languages as one of the most desirable and effective communication and extension strategies while also indicating a desire to get information through modern digital and electronic communications media such as e-mails, website-based information and cell phone-based short message services (SMS and WhatsApp). The dissemination of weather forecasts (seasonal, fortnightly, weekly and daily forecasts) of rainfall events will be an innovation to the farmers in Omusati and Omaheke regions.

The climate-relevance of farmer training and information dissemination is obvious, as an informed population is a prepared population, ready to implement new technology that it understands because of effective knowledge management. This causes both better coping with (adapting to) climate change and also better management of resources so less carbon is released into the atmosphere in the first place.

One of the most important support functions to agricultural production is provided by upstream institutions that provide inputs required by producers, and downstream institutions that process produce and market it. These support services in communal areas were neglected in Namibia's past (= baseline) as it was assumed that communal farmers farm for subsistence and not production of a marketable surplus. The proposed project wants to give these support services due attention, furthering the capacity of institutions to fulfil their mandate, mainly by training and become well-managed, accountable, smoothly functioning and effective service providers to the communal agricultural sector that manage pro cesses properly. This proposed project intends to do market research that identifies and characterises existing (e.g. domestic) and new (e.g. export) markets for products of the Omusati and Omaheke regions, assist regional and local institutions and producers to access these opportunities and to deliver more effective services to the AFOLU sector.

The project intends to complement existing marketing initiatives. Namibia's commercial agricultural sector appears to shun exports to our northern neighbours in Africa in favour of higher-value, but also highly demanding overseas and western markets. While this may be the end goal due to the inherent profitability of these markets, their extreme demands may make the penetration of nearer, less demanding markets a good option for starters. The project also intends to copy successful marketing methods on which Namibia's commercial sector offers good role models to imitate and adjust to communal circumstances. When commercial producers were still weak and inexperienced, they banded together in farmers' and producers' cooperatives to market their products and obtain inputs. They devised various preferential procurement and market share promotion schemes to facilitate marketing their products, some of which are still active today. These methods may be copied with fruitful intent in the regions that the proposed project will work in, in close collaboration with regional authorities. The project will thus strengthen the role of producers' cooperatives for crop and livestock farmers in the two regions.

For example, small input providers in Omusati and Omaheke regions must be mobilised and alerted to the business opportunity that farmers need certain inputs on a regular basis. Possibly, SMEs need training in business operations, stock control and financial management. In the

production sector, there are farmers' and producers' associations in the Omusati and Omaheke regions whose sole existence is motivated by the need for knowledge and information, which the proposed project intends to meet.

On the downstream side, processors and marketers need assistance (mainly awareness-raising and training) to fulfil their mandate in communal areas since many of them originate from Namibia's commercial farming areas and are unfamiliar with the communal way of doing things. For example, the agency tasked with marketing fresh produce, AMTA, has built huge cool storage facilities all over the communal areas from where the fresh produce should be traded, but these cool facilities stand largely empty because most small-holder communal producers do not have transport for their products to these facilities. Instituting a pick-up round amongst small-holder producers would fill the storage halls of AMTA, along with awareness-raising amongst producers but there is a need to alert and prime the institution to this problem that is actually an opportunity. It is foreseen that the Omusati cattle abattoir in Outapi will be managed by a farmers' cooperative rather than by the Meat Corporation of Namibia (Meatco). The new managers may be good businessmen and women but will probably know little about abattoir operations. Such knowledge could be imparted by arranging exposure visits to Namibia's other cattle abattoirs, or even a period of apprenticeship to pick up the necessary foundation knowledge and skills of how to slaughter cattle in an abattoir.

NUST's Namibia Business Innovation Institute will be intimately involved in institutional and business training since it is an acknowledge centre of expertise in these matters, highly rated and experienced in institutional and sectoral development and thus an esteemed strategic partner. Importantly, it also emphasises the realisation of long-term strategic objectives. This innovative approach has not been tried in Namibia before. Building successful businesses is often a long-term process that requires commitment and perseverance, eschews a "fast-buck" mentality and requires innovation and unconventional, even unpopular thinking.

The proposed project aims to improve the capacity of at least 20 producer support institutions (e.g. abattoirs, AMTA, charcoal and producers' associations, farmers' organisations, forest and conservancy management committees) in operational, strategic and business management. This must empower them to manage their operational and management processes properly to adequately support their stakeholders (e.g. producers), enhance offtake and improve livelihoods by making production more profitable.

In summary, the project proposes to initiate and promote input supply, processing, value addition and cooperative marketing at institutional and regional level by involving authorities like RCs, Ministry of Industrialisation, Trade and SME Development, etc. Economic experts of NUST will explore and and empower producers to penetrate new markets with relevant crop, horticultural, livestock, rangeland and forestry products, while devising innovative strategies to overcome marketing and offtake bottlenecks. Improved marketing of agricultural produce acts as "pull" factor that encourages production but is often inadequate, unimaginative and downright inhibitive (e.g. the "red line") in Namibia's communal areas. Appropriate strategies and the capacity to overcome these challenges will be synchronised with regional institutions and national stakeholders to

improve livelihoods and reduce rural poverty. These activities create and enhance the marketing framework in which technical solutions to adapt to and mitigate climate change can be implemented with sustainable success.

3.2 Develop a permanent training capacity at regional level ("Farmers' Academy")

One of the most important requirements for successful project implementation is the full-time presence of trustworthy intermediaries in the participating communities, to ensure constant motivation, information and implementation. This intermediary, known as a "field facilitator", derives from the participating community (hence, is "integrally embedded") and may him-/herself be participating and benefitting from project interventions but has more responsibility than other community members. In the short term, the field facilitator is the link between project and community, channels information and interprets knowledge (mainly to the community) and traditions (mainly to the project). If these field facilitators could be with communities permanently, it would help a lot to perpetuate intervention gains post-project. The long-term goal therefore is to link field facilitators to a permanent regional training institution to sustain adaptability gains.

The proposed project plans to appoint 9 full-time field facilitators, knowledgeable people from benefitting communities who facilitate implementation and cooperation with local communities and authorities (traditional, tribal, etc.). At the end of project, these field facilitators will be assisted to morph into "Community Agricultural Resource Persons" (CARPs) who continue with their extension efforts post-project. CARPs are modelled on the "Community Health Workers" of Namibia's Ministry of Health and Social Services. These community-based health resource persons do first aid, HIV/Aids assistance (e.g. RV administration) and family planning locally, treat easily-treatable diseases while referring patients to relevant institutions for more difficult diseases and incidences, and ensure the flow of medication to communities far removed from health services. Community Health Workers have had an astonishingly positive impact on infant survival, primary health, containment of contagious diseases etc., have greatly improved the interaction of rural patients with government health services and were accepted by local communities in a flash. CARPs can achieve the same in agriculture.

Field Facilitators and CARPs can be equipped with multiple skills to enhance their value to the community. For example, they can be trained as para-ecologists to participate in SRM and rangeland rehabilitation, para-veterinarians to assist with livestock health issues, part-time rangers to assist with conservancy activities, etc. according to their personal interests. These additional skills will also make it easier to find funding to maintain the system of CARPs post-project.

One of the most serious drawbacks of past training interventions in Namibia's communal areas is that training was not institutionalised and therefore ended when the project ended, or petered out shortly afterwards. This proposal wants to be different and ensure that training is sustainable. The project implementer NUST is primarily a tertiary training institution that excels in teaching adults. This alone should add a long-term quality to the planned project interventions in training and

knowledge dissemination as the competent people will not leave the country at project-end, but be traceable to NUST.

The drawback of this arrangement is that the main NUST campus is far removed from the target regions: 1,750 km from Omusati's regional capital Outapi and 1,250 km from Eiseb, a large settlement in the north-eastern communal area of Omaheke region. NUST staff are unlikely to travel these distances regularly after project end to continue training interventions. Therefore, these interventions need a regional counterpart that can act on (implement) the technical backstopping provided by NUST to train farmers and other trainers ("training-of-trainers" such as CARPs). In other words, the proposed "Farmers' Academy" is a collective effort between a tertiary training institution (NUST), a regional authority with a mission to develop its region (the Regional Council and its structures), local agricultural extension people embedded in the village (CARPs) and others.

The targeted regional counterpart is the Regional Council (RC) of each region, consisting of elected constituency councillors, an appointed regional governor and administrative support staff of career public servants. All RC have existing capacity-building mandates and small grant budgets to develop projects in their region, as lack of human capacity is recognised as one of the main factors delaying Namibia's development. RC and constituency offices have the required facilities (e.g. council halls, meeting rooms and offices) needed to free budgets to concentrate on providing training contents and trainers, and not on infrastructure. Since elected RC councillors are much closer to their constituents than Parliamentarians, they are under immense pressure from the electorate to perform and bring development to their region. They are more responsive to local requirements and know the situation better than far-removed Parliamentarians, but need to be guided and empowered to administer a Farmers' Academy properly.

Therefore, future capacity-building efforts should be concentrated on a partnership with RCs, the so-called "Farmers' Academy". It uses RC facilities and community mobilization skills to convey training and capacity building devised by Namibian experts and institutions using funding sourced from own (RC co-funding) and donor budgets as the FA is credible and supervised by both RCs and NTA. The Farmers' Academy can offer CARPs regular, seasonal up-date training (e.g. newest cultivars and cultivation methods to use in the upcoming crop growing season) to ensure that they relay the latest information to farmers, in time for seasonal activities.

Past donor-funded development interventions in Namibia have mostly had a large capacity building component as lack of human capacity is recognised as one of the main factors impacting on Namibia's development. There is good reason to believe that this realisation will continue especially as the proposed FA will target women and vulnerable sectors of society, meaning it should be possible to mobilise significant donor funding to support the indigenous effort, especially since credible and experienced institutions (NUST and RCs) are involved. It will be important to institute transparent and participatory processes and regular, publicised feedback to encourage involvement of other stakeholders.

The proposed output of this activity is a permanent, on-going training capacity at regional level; a FA that provides content and trainers and uses existing structures in the region to train farmers, trainers and institutions. The FA is NTA-accredited and in addition to training and capacity-building, may supply other services such as artificial insemination (AI) to a nascent dairy-ranching sector, seeds of new crops, maintenance of demonstration plots, advocacy, etc. This innovative approach has not been tried in Namibia before (= baseline). Success at regional level will lead to up-scaling to national level.

3.3 Adaptive research and development enhances climate-smart agriculture

The next generation of Namibia's natural resource specialists must gain valuable practical experience of climate adaptation in the AFOLU sector, to better prepare them for a sustainable future, by participating in the proposed project. They must also learn how to interact with farmers, improving their "soft skills". Capacity in applied research to solve practical problems has to be developed in NUST and its post-graduate students, in accordance with its strategic objectives. This would engage NUST with industry, making it more relevant to agriculture and conservation by establishing a bond between academia and industry.

The proposed project activities will include student training, the first primary objective of NUST (to train students in a formal setting). Students will be taken to the field on a regular basis (quarterly for many of the practical project components) to get practical experience of what they were taught in the classroom and to be able to integrate these experiences into their academic knowledge. Nearly as important will be the opportunity to mix and interact with farmers, build self-confidence and lose their fear of mature farmers, many of whom can be quite rough as people skills and "soft skills" are not usually part of their skills set. This will result in NUST producing more rounded students than before, who are better able to fulfil their promise and are also more climate-aware, having experienced the implementation of climate-adaptive responses in practice and first-hand. In total, about 350 under-graduate students will participate in 35 excursions planned during the 5 years of the project. They may run concurrently (but with different groups of students investigating different topics, e.g. a group of Plant Production students and a group of Livestock Production students) or in sequence (e.g. the same group visiting in different years to assess progress). Already, females comprise more than 50% of all under-graduate students at NUST so that this particular intervention is especially favourable to promote the cause of gender equality.

It is often said that "the youth" are the leaders of the future, but is enough done to expose them to the dangers of climate change, and how to adapt to (and mitigate) it? Training the next generation of agricultural leaders early in climate change adaptation (and mitigation) and exposing them intimately to adaptive interventions in the field is highly climate relevant as it is the best guarantor that this knowledge and experience will infuse their future actions and decisions and ensure sustainability of project interventions beyond project end. As one of only two national institutions of higher learning, NUST views it of utmost importance that undergraduate students should be exposed to and participate in the activities of the proposed project to learn from it how to adapt to climate change, and that post-graduate students should research specific intractable

problems to ensure better adaptation responses; in the service of individual, institutional and national capacity.

Inevitably problems will come up during the proposed intervention that need applied research to solve in a climate-smart manner. The second primary objective of NUST, a university of *science and technology,* is to apply research to local problems to promote economic development and sustainability of solutions. The need to solve local/regional problems by targeted, applied research and the purpose of NUST to perform applied research overlap neatly.

Hence, the proposed project provides for nine (9) young professionals to engage in masters or doctoral studies, paying their academic fees and part of their expected research costs, including the analysis of a large number of soil, water, plant and animal tissue samples. Most of these studies will only be completed after project end as data analysis and thesis write-up take time, but the application will probably be clear during project implementation, benefitting farmers in the regions. The adaptation reasoning of these post-graduate studies is that they will investigate problems on the ground, at the grassroots level as well as the institutional level that hinder the implementation of climate-smart responses, thus contributing to the solving of local problems and facilitating the implementation of adaptive responses. It is foreseen that such applied research will involve establishing a baseline of soil, plants and animals, including the sampling of such substances. NUST identifies post-graduate students according to its own institutional procedures to which the proposed project will adhere, although it will attempt to identify and empower candidates from the benefitting regions that have a self-interest in such research and a better chance of staying involved with their region of origin after the project ends, thus contributing to project sustainability.

A criticism often levelled at academics, that they are removed from practical reality while hiding in their ivory tower, will be addressed by this and the previous outcome. Academics of various faculties and departments will be guiding pre- and post-graduate students during exposure tours and research studies and will be intimately involved in the agricultural sector of the targeted regions, to the benefit of industry. The involvement of academics will be focussed on adaptation to climate change and variability and increasing resilience to climate-induced shocks and is expected to contribute significantly to further the adaptive capacity and increase resilience of the sector, establishing an intimate bond between academia and practice. Such adaptive research, development and training enhances climate-smart agriculture and adaptation to climate variability.

B. Economic, social and environmental benefits

The two identified regions (Omusati and Omaheke) are among the most vulnerable regions to climate vulnerability and change in Namibia. The predicted impacts of climate change will disproportionately affect vulnerable population many of whom are rural and dissolute women. The society, in its endeavour significantly interacts with the environment which reduces the flow of ecosystem services and often creates barriers such as overgrazing, deforestation and pulverisation of soil through agricultural practices. These barriers which are mainly anthropogenic are exacerbated by climate-induced factors, such as limited rainfall to productively cultivate the land. The lack of alternative grazing land often limits grazing management practices.

Environmental co-benefits: The project will address the problems of poverty, environmental degradation and climate-led disasters in the project areas and will serve as a model for scaling up in other areas around the country. By ensuring that subsistence agriculture which is at risk of climate change and the impacts of degradation of natural resources to resilience of local economies and livelihoods form the basis of community based adaptation planning, along with building capacity for the implementation of interventions, the project will directly contribute to the SDGs 13, 14 and 15 by integrating the principles of sustainable development into subsistence agriculture and reverse the loss of natural resources.

Therefore, the project will deliver a range of environmental benefits. These include reducing adverse impacts associated with poor and inappropriate land uses, land management practices and agricultural processes, and investments in ecological infrastructure and rehabilitation of degraded areas. Through its investments in ecological infrastructure, the project will support the rehabilitation and restoration natural bushland. The restoration and rehabilitation interventions will increase species diversity, reduce soil erosion (with associated carbon benefits), reduce riverine corridor degradation and flood attenuation and the availability of grass for livestock. Invasive alien plant removal and associated rehabilitation of bushland will improve ecological functioning with associated benefits for fire management and agriculture.

The project is expected to yield positive environmental impacts that will contribute to Namibia's obligations as a contracting party to several environment protocols and conventions, including the United Nations Convention on Biological Diversity and the United Nations Convention to Combat Desertification.

The projects ecological infrastructure pilot projects will form part of a body of evidence that is being compiled in Namibia as part of the Community Based Natural Resource Management (CBNRM) Programme to make the case for investments in natural systems that support social and economic wellbeing, and that collectively promote the concept of ecosystem based adaptation. By capturing best practices and lessons, the capacity building activities of the project will demonstrate how investments in the natural environment can deliver co-benefits in climate change adaptation interventions, and the importance of ecosystem based adaptation as part of an integrated approach to building resilience to climate induced risks.

Furthermore, the interventions above will collectively lead towards environmental sustainability and conservation of natural resources, reduce vulnerability of livelihoods to climate risks and increase household welfare (including incomes) of local communities.

To ensure that any potential impacts are timeously identified and appropriately mitigated, an Environmental and Social Risk Management plan has been developed for the project in accordance with the AF criteria.

Social co-benefits: Job creation is the major anticipated social co-benefit. This ties in with the perspective of the Namibian government that views agriculture as an important source of employment generation in areas where unemployment is high. The social benefits linked to employment generation are important, and thus, the social net benefits are higher than the financial net benefits.

Social sustainability will be ensured using the community based approach to adaptation. This will be supported by the formulation of an exit strategy to ensure that project initiatives are mainstreamed into local processes. The exit strategy of the project will be based on two pillars:

(i) sensitization and awareness at all levels to promote climate resilient development,
(ii) participatory development and monitoring of plans and policies,

One of the biggest challenges within all development programming is how to ensure that individuals and societies adapt beyond the programme cycle of an intervention (in this case beyond 2023). This is crucial to climate change adaptation, because adaptation is a continuous process. People need to acquire the capacity to adapt for generations to come. This project aims to meet immediate needs but also build adaptive capacity for the long-term. This will be done through improving understanding among technical personnel and local communities on the linkages between the social and ecological systems and acquisition of the necessary skills for application of adaptive approaches. The capacity built through this program will also enable communities to implement several other projects for other donors.

Economic co-benefits: The proposed programme will generate **economic co-benefits** through its implementation that include the expected generation of jobs and the strengthening of the economic performance of the land use sector (including agriculture, forestry, ranching etc) in the regions where it will be implemented. It is not possible to indicate a precise estimate of job creation potential, as the weight of the different activities that may be financed under the Project may vary depending on the final pipeline of the project activities. Previous similar projects, however, have generated (or helped maintain, in the case of adaptation-focused operations) jobs in the region of 200 jobs per US$1 million invested.

The project is expected to benefit indirectly approximately 22,658 or 13.5% of the total population in the selected constituencies of which 46.5 % are women, and 40% children. Please also refer to Table 20. These beneficiaries include vulnerable groups such as women, people living with HIV/AIDS, the youth and the disabled. Communities will benefit from the strategic thinking that they will go through in being partners in this project, which will increase their understanding of

climate change and its likely impacts on current and future investments in livelihood support systems and local economic development. This is empowering, and prepares them to engage other development partners with a list of priority areas for support.

Target areas for this project are characterized by high limited opportunities for earning cash income, making opportunities provided by this project extremely important for people in rural areas. The paucity of rural economic opportunities also contributes to the phenomenon of urban migration, which is placing additional pressures on water and power resources in Namibian urban centres. By securing sustainable economic development in rural areas, this project will also help stem the tide of rural-urban migration.

Direct beneficiaries also include household dependants such as children, youth and the disabled in the project areas because of increased food production and possible higher household incomes. It is expected that household incomes accruing to women is spent on health, nutrition and education. Indirect project beneficiaries include rural households located in proximity of target sites those improved management under the project will provide a more sustainable natural resource base and additional livelihood options.

The socio-economic and environmental benefits of the project are listed in Table 8.

Table 8: Economic, social and environmental benefits

Project component	Present situation	Expected benefits		
		Economic	**Social**	**Environmental**
1. Improve ecosystem management	• Low carrying capacity • Bush encroachment • Lack of awareness for technical and environmental standards especially amongst rural women. • No adequate framework to access climate change policy imperatives. • Limited participation in policy formulation and review.	• Increased income generation streams from grass, wood, value added meat products sales. • Reduction in income losses due to SRM and herd management. • Women will generate more income through the sale of crop produce. • Average yield per ha of cereals (maize, millet, sorghum etc) which are basic staples will increase by 5%. • Livestock productivity will be improved through breeding management, selection and feed supplementation. • Crop residue will be used as fodder for livestock feed. • Surplus grass pasture will be converted to hay and further banked to be used during drought. • Exposure to Post-harvest storage techniques will enhance longer shelf life of crop produce. • Marketing cooperatives established during the project, will improve joint marketing of crop by 10 to 20%. • Offtake rate of weaners is expected to increase by 10% per annum.	• More adaptive management of open-access rangelands by resident communities • Improved food security (access to meat, milk and carbohydrate staples). • Firewood will be more available for energy supply. • There will be increased job creation as more women will be engaged during pre-and-post harvest activities. • Women will have more access to cheaper source of energy through the supply of firewood.	• Enhanced rangeland productivity. • More grass regrowth and increased carrying capacity. • Soil degradation will be reduced due to soil conservation methods applied. • There will be a reduction in bush encroachment and as a result lead to conservation of underground water. • Soil degradation will decrease due to implementation of soil conservation and pasture management which will translate into a total of 130 Ha of grass pasture.

Project component	Present situation	Expected benefits		
		Economic	**Social**	**Environmental**
		• Increased income generation streams from grass, wood, value added meat products sales. • Reduction in income losses due to SRM and herd management.		
		• Improvement of regional contributions to trade in crops, charcoal, livestock and value-added products through cooperative system. • Improved terms of engagement (contracting) • Increased market participation	• Increased awareness of national standards and requirements for production, marketing and processing. • Improved compliance to environmental policies and regulations amongst the targeted beneficiaries • More women and youth are exposed to their social rights and privileges for enhanced decision making.	• Preservation of ecosystem through sustainable management or production practises.
2. Climate-smart crop and animal production systems	• Small-scale crop and livestock farmers face frequent occurrence of drought. • Rainfall is spatial and there is temporal variability within one planting season.	• Increased income diversification accruing from new crop cultivars.	• Increased employment opportunities for unemployed youths, women and the disabled. • Improved quality of life (livelihood) of the rural women • Greater resilience to climate change due to the adaptation measures undertaken Reduced rural-to-urban migration.	• Sustainable water efficient irrigation techniques and reduced evapotranspiration • Improved soil moisture, and organic matter. • Improved carbon sequestration

Project component	Present situation	Expected benefits		
		Economic	Social	Environmental
	• High evapotranspiration • Low photosynthetic efficiency • Low soil organic matter	• Increased in crop, livestock and forestry productivity and profitability. • Improvement of regional contributions to trade in crops, charcoal, livestock and value-added products through cooperative system	• Training of more than 5000 farmers of which 30% are women, 10% are marginalised and vulnerable people, 5%, training-of-trainers. • Improved human capital through more women involvement in decision making and production. • Increased awareness of national standards and requirements for production, marketing and processing.	• More adaptive conservation management practices to improve resilience to climate change especially amongst women.
3. Individual and Institutional capacity development	• Lack of knowledge about impending climatic events • Lack of resources to prepare for adverse effect of climate change • Lack of awareness for technical and environmental standards especially amongst rural women.	• Improved terms of engagement (contracting) • Increased market participation	• Improved compliance to environmental policies and regulations amongst the targeted beneficiaries • More women and youth are exposed to their social rights and privileges for enhanced decision making.	• Preservation of ecosystem through sustainable management or production practices.

The project pays particular attention to issues of equitable distribution of resources and economic benefits specifically the aspects of fairness and ensuring the most effective use of project resources. This will be carried out by supporting women and their dependants, and the vulnerable from all societal groups, to participate as informed citizens and to express and advocate for their interests. In this case, a checklist that encourages the development of indicators will be developed to help measure how effectively the project is addressing the different needs, interests and resources of women and their dependants, and vulnerable groups in the project area. Gender equity will be promoted mainly through education and rigorous involvement of women. This approach gives assistance to people and communities with limited resources in such a way that this project can have a snowball effect. This will encourage increased livestock and crop production, productivity and incomes of farmers. It also assists in improving protein consumption, environmental protection and integrated animal farming development. In addition, the project will involve direct interventions at the community level through community development plans that would channel direct support from the project to women and their dependants, and the vulnerable from all societal groups in the project area.

Table 9 below indicates which environmental, social and gender (ESG) safeguarding principles have been integrated into the individual outcomes of the proposed project.

Table 9: Project component outcomes aligned to ESG principles

Project component	Component outcomes	Most important ESG principle integrated
1. Improve ecosystem management	1.1 Sustainable rangeland management improves ecosystem function, biodiversity, climate resilience, carrying capacity, fodder flow and animal production	1,9,10,11,12,14,15
	1.2 Legal provisions regulating community management of natural resources are reviewed for climate adaptability	1,2,3,4,5,6,7,8,13
	1.3 Rehabilitation of degraded rangelands enhances resilience and climate adaptability of pastoral and ranching systems	11,12,15
	1.4 Dry-land grass pastures improve fodder flow, animal production, drought resilience and climate adaptability	9,10,11,12,15
	1.5 Improved management of communal conservancies and community forests enhances climate adaptability	1,5,9,10,11,12, 14, 15
2. Climate-smart crop and animal production systems	2.1 Adapting and climate-smarting of crop and animal production systems that are based on traditional knowledge improves the resilience of communities to climate change	11,12,14
	2.2 Enhanced soil health of crop fields improves food security and climate adaptability	11,12,14
	2.3 Introduction of complimentary/ alternative, climate-smart crop and animal production systems and techniques	2,3,5,7,11,12,14

Project component	Component outcomes	Most important ESG principle integrated
	2.4 Develop and improve market-driven AFOLU value chains at regional level to support climate adaptability	1,2,3,5,6, 11,12, 13,14
3. Individual and Institutional Capacity development	3.1 Systematic farmer training and capacity-building of institutions improves the climate-smartness of AFOLU systems	2,3,5,6,7, 12, 15
	3.2 A permanent training capacity at regional level ("Farmer Academy") sustains adaptability gains	1,2,5, ,9,10,11,12,15
	3.3 Adaptive research and development enhances climate-smart agriculture and adaptation to climate variability	2,6

As indicated from the above table, all 15 ESG principles have been integrated into the present proposal.

C. Cost-effectiveness

This project incorporates adequate measures to harness the envisaged welfare benefits and induced resilience arising from the adoption of climate-smart adaptation strategies with due cognisance to cost efficiency and effectiveness. This is because the efficiency and effectiveness in the allocation of economic resources from ineffective to effective interventions is vital to the harnessing of the more accrued economic net benefits. However, the importance of cost-effectiveness of the proposed project demonstrates not only the utility of allocating resources from ineffective to effective interventions, but also the utility of allocating resources from less to more cost-effective interventions. In other words, it may be used to identify neglected opportunities by highlighting interventions (low hanging fruits) that are relatively inexpensive, yet have the potential to increase the desired effects (wealth, income and resilience). The alternative interventions, proposed interventions, the envisaged output/effects, the expected net outcome, and the project cost-saving activities are highlighted in Table 10.

Table 10: Cost-effectiveness analysis of the proposed project components

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
1. Improve ecosystem management	• Improved rangeland condition • Encroacher bush thinned • Rangeland rehabilitated • Value addition to encroacher bushes/wood • Dry-land cultivated grass pastures established • Fodder production is supported • Policy and legal framework aligned to climate change adaptation in the communal areas • Acquaint producer with the existing acts, laws and	• SRM • Improved rangeland condition • Improved productivity of rangelands • Enhanced livestock production • Livelihood & rangeland production strengthened • Rangeland production adapts better to climate change • Sustainable agro-pastoral farming systems. • Improved rangeland condition • Conducive conditions for climate change adaptation created • Strengthened resilience to climate change impacts (risks) • Unintended consequences of policy and legal frameworks identified and addressed • Desired impacts of the existing legal framework strengthened Enacted	• Integrated research and development • Provide extension services • Community Forestry management & conservancy • Rangeland rehabilitation • improve the existing policy and legal framework applicable to climate change adaptation in the communal areas • Evaluate the impact of existing acts, laws and policies relevant to climate change adaptation in	**1,286,757**	Another alternative considered for improving ecosystem management in the context of climate change is to allow extended fallow periods of more than two years to allow the range land to rejuvenate. However, this alternative is not feasible due to limited grass land especially during the dry period of the year and additional land is available. The alternative to the proposed approach is to do nothing, in which case the regulations are ineffective amplified by the lack of capacity to implement existing regulations and rules

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
	policies on climate change • Policy advocacy to the farming communities	laws help farmers cope with climate change	communal areas • Harmonise different components • Update and simplify legal framework Advocate for changes required		

2. Climate-smart crop and animal production systems	• Improved management ability of crops and livestock • Improved livelihood resilience • Improved marketing of produce • Improve soil moisture retention • Reduced erosion • Improved capacity of benefitting farmers and communities to manage resources more sustainably • Increased raw and processed horticultural produce • Improved managerial ability and resilience of farmers and institutions • Enhanced post-harvest storage	• Improved water use efficiency • Improved production and management of croplands • Increased farm income/profit • Increased resilience to climate change • Increased yields from irrigated horticultural crops • Sustainable horticultural yields • Improved value-addition • Improved marketing of produce • Improved livelihood • Increased employment opportunities • Post-harvest storage practiced by at least 100 Small-scale farmers.	• Introduce CA practices • Research • Post-harvest processing • Design efficient industrial-scale charcoal kiln. • Engage horticultural specialist • Student research and feasibility studies • Field trips and excursions	**900,701**	Not carrying out the suggested interventions translates to increased desertification, unemployment. Specifically, the cost of desertification to Namibia is estimated to be at least US$60 million per year in lost production (Quan et al. 1994). Post harvesting-Spoilage: Can be up to 60% of the produce. In case of improper storage, up to 100% loss can be incurred if the suggested interventions are not carried out (as shown by agronomic board in the northern central areas of Namibia). On farm physical loses in grain weight have not been assessed, but were crudely estimated to

	of horticultural products • Enhance the processing and marketing of horticultural				range from 10% after one storage year to more than 30% over the longer storage period The proposed micro irrigation is at least 30% more water efficient than the flood irrigation used traditionally by communities. The 30% loss in production of irrigated produce is the cost of not implementing improved irrigation methods.

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
3. Individual and Institutional Capacity development	• Knowledge and skills imparted through training and information dissemination • Train farmers, women, marginalised and vulnerable people • Train regional and national institutions (e.g. abattoirs, AMTA, charcoal and producers' associations, farmers organisations, forest management committees) • Disseminate relevant production, marketing and climate risk information • Improve and expand cooperative marketing of	• Managed climate change risk by producers and institutions • Sustainable and profitable production of vegetables • Systematic training based on local experience and incorporating much experiential and practical learning (i.e. practical, hands-on skills development) builds the capacity of farmers, extension and institutional workers and other trainers to adapt to climate change, which improves their livelihoods • Improved marketing of agricultural produce • Permanent training capacity established at regional level • Up-scaled regional role model to national level • Trained facilitators evolve into embedded "Community Agriculture • Students are exposed to practical project work • Farmers learn how to apply knowledge gained	• Field trips and excursions • Training facilitation • Administrative and financial assistance • Train more than 5000 farmers • 30% of trainees will be women and 10% marginalised and vulnerable groups • Student research and feasibility studies • Distribute information to stakeholders • Explore new markets and penetrate existing ones • Establish farmers' training institution & train-the-trainer in Omusati and Omaheke regions	**2,049,729**	An alternative to capacity building is partnership development in which knowledge and skills are given to local NGOs and community-based organisations. If capacity building is not carried out, the cost of not training is immeasurable. It leads to low adoption of climate smart principles and techniques to curb livestock and crop loses.

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
	processed products • Regional FA established • Capacitate NUST Students through field trips to project sites • Post graduate students capacitated to undertake scientific research.	• Applied research capacity is built among the candidate students	• Obtain NTA accreditation • Examine, train, empower and re-train field facilitators. • Secure demonstration plots. Grant 9 post-graduate students opportunities to obtain M.Sc. or Ph.D. degrees • Assist them to develop empirical solutions		

The envisaged project responds directly to the well-considered objective of the AF of facilitating and supporting direct community action in climate change adaptation and mitigation. Global funding mechanisms have demonstrated that donor funding is more effective at delivering tangible benefits that respond to direct needs of beneficiary communities, and should thus be sustained. Direct community involvement through community-based adaptation activities increases the chance of sustainability as community members have a sense of ownership of the projects and thus potentially an incentive for sustainability is created. The project approach has been endorsed by Namibian stakeholders who, at consultation platforms, called for a mechanism that will empower local communities to conceive and drive local adaptation responses directly.

The project will be implemented through existing structures, and will thus save costs in project mobilization and inception. Such existing structures include the NUST's internal structures as outlined earlier in this proposal as well as tailor-made multi-stakeholder institutional mechanisms that NUST have put in place as part of institutional arrangements for the project. Another factor contributing to efficiency and cost-effectiveness is that potential project recipients will be screened and prioritized against specific pre-determined selection criteria.

D. National sustainable development strategies

The proposed project is consistent with several national policies and strategies on climate change, development and environmental management in Namibia, including the:

1. National Climate Change Policy for Namibia, 2001

The goal of the National Policy on Climate Change is to contribute to the attainment of sustainable development in line with Namibia's Vision 2030 through strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks. The National Policy on Climate Change seeks to outline a coherent, transparent and inclusive framework on climate risk management in accordance with Namibia's national development agenda, legal framework, and in recognition of environmental constraints and vulnerability.

2. NCCSAP 2013-2020

The goal of the National Climate Change Strategy and Action Plan (NCCSAP) 2013-2020 is to further facilitate building the adaptive capacity of Namibia to increase climate change resilience and to optimize mitigation opportunities towards a sustainable development path, guided by the National Climate Change Policy for Namibia, 2001. The specific objectives of the NCCSAP are to:

- Reduce climate change impacts on Namibia's key sectors and vulnerable communities;
- Integrate climate change issues (adaptation and mitigation) into sectoral policies, and national development;
- Develop and enhance capacities at all levels and strengthen institutions to ensure successful implementation of climate change response activities;
- Facilitate funding resources for effective mitigation and adaptation investments necessary for the effective implementation of the NCCSAP;
- Provide an institutional framework to guide international and national climate financing modalities and support climate readiness (linking to Namibia's Climate Finance Readiness Strategy).

The primary focus of the proposed project is to assist vulnerable communities especially women to implement adaptation actions and practices that strengthen their adaptive capacities and enhance resilience of their farming system to climate variability and change. The NCCSAP is guided by seven principles that are streamlined to the project objectives and project components for this project are listed next to the specific principle below:

- Mainstreaming climate change into policies, legal framework and development planning (Component 3);
- Sustainable development and ensuring environmental sustainability (Components 1, 2 and 3);
- Stakeholder participation in climate change policy implementation (Component 1 and 3);
- Awareness generation, education, training and capacity building (Component 3);

- Human rights-based development (Component 1 and 3);
- Promote and address ‘adaptation’ and ‘mitigation’ as key approaches (Components 1 2 and 3);
- Promote Public Private Partnerships to foster involvement of all sectors in sustainable development (Components 2 and 3).

3. Nationally Determined Contributions, 2015

In its Nationally Determined Contributions submitted to the UNFCCC (MET, 2015), Namibia demonstrated that it is the driest country sub-Saharan Africa and is dependent on climate sensitive sectors of the economy. Adaptation is therefore of prime importance to the country and is high on government’s agenda to guarantee the welfare of the people while reducing risks and building resilience.

4. Vision 2030

Namibia’s Vision 2030 goal is to improve quality of life of the people of Namibia to the level of their counterparts in the developed world by, 2030. It is a vision that will take Namibia from the present into the future. It is a broad, unifying vision which would serve to guide the country’s five-year national development plans (NDPs), from NDP2 through NDP5. Sustainable development is the cornerstone on which the strategies for realising the objectives of Vision 2030 pivot, the driving force among the complex agents of development consist of the following:

- Education, Science and Technology
- Health and Development
- Sustainable Agriculture
- Peace and Social Justice
- Gender Equality

5. NDP5

NDP5 is informed by global, continental, regional and national development frameworks. These include the Global Development Goals (Agenda 2030), African Union agenda 2063, Southern African Development Community (SADC), Regional Integrated Strategic Plan (RISDP), Vision 2030 and Harambee Prosperity Plan (HPP). The principle of sustainable development permeates NDP5. Further to this, the plan frames the achievement of progress within a framework of ensuring the ability of future generation to thrice. NDP5 has four key goals and they are as follows:

- Achieve inclusive, sustainable and Equitable Economic Growth.
- Build Capable and Healthy Human Resources;
- Ensure Sustainable Environment and Enhance Resilience. The goal for this pillar is to ensure sustainable environment. Namibia’s environmental objectives are: sustainable management and utilization of natural resources and sustainable management of the environment.
- Promote Good Governance through Effective Institutions

The proposed project components directly contribute to the four goals of NDP5. Specific international and national policies that are applicable to the proposed project are presented in Section E.

Finally, various development plans that Namibia created or ratified – including Vision 2030, the Sustainable Development Goals (particularly SDG5 and SDG16), and the AU's Agenda 2063 – subscribe to the notion that achieving gender equality, empowering all women and their dependants is imperative for broad and meaningful development. Specifically, the 5th National Development Plan calls for the mainstreaming of gender in all sector policies and programmes to ensure equitable economic growth.

E. National technical standards

The AF Environmental and Social Policy is consistent with Namibia's Environmental Management Act, other related laws and policies which ensure that the Project does not affect the environment and people, but enhances benefits to the environment and the people. The Project follows a variety of Namibian policies and regulations e. g. Namibia's 2030 Development Vision, Harambee Prosperity Plan, The Water Resources Management Act, policies and regulations related to climate change, agriculture, the environment, land and water and gender and International conventions and treaties ratified by the Government of Namibia and any district level plans of relevance, to be identified on a sub-project by sub-project basis.

Gender equality, including fairness, just and equitable access to all resources, is an important priority in Namibia's National Development Plan and is one of the Sustainable Development Goals principles. The Namibian Constitution, in Article 10 (Bill of Rights), guarantees equality before the law and outlaws discrimination on the grounds of sex and gender. Building on this, the National Gender Policy (2010) contains a full chapter on "gender and environment" while Namibia's National Policy on Climate Change (2010) and the subsequent National Climate Change Strategy and Action Plan for the 2013–2020 period both contain strategic provisions for gender safeguards and mainstreaming. These are all aimed at facilitating equal participation of both men and women in development initiatives.

Namibia is signatory to several international conventions that deal with the sustainable utilisation of natural resources and protection of the environment. These conventions also consider sustainable livelihoods of the most vulnerable groups in communities, particularly women and their dependants. The main international conventions, protocols and treaties relevant to environmental management are as follows:

Table 11: International conventions, protocols and agreements ratified by Namibia

International protocols and agreements	Status
1. United Nations Convention on Biological Diversity (UNCBD)	Ratified
2. Biosafety (Cartagena Protocol)	Ratified
3. United Nations Convention to Combat Desertification (UNCCD)	Ratified
4. United Nations Convention on Climate Change (UNFCCC)	Ratified
5. Paris Agreement on Climate Change	Ratified
6. Vienna Convection for the Protection of Ozone Layer	Ratified
7. Montreal Protocol on Substances that Deplete Ozone Layer	Ratified
8. Stockholm Convention on Organic Pollutants	Acceded to Convention

Namibian environmental law is a complex and interlocking system of standards, policies and developmental agenda. The Constitution of the Republic of Namibia is the supreme law of the country that guides the formulation of policies, Acts and strategies. Every country in Southern African Development Community (SADC) including Namibia has a dedicated environmental Act in force. The execution of this project will be carried out in full compliance within the legal framework and procedures. Project implementation will also be executed in line with the legislative framework and procedures as depicted in Table 12.

Table 12: Key legislative framework and procedures in Namibia (selected)

Sector	Compliance	Clearing Authority
Environment through MET		
Environmental Management Act, 2007 (Act No. 7 of 2007)	Component 1 (Sub-sections 1.1, 1.4 and 1.5), Component 2 (Sub-section 2.1, 2.2, 2.3, 2.6) Component 3 (Sub-section 3.1) will have to comply with environmental impact assessment steps. The following EIA steps will have to be followed: (I) screening, (ii) EI and environmental management plan (EMP), (iii) obtaining Clearance Certificate.Clearance Certificate (can take up to 6-8) months (iv) EMP included in the EIA (v) Follow-up (Monitoring and auditing)	Directorate of Environmental Affairs, Division of Environmental Assessment, Waste Management and Pollution Control, and Inspections (EAWMPCI).
National Policy on Climate Change for Namibia (2001)	The project is consistent with the National policy on climate change objectives that deal with reduction of climate change impacts on key sectors and vulnerable communities and integration of climate change issues (adaptation and mitigation) into sectoral policies, and national development. Components 1-5 are aligned to this policy	Directorate of Environmental Affairs, Division of Multilateral Environmental Agreements (MEA)
Agriculture through MAWF		
National Agricultural Policy (2015)	Components 1-5 are consistent with the following selected objectives of the National Agricultural Policy: • Accelerate the agricultural sector's contribution to the National GDP. • Create a conducive environment for increased and sustained agricultural production and productivity • Promote the development of the national agriculture sector across the value chain • Serve as a basis for subsequent policies as well as aligning existing legislation (especially for Component 5)	Directorate Agricultural Production, Extension and Engineering Services
National Drought Policy (under review)	The proposed project objectives are streamlined to the following objectives of the National Drought Policy of 1997: • Ensure that household food security is not compromised by drought. • Encourage and support farmers to adopt self-reliant approaches to drought risk; the drought policy must motivate people to be self-reliant in terms of food production. • Preserve adequate reproductive capacity in livestock herds in affected areas during drought periods.	Directorate Agricultural Production, Extension and Engineering Services

Sector	Compliance	Clearing Authority
	• Ensure the continuous supply of potable water to communities, and particularly to their livestock • Minimise the degradation of the natural resource base during droughts;	
Water Resources Management Act, 2013 (Act No. 11 of 2013)	The project will not require new boreholes/wells to be drilled for extraction of ground water existing water sources especially for Component 2 will be utilised and no additional irrigation permits will be sourced.	Directorate Water Resource Management provides permits to drill boreholes, while Directorate of Environmental Affairs enforces environmental compliance (EIA and EMP Clearance Certificate)
Soil Conservation Act, 1969 (Act No.76 of 1969)	The principle of the project is in line with the sustainable utilisation of natural resources. The project will apply conservation agriculture(CA) methods such as incorporation of grass lays, minimum tillage to reduce soil pulverisation especially in Omusati	Directorate Agricultural Production, Extension and Engineering Services, while Directorate of Environmental Affairs enforces environmental compliance (EIA and EMP Clearance Certificate)
Agricultural Pests Act, 1973 (Act No. 3 of 1973)	For Components 1-3 only approved and environmentally sustainable pesticides and other production inputs such as herbicides will be used during the project implementation	Directorate Agricultural Production, Extension and Engineering Services, while Directorate of Environmental Affairs enforces environmental compliance (EIA and EMP Clearance Certificate)
Forest Act, 2001 (Act No. 12 of 2001)	For bush thinning (Component 1) a permit will have to be obtained and this takes between 1-2 days. Protected trees species such as *the Acacia erioloba, Boscia albitrunca, Burkea africana, Colophospermum mopane, Guibourtia coleosperma* among others will not be harvested.	Directorate of Forestry issues permits, while Directorate of Environmental Affairs enforces environmental compliance (EIA and EMP Clearance Certificate)
Communal Land Reform Act (2002)	Targeted project sites are for beneficiaries with jurisdiction allocated by the traditional authorities in Omusati and Omaheke regions.	Ministry of Land Reform through the Directorate of Land Reform and Resettlement
Planning through the National Planning Commission		
NDP5	Components 1-5 are aligned with the following: NDP5 (i) capacity development (Component 4) (ii) Achieve inclusive, sustainable and equitable economic growth (project objectives 1-5) (iii) Ensure Sustainable Environment and Enhance Resilience (Components 1-5) (iv) Promote Good Governance through Effective Institutions (Component 4-5)	National Planning Commission provides a planning framework in which government agencies operates
Disaster and Risk Management (2009)	The goal of the policy is to contribute the attainment of sustainable development in line with Vision 2030 through strengthening national	Office of the Prime Minister, Directorate of Disaster Risk Management

Sector	Compliance	Clearing Authority
	capacities to significantly reduce disaster risk and build community resilience to disasters. In 2011 Namibia developed a National Disaster Risk Management Plan (NDRMP). The aim of the plan is to provide a framework for the development of sectoral and regional risk management plans and contingency plan that are consistent with the proposed project objective.	

F. Duplication with other funding sources

At present, there is no other project which focuses on adaptation actions to address projected risks and impacts because of climate change in the selected communities. Also, there is no single initiative that is focusing on an integrated farming, ecosystems-based approach to reduce the vulnerability of local farmers to climate change and variability in Namibia. The proposed project is the only one in the proposed sites that will implement a range of adaptation actions that directly responds to the recent Vulnerability and Adaptation Assessments and deals with resilience to climate change and variability of communal farmers in crop, horticultural and livestock production.

Namibia has been subject to many project interventions over the years, many of which were not sustained beyond project end. NUST has learned from these lessons and incorporated the following improvements in the project design:

- Problem: Participation of beneficiaries is based on the donation of farming inputs. Lesson: farming inputs will not be provided for free, unless absolutely essential. Farming inputs will only be provided to establish demonstration plots.
- Problem: The trialled technical practices are not taken up because they were given inadequate time to become part of the local farming system. Lesson: project period must be long enough to provide ample opportunity for uptake.
- Problem: New initiatives are not sustainable because they do not contribute to short- and medium-term farming profitability and/or sustainability. Lesson: Farmers will only adapt new production techniques if they are profitable and sustainable in the long term. This was an important consideration during the project design phase and entailed examining if an activity is viable (is it needs-based? will it be taken up by farmers?) and up-scalable (will the neighbour do it as well because it makes sense?)
- Problem: New initiatives are not sustainable because they are not rooted in local/regional farming or land use realities. Lesson: Proposed solutions must come from the grassroots level, with community participation.

Related projects in Namibia from which lessons have been learned for application in the proposed project are the following:

1. Urban and Peri-Urban Horticulture Development

DAPEES in the MAWF funded and launched the project Integrated Initiative in Support of Urban and Peri-Urban Horticulture Development.

The project's technical specifications include:

- Integrated production and protection management techniques
- Micro-garden system
- Micro-irrigation techniques
- Cultivation of improved and adapted varieties

The project's ultimate goal was to contribute to food security by improving access to high quality fresh horticulture produce at household level all year round; and to promote employment and

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

- Efficient water usage, prevention of insect pests and diseases
- Requiring little physical effort, to be suitable for the weak, old and young
- Use of limited space in Peri-Urban settings

Lessons learned are that continuous extension services support to the poor is required; creation of markets for produce is a driver of producers' commitment; and sustainability and upscaling was constrained by limited water in urban environments and particularly in the Peri-Urban informal settlements where water is rationed and bought on a daily basis.

2. Green Scheme

Another initiative of government under the MAWF is to encourage the development of irrigation based agronomic production in Namibia, 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 near large-scale irrigation scheme to gain skills.

3. CPP-ISLM

Another bigger and multi-sectorial five-year project (2008-2012) initiative known as Country Pilot Partnership for Integrated Sustainable Land Management (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 programme supported livelihood diversification interventions, e.g. indigenous veld foods production/processing, grazing management, communal conservancies and crop production (see Figure 5 below). 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 Corporation for International Cooperation GmbH (GIZ), NGO communities such as the Namibia Nature Foundation (NNF), all aim at overcoming barriers to combating land degradation and its effects.

Lessons learned are that long-term support is needed by government and donor agencies to mobilise and build capacity of communal farmers to improve ecosystem management. Sustained capacity building efforts will ensure sustainable natural resource use and management under communal systems and in variable dry environments.

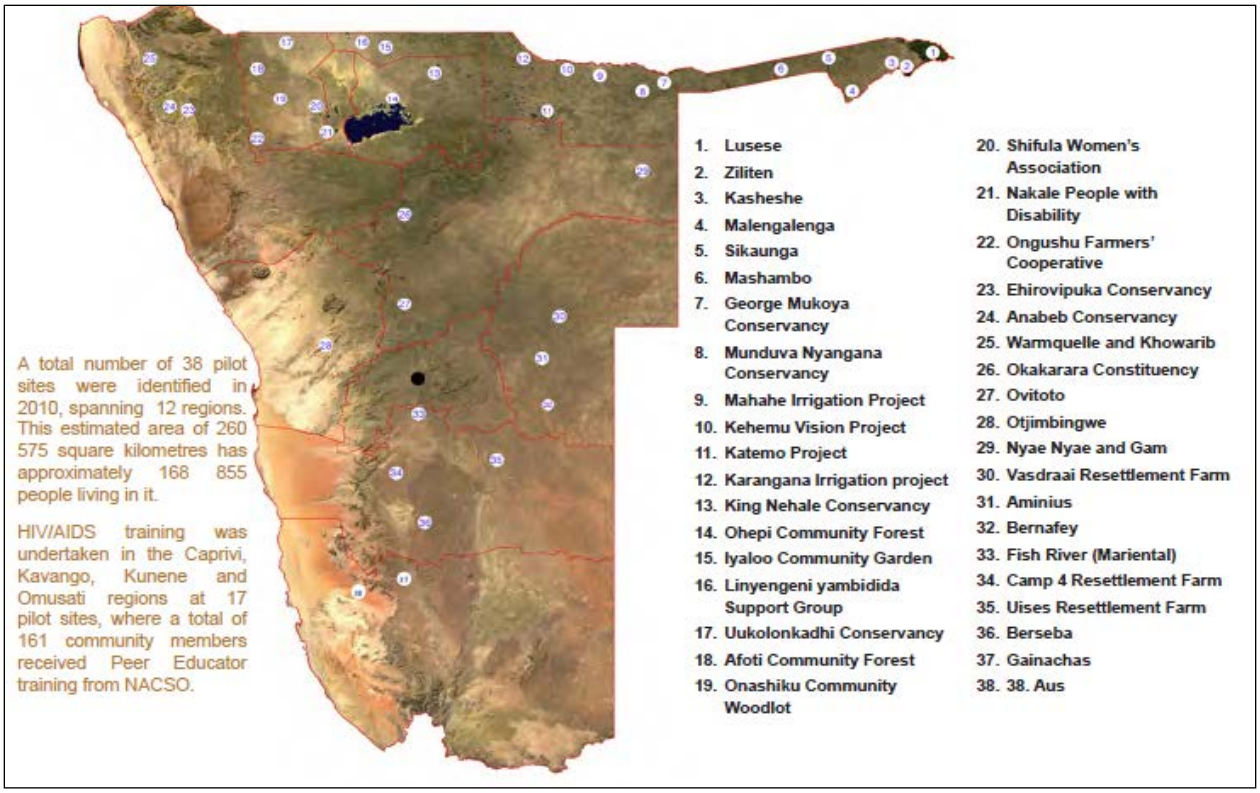


Figure 5: Similar CPP-ISLM project in Namibia (MET, 2010)

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 are 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.

4. Innovative Grants Mechanism

This 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 contributed to improved land management it did not specifically target or 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.

Lessons learned are that targeting individual households has greater impact on livelihoods than group projects; while group projects are successful if benefits clearly outweigh benefits individuals can gain without group efforts.

5. SCORE

This project Scaling up Community Resilience (SCORE) aims at strengthening the adaptive capacity for climate change and reduce the vulnerability to droughts and flood for approximately 4000 households, of which 80% are women-led, in the north-central Namibia. The SCORE project (2015-2019) target results are to strengthen smallholder's capacity to adopt climate change resilient agricultural practices, reduce vulnerability to drought and floods by restoring wells and enhancing flood water pools for food security as well as the mainstreaming of climate change into national agricultural strategy/sector policy.

The focus is on harvesting floodwaters and rehabilitation of wells for crop production to increase food security in vulnerable households. In the Omusati region, a project site is located in the northern part of the region with high incidence of floods. This site does not overlap with the sites of this proposed project. The SCORE project does not cover the Omaheke region.

A lesson learned from this project is that communities are overwhelmed by climate variability. The extreme flooding in during the years 2008 – 2010 following severe droughts in 2013 – 2016 rendered small-scale farmers vulnerable to food insecurity.

6. Dry-land Crop Production Programme (DCPP)

The dry-land crop production component of this programme by the MAWF has strong synergies with the proposed project. The MAWF provides subsidised seeds, fertilizers and limited ploughing services for a maximum 3 ha per farmer. The programme is constrained by the high population density in Omusati and the spatial expanse of the Omaheke region, making it only possible to cover a limited number of farmers.

7. CRAVE

Possible synergies exist with the recently incepted Climate Resilient Agriculture in three of the Vulnerable Extreme northern crop-growing regions (CRAVE) project in the Kavango and Zambezi regions, that is funded by the Green Climate Fund and has the MAWF as the executing entity.

8. Other projects

Other projects from which lessons were learnt In addition to the above projects the proposed project will build on the following development interventions in Namibia that have investigated and promoted the communal farming sector:

- The Sustainable Animal and Rangeland Development Program (SARDEP) immediately after independence in 1990 investigated the reasons why communities

overgraze their natural rangeland and suggested some solutions. These were never taken up because they fell outside the project implementation period, some have been incorporated in the present proposal.

- The Northern Areas Livestock Development Program (NOLIDEP) in the late 1990's was a huge intervention that investigated the interaction between communal livestock farmers and their natural resource base. It yielded many valuable insights and recommended some innovative practices that were, unfortunately, not taken up adequately as sustainability arrangements were not strong enough. Amongst others, most technical project personnel were not Namibian nationals and when they returned to their home countries at project end, their knowledge went with them and was practically lost to Namibia. In contrast, the current proposal will be staffed completely by Namibian nationals to avoid this problem.
- The agriculture component of the US-funded MCA-N Compact that ended in 2014 concentrated on solving the issue of contagious diseases of cattle (e.g. foot-and-mouth disease, lung sickness) in the northern communal areas of Namibia, which currently prevents their regular marketing and export, thus impoverishing communal producers. These proposed solutions form the basis of the processing and marketing components of the current proposal.

G. Learning and knowledge management

The Project pursues a strategic approach that strives towards improved knowledge management and communication to facilitate optimal mainstreaming of project results. This will ensure that the experiences, lessons learned and best practice case studies, as well as expertise on appropriate processes and concrete recommendations, will be packaged into different knowledge management tools, for the benefit of the immediate beneficiaries and wider audience beyond the project scope. Within each of the components, cross-cutting linkages are being established through the utilization of science-based tools. These include; the formulation of indicators and activities; spatial mapping of the demonstration sites; and participatory resource assessments done by local stakeholders/immediate beneficiaries. The project seeks to produce Best Available Practices and Best Available Technologies (BAPs/BATs) adoption models that can be replicated at national and regional scale, as appropriate.

The focus of knowledge management within the project will be based on the following themes and tools/engagement mechanisms:

- Best Practices and Technologies – the best practices and processes within the project components will be documented emerging from the demonstration plots. It focuses on showcasing some of the demonstrated localized BAPs/BATs. The tool for this approach will be primarily through scientific publications, quarterly newsletters and conference proceedings. The portrayal of the best practices contains comprehensive information on the various processes and technologies being applied in the respective local realities;
- Local Voices – focuses on documenting the impacts of the project within each site, specifically impacts benefitting the local communities with emphasis on gender involvement and guidance from women in particular. It entails following up with project leaders, beneficiaries and communities capturing their voices to provide a human account of how their interactions with the project have improved their livelihoods. The radio will be used effectively for this approach. This uses participatory methodologies and approaches to ensure that the human stories of sustainable integrated agriculture experiences in Namibia are documented;
- Environmental Economic Dynamics – seeks to document the value of the project work in real economic terms. This gives a special emphasis to the private sector players and exhibits how the project (including SMEs) are contributing to improved results through the marketing activities of Component 2. It is expected that the private sector players will drive the work to ensure long-term sustainability;
- Policy Change Processes – seeks to identify some of the policy recommendations and interventions that are needed to enhance sustainable farming systems at national, regional and global levels. Tools for this approach include, regional and national platforms (workshops, agricultural dialogue sessions and parliamentarian/ policy briefs) that will form the basis for the advocacy of the lessons, best practices and results emerging from project implementation. This is expected to lead to increased public awareness and demand for actions to prevent unsustainable farming practices.

It is further envisaged that with the focused Knowledge Management and Communication approach, the project will contribute to enhancing sustainability, increasing visibility, and sharing the valuable knowledge generated nationally, regionally and internationally. It will also contribute to the preservation of the wealth of knowledge and experience emerging from the project well beyond its life span. Knowledge management forms an integral part of component 3: Capacity Development, although it is recognised that all components have elements of knowledge management which will be managed and collated under component 3. In this regard, it is pertinent that the knowledge management are streamlined with project components into the respective activities. Efforts will be made to ensure synergy with national initiatives converging at the Project website and through the Quarterly Newsletter.

In addition, the media stakeholders will be actively engaged, sensitized and encouraged to highlight issues around sustainable farming systems arising from the Project. Other platforms such the annual farmers' day, Ongwediva and Windhoek Agricultural trade fairs, as well as multiple online social media (WhatsApp, Facebook and Twitter) will be key to disseminate lessons learned, to the wider audience beyond the project regions.

Furthermore, focus will be on development of the skills and knowledge required by to immediate beneficiaries as well as the national wider audience, which in terms of engagement mechanisms to be adapted will include the following as a minimum;

- Making the case for climate resilience and gaining stakeholder perspectives
- Identification of opportunities for climate resilience in new and existing development activities
- Development of economic cases through cost benefit analysis or cost effectiveness assessment
- Robust decision making
- Development of financing and investment strategies
- Mainstreaming into development planning processes
- Monitoring and evaluation

The integrated knowledge management element is aimed at ensuring that project will be a provider of cutting-edge knowledge aimed at supporting the application of climate resilience within the targeted regions. This will be achieved by capturing existing knowledge within the diverse network as well as facilitating the generation of new evidence-based and local context-specific knowledge, in order to ensure that the project continues to support the National Climate Change Strategies and Action Plan (NCCSAP) (2013-2020).

H. Consultative process

The consultative process occurred in two steps, after initial planning using amongst others literature and maps of the two target regions including biophysical and socio-economic features:

1. In 2017, stakeholders in the AFOLA sector in Omusati and Omaheke regions were consulted to get a thorough impression of what was happening in this sector and its major needs (related to climate change adaptation).
2. The initial consultative round was followed by detailed community consultations in 2018 to determine climate-related needs at the grassroots level and verify that the proposed project indeed reflects the needs of the communities in Omusati and Omaheke regions.

This approach was found to be adequate and representative as sufficient information was collected for the ESIA.

A wide range of stakeholders, particularly local communities, were consulted during preparation of the proposal. At the outset of the design process, 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 Omusati and Omaheke regions. To ensure sustainability of the information and 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. To ensure involvement of all the stakeholders in the whole process of needs identification and proposal development an "all-inclusive strategy" was utilized as depicted in Figure 6.

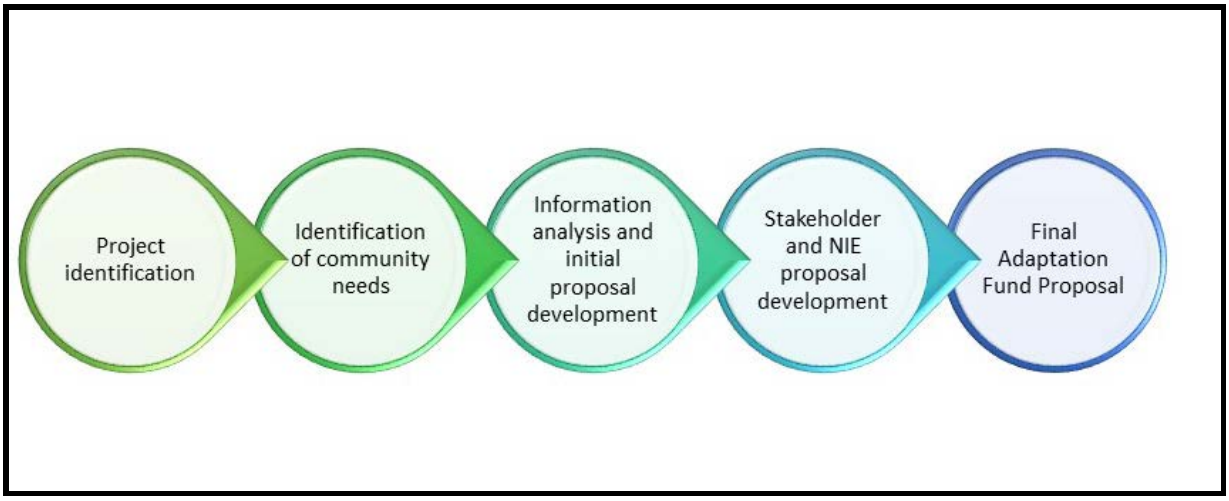


Figure 6: Consultative framework

1. Consultation of AFOLU stakeholders

The first consultative round in 2017, of AFOLU stakeholders, was a novel approach to improve the sustainability of project interventions. Experience and lessons learned from previous projects have shown that if a proposed intervention is not connected to a real, demonstrated need of a community, its chances of being adopted are slim. However, in community meetings, community

members mostly express overwhelming support for a proposed intervention, only to hold back on implementation. In other words, the desire is expressed but the (long-term) commitment is not there. Therefore, the project team during the scoping phase was looking for actions the community already undertook on their own to address a specific, climate-related problem. For example, we knew that control of encroacher bush would be part of our proposed interventions. Then we looked for communities who had already started doing it and whose inherent efforts had need for improvement or optimisation and had potential for up-scaling and replicability in other places. This demonstrated the commitment of the community and was taken as an improved chance of success of the proposed intervention. We then engaged with these structures that the community had started to implement their activities, e.g. the people who did the bush control. In other words, we did not consult whole community about our proposed interventions but sought out those community-parts who had already started in the direction our proposal had indicated. We then engaged these embryonic structures, calling them “stakeholders”.

Although these stakeholders are organically connected to their communities, they no longer represent the grassroots level but are already a level or two higher up. This is a lesson learned from Namibia’s countless development interventions which had the best intentions but disappointed with deliverables because the communities consulted were not able to implement what they had committed themselves to. We basically reversed this approach by first looking for concrete signs of commitment (preferably, own action taken voluntarily) before starting community consultations in 2018. A full list of AFOLU stakeholders consulted in 2017 is provided in the table below. This consultative round ensured that there is direct buy-in by the governors and regional councillors of the Omusati and Omaheke regions, local agricultural unions, farmers’ cooperatives and leader farmers that are involved in crop production, horticulture and livestock production (10 females and 25 males in total). These stakeholders will continue to be consulted throughout the implementation and monitoring and evaluation of the project.

Table 13: Stakeholders consulted during project formulation in 2017

Name and affiliation	Gender	Institution	Contacts
Omusati			
Hon. Endjala, Governor of Omusati Region	Male	Political head of Omusati region	+26465 250614
Ndapanda Kanime, RC	Female	Deputy Director Rural Services	+26481 124 7683
Martin Petrus, Chief Controller	Male	Rural Water Supply/MAWF	Outapi
Dr Laina Hango, Department of Veterinary Services (DVS);	Female	State Veterinarians/ MAWF	+26481 82 9202
Dr Josaphat Peters, (DVS)	Male	State Veterinarians	+264 65 251420
Albertus Jason, Omusati Livestock Marketing Cooperative	Male	Deals with Ohamajongwe Farmers' Coop, Amarika Farmers' Coop; and Group Livestock Management Scheme at Otjitjekwa and Omutambomaue.	+264813447815; jasonalbertus@yahoo.com
Elise Haimbondi, Admin Officer - Omusati Livestock Marketing Coop	Female	Administration of livestock marketing and transportation	+264812623341
Weyulu, Mahenene Research Station Manager	Female	Research on: Crop varieties, pasture and fodder production, pest management and control,	ndatelela@yahoo.com
Suama Nangolo (Secretary), Eriki Shituomunu (Chairperson of the Board)	Female	Northern Namibia Farmers Seed Growers Cooperative	+264 812601154

Name and affiliation	Gender	Institution	Contacts
Paulus Amutenya, Chairperson; Ms Johanna Admin Officer	Male	Olushandja Horticultural Producers Association	Chairperson: +264812443204, +264812961496. Admin Officer +264813840681
Martin Embundile, Chief Extension Officer,	Male	DAPEES / MAWF	+264 65 251028
Omaheke			
Hon. Erwin Katjizeu, Otjinene Constituency Councillor	Male	Political Head of the constituency	+264811607998
Hon. Chester Kaurivi, Otjombinde Constituency	Male	Political Head of the constituency	+264811657779
Hon. Tjaitonga Kanguatjivi, Epukiro Constituency Councillor	Maile	Political Head of the constituency	+264812629263
Tweumuna Tjaronda Treasurer of Epukiro Crop Farmers' Cooperative	Female	Dry-land crop production in Epukiro Constituency	
Nguezeeta Hange Kazondunge, Otjombinde Crop Farmers' Cooperative	Female	Dry-land crop production in Otjombinde Constituency	
Bethel Kazapua, Extension Officer – DAPEES/MAWF Eiseb Block	Female	Dry-land crop production in Otjombinde Constituency	+264812998292

Name and affiliation	Gender	Institution	Contacts
Vetumbuavi Mbaha Chairperson of Okarui Women Horticulture	Female	Horticultural production Otjinene constituency	+2642967827 +2644354900
Mbazuvara, Vizamehi Crop Farmers' Cooperative	Male	Dry-land crop production in Otjinene Constituency	+264 813591048
Aron Nangolo, Treasurer of Otjombinde Conservancy	Male	Wildlife conservation, rangeland management	+264816967722
Mbazuvara, Chairperson of Otjinene	Male	Otjinene constituency – bush harvesting and charcoal production	+264 813591048
Ms Klaudia Hamutenya, NAFOLA Liaison Officer	Female	Responsible for community forests in Otjombinde Constituency	+264814682164
Tjavanga Kamburona, NAFOLA Liaison Officer	Male	Responsible for community forests in Epukiro Constituency	+264812050674

Stakeholders' consultations focused on the following questions, themes and concepts:

- What needs to be done to enhance livelihood resilience to climate variability (droughts, floods and other extreme weather conditions) or adaptive measures are being implemented, and what capacities are available?
- What are the top priorities livelihood activities possible to implement (or are being implemented) to address climate change resilience? (for livestock production / crop production / conservation).
- Any programmes being implemented on bush management? Rangeland management? Crop production? Crop production? Livestock marketing, diversification and value addition? Rangeland rehabilitation?
- Where are these projects/ programmes being implemented?

Minutes were kept of these meetings and are attached in Annexure 2 and 3. The outcomes of stakeholder meetings informed the proposal in general.

2. Consultation of grassroots communities

Different communities and individuals participated in stakeholder consultation workshops organized by NUST from 23 April to 11 May 2018. The workshop itinerary and communities consulted are attached in Annexure 2 and 3. During these workshops, environmental and social risks and associated mitigation measures were identified, in consultation with local communities. Communities were interviewed using two structured questionnaires concerning the incidence of climate change and local knowledge of it (attached in Annexure: 1) and concerning aspects important for the environmental, social and gender safeguarding process. During the consultation processs, communities were asked their three main production challenges and their three main marketing/socio-economic challenges in a free discussion.

Following the community meetings, some role players participated in further stakeholder consultations through telephonic interviews and email to verify needs identification, problems identification and planning for adaptation measures.

During 23 to 27 April 2018, consultative meetings were conducted with a cross-section of community representatives in Omusati region, arranged with the assistance of the Regional Councillor and Constituency Councillors. Six of the twelve constituencies in the Omusati region were consulted, representing a sample size of 50%. The techniques used included Town Hall style meetings with local administrators and community members, Focus Group Discussions and structured interviews. The process began with observations across some areas worst hit by the water crisis, a glaring impact of climate change. Field visits provided an opportunity to affirm, beyond reasonable doubt, the severe state of affairs, a mere representation of the situation in the regions. Poverty has without a doubt reinforced the plague, rendering the local communities unable to sustain their livelihoods. It is simply miraculous how the local communities survive in such an environment. Access to water for communities is a matter of urgency, more so in the adversely affected areas. Consultative meetings were also held with individual farmers and this was very inspiring. The chief impediment to livelihoods of farmers remained the evident scarcity of water. These were very fruitful sessions that re-affirmed the ill state of affairs. The consultative

process revealed that the local community in Omusati understand that there are changes that are happening in the local climate and looked forward for adaptation techniques. The local community and stakeholders are very supportive of the proposed project.

Consultative meetings were conducted from 7 to 12 May 2018 with a cross-section of community representatives in Omaheke region, arranged with the assistance of the Regional Councillor and Constituency Councillors. All four communal constituencies of the Omaheke region were consulted, for a sample size of 100%. The same techniques used in Omusati were also used in Omaheke to solicit viewpoints and to better understand the problem, it's root causes and potential interventions that would achieve greater resilience to climate change shocks. Water scarcity was mentioned as a major climate change challenge. In addition to the findings from Omusati region, it was also noted that the community is keen to develop off-farm livelihoods but need assistance to access skills and training opportunities in order to adapt to the impacts of climate change. Figure 6 shows some of the community consultation meetings that were carried out in the two regions.

Figure 7: Community meetings in Omusati and Omaheke regions respectively

The detailed attendance list of stakeholders and community members consulted in Omusati and Omaheke regions is as shown in Annexure 2 and 3. Through the assessment of community needs, the community per region identified the following critical problems (not in any order of priority):

<u>Omusati region</u>

Challenges faced by communities included:

- Low rainfall for crop and livestock production (agricultural and hydrological droughts)
- Lack of portable drinking water
- No water harvesting infrastructure

- Saline water
- Few boreholes
- Lack of support for ploughing services
- No enough feeds for livestock production
- Limited supply of drought tolerant seeds
- Limited storage facilities for crops after harvesting
- Human wildlife conflicts
- No value addition to crop and livestock products
- Limited marketing opportunities for crop and livestock products
- Limited capacity on animal husbandry (training) resulting in overgrazing
- Limited training on climate smart agriculture
- Pests and diseases for both crops and livestock
- Bush encroachment
- Veld fires
- Inadequate early warning systems for climate events
- Land degradation
- Inadequate research on soil and general land management

Omaheke region

- Bush encroachment
- Limited grazing for livestock
- Climate change problems
- Poor land management
- Forest Act does not allow communities to clear their bush encroached land
- Poisonous plants
- Animal disease control and increased outbreaks (FMD and Lumpy skin)
- Limited training on animal husbandry
- Vaccination challenges, GRN doing less
- Poor coordination of livestock marketing among all stakeholders
- Poor control of establishment of settlements
- Illegal fencing
- Overstocking of livestock
- Limited marketing opportunities for livestock and crops
- Poor maintenance of auction kraals
- Communication infrastructure is poor to aid information sharing on livelihood/livestock issues
- Poor feeder roads to access markets
- Collusion among livestock buyers especially whites from South Africa
- Increased livestock theft
- Low prices at deteriorating abattoirs
- Dilapidated state of most boreholes
- Uncontrolled forest fires

- Lack of agricultural implements
- Variable rainfalls
- Youth unemployment
- Regular drought occurrences
- Middlemen in livestock reduces the profit for farmers
- Lack of information on climate change adaptation
- Increased Human Wildlife Conflicts
- Inconsistent livestock prices
- Heat stress
- Roaming buffaloes
- Land degradation
- Lack of knowledge on financial management

The DRFN which is accredited as the National Implementing Entity (NIE) for Namibia by the AF has been a facilitator in this process functioning in close partnership with the MET, which is the Designated Authority of the AF. In June 2017 the EE participated in a AF-funded PFG workshop facilitated by the NIE in cooperation with the International Arid Lands Consortium (IALC). A number of participatory meetings which were aimed at developing and refining the concept took place.

In summary, the inputs gathered (detailed minutes in Annexure 2 and 3) during these consultations form the basis of the project. The letters of support from some of the consulted persons and institutions are enclosed in Annexure 4 and 5.

I. Justification for funding requested

The proposal is costed at USD 4,999,880 will be spent on applying adaptation reasoning. Improving the adaptive capacity of communities in Omusati and Omaheke regions requires an integrated approach of training communities and the institutions that serve them, enable these stakeholders to execute their mandate efficiently, bring various other stakeholders and role players onto the same platform and investigate how adaptation bottlenecks can be overcome in an innovative and participatory manner. This justifies the components, as follows:

Component 1: Improve ecosystem management

The current baseline is that natural rangelands in communal areas, particularly those in Omusati and Omaheke regions are severely degraded. Quantitative baseline indicators are presented in Part II A, in the description of project components. The poor condition is caused by lack of awareness of SRM as well as a number of factors that make it difficult for communities to implement SRM, e.g. lack of legal instruments to prevent and eject “pasture poachers”. The proposed project aims to achieve a mind shift change in affected communities towards SRM and empower them to implement such practices, amongst others by encouraging them to devise their own solutions so that a top-down approach is avoided and buy-in is achieved.

The adaptation alternative is that the health (condition) and productivity of natural rangelands is improved and they yield more fodder of a better quality and on a more reliable basis than before, thus enabling communities to produce more animal products off the same area of rangeland (their commonage) than before (i.e. an improvement in production efficiency) (some of these claims are quantitatively justified in the description of project components, Part II A). At the same time, improved rangelands become more resilient towards climate-induced shocks and better able to buffer adverse conditions, thus shielding the communities from these impacts.

Component 2: Climate-smart crop and animal production systems

The current baseline is that targeted beneficiaries are surprisingly unable to implement the basics of crop and livestock production given the effort spent in the past on training communities in these disciplines. This shows that awareness and knowledge are not the only deficiencies but that often communities lack the tools to implement adaptive production and husbandry strategies.

The proposal seeks to strengthen the ability of communities to implement sensible adaptation responses and strategies. This is an effort that integrates various concept of training, the availability of suitable inputs and the profitable and efficient sale of (value-added) produce. The better condition of the natural resource, soil (for crop production) and rangeland (for livestock production) achieved in the first component of the project now has to be converted into improved crop and livestock yields. This requires knowledge of climate-smart production techniques and their application and implementation. Often, physical inputs required are not available to local farmers and the project aims to improve this situation not by providing these inputs of equipment and consumable supplies for free, but by assisting local input suppliers to expand their businesses to meet the demand of the farmers. Farmers currently cannot pay for inputs as they don’t receive good prices for their products, or cannot market them formally at all. Again, the project aims to improve marketing mechanisms (e.g. through cooperative and collective marketing) and develop

new markets to which farmers can sell profitably so they can afford to invest some of the proceeds back into production. Traditional Namibian marketing facilitators such as the Meat Board have not been effective at creating new, viable markets for the produce of communal areas, frequently citing “quality” as a major stumbling block. The proposed project will address this issue by improving the state of the natural resource base. However, the emphasis is on efficiency of production and not output so as not to put additional pressure on the natural resource base. This adaptation alternative would represent a paradigm shift in communal agriculture, which has been a “low input” system.

The current baseline is that communal producers are little able to implement the basics of irrigating horticultural crops for efficient production, it appears that knowledge of irrigated production is better but the ability to implement is lacking. This is mainly because irrigated horticulture is not a traditional communal activity that can fall back on a centuries-old tradition, but a new area of production. It is also altogether more intensive than dry-land cropping and livestock-keeping. This sector is especially sensitive to climate change as the availability of irrigation water will likely reduce with climate change and the heat stress on irrigated crops will increase.

The adaptation alternative is to facilitate production of irrigated horticulture through an integrated process of training, facilitating access to inputs, securing livelihoods by securing access to inputs (especially irrigation water), improving yields by increasing production efficiency, and improving income by adding value through processing (e.g. process excess tomatoes in to tomato sauce or a Namibian speciality, relish) and expanding marketing to northern Namibia’s domestic market of 1-1½ million inhabitants. In this manner, the proposed project will attempt to fill a void left by the inadequate involvement of other Namibian marketing facilitators such as the Namibian Agronomic Board, Agricultural Marketing and Trading Agency (AMTA) etc. which has left the communal farmer, already the most marginalised of all farmers, on his/her own in terms of marketing. As with the previous component, emphasis will be on cooperative and collective marketing as this bundles the efforts of various small, individual producers and marketers. Also, the local and regional market will be targeted first as it imports most of its food from outside the regions and from the commercial farming sector rather than supporting local producers.

Component 3: Individual and institutional capacity development

A central theme running through all three previous project components has been the need for training in modern, efficient and sustainable production methods and knowledge of the market(s) to improve the output of communal farming systems and increase the offtake. The current baseline is that the offtake from the communal cattle herd varies per region but is a low as 3% and seldom higher than 8%. Yield of the grain staple crop “mahangu” (pearl millet) is said to be 300 kg/ha, hardly enough to feed an extended communal family and have seed grain left for next season, thus making such grain farmers very vulnerable to climate-induced risks. This is despite considerable efforts having been invested in farmer training in the past, but obviously in a manner that has had no lasting impact.

The adaptation alternative is to present training in a different manner than “business-as-usual”, namely to change it from theoretical to practical, with emphasis on experiencing things and practicing skills hands-on on on-farm demonstration plots, where another farmer has tried

something and is now relaying the experience by way of demonstration. Much of the budgeted consumable supplies and equipment will be spent on facilitating demonstration plots as this is a vital component of effective, lasting knowledge transfer. Another innovative approach will be to make training long-lasting by integrating a training facility into the RC, which has all the infrastructure needed to support training (even a “small grants” facility that could be used to maintain demonstration plots) and thus creating a permanent training capacity in a region. Since halls, offices and community centres exist, this regional FA can concentrate on providing training content and trainers, thus facilitating a very cost-effective approach to farmer training. The undergraduate students of NUST will participate in this training whenever possible by way of field trips, to ensure uptake of adaptation strategies into curricula and exposure of students to the “real world” of farming. Postgraduate students of NUST will contribute to the training effort by researching and solving local problems.

Namibia’s well-intended and extensive policy and legal framework does not emphasise core issues hampering the productivity of communal farmers and undermines the security of their livelihoods. A case in point (= baseline) is the inadequate protection against “pasture poaching” as detailed in Section 1.2 of Part II A. For a community that is dependent on extensive rangelands for its whole existence, such an oversight is a crucial component that will be addressed by the proposed project. This adaptation alternative will also examine the effect that policies and laws have on the communal population and advocate for change as required. Such legal activities, even though they have their origin in only two of the 14 regions of Namibia, will have an impact on the whole country, making this a very cost-effective project component. The impact of this project will dictate replicability potential.

J. Sustainability of the project outcomes

Namibia has been subject to many project interventions over the years, many of which were not sustained beyond project end. What could have contributed to poor sustainability of project initiatives? NUST has learned from these experiences and is therefore improving the sustainability of the proposed project as follows:

- **Financial sustainability**: New initiatives must be profitable to be taken up by farmers. Initiatives that do not pay for themselves are unlikely to be sustainable. Therefore, this project is designed to include strong income generation and entrepreneurial aspects which will make the project outcomes financially sustainable. Selected interventions are locally viable and targeted beneficiaries are highly motivated as they have started such activities themselves albeit on a very small-scale and under challenging climate conditions. Women have proven to be the key drivers of food security and have shown competency particularly in crop and horticultural production in the two regions.
- **Sustainability of production systems**: Rather than starting new initiatives from zero, this project identified existing, home-grown initiatives that can be up-scaled, improved or otherwise extended as existing initiatives are testament to a proven need for this initiative and of community commitment.
- **Policy level sustainability:** There is an increasing realisation that climate and land use change challenges require a range of local and regional strategies, technological interventions and gender considerations. 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 for vulnerable crop and livestock farmers, with priority on women farmers, under prevailing and predicted harsh climate change scenarios.
- **Environmental sustainability:** The project looks at water use efficiency in crop production systems, rangeland rehabilitation (through de-bushing, reseeding and sustainable harvesting of natural pastures and fodder production) and biodiversity conservation on rangelands and in wildlife conservation areas. Operations will be sensitive to environmental sustainability. Amongst others the following will be incorporated: water-use efficiency: low water usage in irrigation system; enhancement of soil health, organic or low pesticide application, the use of solar energy for water pumping, and selective de-bushing which 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.
- **Institutional sustainability:** The programme will be coordinated by NUST in collaboration with MAWF's DAPEES, Regional Governors, RC, Constituency Councillors at the national and district (regional) levels. At the local level, farmers' associations, farmers' marketing cooperatives will ensure sustainability of interventions by ensuring capacity building, value addition and marketing of farm produce (products). Existing farmers' associations /

cooperatives will be capacitated to strengthen institutional sustainability. Capacity of community forest committees, charcoal producer associations and conservancy committees will be enhanced by introducing resource management and financial plans that will ensure financial and institutional sustainability

K. Environmental and social impacts and risks

According to the objectives and planned activities, the Programme will generate low and moderate negative environmental impacts, providing important positive impacts on the environment and the community for the medium term. The environmental and social impacts are expected to be low and moderate and therefore classified in **category B**, requiring the formulation of an Environmental Analysis that considers the fifteen AF Environmental and Social Performance Standards and its recommendations. Please refer to the Annexure 6 to view the ESIA.

The project design has explicitly included consideration of potential environmental and social impacts of the project's activities, as well as mitigating measures to reduce the likelihood and severity of any unforeseen negative impacts. For example, to mitigate the risk that the project will negatively affect land tenure arrangements, including communal and/or customary/traditional land tenure patterns, the project's approach is to prioritise those areas which have clear and transparent tenure arrangements, as well as explicitly described local measures for conflict resolution. Further risks on biodiversity may emanate from rehabilitation work on the encroacher bush as well as support to agriculture production systems such as production of fodder for livestock which could have an effect on native species.

Women in Namibia tend to have unequal access to and control over resources, particularly in rural areas (Iipinge et al., 2000). Women are more vulnerable to the effects of climate change than men primarily as they constitute the majority of the poor and are more dependent for their livelihood on natural resources that are threatened by climate change. Furthermore, women already face numerous social, economic and political barriers that limit their adaptive capacity. Since women are mainly charged with the responsibility to secure water, food and fuel for cooking and heating, they face the greatest challenges. When coupled with unequal access to resources and to decision-making processes, limited mobility further places women in rural areas in a position where they are disproportionately affected by climate change. The specific vulnerability of women in Namibia is notable in a number of areas. For example, almost half of the severely food insecure households are headed by women, as well as a third of the moderately food insecure. These female-headed households, which represent about a fifth of total households, also have a significantly higher overall incidence of extreme poverty.

Table 14 provides a rating of the environmental, social impacts and risks which might be associated with the project implementation.

Table 14: Environmental, social impacts and risks identified

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

An in-depth analysis of the project's environmental, social impacts and risks that can be associated with the project of the proposed magnitude is provided in Table 15 below:

Table 15. Detailed analysis of environmental, social impacts and risks associated with the project.

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 **Key Issue**: Does the project represent any potential risks of noncompliance with local and/or international law & legislation?)	All interventions under this project do not require a comprehensive EIA according to the Environmental Management Act, 2007 (Act No. 7 of 2007).	There is a requirement to secure harvesting permits. The Ministry of Agriculture, Water and Forestry will monitor regularly for compliance with the pertinent national laws and standards and Social (M&E specialist) will monitor adherence to the 15 principles.
Access and Equity **Key Issue:** Is there a risk that there will be no just and equitable access to benefits? (treated effluent, rainwater harvested, related health and socio-economic benefits/services, etc?)	The activities of the project are oriented to promote a fair and equal development between men and women and the vulnerable groups. Most of the initiatives such as in agricultural produce marketing are also oriented to promote the active involvement of women groups in order to achieve enhanced empowerment. The project will provide fair and equitable access to the project's benefits and will facilitate the creation of robust institutions, sustainable livelihoods and knowledge sharing among all beneficiaries.	Women engagement and empowerment through the labour and social laws are ensured. Include contractual clauses to executing agencies that for all initiatives, a cross-cutting component of gender equity has to exist and be maintained. This will be also monitored under the M&E of the project reporting and through ensuring gender sensitive meetings and appointment of female experts so that women feel at ease to be engaged with project activities and meetings. The project will ensure that the M&E/gender expert will be monitoring gender integration during implementation so that women and men are engaged fully and in an equitable manner as identified under gender mainstreaming activities, and that they both are treated equally and fairly in terms of benefits (social and economic) with no adverse impacts on them.
Marginalised and Vulnerable Groups **Key Issue:** That project activities do not risk generating adverse impacts on marginalised and vulnerable groups (women, poverty pockets, farmers in remote areas of Omusati and Omaheke who maybe living in project areas, children and youth)	No initiatives are identified with orientation or execution that could generate a negative impact on marginalized and/or vulnerable groups. All the initiatives are oriented to generate benefits for the groups most vulnerable to climate change and socioeconomic conditions. However, there is the risk of overlooking their engagement in	Include clauses that the development of the initiatives will not generate adverse impacts on vulnerable groups. Priority should be to target poverty pockets, women, vulnerable groups and ensure the benefit of vulnerable groups living in the project areas.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
	design and development of the agricultural activities.	
Human Rights **Key Issue:** Does the development of the project represent a risk of disrespecting international human rights?)	The project empowers the communities to exercise their human rights and systemically educates and empowers them to use it to their benefit and development. The project does not foresee any violation of human rights.	Human Rights are not to be violated under the Namibian Human Rights Law and are monitored by the Constitution of the country**.** The project will respect and promote human rights, equality, freedom of expression and association, access to services, information as mandated by the Namibian Constitution.
Gender Equality and Women's Empowerment **Key Issue:** Does the project represent a risk of not promoting gender equity in a way that men and women are enabled to participate fully and equally, receiving equal social and economic benefits and not suffering from adverse effects? There are also issues related to gender-differentiated job creation targeting in the programme proposal)	The project activities will be planned, implemented and monitored by community based institutions and a fair and equitable gender representation will be ensured in these CBOs. Efforts will be made to ensure equal participation of women in interventions and decision making too. During the consultative process and project formulation exercise a gender analysis has been conducted which have provided specific areas to address. These have been incorporated in the design interventions and are expected to empower the women beneficiaries. Women drudgery will also reduce with enhanced availability of fodder and enable them to provide time to undertake women focused livelihood activities which will be promoted under the project. Capacity building and skill development training for sustainable livelihood generation will be provided to the women of the village communities as well. This will ensure participation by women fully and equitably, and that they do not suffer adverse effects.	Women engagement and empowerment through the labour and social laws are ensured. This will be also monitored under the M&E of the project reporting and through ensuring gender sensitive meetings and appointment of female experts so that women feel at ease to be engaged with project activities and meetings. The project will ensure that the M&E/gender expert will be monitoring gender integration during implementation so that women and men are engaged fully and in an equitable manner as identified under gender mainstreaming activities, and that they both are treated equally and fairly in terms of benefits (social and economic) with no adverse impacts on them.
Core Labour Rights	Payments to labour under the project area will be made as per Government approved norms duly following minimum wage rate and hence	Labour law compliance for worker safety, health and rights supervised by the national, international human rights orgs and ILO

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Key Issue: Does the project represent a risk of disrespecting the labour rights identified by the International Organization for Work? Child Labor may pose another risk	ensuring core labour rights. While full control on non violation of Labour rights will be exercised when labour is being paid using project funds the same cannot be ensured when government schemes are being leveraged and the payment is to be made under a government scheme.	**-** For the child labour risk mitigation, The project team will ensure to include this issue in the curricula of the capacity building workshops under component 4.
Indigenous Peoples **Key Issue:** Does the project represent a risk of disrespecting the rights and responsibilities established in the Declaration of the United Nations about the Rights of Indigenous groups and/or applicable instruments related to indigenous groups?)	All indigenous peoples have been identified in the project area as vulnerable groups in the project area.	Socioeconomic survey has been pre conducted to learn and identify rights and vulnerable groups in Omusati and Omaheke that could be directly or indirectly impacted during and after the development of the project initiatives and in case they exist, request concrete mitigation plans to eliminate or solve the adverse impacts.
Involuntary Resettlement **Key Issue:** Does the project represent a risk of involuntary resettlement of inhabitants?)	Resettlement of communities does not fall within the purview of the project.	No activities that could require compensation are envisaged, in particular, with regard to possibility of some modified grazing regimes or earthen dams for rainwater harvesting as they would be in communal lands in the project areas.
Protection of Natural Habitats **Key Issue:** Does the project represent an unjustified risk of conversion or degradation of natural habitat including those legally protected, officially proposed to become legally protected, critical habitats or areas renown and protected for indigenous groups or traditions?)	Integrated within the project design is the protection of natural habitats; in this case project area itself by enhancing the adaptive capacities of all its stakeholders and ensuring the effective functionality of the services it provides.	Request cadastral plans or land use permits to verify the existence or proximity to protected areas. Project intervention sites, where the cropping and rangeland management activities will happen in component 1 and 2 will reduce the negative impacts of climate variability and change on natural habitats and no negative effects on natural habitats are anticipated.
Conservation of Biological Diversity **Key Issue:** Does the initiatives represent a risk of unjustified reduction or loss of	Integrated within the project design are activities that ensure that the flora and fauna within the project area is conserved by reducing the unsustainable dependency of the communities on the forest resources and	The Environmental Management Act, 2007 (Act No. 7 of 2007) and Forest Act, 2001 (Act No. 12 of 2001) request executing agencies to identify and prevent risks of biodiversity loss and to avoid introduction of alien species.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
biodiversity, as for example the massive introduction of alien species?)	thereby further reducing man-animal conflict and ensuring biodiversity conservation. Crop mixes that are not prone to raiding by wild herbivores will be promoted that will be a step towards building a harmonious relationship between the project community and the wildlife in the region.	Project interventions will enable improved management of natural habitats, thereby supporting the conservation of biological diversity.
Climate Change **Key Issue:** Does the initiatives represent a risk of unjustified generation of greenhouse gases?	The project supports enhancing the adaptive capacity of the local community and the KPC against adverse impacts of climate change. Increase in carbon sinks which is a co benefit is also expected to be achieved through project interventions and thus is not expected to contribute to GHG emissions. No project interventions are expected to contribute to release of gases responsible for CC	The adherence to the recommendations of the Third National Communication issued in November 2015 to UNFCCC and the National Climate Change Policy of Namibia will ensure adaptation to CC through this project. The project will build community and poverty pockets resilience to climate change, and will not result in an increase in greenhouse gas emissions or other climate change inducing drivers.
Pollution Prevention and Resource Efficiency **Key Issue:** Does the initiatives represent a risk of not making efficient use of energy, water resources, or not providing adequate treatment and disposal of waste streams?	The project is not expected to generate any environmental pollution and aims for higher resource efficiency for better management of available natural resources.	The project will not produce excessive waste, or release pollutants, and the small dairy plant must comply with effluent discharge standards.
Public Health **Key Issue:** Does the initiatives represent a risk of generating potential negative effects on public health?	No adverse impact on public health related issues is envisaged.	Farmers training will be initiated to ensure no negative impacts on public health arise as a result of the project.
Physical and Cultural Heritage **Key Issue:** Does the initiatives represent a risk of alteration, damage or removal of resources or cultural sites or with an accepted natural and scenic value?	No adverse impact on cultural heritage related issues has been identified. Mitigation of tourism impacts on project areas will be given due consideration.	Request compliance with Law regarding identification and protection of cultural and archaeological, nearby the location where activities are taking place. Request the identification of preventive measures if necessary in order to avoid direct or indirect damage.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		The project will adopt an inclusive approach, and cultural sites identified by the communities in the target areas will not be altered, damaged or removed. Include contractual clauses that if during the development of the initiative damages to cultural, archaeological or sites accepted as natural or scenic are identified, they must be communicated by the executing entity to the National Implementing Entity (NIE) and if necessary, actions must be suspended until finding and implementing a valid solution.
Lands and Soil Conservation **Key Issue:** The development of the initiatives represents a risk of degradation of land or soil?)	Restoration activities are envisaged to help in land and soil conservation and will not create any damage to land and soil resources.	The project will seek to conserve land and soil through restoring of grasslands and adjacent riparian environments, through reducing bush encroachment thereby reducing the fuel load and threat of wild and fires, and through the promotion of conservation agriculture techniques that conserve topsoil.

The project will be executed in close consultation with Government line ministries (MAWF, MET, Ministry of Urban and Rural Development and the Office of the Prime Minister) and local institutions and in full compliance with all the different Namibian laws and regulations. The project incurs no major negative impacts within the categories listed in Table 15.

Components 1-3 fully complies with Namibian laws and regulations which focuses on the empowerment of marginalised groups, capacitating women, complies with the labour law and basic human rights, inclusion of indigenous groups, no involuntary resettlement and protection of natural habitats through climate smart practices. All Components 1-3 do not produce significant pollution and contributes positively to the conservation of biodiversity. The project will positively enhance the provision of ecosystem services by adopting sustainable soil conservation practices.

Project initiatives represent no risk of making efficient use of energy and water resources with minimal greenhouse gas emissions. None of the project components exposes the targeted communities to negative effects of public health. Targeted communities will not be exposed to initiatives that will alter, damage or removal of cultural sites. Components 1-3 mainly deal with restoration of natural vegetation and preservation of soil health.

The project proposal is categorised within Category B, considering that there are minor adverse environmental or social impacts. The project has many benefits for the communities in Omusati and Omaheke as described in Part II, Section B. The project is also congruent to national developmental strategies and policies.

PART III: Implementation arrangements

A. Arrangements for project implementation

The proposed Project intervention provides an opportunity to kick-start an approach, which moves beyond academia (science-based) into a more implementation-based policy-informing process, aimed at the ultimate improvement of livelihood opportunities (placing the project beneficiaries at the centre of the project) in Namibia. This science/policy interface is strengthened through the envisaged partnership with the involved line Ministry and local level governance structures, which will be prominently represented on the National Steering Committee and the various Regional Technical Committees.

The project implementation takes place at three levels, namely, nationally, institutionally and locally (technically) as is depicted in Figure 7.

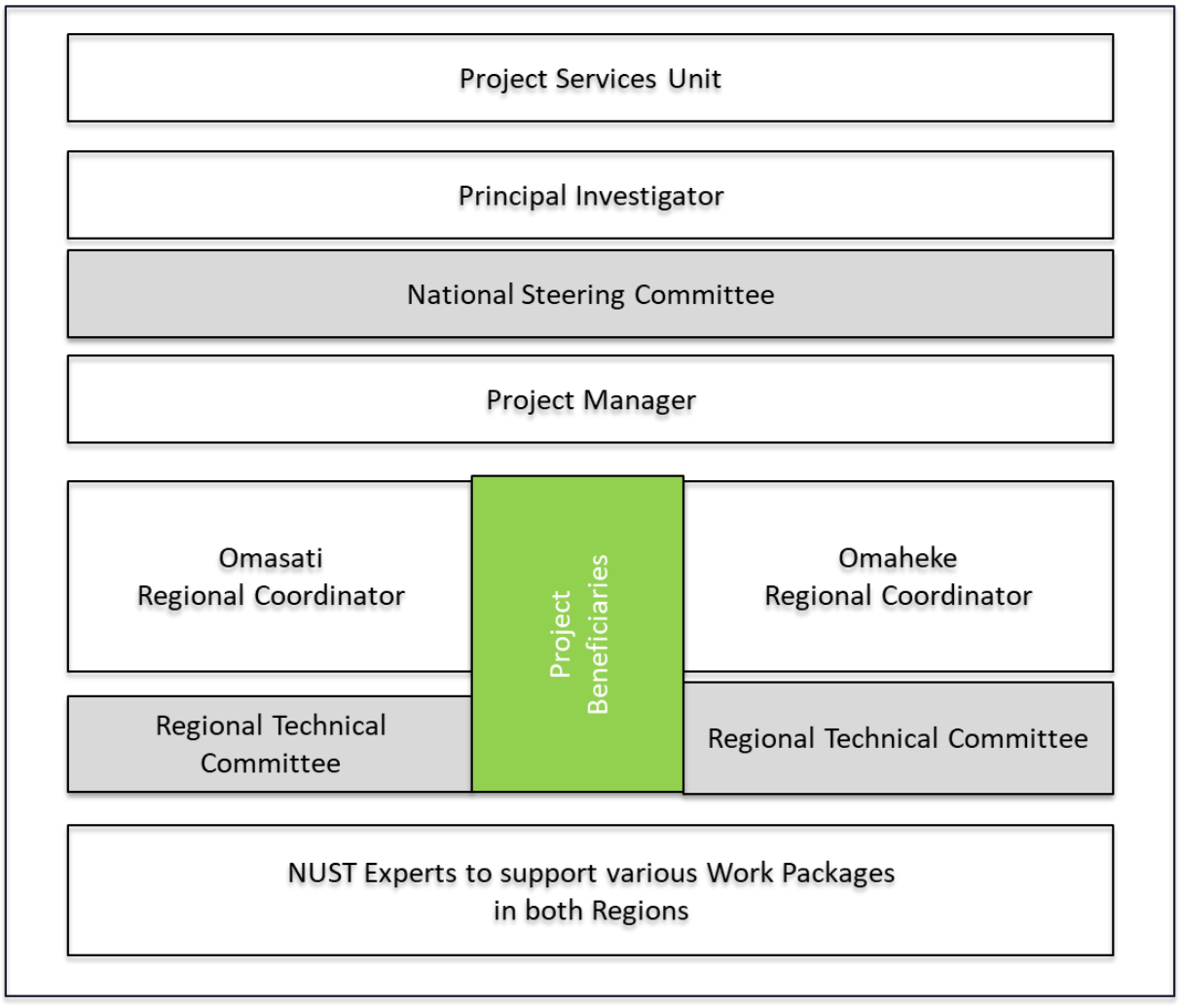


Figure 7: Detailed national and institutional project implementation design

The Namibia University of Science and Technology, as the National Executing Entity will coordinate the Project in consultation with the beneficiaries and identified national partners. The

Projects Services Unit (PSU) within NUST, provides a facilitation and coordination function for all third party funded projects and will thus execute the project management function (with emphasis on monitoring, evaluation and adjustment) with the Institution. The PSU espouses an inter-disciplinary and multi-sectoral approach and recognises the future long-term research needs to maximise impact. The PSU coordinates all administrative, monitoring and evaluation related tasks. The Finance Unit, within NUST offers additional administrative support to carry out all required bookkeeping and financial reporting tasks.

The structure of the indicated project team (Figure 7) resumes the concept of efficient decision-making structures and shared responsibility amongst all partners for a flexible, effective and transparent implementation of the project. The Principal Investigator is responsible for the overall technical project management, while the Project Manager will be responsible for seamless project implementation and good cooperation between all partners/stakeholders. The warranty of a high quality and efficiency of the project is translation and dissemination of results to the scientific community, industry, the public and stakeholders.

The project is strategically designed to have Regional Coordinators employed on the project budget per region, to ensure that there is project ownership and smooth implementation. The selection for the Coordinators will be done through an inception meeting, where community members will nominate their representatives based on set criteria, such as required expertise and experience. The community members in the project play an active project implementation role, as indicated in table 16. For example, in component 1, they are actively involved in cultivating dry-land grass pasture, Improving drought resilience, Community forest and conservancy intervention and Rangeland rehabilitation actions. The technical involvement of community members in the project is further elaborated in Part II: Project Justification, Project Components, Section A.

Regional Techinical Committees will be established in every Region to offer professional advice and support to the team and contributes to guiding, qualifying and optimising the project design and implementation facilitated and coordinated through the Project Manager. Furthermore, Regional Technical Committees' responsibility will be to foster the creation and institutionalisation/sustainability of the project outputs. The Committee meets on a bi-annual basis and would comprise of Traditional Leaders, Regional and Constituency Development Committee members, Community-Based Organisations, Non-Governmental Organisations, Various Local Government Offices and selected community members, to represent the wider project beneficiaries. The implementation design supports the demand-driven/bottom-up approach where the issues and priorities are coming from the farmers and Community Based Organisations (CBOs), to ensure that the issues from grass roots are well-represented and support evidence-based decisions to ensure issues are needs based.

Finally, the competitive advantage of having an Higher Education Institution as the Executing Entity is the wide variety of experts that can be used based on demand. Various experts and students from NUST will thus be selected from various Faculties depending on the nature and the expertise required per project component. These experts will thus be responsible for all issues related to the management, the conceptual development and progress and the integration of evidence elaborated within their respective project component.

The DRFN is accredited by the AF as the NIE to execute the oversight role for projects/programmes funded through the AF at the national level. The NIE played a critical role during the development of the proposal through guidance and advice as well as quality assurance of the conceptual and project design. This was done through briefing sessions with project applicants as well as on-going consultations.

Furthermore, Development Partners and the private sector play a role of collaboration with the NIE and EE and academics, respectively, in terms of research, pooling resources and technical assistance towards the issues emanating from farmers that actually drive the implementation design. The model depicts the important role that Local and Regional Government, NGOs, academia and the private sector (“4 cornerstone approach”) play to facilitate impact from and to the local levels. Therefore, they should be seen and used as essential in ensuring sustainable and equitable future partnerships. Hence the reference to long-term incentives to ensure partnerships are sustainable after donor funding is ceased, to prevent duplication of efforts and “white elephant” projects. Creating incentives for partnerships (and the will to participate, hence resulting into ownership over techniques) is the major driving force behind the implementation design.

Table 16: Summarised stakeholder mapping including roles and responsibilities

Stakeholder	Interest	Roles and Responsibilities
Community members including Traditional authorities,	Subsistence, livelihood improvement	Identification of issues, active project implementation, Participation, employment Specific Activities: 1.1-1.5; 2.1, , 2.3, 2.4, 3.1, 3.2
Community Based Organisations/ Producer Cooperatives (eg horticulture, bush harvesting and livestock)	Community development, Increased local production	Coordinating development Projects, representing locals Specific Activities: 1.1-1.5; 2.1, 2.4, 3.1, 3.2
Political representatives (village/constituency development committees, councillors, regional governors)	Bringing community issues to the attention of decision makers	Politically representing the community Specific Activities: 1.2, 1.5, 2.3, 3.1, 3.2
Non-Governmental Organisations	Empowering community members	Capacity building, advocating for the community Specific Activities: 1.2, 1.5, 2.3, 3.1, 3.2
Academia and Students	Inter-disciplinary research with community and related management practices and impacts, using data to empower community	Research and capacity building Specific Activities: 1.1-1.5, 2.1-2.4, 3.1-3.3
Extension workers (line ministries based in area)	Promoting sector programs at community level	Supporting community to adapt sector initiatives Specific Activities: 1.2, 1.5, 2.3, 3.1, 3.2
Private Business including village/local entrepreneurs who source produce from rural producers	Making profits from providing needed goods and services	Providing goods and services, employment providers Specific Activities: 2.3, 2.4, 3.3
Project Management team	Project management and coordination, Donor reporting and accounting	Overall project implementation, facilitation, research, Monitoring and evaluation Specific activities: 1.1-1.5, 2.1-2.4, 3.1-3.3

B. Financial and project risk management

This project identifies several risks which may impact its implementation. These include political, delays in project implementation, socio-economic, technological, physical, financial and human risks. These risks have been fully considered during the formulation of this project and mitigation actions have been outlined. Based on the overall assessment of all the risks identified, the project can be classified as a low risk project (Table 17).

Table 17: Risk factors and mitigation measure analysis

No.	Risk types	Main risk factors	Classification	Mitigation measures
1	Political	Political interference	Low	The action will be implemented within national goals and priorities thus adhering to national and regional legislative frameworks. Political buy-in would be solicited through component 1.
2	Delay in project implementation	External factors may delay project implementation	Moderate	The project is a high priority of the Government, and will receive support where difficulties are encountered
3	Socio-economic	Lack of partner buy-in (no commitment / interest from partners beyond the initial phase)	Low	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 with institutional procedures and capacity development. The participating parties operate within a signed Memorandum of Understanding and hence have already agreed on common vision and collaboration.
4	Technological	Impractical technology options	Moderate	Technology is demand based and identified by the users, hence fostering ownership over process. This will be addressed through components 1-3.
5	Physical	Geographical barriers to share S&T data	Low	The establishment of the proposed technology model will be adapted and will from the on-set identify common unifying approaches, while recognising physical (Geographical) elements.
6	Financial	Failure to achieve financial sustainability by the end of the project and failure to attract third party	Low	During expansion will address this risk through developing an exit strategy from the beginning of the action. Institutionalisation of many of the project functions within existing strategies, will

No.	Risk types	Main risk factors	Classification	Mitigation measures
		funding beyond initial phase		add to sustainability and ownership over project outputs.
7	Human capacity	Lack of proper/ strategic leadership in management team	Low	The Coordinator of the action has vast experiences 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.
8	Human capacity	Poor experienced/ qualified staff recruited for the project in later years	Low	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.
9	Human capacity	Inadequate trainers	Low	International and local industry experts will be used as resource persons while building capacity in local trainers. The capacity development will appropriate address this risk.
10	Quality	Compatibility of technology and quality results	Low	Address quality control and assurance issues through ensuring that relevant national stakeholders are involved in the process from the beginning of the programme to facilitate the technology identification and transfer process.

C. Environmental and social risk management

The project will make use of existing social and environmental safeguards that are applied in terms of national policies to ensure that no negative unintended consequences occur as a result of the project's activities. As per the standards of the AF Environmental and Social Policy, all institutions to be involved in implementation of project activities will be required to develop and implement an Environmental and Social Management System commensurate to the risks, and approved by the project Environmental Focal person who will be the implementing person of the Environmental and Social Management Plan (ESMP). For a more detailed description, please refer to the Environmental and Social Management Report appended to this report (Annexure 6).

It is anticipated that the Project will impact women's empowerment positively. Community based adaptation planning, learning, reflection and monitoring. The Community Based Adaptation (CBA) approach that the project is embracing addresses social drivers of vulnerability including gender inequality and other factors related to social exclusion. CBA also constitutes an effective vehicle for building resilience of vulnerable individuals, households and communities from the ground up, while addressing the objectives of wealth creation and poverty reduction. Apart from these interventions, there will be many project activities involving stakeholder participation, including at a management level and equal representation of each gender in these activities will be strongly encouraged especially women's representation. Therefore, the project will have variable impacts on women, different ethnic groups and social classes. Through the CBA approach, the differences between men and women activities will become clear and the project will strive to target the relevant social or gender groups to ensure effectiveness of the project, while at the same time aware of the need for equitable access to benefits of the project. This will in particular be important with the financial tools, and the establishment of the income generating activities. No society is homogeneous, and while it is important to spread project benefits equitably, considerations for sustainability requires that capacity and interest be matched carefully with engagement with financial tools. However, the project has a huge array of benefits, and the important point will be to develop and apply criteria for matching benefits to social and gender groups, and that the process be done transparently and involve high levels of consultation.

This Project will promote women participation to equally voice their concerns and challenges, identify barriers that keep them out of the main economic, political and social spheres, and find sustainable solutions best achieved when women are directly engaged. Thus, most of the women's vulnerabilities will be addressed by creating platforms that ensure women's participation, involvement and inclusiveness in all stages of the project lifespan. Gender concerns will be central to the design of business and economic instruments.

Promoting women's rights and influence is a noble aspect of this project, which will close the gender gap in agriculture by placing more resources in the hands of women to strengthen their voice within the household and wider society. This has proven to be a successful strategy for enhancing the food security, nutrition, education and health of the vulnerable. For example, Namibia has adopted the cooperative model, which mainly comprises of women. Cooperatives and particularly agricultural cooperatives do play a major role in production, primary processing

and marketing of agricultural and livestock commodities. The justification for cooperative arises from their potential in maximization of profits, harnessing various skills with members, enhancing advocacy and bargaining power, enhancing financial accessibility, boosting social capital, promoting investment, providing educational opportunities, improving market access and contributing to poverty reduction.

Grievance Policy

In order to ensure that the implementing partners are fully aware of their responsibilities with regards to provision of the Environmental & Social Policy of Adaptation Fund, as well as with the ES+G Policy (DRFN, 2017) of the NIE, all partners will receive continuous and regular awareness sessions on the guidelines, systems, policies and procedures related to the environmental and social policy including the grievance redressal mechanism.

The project aims to adopt a bottom up approach, thus the project interventions will always undertake a consultative process with the community. This is expected to ensure prevention of grievances that might arise from the project activities. However, if at all, there are any grievances, the below redressal mechanism is proposed:

- Grievance redressal mechanism would be shared with the community during the project inception workshop and subsequent meetings with the community.
- As part of the grievance redressal mechanism, the contact details of the project partners - Cluster Coordinator/ Project Manager would be made available to stakeholders including project beneficiaries and the community. Contact numbers would be displayed at common or predominant places along–with the project details. This is expected to promote social auditing of project implementation.
- The grievance mechanism will be available to the entire community. However, the functionality of the mechanism rests with the community considering that the project including the grievance mechanism is envisaged to be a bottom up approach.
- Grievances are aimed to be addressed at the field level by the project team which will be the first level of redressal mechanism. If the grievance is not resolved at the field level, it will be escalated to the EE and then to the NIE who will be responsible for addressing grievances related to violation of any of the provisions of Environmental and Social Policy of the Adaptation Fund.

All grievances received and action taken on them will be put up before the EE and NIE meetings and will also be included in the progress reports to the NIE for reporting and monitoring purposes.

D. Monitoring and evaluation

At institutional level, technical and administrative support to all projects is channeled through a dedicated PSU. This support is in the form of project monitoring, technical back-up and quality management in accordance with the institutional quality management system. The technical and administrative support is specifically tailored to each individual project depending on the nature and complexity of the project and taking into consideration any specific areas of interests based on donor requirements. This is done based on six principles:

- A vision for the project;
- Clear and well-defined roles;
- Clear organization and plan for delivering the support;
- An extensive knowledge base and access to wide variety of experts from the NUST pool;
- State of the art management systems; and
- Effective communications.

The key technical and administrative support includes:

- Contract management (i.e. donor compliance);
- Financial and time control;
- Human resources management including fielding of experts needed;
- Logistical support;
- Technical backstopping;
- Technical and Financial report coordination and
- Supervision, monitoring and evaluation.

A dedicated Projects Coordinator/ Quality Manager will be seconded to the Project, from the PSU in line with the comprehensive Quality Management System as per the institutional policy. The Projects Coordinator will ensure a Project Quality Plan for this project is established and known to all project staff during the inception period. The Quality Plan outlines the specific plans and controls for the project. Most importantly, quality management is addressed at all stages of the project cycle and throughout the project implementation period.

The methodological approach and evaluation framework in quality assurance is grounded on the following activity pillars:

1. Internal project evaluation;
2. Reports and documentation coupled to reporting period and internal verification process;
3. Feedback loops;
4. Quality management plan;
5. Evaluation of the key-deliverables and the implementation modalities;
6. External project evaluation for quality assurance and control will be done primarily by the NIE
7. Elaboration of the evaluation report, including recommendations and

8. Facilitate development of the Project sustainability and dissemination plan which will measure the success of the project outcomes.

The result framework will form the basis of monitoring based on performance indicators and predefined deliverables.

Finally, a contingency plan will be facilitated through the PSU. There are numerous risks in projects also presents related challenges. Some of these challenges can be predicted and possible solutions can be proposed to allow a quicker targeted reaction. During the monitoring and evaluation process, special emphasis will be placed on developing specific tools (to be tailored based on minor risks indicated in Table 17) to monitor environmental, social (gender) risks, to ensure climate change adaptation put in perspective from this particular angle. The PSU also acts as the knowledge broker and will facilitate local, external as well as international collaboration (where deemed necessary). The following different combinations of M&E documents will be used:

- **Internal quarterly report:** Quarterly monitoring reports will be prepared to reduce donor reporting pressure.
- **Annual Report:** Annual Report is an extensive key report which is prepared to monitor progress made since project start and in particular for the previous reporting period. This will be assessed by PSU and would be submitted to NIE for onward submission to the AF Fund Board.
- **Periodic field Survey report:** all field survey, visit and demonstrations and any experimental testing will be documented and monitored.
- **Mid-term Assessment Report:** The project will conduct a mid-term review after 2½ years.
- **Terminal Evaluation Report:** Three months prior to completion of the project, an independent evaluator will be appointed and paid for by the NIE to evaluate the impact of the project as well as project replicability.
- **Final Report** will be delivered within 6 months of project closure, by internal project team.

Internal M&E will give the implementers an opportunity to apply change management measures as stipulated by the AF, should re-planning and adjusting milestones and indicators will be necessary depending on conditions in the field.

Project expenses will be accounted for annually to the Executing Entity, who will report further to the AF. This is to ensure that money spent is kept track of and that it is spent in the intended manner, to ensure the integrity of the implementing entity, executing entity and the donor. The Project Services Unit of NUST will be responsible for the daily procurement of project related activities; however overall financial quality control will be done by the Finance Unit, which includes detailed book-keeping of costs and annual auditing according to the institution's internal procedures. The organisation tracks project and/or funder expenditure using an Integrated Tertiary Software (ITS) System. All grant funds are kept, managed and controlled separately, thus a dedicated cost centre will be opened for the financial management of the project. The Project Leader is responsible for making the requisitions in line with the approved budget lines.

Thereafter, the requests are reviewed and first approval will be granted by the Project Services Unit and final approval is done by the Finance department. The Integrated Tertiary Software (ITS)

System is developed in such a way that project managers cannot procure any services or products if the budget lines do not have sufficient funds. This aids in budget control. Accounting and

Recordkeeping Procedures are done in accordance with the Finance Policy as well as the document and record keeping policy of the institution.

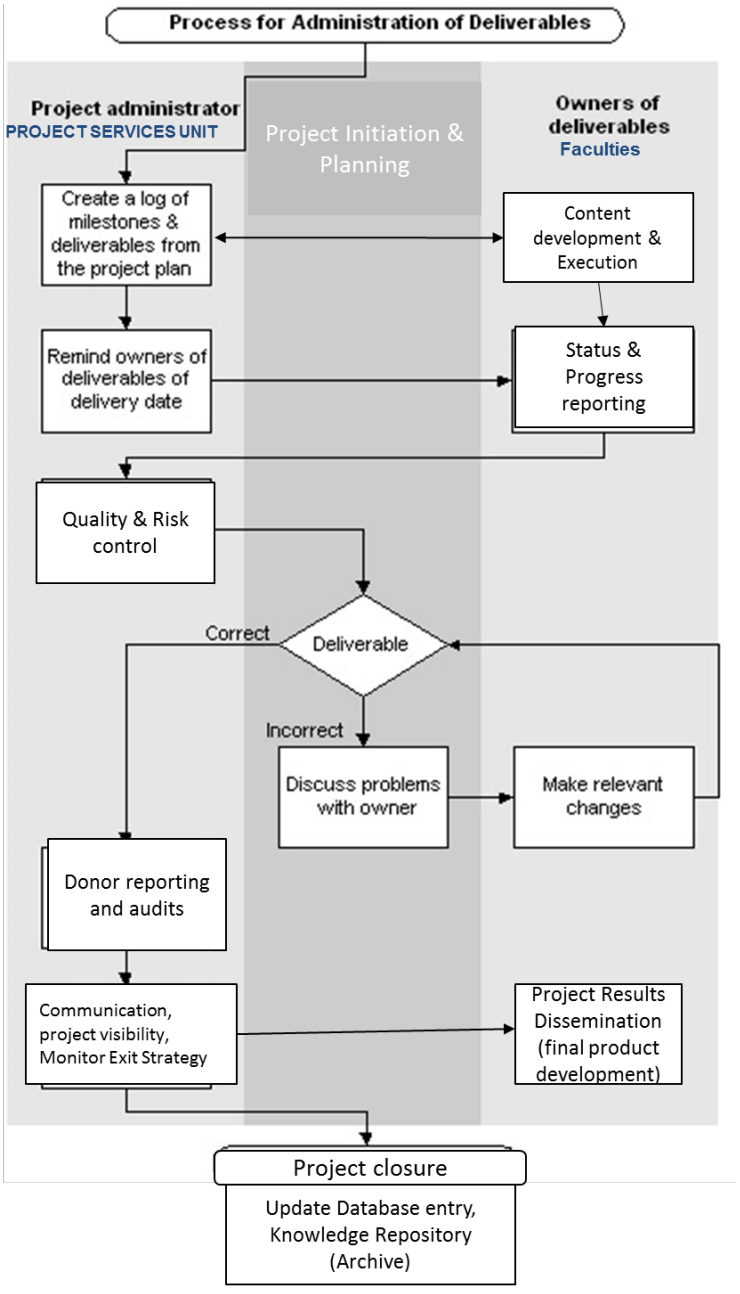


Figure 8: NUST Monitoring and Evaluation Framework to be used for the project

Procurement guidelines and procedures are in place which states the limits of authority. The Procurement Guidelines comprise the official document of the institution for the conduct of business in purchasing and procurement of goods from vendors or suppliers. In addition, the institution has aligned its procurement guideline with the Namibia Tender Guidelines and Regulations. In 17 years, the NUST has developed an efficient financial management system with zero deficits. A dedicated projects financial administrator is responsible for payment and risk management of funds in close consultation with the Project Services Unit. The project will be monitored according to the NUST grants evaluation framework (Figure 8).

Both the NIE and the EE are involved in monitoring and evaluation, although at different levels. Detailed budgets for the Project Execution Cost required by the EE and for the Project Management Fee required by the NIE are presented in Part III, Section G below.

E. Results framework

Table 18: Results Framework

Component outcomes	Indicator	Baseline	Target	Sources of verification
Project Component Outcome 1: Improve ecosystem management				
1.1 More adaptive management of communal rangelands by resident communities improves ecological functioning and services such as carrying capacity (important in pastoral systems!) and nutritive value, increases biodiversity, reduces impact of climate change and improves drought resilience. Women and vulnerable communities are targeted.	Number of communities implementing SRM; area (in hectares [ha] as derived from Google Pro maps) under SRM; benchmark grazing exclosures established	No sustainable/ adaptive rangeland management in place except in one village in southern Omusati region that applies rotational grazing. No benchmarks. Women and marginalised groups play no/small role in formulating SRM plans.	SRM applied to 100,000 ha in Omusati communities supplying slaughter cattle, and 300,000 ha in Omaheke growing weaners out on pastures (including control of fire and poisonous plants). Number of benchmarks depends on number of intervention sites. Women and marginalised groups actively involved in SRM.	Field measurements and Project reports (annual reports, mid-term review and final evaluation report). Liaise with other NGOs that may be involved with marginalised communities.
1.2 Identify and address unintended consequences and strengthen desired impacts of the existing legal framework so that it provides a more conducive framework to communal agriculture, conservancies and community forests and for climate change adaptation. Advocated improvements in policy and legal framework will provide conducive conditions for climate change adaptations and strengthen resilience.	Number of legal provisions that enhance resource security and management at community levels, preventing problems such as “pasture poaching”.	Existing legislation that regulates resource security at community level is not/insufficiently/ incorrectly applied. No legal provisions in place for community-level resource management except for forest resources and game.	1. Investigate and quantify impact of existing community resource legislation at grassroots level. 2. Apply existing policy instruments to effectively protect resource access/security of communities to ward off “pasture poaching” for example. 3. Advocate for changed/new policy instruments to improve resource security of communities.	Project reports, policy briefs to legislators
1.3 Judicious bush and erosion control followed by re-introduction of locally extinct grasses rehabilitates rangeland condition and productivity, thus improving ecosystem function, services and	Number of erosion works. Area in hectare of land with selective bush thinning and re-seeded	Little to no erosion control. Bush control is currently prohibited on communal lands. Re-seeding attempts in Omaheke only	1. Control soil erosion with appropriate erosion works (number depends on site characteristics). 2. Selectively thin encroacher bush on 20,000	Field measurements, project reports, engineering reports on kiln,

Component outcomes	Indicator	Baseline	Target	Sources of verification
resilience. Re-structuring of existing, barred and unsustainable charcoal enterprises to obtain regulatory approval opens up a new industry. Improving charcoal process efficiency with help of NUST engineering experts leads to more efficient utilisation of natural resources (encroacher wood) that serves as a role model for other areas.	with locally adapted grasses. Number of "grass gardens" established to multiply seeds of desirable grasses. DoF approval for charcoaling. Kiln improvement.	(Lister farm). No "grass gardens" = no seed multiplication. No DoF approval for charcoaling, no efficient kilns (only drum-type kilns), zero charcoaling	ha of degraded rangeland in Omaheke and 2,000 ha in Omusati. 3. Over-sow with desirable indigenous, perennial grass species started in "grass gardens". 4. Charcoal industry and kilns re-structured and approved by DoF.	DoF approval documentation
1.4 Dry-land grass pastures are widely used to augment fodder flow, intensify livestock production and provide hay for a drought fodder bank, hence improving climate resilience. Pastures take grazing pressure off natural rangelands, making it easier to rehabilitate them and improve ecosystem services (e.g. fodder flow).	Hectares of land under dry-land cultivated pasture of climax grazing grasses, and livestock grazing capacity. Bales of hay made and standing haylage that contribute to drought reserve.	Zero dry-land pasture production in place and no drought fodder bank.	Establish 1,000 ha of pastures in Omusati (in crop fields, integrated into crop rotation) to support cattle destined for slaughter and 3,000 ha in Omaheke (on-farm) to grow out weaners to slaughter. Calculate contribution to grazing capacity. Trial mixed grass-legume pasture. Bale and store hay as drought reserve.	Field measurements (e.g. ha of pasture, number of hay bales), Project reports
1.5 More adaptive management of conservation areas (existing and new) improves adaptation to climate change, improves sustainable forest management, diversifies options and creates employment that is especially suited to women and marginalised groups. Resource conservation is better integrated with agriculture at the landscape level. Very suitable for women (e.g. tourism) and marginalised communities (e.g. re-forestation).	Number of conservancies and community forests with adaptive management plans; number and type of tourism activities developed; involvement of women and marginalised groups	Only two conservancies have management plans, but without climate change adaptation. No tourism activities. Opportunities for women and marginalised groups not quantified.	Compile management plans for communal conservancies and community forests where these do not exist and revise existing plans to improve climate adaptation. Assist communities to implement plans. Tourism activities introduced. Quantify opportunities for women and marginalised groups.	Management plans, tourism projects active, Project reports
Project Component Outcome 2: Climate-Smart crop and animal production systems				

Component outcomes	Indicator	Baseline	Target	Sources of verification
2.1 The implementation of various improved and climate-smart production techniques (e.g. soil improvement, grass ley crop rotation, rainwater harvesting, producing own vegetable seedlings, fertilisation based on soil analyses, conservation agronomy, integrated pest management; mineral supplementation of livestock based on organ analyses, parasite control, breeding and selection of female replacements, etc.) improves efficiency of production and yield, resulting in more marketable products of higher quality, and thus sustainability. Improved fodder flow management, especially at critical times of the year (e.g. dry season) or production cycle (e.g. mating periods) increases the productivity, fertility, survival of livestock. Hence, the livelihoods of rural people and their resilience to climate shocks and frequent droughts improves.	Benefits from this intervention measured in: area in hectare, type of intervention, number of farmers, number of livestock involved, change in crop and livestock yield (e.g. fertility rate, growth rate etc. of animals). Fodder flow plans compiled. Fodder flow quantified on 300,000 ha in Omaheke and 100,000 ha in Omusati (includes graze and browse forage (t/ha), deferred grazing (t/ha), foggage (t/ha), hay (bales/ha), fodder quality (by chemical analysis, % or ppm). Lick use. Nutrient status derived from organ analysis. Local-level monitoring systems. Size of drought fodder bank	Most farmers (90% plus) in Omusati and Omaheke apply traditional dry-land cropping and pastoral techniques that are not climate-smart. No fodder flow plans and local-level monitoring. Limited lick use, but often of wrong type.	Number of farmers that use improved, climate-smart production techniques, and ha of land, number of animals affected: - 130 dry-land crop farmers (100 in Omusati, 30 in Omaheke), - 100 (75/25) irrigating horticulture farmers, and - 20 (10/10) pastoral communities with fodder flow plans. Determine nutrient status of livestock by analysing organs (blood, liver, milk, etc.) and improve lick supplementation These interventions raise livestock production by 15%. In Omaheke, improved feeding enables farmers to grow 15,000 previously-exported weaners out locally. Local-level monitoring systems implemented, used. Enable communities to survive a one-year drought with more livestock intact and producing than before.	Field measurements (e.g. log books of farmers, yield/ha of crop and livestock productivity e.g. body weight and condition, fertility rate, mortality rate, growth rate, etc.). Laboratory reports of organ analyses.), local-level monitoring data sheets, fodder flow plans (incl. laboratory analyses of fodder). Project reports
2.2 Organic matter and fertility of crop field soils is improved, weed and pest cycles are interrupted and hence reduced. This increases crop yield per hectare, as does the use of more adapted cultivars, and improves food security of vulnerable communities living in marginal	Number of farmers using grass ley in crop rotation; soil OM and fertility; length of DTFS hedge rows around crop fields	Only one farmer in Omaheke uses grass ley in dry-land cropping (Erindi Ozombaka village); none do in Omusati. No hedge rows around crop fields. OM	1. Soil organic matter content is increased measurably by incorporating grass leys into crop rotation. 2. 130 crop farms (100 in Omusati, 30 in Omaheke) integrate 2,000 (1,200/800) ha of grass leys into their	Laboratory reports of soil analyses, field measurements (number of farmers, hedgerow length); Project reports

Component outcomes	Indicator	Baseline	Target	Sources of verification
cropping areas. Hedge-row protection of fields improves soil stability in crop fields (e.g. reduces flood damage in Omusati region, and wind erosion) while also providing extra browse fodder.		content of crop field soil generally < 0.5%.	crop rotation, and use hedge rows	
2.3 New and diversified income streams provide farmers with options that promote climate adaptation, resilience, regional economic development and reduce vulnerability. Dairy-ranching serves a well-populated market with fresh milk and processed dairy products and is a climate-smart intensification and diversification strategy. Goat meat is currently only sold informally. Processing and formal marketing will secure and transform this sector. Introduce other sub-tropical fruit than mango e.g. avocado, kiwi etc.	Description and (if possible) initiation of alternative or complimentary production systems. If start-up is feasible, measure number of farmers involved, how much milk/new tropic al fruit they produce for sale, how much goat meat is marketed formally and describe the new value chain.	No alternative or complimentary production systems exist to reduce the risk associated with traditional crop and livestock production systems (only 3 farmers produce milk on small scale in Omaheke; none in Omusati). Milk is imported into these regions. No formal goat meat marketing. Fruit only in home gardens.	Feasibility study of pasture-based, cross-bred smallholder dairying system, formalised system of goat meat marketing, introduction of new sub-tropical fruit. If possible, initiation of these alternative/complimentary production systems. Preferential involvement of women and marginalised communities in these production systems and value chains is utterly feasible (e.g. dairy and meat processing).	Feasibility studies. Initiation of new income streams. Project reports.
2.4 The changing of mind-sets and practices of communal farmers from subsistence farming and investing in animals (growing their herd), to production-oriented, increasing herd off-take, using financial instruments: “commercialises” these two communal areas, increasing the adoption of tested climate-smart techniques. Appropriate strategies and the capacity to overcome challenges in developing and improving market-driven AFOLU value chains are synchronised with	Description and quantification of value chain and potential. Development of market-driven AFOLU value chains results in larger number of diversified marketing options and increased offtake. Improved and cooperative marketing of processed products.	Value chains in Omusati and Omaheke are poorly defined. No value addition to crops and livestock is taking place. Postharvest storage decreases product quality. Marketing is facilitated by AMTA and livestock auctioneers external to local communities.	130 dry-land crop and 100 irrigating horticulture farmers apply better post-harvest storage of crops. Their produce and that of 20 pastoral communities is processed to add value. More input suppliers and more accessible inputs. Cooperative marketing of produce is developed and promoted. New markets are developed to increase offtake by 15%.	Value chain descriptions. Memoranda of understanding or similar arrangements with regional authorities to promote marketing of local produce. Project reports.

Component outcomes	Indicator	Baseline	Target	Sources of verification
regional authorities and national stakeholders to improve livelihoods, reduce rural poverty and climate-smart the AFOLU sector in Omusati and Omaheke.				
Project Component Outcome 3: Individual and Institutional capacity development				
3.1 Systematic training based on local experience and incorporating much experiential and practical learning (i.e. participatory, hands-on skills development on demonstration plots) and the regular dissemination of relevant information via public media strengthens awareness, creates ownership and builds capacity of farmers, extension and institutional workers, entrepreneurs and trainers to adapt to climate change, which improves their livelihoods and sustains climate risk reduction interventions. Improved capacity to manage institutions, processes and value chains properly and realise long-term strategic objectives provides quality support to producers, enhances offtake, value addition, profitability and sustains adaptability gains post-project.	Number of farmer training events, training content, number of participants. Capacity of institutions serving regional farmers to fulfil their mandate effectively. Number of relevant production, marketing and climate risk information disseminated through appropriate media. Linkages to CSR initiatives established.	Farmers training is a huge effort in Namibia but very theoretical, lecture-based, not experiential, no demo plots. Appropriately packaged information that systematically targets producers of crops and livestock in the context of climate change adaptation has not been done. No institutional capacity building exercise has ever been carried out.	Train more than 5,000 farmers from benefitting communities (at least 30% women, 10% marginalised and vulnerable people, 5% training-of-trainers) in sustainable resource management and surplus-oriented farming over 600 days. All training materials compiled into training kits or info packs and distributed to stakeholders. Disseminate relevant production, marketing and climate risk information weekly, using popular, accessible print, verbal, visual and electronic media. Train at least 20 regional and national institutions that serve farmers in Omusati and Omaheke regions (e.g. abattoirs, AMTA, charcoal and producers' associations, farmers' organisations, forest management committees) in operational, strategic and business management.	Training programme verified by attendance registers. All training contents compiled into training kit. Info publication schedule, news media clippings, information tools (e.g. pamphlets) and dissemination reports. NUST School of Business involvement schedule. Project reports

Component outcomes	Indicator	Baseline	Target	Sources of verification
3.2 Field Facilitators based in participating communities link project implementers with beneficiaries. As CARPs, they link up with the Farmers' Academy, farmers' associations and regional authorities post-project to help sustain capacity-building and climate-smartness beyond project end. The FA maintains training and information dissemination beyond project end and may expand into other services (e.g. artificial insemination of dairy cows). A successful regional role model can easily be up-scaled to national level.	Number of field facilitators recruited to work within the farming communities, their capacity developed and linkage to sustainability achieved (i.e. link to FA). Establish a (regional) FA. Trainer and content accreditation by NTA.	No specified field facilitators in place. No CARPs or equivalent in AFOLU sector. FAs do not exist in Namibia.	Appoint 9 Field Facilitators full-time to assist with project implementation. Train, empower and re-train occasionally. Link with Farmers' Academy, farmers' associations and regional authorities to morph into CARPs. Establish a farmers' training institution at regional level in Omusati and Omaheke, using existing and Council's infrastructure. Obtain NTA accreditation. Secure demonstration plots.	Field facilitators' reports and activities. Formalised arrangements with regional authorities, NTA accreditation. Project reports
3.3 Adaptive research and development: The next generation of Namibia's natural resource specialists gains invaluable practical experience of climate adaptation in the AFOLU sector, better preparing them for a sustainable future. They also learn how to interact with farmers, improving their "soft skills". Capacity in applied research to solve practical problems is built in NUST and its post-graduate students, in accordance with its strategic objectives. This engages NUST with industry and makes it more relevant to agriculture and conservation by establishing a bond between academia and industry.	Number of students working in the targeted communities, number of student field excursions. Research and develop applied solutions to local problems.	None on climate change adaptation for specified interventions and targeted regions.	Take 350 scientists-in-training at NUST on 35 practical excursions to Omusati and Omaheke projects, to participate actively in scheduled activities. Grant 9 post-graduate research opportunities to MSc and PhD candidates, researching local problems, developing applied solutions and based on sampling the local baseline.	Academic schedule and reports concerning field excursions and post-graduate training. Project reports

F. Alignment with the Results Framework of the Adaptation Fund

Table 19: Project alignment with Results Framework of the Adaptation Fund

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Objective 1: To improve ecosystem management in the chosen model regions by implementing climate-smart management and rehabilitation techniques that improve the fodder flow and ecologic al services provided by natural rangelands and "forests"[10], thus making local communities more resilient against climate change impacts. Includes review of the legal framework to make it more conducive.	Area of land placed under SRM and number of farmers/communities participating. Similar for rehabilitation activities. Ecological services improved as measured by grazing output (fodder flow), botanical composition of the rangeland (e.g. grass:bush balance), etc. Number of new, changed and improved policy imstruments.	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress Outcome 7: Improved policies and regulations that promote and enforce resilience measures	Indicator 5: Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress Indicator7: Climate change priorities are integrated into national development strategy	1,286,757
Objective 2: To further the implementation of climate-smart production, management and value-addition techniques in local and regional crop and animal (wild game and livestock) production systems and value chains, to enhance the adaptive capacity of vulnerable communities to climate variability	Yield and efficiency of production parameters such as kg/ha yield, growth rate, fertility rate, mortality rate, soil fertility and OM content, nutrient concentration (status) deduced from organ analyses, etc.	Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	Indicator 4.1: Development sector's services responsive to evolving needs from changing and variable climate	900,701

[10]: These two regions of Namibia are too arid to harbour true forests. However, they have dry woodlands that are managed as forests, therefore the term "forest" is used conveniently and in the wider sense.

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
and change along the whole value chain.				
Objective 3: To strengthen the knowledge and skills of vulnerable communities required to adapt and become more resilient to climate change and variability, and the (operational) capacity of institutions to deliver services effectively, by building their capacity along the whole value chain(s) that they are involved in.	Number of vulnerable communities, persons and institutions whose knowledge and skills are strengthened to become more resilient to climate variability and change. Training kit, communication schedule, MoUs with appropriate stakeholders etc.	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses. Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	Indicator 2.1: Number and type of targeted institutions with increased capacity to minimise e xposure to climate variability risks. Indicator 2.2: Number of people with reduced risk to extreme weather events. Indicator 3.1: Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	2,049,729

Table 20: Targets for AF's core indicators of the project

Adaptation Fund Core Impact Indicator "Assets Produced, Developed, Improved, or Strengthened"				
Date of Report	**31 August 2018**			
Project Title	**Community-based integrated farming systems for climate change adaptation**			
Country	**Namibia**			
Implementing Agency	**Desert Research Foundation of Namibia (DRFN)**			
Project Duration	**5 years**			
	Baseline	Target at project approval	Adjusted target first year of implementation	Actual at completion
Sector (identify)	AFOLU	October 2018	April 2019	April 2024 (end of fieldwork)
Targeted Assets: **1. Development sector services**		Same as baseline		
1.1 Local/regional AFOLU value chains	1.1 As yet unidentified number of value chains		1.1 Identification of relevant value chains	1.1. Identified local/regional AFOLU value chains described and optimized
1.2 Capacity development of individuals and institutions	1.2 Limited individual and no institutional capacity development		1.2 10% of final target	1.2 Capacity of 5,000 individuals and 20 institutions developed
1.3 Regional Farmers Academy	1.3 Zero		1.3 Same as baseline	1.3. Two regional Famers Academies established

1.4 Training of young scientists and professionals	1.4 Zero		1.4 10% of final target	1.4 Formal training of 550 young scientists and 9 professionals 2.1 400,000 ha of rangeland managed sustainably according to NRMPS
2. Physical infrastructure		Same as baseline		
2.1 Management of rangeland	2.1 Zero management according to NRMPS		2.1 10% of final target	2.1 400,000 ha of land managed sustainably according to NRMPS
2.2 Rehabilitation of degraded rangelands	2.2 Zero		2.2 10% of final target	2.2 22,000 ha of degraded rangelands rehabilitated
2.3 Cultivated grass pasture	2.3 Zero		2.3 10% of final target	2.3 5,000 ha of dry-land cultivated grass pasture established
2.4 Grass leys in crop fields	2.4 Zero		2.4 10% of final target	2.4 2,000 ha of grass leys introduced into crop rotation systems
2.5 Crop and animal production management and systems	2.5 Limited physical assets and non-adaptive management		2.5 10% of final target	2.5 Physical assets and management of 230 crop farmers and 20 pastoral communities improved
Changes in Assets		Same as baseline		
a. Rangeland sustainably managed according to NRMPS	a. Zero ha		a. Somewhat improved	a. Fully improved

b. Rangeland rehabilitated by soil erosion control, encroacher bush thinning and grass sword strengthening	b. Zero ha		b. Somewhat improved	b. Fully improved
c. Dryland cultivated grass pasture established.	c. Zero ha		c. Somewhat improved	c. Fully improved
d. Grass leys incorporated into crop rotation	d. Zero ha		d. Somewhat improved	d. Fully improved
e. Crop and animal production management and systems	e. Limited physical assets and non-adaptive management		e. Somewhat improved	e. Fully improved
f. AFOLU value chains	f. As yet unidentified number of unimproved value chains		f. Somewhat improved	f. Fully improved
g. Capacity development of individuals and institutions	g. Limited individual and no institutional capacity development		g. Somewhat improved	g. Fully improved
h. Two regional Farmers Academies established	h. Zero		h. Somewhat improved	h. Fully improved
i. Climate-adaptive capacity of scientists-in-training formally developed	i. Zero		i. Somewhat improved	i. Fully improved

G. Detailed budget

Table 21: Detailed budget for Project Activity Cost (A)

No.	Item	Year 1 cost	Year 2 cost	Year 3 cost	Year 4 cost	Year 5 cost	***Total cost***
1	**Improve ecosystem management**						
1.1	Travel	17,500	12,720	10,112	10,719	15,436	***66,487***
1.2	Per diems	47,040	48,972	51,910	55,025	64,829	***267,777***
1.3	Consumables (fertiliser, seed etc.)	16,923	13,454	14,261	10,078	10,884	***65,600***
1.4	Sample analyses (soil, plant)	3,500	4,638	2,949	3,126	2,251	***16,464***
1.5	Equipment (hay- & charcoal-making, cultivation, solar-electric fencing etc.)	80,000	42,400	44,944	38,113	20,581	***226,037***
1.6	Cultivate dry-land grass pasture	110,000	116,600	123,596	131,012	0	***481,208***
1.7	Develop efficient kiln	4,615	14,677	15,558	16,491	17,810	***69,151***
1.8	Improve drought resilience	7,692	8,154	8,643	9,161	9,894	***43,544***
1.9	Community forest & conservancy intervention	1,650	1,749	2,472	3,275	2,830	***11,976***
1.10	Rangeland rehabilitation actions	6,923	9,785	10,372	5,497	5,937	***38,513***
	Sub Total	**295,844**	**273,147**	**284,817**	**282,497**	**150,452**	***1,286,757***
2	**Climate-smart crop and animal production systems**						
2.1	Travel	16,000	12,720	10,112	10,719	11,577	***61,128***
2.2	Per diems	47,040	48,972	51,910	50,023	64,829	***262,774***
2.3	Consumables (fertiliser, seed, pest control, lick, etc.)	18,720	19,843	21,034	22,296	24,079	***105,972***
2.4	Sample analyses (soil,plant,blood etc)	11,025	16,881	15,141	16,049	11,030	***70,125***
2.5	Equipment (shade, cultivation, husbandry, irrigation, pumps etc.)	65,385	69,308	58,773	109,024	58,873	***361,362***
2.6	Feasibility studies (goats, wildlife, abatoir, diary)	12,066	12,790	4,519	4,790	5,173	***39,339***
	Sub-total	**170,236**	**180,513**	**161,489**	**212,901**	**175,562**	***900,701***

No.	Item	Year 1 cost	Year 2 cost	Year 3 cost	Year 4 cost	Year 5 cost	***Total cost***
3	**Individual and Institutional Capacity Development**						
3.1	Project Manager	28,761	30,487	32,316	34,255	36,995	***162,815***
3.2	Financial and M&E Support	15,408	14,291	15,149	16,057	19,819	***80,725***
3.3	Regional Coordinators	27,502	29,152	30,901	32,755	35,375	***155,685***
3.4	Field facilitator (wage, transport)	9,423	9,988	10,588	9,620	6,926	***46,545***
3.5	NUST Experts	25,007	21,206	22,479	23,827	25,734	***118,254***
3.6	Horticultural specialist	8,700	4,611	4,888	5,181	5,595	***28,975***
3.7	Development of Environmental and Social Risk Assessment and Management Plan	70,400	35,200	26,400	17,600	26,400	***176,000***
3.8	Post-graduate student & research costs (3 PhDs and 6 Master's)	51,068	75,785	80,332	48,659	0	***255,845***
3.9	Community excursion costs	71,680	0	0	85,372	0	***157,052***
3.10	Vehicles	73,846	0	0	0	0	***73,846***
3.11	Travel	20,000	9,540	14,045	8,933	10,290	***62,808***
3.12	Per diems	31,500	50,085	47,191	56,276	40,518	***225,570***
3.13	Training material	5,769	6,115	8,643	9,162	7,421	***37,110***
3.14	Training courses	6,600	16,324	24,719	39,304	56,597	***143,544***
3.15	Marketing assistance & development	11,538	12,231	19,447	27,485	14,842	***85,543***
3.16	Establish regional training facilities	1,923	4,077	6,482	9,162	9,895	***31,539***
3.17	Community Workshops, meetings	13,173	16,756	35,523	18,827	50,833	***135,113***
3.18	Advocacy activities (including Regional and National Steering Committee meetings)	4,470	4,738	5,022	5,324	5,750	***25,304***
3.19	Communication, visibility	12,500	7,950	8,427	5,955	12,625	***47,457***

No.	Item	Year 1 cost	Year 2 cost	Year 3 cost	Year 4 cost	Year 5 cost	***Total cost***
	Sub-total	**489,270**	**348,537**	**392,552**	**453,752**	**365,617**	***2,049,729***
4	**Project activity cost**	**955,349**	**802,198**	**838,859**	**949,150**	**691,631**	***4,237,187***

Table 22: Budget notes for Project Activity Cost (A)

No.	Item	*Total Costs*	Budget notes
1	**Improve ecosystem management**		
1.1	Travel	***66,487***	Travel budget for Component for both Regions
1.2	Per diems	***267,777***	Per diem rate based on internal NUST guidelines
1.3	Consumables (fertiliser, seed etc.)	***65,600***	Consumables procured for pastures, bush control, rehabilitation
1.4	Sample analyses (soil, plant)	***16,464***	Soil analyses before pasture establishment, fodder analyses
1.5	Equipment (hay- & charcoal-making, cultivation, solar-electric fencing etc.)	***226,037***	Equipment procured to cultivate pastures, make hay and charcoal, fence and graze pastures, count game, etc.
1.6	Cultivate dry-land grass pasture	***481,208***	4,000 ha of dry-land grass pasture established
1.7	Develop efficient kiln	***69,151***	Large- efficient kiln developed for communal charcoal industry
1.8	Improve drought resilience	***43,544***	Various measures aimed at resilience, including fodder banking
1.9	Community forest & conservancy intervention	***11,976***	Assisting communities to design and/or implement management plans
1.10	Rangeland rehabilitation actions	***38,513***	Erosion structures, re-seeding and other rehab measures
	Sub Total	***1,286,757***	
2	**Climate-smart crop and animal production systems**		
2.1	Travel	***61,128***	Travel budget for Component for both Regions
2.2	Per diems	***262,774***	Per diem rate based on internal NUST guidelines

No.	Item	*Total Costs*	Budget notes
2.3	Consumables (fertiliser, seed, pest control, lick, etc.)	***105,972***	Consumables procured for crop (fertiliser, diesel, seed, pest control etc.) and livestock production (lick, vaccines etc.)
2.4	Sample analyses (soil,plant,blood etc)	***70,125***	Analysis of various soil and plant matter from crop; animal tissue
2.5	Equipment (shade, cultivation, husbandry, irrigation, pumps etc.)	***361,362***	Equipment procured to cultivate crops (ploughs, rippers, sprayers and spreaders, etc.) and livestock (burdizzo, AI flask, etc .)
2.6	Feasibility studies (goats, wildlife, abatoir, diary)	***39,339***	Studies to investigate v alue-addition to goat & wildlife enterprises
	Sub-total	***900,701***	
3	**Individual and Institutional Capacity Development**		
3.1	Project Manager	***162,815***	Dedicated project manager to implement project timeously
3.2	Financial and M&E Support	***80,725***	To assist with financial and monitoring and evaluation of project (donor liaison)
3.3	Regional Coordinators	***155,685***	Dedicated regional coordinators to implement project timeously based in regions (employed from community)
3.4	Field facilitator (wage, transport)	***46,545***	Field facilitators to work in project areas full-time
3.5	NUST Experts	***118,254***	Experts from NUST guiding the project implementation budgetted at senior Lecturer level
3.6	Horticultural specialist	***28,975***	External Expert to complement NUST capacity
3.7	Development of Environmental and Social Risk Assessment and Management Plan	***176,000***	ESIA and ESMP Updating and development of an auditing framework Training of PMU and stakeholders in ESMP implementation
3.8	Post-graduate student & research costs (3 PhDs and 6 Master's)	***255,845***	Academic fees, research equipment of post-graduate students (including printing and publication costs)
3.9	Community excursion costs	***157,052***	Field excursions by community members (benchmarking)

No.	Item	*Total Costs*	Budget notes
3.10	Vehicles	***73,846***	Double cabin 4x4 LDV fully equipped acquired fr project implemnt.
3.11	Travel	***62,808***	Travel budget include all travel for this Component (training, meetings, community visits and students fieldwork)
3.12	Per diems	***225,570***	Per diem rate based on internal NUST guidelines
3.13	Training material	***37,110***	Training material includes videos, hand-outs, tapes, etc.
3.14	Training courses	***143,544***	Cost of training events (venue, meals, tpt of participants, etc)
3.15	Marketing assistance & development	***85,543***	For marketing cooperatives & to explore new markets
3.16	Establish regional training facilities	***31,539***	Provide contents and trainers, furnish infrastructure, etc.
3.17	Community Workshops, meetings	***135,113***	Community workshops, including project initiation and closure meetings in both regions
3.18	Advocacy activities (including Regional and National Steering Committee meetings)	***25,304***	Material and actions to inform and influence law-makers through the Regional and National SC
3.19	Communication, visibility	***47,457***	Sign-posting, branding, report-writing assistance, comms strategy
	Sub-total	***2,049,729***	
4	**Project activity cost**	***4,237,187***	

Table 23: Detailed budget for Project Execution Cost (B)

This table represents detailed Monitoring and Evaluation costs by the EE.

Item	Execution Intervals	Unit	No. of Units	Unit Rate	Total (USD)
Planning Support tools Development and monitoring					
Contractual Familiarisation and template development (MoUs with local partners) and change management	Quarterly	Months	10	2,498	24,982
Project Operational Framework	Quarterly	Months	10	1,510	15,102
Quality Management Plan	Quarterly	Months	15	1,558	23,371
Sustainability and Exit Plan	Quarterly	Months	15	2,498	37,473
Communication Plan	Quarterly	Months	25	1,558	38,951
Knowledge Management Plan and database maintenance	Half-yearly	Months	30	1,558	46,742
Reporting					-
Internal quarterly report	Quarterly		20	1,558	31,161
Annual Report	Annually		5	1,558	7,790
Periodic field Survey report	Quarterly		20	1,558	31,161
Mid-term Assessment Report	Once-off		2	2,498	4,996
Final Report	Once-off		1	1,479	1,479
Planning Meetings					-
Project Planning meetings (Core team)	5 times a year	Number	25	1,154	28,846
Financials					-
Internal Verification and Audit preparation	Annually	lumpsum	5	615	3,077
Bank charges	Monthly	Months	60	53	3,195
Office related expenses					-

Item	Execution Intervals	Unit	No. of Units	Unit Rate	Total (USD)
Office space and local travel (within Windhoek)	Monthly	Months	60	473	28,402
Internet access	Monthly	Months	60	621	37,278
Consumables (telephone, stationeries etc)	Monthly	Months	60	118	7,101
Total Costs of Monitoring and Evaluation					**371,108**

Table 24: Budget for Project Management Fee (C)

Budget category	Budget purpose	Budget (USD)	Budget note
1. Management	Overall project coordination Financial management Performance management Information and reporting management Project support to EE	200,096	1
2. Operations	Travel Per diem Progress meetings Oversight and governance workshops	49,408	2
3. Office services and supplies	Utilities Telecommunications Office supplies	61,385	3
4. Auditing and consulting services	Auditing Project evaluation Technical support	62,354	4
5. Knowledge dissemination	Information distribution Reporting	18,462	5
Total budget	**Project management**	**391,705**	

Table 25: Budget notes for Project Management Fee (C)

Budget notes
Budget category 1: Management Salaries or part thereof for Project coordinator, Financial officer, Internal auditor and Administrative clerk who execute or participate in the following management functions: 1. Overall project coordination, including to • Manage the relationship with the AF and ensure AF satisfaction with project execution in terms of outputs and outcomes, funding utilization, project execution period and reporting • Ensure that all key project partners (DA, NIE, EE, consultants) have a full understanding and ownership of the project, and clearly understand their respective roles and responsibilities • Establish and maintain an overall schedule for project execution, management, monitoring, evaluation, and reporting activities • Establish clear guidelines as to requirements and procedures that will apply to implementation of programme activities, including reporting, grievance handling, disbursements, virements, etc. • Ensure satisfactory stakeholder involvement and participation 2. Financial management, to • Ensure budgetary control, compliance with accepted accounting standards and financial control processes, and financial transparency • Manage, monitor and track AF project funding, which includes ensuring cost-effective procurement processes; disbursement of funds to the EE according to agreed work plans, time-bound milestones and achieved outcomes; monitoring of EE expenditure, with specific emphasis on gender-responsive activities; financial reporting to the AFB; and the return of unspent funds to the AF • Ensure that financial management practices comply with AF requirements • Ensure that financial reporting complies with AF requirements • Appoint external auditors for auditing of NIE and EE accounts 3. Performance management, to • Monitor and track project execution at the office and in the field to ensure that activities are carried out and objectives in terms of outcome indicators are achieved within the agreed time schedule, with specific emphasis on gender-responsive activities • Assist the EE to identify and implement risk management strategies and to implement corrective measures should project execution be threatened in terms of scope, budget or schedule

Budget notes
• Provide guidance to the EE in establishing performance measurement processes • Chair meetings of the TAC to maintain stakeholder support and to obtain advice on matters that influence successful project execution • Identify, appoint and support execution of mid-term and final project evaluation 4. Information and reporting management, including • Maintaining information management systems and specific project management databases to track and monitor project information • Distribution of information, newsletters, regular updates and reports on the project using various media • Ensuring compilation and submission of annual reports to the AF 5. Project support to the EE, including • Policy compliance support (e.g. International conventions, AF, GRN, DA) as well as DRFN's Environmental, Social and Gender Policy • Provision of guidance on AF procedures and requirements pertaining to various areas • Support and advice on programming, implementation, troubleshooting, evaluation and reporting
Budget category 2: Operations Expenditure on: • 4x4 vehicle lease and fuel • Staff accommodation and daily allowance • Venue and catering cost • Meeting and workshop material incurred in executing the following activities: • Project site monitoring and evaluation (over and above visits in combination with EE) • Hosting and attending meetings and workshops

Budget notes
Budget category 3: Office services and supplies
Expenditure on: • Municipal services (water, electricity sewage and waste removal) • Telephone, cell phone and internet services • Banking fees • Stationery, copies and prints
Budget category 4: Auditing and consulting
Expenditure on: • Fees for annual and final audit carried out by auditing firm • Fees and costs for consultant to do mid-term and final project review • Fees for consultant to render policy compliance support (International conventions, AF, GRN, DA, DRFN's mandate)
Budget category 5: Knowledge dissemination
Expenditure on: • Distributing information, newsletters, regular updates and reports on project work and progress using NIE webpage, social media and print media

H. Disbursement schedule

Table 26: List of project milestones

Milestones	Expected dates
Signature of agreement between AF and NIE	March 2019
Start of project (Inception workshop)	April 2019
Inception report (1 month after inception workshop)	May 2019
End of execution Year 1	March 2020
Annual Performance Report 1 - PPR 1 (within 2 months of end Year 1)	May 2020
End of execution Year 2	March 2021
Annual Performance Report 2 – PPR 2 (within 2 months of end Year 2)	May 2021
Mid-point of project implementation	October 2021
Mid-term evaluation report (within 6 months of mid-point)	April 2022
End of execution Year 3	March 2022
Annual Performance Report 3 – PPR 3 (within 2 months of end Year 3)	May 2022
End of execution Year 4	March 2023
Annual Performance Report 4 - PPR 4 (within 2 months of end Year 4)	May 2023
End of execution Year 5	March 2024
Project implementation completion	March 2024
Annual Performance Report 5 - PPR 5 (within 2 months of end Year 4)	May 2024
Project completion report (within 6 months of project completion)	September 2024
Project closing (6 months after project and disbursement completed)	September 2024
Terminal evaluation report (within 9 months after project completion)	December 2024
Final audited financial statements (within 6 months of end of NIE FY)	June 2025

Table 27: Disbursement schedule

Payment milestone	Scheduled date	Activities Cost (A)	Execution Cost (B)	Management Fee (C)	Total disbursement (A+B+C)
Signature of agreement	March 2019	955,349	74,221	72,628	**1,102,198**
PPR 1 submission	May 2020	802,198	74,221	72,628	**949,047**
PPR 2 submission	May 2021	838,859	74,221	81,648	**994,728**
PPR 3 submission	May 2022	949,150	74,222	81,648	**1,105,020**
PPR 4 submission	May 2023	691,631	74,223	83,153	**849,007**
Total project		**4,237,187**	**371,108**	**391,705**	**5,000,000**

I. References

Barnard, P. (ed.) 1998. Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force. 332 pp.

Bockmühl, F. 2009. PowerPoint presentation on the “Platveld Aquifer Study” of 2009, reporting to the Ministry of Agriculture, Water and Forestry.

Christian, C., De Klerk, J.N., Bockmühl, F., Van der Merwe, B., and Mostert, A. 2010. Desk Top Study on the Effect of Bush Encroachment on Groundwater Resources in Namibia. GIZ-sponsored consultant’s report, Namibia Agricultural Union, Windhoek, Namibia.

Dirkx, E., Hager, C., Tadross, M., Bethune, S. and Curtis, B. 2008. Climate change vulnerability and adaptation Assessment. DRFN and Climate Systems Analysis Group. Prepared for the Ministry of Environment and Tourism.

DRFN. 2009. Climate change vulnerability and adaptation assessment. Desert Research Foundation of Namibia, Windhoek.

DRFN. 2015. First national report on implementation of the United Nations convention to combat desertification. Available at www.unccd-prais.com/.../1ed4e478-f24d-475c-b962-a0fa014a4a65

DRFN. 2017. Manual for integrating Environmental, Social and Gender Risk Policies into Adaptation Fund project and programme development and management: Namibia. Desert Research Foundation of Namibia, Windhoek.

DRFN & SIDA. 1992. Basin Management Approach. A Guidebook. Desert Research Foundation of Namibia, Windhoek.

FSNAP. 2013. Multi-sectoral nutrition implementation plan, results framework & dashboard of indicators. Namibia (2012/13-2015/16). Available at https://www.unicef.org/namibia/Namibia_Report_on_the_Multi-sectoralCIP_100913).pdf

GIEWS/FAO. Country Report: Namibia. 12 August 2015.

Hudson, D. A. and R. G. Jones. 2002. Regional climate model simulations of present day and future climates of Southern Africa. Hadley Centre, Bracknell, Technical Note 39.

INDC. 2015. Intended Nationally Determined Contributions (INDC) of the Republic of Namibia to the United Nations Framework Convention on Climate Change.

IPCC. 2001. Impacts, Adaptation, and Vulnerability. Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

Kimball, B.A., K. Kobayashi, and M. Bindi. 2002. Responses of agricultural crops to free-air CO2 enrichment. Advances in Agronomy 77: 293-368.

Kruger, A.S. 2014. *Study on Informal Trade of Beef/Cattle in the Northern Communal Areas.* Final Project Report of the Livestock Marketing Efficiency Fund of the Millennium Challenge Account Namibia (MCA-N), Agra Ltd., Windhoek, Namibia.

Lindeque, P. and Rothauge, A. 2015. *Survey development and implementation in preparation of a De-Bushing Advisory Service (DAS).* Project report, Support to De-Bushing in Namibia, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Windhoek, Namibia.

Mallet, M and Du Plessis. P. 2001. Mahangu post-harvest systems. A summary of current knowledge about pearl millet postharvest issues in Namibia. Research Report. Minsitry of Agriculture, Water and Rural Development, Directorate of Planning and Namibian Agronomic Board. Windhoek. Pp.47

MAWF. 2012. Namibia Rangeland Management Policy and Strategy (NRMPS). Ministry of Agriculture, Water and Forestry.

Meat Board. 2017. Meat Chronicle, February 2017. Meat Board of Namibia.

Mendelsohn, J. 2006. Farming System in Namibia. Available at http://www.environment-namibia.net/tl_files/pdf_documents/selected_publications/Farming%20Systems%20in%20Namibia_Mendelsohn_2006.pdf

Mendelsohn, J., Jarvis, A., Roberts, C. and Robertson, T. 2002. Atlas of Namibia: a portrait of the land and its people. David Publishers, Cape Town, South Africa.

MET. 2002a. Ministry of Environment and Tourism annual report, Windhoek, Namibia.

MET. 2002b. Initial National Communication to the United Framework Convention on Climate Change. July 2002. Available at http://unfccc.int/resource/docs/natc/namnc1.pdf.

Midgley, G., Hughes, G., Thuiller, W., Drew, G. and Foden, W. 2005. Assessment of potential climate change impacts on Namibia's floristic diversity, ecosystem structure and function. Namibian National Biodiversity Programme. Directorate of Environmental Affairs.

MET. 2010. Namibia Country Pilot Partnership (CPP) Programme for Integrated Sustainable Land Management (ISLM). Annual Report.

MET. 2011. National Policy on Climate change for Namibia.

MET. 2014. Namibia National Climate Change Strategy and Action Plan, 2014

MET. 2014. Regional Climate change information toolkits. Ministry of Environment and Tourism, Windhoek, Namibia

MET. 2015. 3rd National Communication to the UNFCCC, 2015.

Norby, R.J., S.D. Wullschleger, C.A. Gunderson, D.W. Johnson, and R. Ceulemans. 1999. Tree responses to rising CO2 in field experiments: implications for the future forest. Plant, Cell and Environment 22: 683-714.

NPC. 2017. Namibia's 5th National Development Plan (NDP5).

NEWFIU. 2015. Namibia Design of an Improved Climate Risk Management Early Warning System (EWS) and EWS Information Centres.

Quan. J, Barton, D and Conroy, C. 1994. The Economic impact of desertification in nothern communal areas. Directorate of Environmental Affairs, Ministry of Environment and Tourism. Windhoek. 35pp.

Reid, H., Sahlén, L., Stage, J. and MacGregor, J. 2007. The economic impact of climate change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy. Environmental Economics Programme. Discussion Paper 07-02. International Institute for Environment and Development. November 2007.

Rothauge, A., 2013. A Quick Guide to Cultivated, Dry-Land Grass Pastures in Northern Namibia. Occasional report, Agra Ltd., Windhoek, Namibia.

Rothauge, A., 2014. Baseline Survey of Animal Nutrition in the Northern Communal Areas of Namibia. Final Project Report of the Livestock Marketing Efficiency Fund of the Millennium Challenge Account Namibia (MCA-N), Agra Ltd., Windhoek, Namibia.

Rothauge, A., Hakusembe, A.S. and Kalundu, S. 2015. Sustainable Wood Use in the Western Kavango. Feasibility Study for Nkurenkuru Town Council, Nkurenkuru, Namibia.

Rothauge, A., 2016. Dry Season Baseline Assessment 2015: Characteristics and Management of Woody Plants and Livestock in NAFOLA Hotspots. Baseline Assessment Report of the NAFOLA (Namibia's Forested Lands) programme, Directorate of Forestry, Windhoek, Namibia.

Rothauge, A., 2017. *Adapting to Climate Change in Arid North-Western Namibia by Combatting Desertification*. Interim Project Report, Delegation of the European Union to the Republic of Namibia (Rural Development Section), Windhoek, Namibia.

Scholtz, M.M., Maiwashe, A., Neser, F.W.C., Theunissen, A., Olivier, W.J., Mokolobate, W.J.M.C. and Hendriks, J. 2013. Livestock breeding for sustainability in the era of climate change. *South African Journal of Animal Science* 43(3): 269-281.

Shilongo, A.T. 2014. Development of strategies, road map, plan of action and preparation of supporting documents to declare the NCA free of Foot-and-Mouth Disease and Contagious Bovine Pleuropneumonia. Final Project Report of the Livestock Marketing Efficiency Fund of the Millennium Challenge Account Namibia (MCA-N), Directorate of Veterinary Services, Windhoek, Namibia.

Stern, N. 2006. The economics of climate change. Available at http://www.hm.treasury.gov.uk/independent_reviews/stren_review_economics_cliamte_change/stern_review_report.cf

Sweet, J., 1998. NOLIDEP Adaptive Research Programme 1996-1998: Summary. Final Project Report, Rangeland Management Section, Northern Areas Livestock Development Programme, Windhoek, Namibia.

Trading Economics. 2015. Namibia GDP per capita. Available at https://tradingeconomics.com/namibia/gdp-per-capita

Van Rooyen, J., 2014. Beef Production in the Zambezi Region of Namibia: Socio-economic and socio-ecological perspectives on trade, disease control and wildlife conservation. Final Project Report of the Livestock Marketing Efficiency Fund of the Millennium Challenge Account Namibia (MCA-N), University of Pretoria, Pretoria, South Africa.

Williams, R., Scholtz, M.M. and Neser, F.W.C. 2016. Geographic al influence of heat stress on milk production of Holstein dairy cattle on pasture in South Africa under current and future climatic conditions. *South African Journal of Animal Science* 46(4): 441-447.

World Health Organisation. (2013). Namibia Country cooperation strategy: at a glance. Available at http://www.who.int/countryfocus

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

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

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

Mr. Teofilus Nghitila *Environmental Commissioner,* *Ministry of Environment and Tourism,* *Namibia*	**Date:** *1 August 2018* ***Signature:***

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2018 -07- 31
Office of the
Environmental Commissioner

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 5, 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.	
Martin Schneider **National Implementing Entity** **Desert Research Foundation of Namibia (DRFN)**	
Date: 1 August 2018	Tel.: +264812460379 E-mail: martin.schneider@drfn.org.na
Project Contact Person: Dr M Schneider	
Tel. :+264812460379, or +26461377500 E-mail: martin.schneider@drfn.org.na	

Project title: Community-based integrated farming systems for climate change adaptation
Executing entity: Namibia University of Science and Technology (NUST)

[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.

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

Tel: (00 26461) 284 2111
Fax: (00 26461) 232 057

Cnr Robert Mugabe &
Dr Kenneth Kaunda Street
Private Bag 13306
Windhoek
Namibia

E-mail: petrus.muteyauli@met.gov.na
Enquiries: Petrus Muteyauli

1 August 2018

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

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 integrated farming systems for climate change adaptation"**

In my capacity as Designated Authority for the Adaptation Fund in Namibia, I confirm that the above 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 project proposal for resubmission with 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.

Sincerely,

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2018 -07- 31
Office of the Environmental Commissioner

Teofilus Nghitila
Environmental Commissioner

"Stop the poaching of our rhinos"

All official correspondence must be addressed to the Permanent Secretary

Annexures

Annexure 1:Questionnaires/ Interview guides

Community-based integrated farming systems for climate change adaptation

0. INTRODUCTION
0.1 Introduce yourself
0.2 Introduce the study
0.3 Thank participants for accepting your invitation

Icebreaker: Do you have anything about your livelihood that you would like to share with us?

1. Perception of communities on climate change

1.1 What is climate change?

Changing rainfall (storm patterns and size)	
Changing temperatures	
Changing livelihoods hence income levels	
Other (mention)	

1.2 What are the causes of changing weather conditions?

Pressure on the forest	
Poverty	
Natural factors	
Rainfall (storm size)	
Drought	
Changing temperatures	
Other (mention)	

1.3 How important is the issue of climate change to you personally?

Very important	
Quite important	
Not very important	
Not at all important	

1.4 Do you think climate change is something that is affecting or is going to affect you, personally?

Yes	
No	
Don't know	

1.5 To the best of your knowledge, have there been any climate change awareness campaigns carried out in your area?

Yes	
No	
Don't know	

1.6 What challenges are you facing in responding to the effect of climate change in your livelihoods?

Political interests	
Increased conflict	
Lack of support from the local leaders	
Lack of commitment by the community	
Inadequate resources	
Others (mention)	

1.7 Suggest best ways for responding to the effect of climate change on rural livelihoods within your location?

_____
_____
_____
_____

2. Local Awareness and Perception of climate variability and trends related to climate change (over the past 10-20 years)

2.1 Rainfall

Important		Unchanged		Little	

(in historical matrix)

Rainfall	**Last year**	**5 years ago**	**10 years**	**15 years**	**20 years ago**	**Observations**
Quantity						
Period						
Duration						

Impacts of the situation on the population's overall existence, the way they lived it, and suggestions for addressing the problems.

2.2 Temperature

Hot		Cold		Constant	

(in historical matrix)

Rainfall	**Last year**	**5 years ago**	**10 years**	**15 years**	**20 years ago**	**Observations**
Hot						
Cold						
Constant						

2.3 Flood

Frequent		Rare		Important		Constant		Little	

2.4 Drought

Frequent		Rare		Severe		Constant	

2.5 Agricultural land

Diminishing		Sterile		Unchanged	

3 The impact of climate change on livelihoods

3.1 What is the main livelihood strategy of your household?

Crop farming	
Livestock keeping	
Petty trading	
Other (mention)	

3.2 What is the impact of climate change on living?

Land Use conflicts	
Low production / productivity in crop / livestock	
Land / forest degradation	
Other (mention)	

3.3 What ways are you involved in identifying adaptation strategies in your location to address the effect of climate change?

Collection of the non-timber forest products	
Change of crops patterns	
Moving to other areas	
Cross breeding of livestock to make them hardy to climatic changes	
Change of eating habit/ food preference	
Other (Mention)	

3.4 What are the challenges when adopting climate change adaptation options?

Insufficient capital assets	
Insufficient policies	
Insufficient technology adaptation	
Other (mention)	

4 Farming today

4.1 How much is the size of your crop field?

< 1 ha	
1.1-2 ha	
2.1-3 ha	
3.1-4 ha	
>4 ha	

4.2 Do you have or rear livestock's? What kind and how much

Cattle	
Cow	
Sheep	
Goat	
Chicken	
Others	

4.3 For what purpose are you rearing livestock's?

Selling	
Household use	
Others	

4.4 What are the main crops that you cultivate on your farm?

Crops	
Vegetables	
Fruits	
Trees	
Others	

4.5 How is the yield when you compare with previous five or ten years? Can you tell us in kilograms? **If so, interviewer to make additional notes per crop.**

Very high		
Medium		
Low		
Others		

4.6 What kind of farming techniques are you using?

Oxen plough	
Hoes	
Digging sticks	
Small farming machine	
Others	

4.7 What kind of farming methods are you using mostly?

Intercropping	
Crop rotation	
Monocropping	
Others	

4.8 Is there any other agricultural practices applied in your farm?

Mulching	
Manuring	
Cover crop	

Wind breaks	
Contour ploughing	
Slash and burn	
Others	

4.9 Are you using any of the below chemical fertilizers and pesticides on your crop field?

Herbicides	
Fungicides	
NPK	
Others	

General

Apart from climate changes, what may be the other reasons which can negatively influence the earning of living, nutrition, standard of living and health in your community?_____

_____

_____

_____

_____

_____

Date: ……

Time: ……...

Location: …….

Key questions for ESMS:

1. Project implementation – will it be required to create a new farm land or support to existing small-scale farmers (**NUST**)?

……
……

2. What is the total size of project implementation in hectares (**NUST**)?

……

3. Are there any marginalised and vulnerable communities in the area? If **yes**, how will they be integrated into the project?

……
……

4. What are the key environmental issues in the project area (pollution, land degradation, flooding, rapid development, urbanisation, overfishing, deforestation)?

……
……

5. What are the current farming systems: are there any use of artificial fertilisers, mechanised agriculture?

……
……

6. What are the most important wildlife species in the area?

……
……

7. What are the most important plant species in the area (providing fruits, shade)?

……
……

8. Is there any human wildlife conflict in the area? If so, which species are involved?

……
……

9. Are there any heritage sites in the area (sacred sites, traditional areas reserved for culture)?

……
……

10. Are there any conservancies/community forests in the area? How are they contributing to people's livelihoods?

……
……

11. Are there any clinics, schools in the area?

……
……

12 What are the major sources of employment/income?

……
……

13 Are there women involved in the agricultural sector? If **yes**, how are they involved?

……
……

Annexure 2: Consultation Minutes: Omusati Region (2017 and 2018)

1 September 2017

A check list of questions was formulated to guide the key informant discussions. In the minutes below, we present the proceedings per key informant.

Ms Elise Haimbondi, Administrative Officer – Omusati Livestock Marketing Cooperative - Female

We asked about the current state of affairs in her community with regard to climate change adaptation, she indicated that they have been implementing some isolated adaptation measures but no formal adaptation activities. This is due to the fact that the previous activities were mostly funded through GOPA Project which ended in 2014 and no funding for continuation. She also indicated that there are no *de facto* adaptation activities in her community that are not yet labelled as climate change adaptation. The only conspicuous adaptation practices currently in place to reduce the vulnerability to climate change in mainly the sale of grass (cattle feed) to the members of the cooperative in the community. When asked about the rangeland condition, Ms, Haimbodi indicated that there have been an increasing deterioration of the rangeland in that there no more grazing areas for livestock at all due to drought. When asked about what should be done differently to increase the productivity of the rangelands, she clearly indicated that there is a need to plant grasses that will be able to cater for all, seeds for grasses to be distribute to the farmers if possible and plant themselves.

When asked about the prevalence of climate change awareness campaigns in her community, Ms. Haimbodi indicated that there are no awareness going on at the moment and will be appreciated if the whole community can be educated. This also implies that no dissemination taking place and most farmers do not understand the consequences. However, in her community, they have used ripper fallows (a tractor that is used to plough in dry and wet condition) as advised by the utilised extension services that provides technical farm or livestock inputs. In terms of cropping, she provided the following harvesting estimates for the past 5 years (although she could not outline it per crop): 2017 – 3 Tones; 2016 – 1 Tones; 2015 – 0; 2014 – 4 Tones; and 2013 – 6 Tones.

Ms Suama Nangolo, Secretary – Northern Namibia Farmers Seed Grower Cooperative - Female

We asked her about state of play in her community with regard to climate change adaptation. She indicated that they have initial discussions ongoing on adaptation but no concrete plans yet. She also indicated that there are no *de facto* adaptation activities in her community that are not yet labelled as climate change adaptation. When asked about the rangeland condition, Ms, Nangolo indicated that there has been an increasing deterioration and it is very difficult to control. When asked about the rangeland management methods that they have previously used and how effective were they, *she indicated that through the GOPA project, people use to graze in groups and on allocated areas and let other areas rest (camps).* She went on to say if the rangeland management system that was used by GOPA could be continued, but it's not easy because those farmers use to get paid for looking after the cattle in those camps but they stopped because no payment. May be to grow more grass in those grazing area and get it restored. In terms of climate change awareness campaigns, she clearly indicated that there is no awareness. When it occurs, it is mainly through cooperatives but only the members who benefit but the rest of the community are not aware of the danger. For extension and advisory services, she indicated that the Ministry of Agriculture Water and Forestry is encouraging the use of Conservation Agriculture but

it is still not yet fully understood for full deployment of the techniques associated with it. In terms of crop production, she indicated that she only harvested 25 bags of 50 kg each, because of the drought and crops were destroyed by insects last year.

Mr Tjavanga Kamburona, NAFOLA Liaison Officer, Epukiro Constituency - Male

When asked about the state of play in his community with regard to adaptation, he indicated that there is nothing at all that is happening and there are no *de facto* adaptation activities in his community that are not yet labelled as climate change adaptation. He also indicated that he can't think of any climate change adaptation practices in place to reduce the vulnerability to climate change. However, he was quick to indicate that the rangeland condition has deteriorated in the past 5 years so much, as there is no form of rangeland management in place, few farmers manage it on their own and no specific rangeland management practiced in his community. In terms of improving rangeland condition, he indicated that the rangeland condition can be improved by debushing, setting of camps and rotational grazing; drilling of boreholes in different areas to reduce over grazing as farmers are sharing boreholes or a group of farmers relying on one boreholes. In terms of awareness on climate change impacts, he indicated that the NAFOLA project and other relevant stakeholders (Ministry of Agriculture, Water and Forestry, the Directorate of Forestry) have been creating awareness and providing knowledge on what can be done, but not on a scale of satisfaction, a lot is still need to be done as there is a big gab. In addition, sporadic information on climate change adaptation is provided by the Regional Offices through the Media, through the Radio (Locally). In terms of advisory or extension service that provides technical farm or livestock input, Mr. Kamburona indicated that they were exposed to Conservation Agriculture through the extension officers in which few farmers were trained, When asked about crop production, his comment was that "It's very hard to tell as farmers in the area are more practical on livestock production than crop, there is a need for awareness on crop production may be they can produce for the market".

Mr Aron Nangolo, Treasurer of Otjombinde Conservancy, Wildlife Conservancy and Rangeland Management - Male.

When asked about the state of play in his community with regard to adaptation, he indicated that they have an adaptation strategy and have implemented measures – debushing reseeding – introducing perennial grasses. There are no *de facto* adaptation activities on your territory that are not yet labelled as climate change adaptation. In terms of adaptation practices currently in place to reduce the vulnerability to climate change, he indicated that there is capacity building through Agra Provision funded UN via Global Environmental Fund with the focus on rangeland management targeted at the farmers. Mr Nangolo also indicated that the rangeland condition has deteriorated during the past 5 years and evidence of this is the report from Dr Axel through NAFOLA project – the rangeland in the Southern area of Otjombinde has deteriorated and the northern part good grazing but there is no water. He went on to say that there are no rangeland management methods that have previously been used. In terms of what should be done differently to increase the productivity of the rangelands, he suggested that there is a need for famers to be educated and consider the method of rangeland management in terms of rotational grazing; carry out debushing or bush thinning; and introduction of perennial grasses through reseeding. He indicated that climate change awareness campaigns are not carried out to the level of those at the grass root is none. In terms of the utilisation of any kind of advisory or extension service that provides technical farm or livestock inputs, he indicated that the Ministry of Agriculture, Water and Forestry usually disseminate information on livestock marketing and other services like how the climate change affect rangeland management. Also, the Environmental Advisory Committee has provided training rangeland management, debushing, biomass and forest value addition and the Conservation Agriculture practices promoted through the NAFOLA project. In terms of cropping, he indicated that the crop production idea

was introduced to his community only this year and haven't harvested yet since their main focus was livestock production.

Mr Paulus Amutenya, Chairperson of Olushandja Horticultural Producers Association - Male

In terms of the state of play in his community with regard to adaptation, Mr Amutenya indicated that they have initial discussions ongoing on adaptation but no plans yet. He also indicated that they have *de facto* adaptation activities in his community that are not yet labelled as climate change adaptation. He said "our group uses rain water and water from the rivers during rainy season to water our gardens and if this water could be harvested and stored and be used during dry season then it can help the communities". On the other hand, he does not know of any adaptation practices currently in place to reduce the vulnerability to climate change. When asked about the deterioration of the rangeland condition in the past 5 years, he said the condition has deteriorated very much and every one competes for the area to graze their livestock and no control to manage the grazing area. He indicated that in the past, people will graze in groups and areas could be restored for future. In doing things differently to increase the productivity of the rangelands, he indicated that "growing more grass in the dry area during rainy season, and farmers to start using rotational grazing but it's very difficult to control if we don't have control measures in place. Also harvest like the commercial farmers does". In terms of climate change awareness campaigns carried out in his community, he indicated that there are awareness going on but only target urban people but not people who do not have access to information and are mostly affected and lack the knowledge. These are mainly through farmers meeting, again, only target the people in town not those at the grass root level. In terms of advisory or extension service that provides technical farm or livestock input, he indicated that they use Ripper Fallow, and try to focus on conservation agriculture farming, and grow more during rainy season. He said he has harvested about 40 bags of 50 kg on average during the past 5 years.

Ms Johanna, Admin Officer, Chairperson of Olushandja Horticultural Producers Association - Female

In terms of the state of play in her community, Ms. Johanna indicated that they have initial discussions ongoing on adaptation but no plans. She said they have *de facto* adaptation activities in her community that are not yet labelled as climate change adaptation. For instance, they use rain water and water from the canal to water the gardens, this is one form which can be identified and be implemented. Adaptation practices currently in place to reduce the vulnerability to climate change involve the digging of wells in fields, the pumping of water from the canal during the rainy season where water is reserved and used to water the vegetables during dry season. In terms of range land deterioration, she indicated that they are a horticultural community, not involved in livestock production but can agree that the rangeland has deteriorated that's why they have cattle roaming around the town because of that. She suggested that there is a need to grow more grass for the cattle, and manage the grazing areas. Climate change awareness campaigns have been carried out sporadically in her community. In terms of advisory or extension service that provides technical farm or livestock inputs, she indicated that 98% of her horticultural group use drip irrigation and the rest uses fallow irrigation, no full support from the government.

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Ruacana Regional Council, 24.04.18
NUST RF Team & Hon Andreas Shintama + Mr Komeya

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction of the project to the Regional Councilor	Councilor: Region has not received enough rainfalls over the past 5 years. Councilor indicated that they have serious grazing pressure and more people are enrolling in the Ruacana area.	← General discussion
	NUST Team: Reintroduction of the project. The reasons for choosing [illegible] elaborated & the reasons for choosing Omusati as very densely populated.	
	Councilor: He announced on the radio to invite all groups of the community members. NUST: Introduced the Project components to the Councilor.	
2. Role of the Ministry of Environment & Tourism (NDA)	- To ensure that development objectives are included in the project.	
	- They have to be sure that the project is responding to NDP needs before issuing the non-objection letter for the project.	
3. Challenges faced by Community	- Limited rainfall and deteriorating grazing areas, - Salty water	
	No water harvesting infrastructure. Human wildlife challenges (lions, elephants, hyenas). There is Uukwaluudhi and Uukolonkadhi conservancies & Etosha.	
	Vulnerable groups include the Himbas, San, [illegible] but interventions should be done through the councilor's office.	
4.	- There are limited schools & clinics. - No feeds for livestock	
Market of surplus food	- There are problems with marketing surplus crops. These can be sold to AMTA but at low prices mainly for mahangu. No market for mahangu. - No market for surplus cattle due, abattoirs closed. - Red line issues are discouraging. - Storage of mahangu is a problem mainly for traditional baskets.	
Sources of livelihood	- Selling Cuca shops, farming, social grants	
New technologies	No block in accepting new technologies e.g. tractors but the problem is affordability ↑ cost!!!	

(Left margin:) ↑ Inconsistent weather prediction

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Okakarara Constituency Office, 24.04.18

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	Councilor Shikulo welcomed the NUST-AF Team. NUST-AF Team introduced the components of the AF project. The region council members [illegible]	
Challenges faced by the	- Less rainfall resulting in poor borders for animal, especially this year.	
Councils	- Human longer due to less rainfall - Saline water. - Agricultural drought. - Overgrazing. - Overstocking. - Pests, birds and any worms. - Unfair competition for ~~of~~ HWC by GRN	
3.	- No markets for livestock and buyers for ~~livestock~~ livestock. - No training on how to process animal skins and other by-products. - Veld fires - No storage facilities	
4.		

(*) ~~Tourism~~ Animal husbandry practices as a business idea
(*) Animal health
(*) Animal nutrition

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Ruacana Council Office. 25.04.18

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	Councilor introduced his community to the NUST-AF team. The NUST team then introduced themselves to the community and their roles in the project development. NUST introduced the project as being aimed to increase resilience and improve ecosystem functioning. They went on to describe some of the components of the project. Councilor asked the community if they have questions for clarification.	
2. Challenges faced by the community	Water is not easily accessible - longer distances of about 10-15 km need to be travelled. Fodder for livestock is scarce, canal is very far. - There is not enough equipment for ploughing, rippers and tractors are required to improve agricultural outputs. - There are no sufficient boreholes or no earth dams to capture rainfall. No seeds and livestock feeds.	
3.	- No animal vaccines. No markets for livestock. - No water distribution from town council - Limited tractors. - Lack of training on CSA	
	- Lack of pest control knowledge - Land degradation - No research on [illegible] [illegible]!	
Effectiveness of hand held tractors	There are many farmers needing these tractors but the demand is very high	
4.		

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

36 ——
43 ——

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Tsandi Constituency Office, 25.04.18

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	NUST introduced the aim of the project being that it is aimed to ^ enhance of communities to some impacts of CC. Indicated that this is the second visit on this project. Informed the participants about the project components.	
2. Challenges or vulnerability of community to CC	- Water for human and livestock and gardens is not available. - Grazing areas are not protected - Markets for products - Lack of training for the farmers. - Bush encroachment - Deforestation - Animal feeds are expensive and scarce - Soil infertility (poor soils), No manure since animals have moved to cattle posts while seeking for better grazing. - Fertilizer is not enough - Animal diseases (Foot & mouth disease) - Given away prices for cattle due to the non-availability of formal market. - Hyena and wildlife problems mainly elephants. - Overstocking - Fencing off of communal land - Insect pests (Army worms, & crickets)	
3.		
4.		

(*) Animal health
(*) Parasite control
(*) Animal husbandry practices
(*) Animal nutrition
(*) General adaptation & mitigation of CC
(*) Train farmers that farming as business

} Training required

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Okalongo, 26.04.18

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	MAWF Extension officer welcomed all to the meeting. NUST AF introduced the project. This was also continued by the Councilor, with emphasis on the negative impacts of CC.	
Challenges	- No water - No support ploughing, ripping - Lack of agricultural implements	
	- How to improve soil fertility and the water conservation agric. - Flooding of cuca bread	
2.	- HWC, elephants - No value adding of livestock by products	
	- Lack of cattle market opportunity - Animal husbandry training	
	- Animal production systems are improving	not
3.	- Feed to cattle are not enough - Pests - A seed shortage	
	- improved irrigation	
4.		

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Omusati Regional Council, 24.04.18, 08:00 - 09:00
Mr Shaningwa & Ms Kaume

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction with Mr Shaningwa	Community engagements: Emphasis on community/groups most representative. Which areas to focus on. How to have consultations (individuals or groups?) Better to take 2 TAs.	There are seven TAs in Omusati. Need to meet with the councilor
	Selection of areas to visit: Ruacana 24.04.18 Okalano daTsandi 25.04.18 Okalongo 26.04.18 Etayi 27.04.18	
	Feedback session 27.04.18 at Omusati Regional Council.	
2. Representation of Omusati Region	Mr Shaningwa indicated that the proposed communities are ~~rep~~ representative of the entire Omusati region	Mr Shaningwa
3. Ruacana meeting	Meeting moved to 25.04.18 Councilor needs to go on the radio to inform his constituents. But on the 24th visit Okahandja.	

Ms Kashindi : 0811 4704 92
Okalongo Control Admin.

~~Katuo~~ Kauna Shapenga (DAPEES Okalongo)
081 280 7455

5, 14, 2
12, 18
51
♀: 31

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

n = 47 (♀: 31, ♂: 16)

ATTENDANCE REGISTER

DATE: 26/4/2018 TIME: VENUE: Anamulenge/Onawa farm. ACTIVITY/PURPOSE: Okalongo Community (farmers') meeting

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	KAUNAPAWA	SHAPENGA	F	MAWF- DAPEES	SAET	Shapengakauna@yahoo.com ~~Shapenga.Kauna~~	081280745 5	
2	Emily Loide	Shipateko	F	MAWF-DAPEES	AET	ndati78@hotmail.com	08/2280815	
3	Anna	Shakungu	F	Farmer	Farmer		0813860749	
4	Gloria	Elastus	F	Farmer	Farmer		081306 2279	
5	Elizabeth	Mweutota	F	Farmer	Farmer		0813230 232	
6	Kapandu	Kakwatange	F	Farmer	Farmer		08127 50600	
7	Naapopye	NGwedha	F	MAWF- DAPEES	Admin		0813750 971	
8	I. Shalongo	Mweendina	M	MAWF- DVS	AHT	Mamweendina@gmail.com	081271 5648	
9	Andreas	Tipinge	M	MAWF-DAPEES	SAT			

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
10	Nomsa	Ileka	F	Famer	Farmer		0813635	
11	Lydia	Ekandjo	F	Famer	Famer		081226 4867	
12	Hilia Nemuno	Iyambo	F	Famer	Famer		08137 80038	
13	Elizabeth	Shiimyenga	F	farmer	Famer		0813388 013	
14	Maria	Kamakela	F	Famer	Famer		08128 99756	
15	Sylvia	Angula	F	Famer	Famer			
16	Nhuleipo	Kambuta	M	Famei	Famer		081275 6493	
17	Bernadette	Ailenge	F	Famer	Famer		0813081 284	
18	Tunias	Shatipamba.W	M	Famer	Famer		0812902 992	
19	Simeon	Nakanyenga	M	Famer	Famer		08125 09015	
20	Theresia	Aluvilu	F	Famer	Famer		081269 2662	

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

Okalongo

ATTENDANCE REGISTER

DATE: **TIME:** **VENUE:** **ACTIVITY/PURPOSE:**

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	Toivo	Shiluute	M	MAWF-Outapi	ASO		0812400531	
2	Ambaubi	Oneinaus	M	FARMER	FARMER		0815445307	
3	Erkki	Shitwomunku	M	MAWF-Onawa	SAT ~~SAT~~		0812601154	
4	Kalipi	Klerner	M	Reg. Councillor	R		0813732447	
5	Elizabeth	Shiuute	F	FARMER	FARMER		N/A	
6	Aule	Nikasius	M	FARMER	FARMER		0817193229	
7	Liina N	Ayambo	F	FARMER	FARMER		0812659187	
8								
9								

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

Okalongo

ATTENDANCE REGISTER

DATE: **TIME:** **VENUE:** **ACTIVITY/PURPOSE:**

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	Josephina	Hamukwaya	F	Farmer	FARMER	—	0813390049	
2	Helvi	SAM	F	FARMER	FARMER		0813032262	
3	Siita	Angula	F	FARMER	FARMER		0813316385	
4	Shilongo	P. Kafula	F	FARMER	FARMER		0812846787	
5	Helena Hena	Daniel	F	FARMER	FARMER		0857026039	
6	Aina	Uusiku	F	MAWF-Outapi FARMER	SAET FARMER		0812335292	
7	Maria	NGololmwe	F	FARMER	FARMER		0813256067	
8	Annastasia	Pongodi	F	FARMER	FARMER		0812913734	
9	Kamati	Johannes	m	FARMER	FARMER		0814555626	

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
10	Hokela	Aihonya	M	FARMER	FARMER		N/A	
11	Susana Sh	Kornelius	F	FARMER	FARMER		0818595304	
12	Emili	Dominikus	m	FARMER	FARMER		N/A	
13	Fransina	Ndalumbililikiwa	F	FARMER	FARMER		0812219447	
14	Henriette	Andjamba	F	FARMER	FARMER		0813560055	
15	Linda	Amutenya	F	FARMER	FARMER		0812051756	
16	Elandjo	Josef	m	FARMER	FARMER		N/A	
17	Ndamona	Sheehama	F	FARMER	FARMER		0812371225	
18	Agnes	Shiuute	F	FARMER	FARMER		0814164541	
19	Ireneus	Mwanyangapo	m	FARMER	FARMER		0812708644	
20	Dionisius	Leonard	M	FARMER	FARMER		0812454982	

namibia university of science and technology

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

ATTENDANCE REGISTER

Page 1

DATE: 25/4/2018/9 **TIME:** **VENUE:** Ruacana Council Hall **ACTIVITY/PURPOSE:** Ruacana community meeting

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	Bertha	Shagardjua	f	Omusati R. Council	Admin. Office	bshagardjua[illegible]	065 272133	
2	Hon. Andreas	Shintema	M	Omusati R. Council	Councillor	ruacanacouncil.gmail[illegible]	065272133	
3	Erastus	Mashina	M	RTC / Swapo. Office	Coordinator	[illegible]	0812992650	
4	AMBROSIUS	SHANINGWA	M	MAWF - RUACANA ADC	TECHNICIAN	amboyshaningwa @gmail.com	081555 5557	
5	NANGOLO	NDJELE	M	FARMER	ASSISTANT HEADMAN		08175 20757	
6	Johannes	Muhingua	M	Farmer	Headman	—	—	muhi.
7	Patricia	Amutenya	F	FArmer	Headwoman	—	26 / 08129533	
8	Emilia	Hishidimbwa	F	FARMER	RetiredNurse	-	975 / 0812860975	
9	Loini S.N	Iipinge	F	youth	Secretary		590 / 081209350	

Ruacana
Page 2

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
10	LAZARUS	KORNELIUS	M	FARM	FARM	—	0812511046	
11	FILLIMON	DISHENA	M	FARM	FARM	–	0811222766	
12	MICHAEL T	KAMBANGULA	M	FARM	TRETURER	–	0812713666	
13	Cornelius	Heita	M	Farm	Farmer	—	0812150347.	
14	Gabriel	Nuunyango	M	Nature Conservation	Assist Ranger	—	081 2753545	
15	Silas K	HAINDONGO	M	RUHACANA FARM	ADVISOR	Kemanyeh@gmail	0812044895	
16	Petrus	SHINEDA	M	FARM	FARM	–	0813380396	
17	Maria	Matheus	F	village	Secretary	—	0812502602	
18	LITSIAS	AUPOKOLO	M	FARM	Pastor	-	0812051766	
19	Kamati	Michael K	M	Nampol	Camandor station	—	0812388990	
20	DANIEL H. H.D Haluwoodi	HALUWOODI	M	Farmer	CHAIR Pers For Asociation	—	0812692003	

Ruacana
Page 3

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
FIELD WORK: PREPARATION GRANT FUND (ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS)
ATTENDANCE REGISTER

DATE: **TIME:** **VENUE:** **ACTIVITY/PURPOSE:**

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	Eunike	Mulumeneke	F	farm	farmer	—	0812371070	
2	Aulelia	Tjombolola	F	village	headwoman	—	081	Aulelia
3	Nyanyukweni	Amakali	F	Farm	farmer	—	0812345339	Amakali. a.
4	GILTY ~~M. SITALI~~	SITALI	M	PRIVATE	CONSULTANT	gilitysitali@gmail.c	+266 81 379 745 52	
5	AKUSTARICUS	Komeya	M	RCC Ruacana	SAO	oli.komeya@yahoo.co.uk	0812321084	
6	WETHDELINUS K.	SHIKALEPO	M	RUACANA FARMER	FARMER	— —	0812363425	
7	JASON	Nyati	M	Farmer	Farmer	—	0812884758	
8	Mateus Kalumbu	Kalumbu	M	Farmer	headman	—	0813104487	MS Kalumbu
9								
10								

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

ATTENDANCE REGISTER

DATE: 25/4/2018 **TIME:** **VENUE:** Okahao Constituency **ACTIVITY/PURPOSE:** Okahao community meeting

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	JUSTINA	ANGULA	F	ORC-Okahao	Control Admin Officer	okahaoconst@gmail.com	065 25240	[illegible]
2	Leonard	Shikulo	M	ORC-Okahao	farmer + Regional Councillor	ishikulo18@gmail.com	065 252405	[illegible]
3	Max	Uutoni	M	D-Coordinator Okahao	farmer + D. Coordinator	farmer + max.uutoni@gm	0812620795	[illegible]
4	Hilja	Munkundi	F	B-Coordinate Okeeholongo	Teacher	N/A	0813013461	[illegible]
5	Ignatius	Shaanika	M	D. coordinator Okeeholongo	Teacher	N/A	0812169277	[illegible]
6	Alpheus	Kangongo	M	B. Mobiliser	farmer Headman (Teacher)	farmer N/A	0812590261	[illegible]
7	Irja ~~Amadhila~~	Amadhila	F	B. Coordinate	Farmer	N/A	0812032793	[illegible]
8	Mateus Shaanika	SHAANIKA	M	B Secretary okeeholongo	Farmer	N/A	08165 02156	[illegible]
9	Martha ~~[illegible]~~	Neshona	F	B Coordinate	B/coordinate Farmer	N/A	08125 98626	[illegible]

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
10	Hambeleleni	Hamfeleleni	F	B. information	farmer + Teacher	N/A	N/A	[signature]
11	Hendrina	HNakashole	F	B Mobiliser	Farmer	N/A	N/A	[signature]
12	Ainna	Elago	F	dl/mobiliser	Farmer	N / A	N/A	[signature]
13	Andreas	Kuume	M	intgeinghio [illegible]	Farmer [illegible]	N/A 08137	081379[illegible] 965	[signature]
14	PETRINA	AMUNYELA	F	Branch coordinator	teacher	N/A	0811[illegible]	[signature]
15	Julia-Mirjam	Katoole	F	District Information [illegible]	farmer + teacher	jmirjam32@gmail.com	0812864[illegible]	[signature]
16	Lahja	Nathinge	F	B. Information	farmer N/A	N / A	0813237181	[signature]
17	KANANA	Phillip	M	MEMBERS ELDERS	farmer AMUSHANG	N/A	081332[illegible]	[signature]
18	Shimi	Paulus	M	B. INFORMATION	farmer + TEACHER	N/A	0812551843/ 0811478[illegible]	[signature]
19	Nelago N	Kamati	F	Okahao Constituency Office	Administrator	okahao const@gmail.com	065-252408	[signature]
20								

n=19, F = 11, M = 8

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

ATTENDANCE REGISTER

DATE: 25/4/2018 TIME: VENUE: Tsandi Constituency Council ACTIVITY/PURPOSE: Tsandi Community meeting-

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	Monika ~~Moses~~	Moses	F	MAWF-DAPEES	SAT	-	065-258142	[signature]
2	STEFANUS	NKANDI	M	EDUCATION	farmer + Principal	nkandy@yahoo.com	0812840148	[signature]
3	Martha	Uushona	F	Tsandi Constituency		tsandiconst@gmail.com	0812590774	[signature]
4	Sakaria	Mwatange	M	Tsandi	farmer + Constituency	tsandiconst@gmail.com		[signature]
5	HESEKIEL	IGONDA	M	MAWF-FORESTRY	FOREST RANGER	heselueligonda@gmail.com	0815500458	[signature]
6	TAMMY	JOHANNES	F	MAWF - DWSSC	RURAL WATER + SANITATION EXTENSION OFFICER	ladytammy@yahoo.com	0812284932	[signature]
7	TUULIKKI	UULE	F	MUVHALA gwaNashilongo FARMERS ASSOCIATION (MNFA)	farmer CHAIRPERSON	tuulikki[illegible]@gmail.com	0812551040	[signature]
8	KarolinaT	Tehelianus	F	Uukwaluudhi Traditional authority	farmer A/T	K Tehelianus	0816179115	[signature]
9	Neigso Ndapandula	Shilongo	F	AMTA	Service organisation GA	shilongondamta.org	0812447644	[signature]

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
10	ANDREAS	AMUSHILA	M	NCCI ISB	V CHAIR		0816377777	A. Amushila
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Otjinene

(3)

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

FIELD WORK: PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

ATTENDANCE REGISTER

DATE: 9/5/15. **TIME:** **VENUE:** **ACTIVITY/PURPOSE:** Otjinene community meeting

No.	Name	Surname	Gender	Affiliation /Institution	Position	Email	Telephone	Signature
1	Tjijenguа	N!Bаuleua	M.	OTA.	Councillor (OTA)		0815909946	[signature]
2	Erwin	Katjizeu	M	ORC	Councilor (Otjinene)		0811607988	[signature]
3	Obson	Kandjii	M.	Farmer			0813161515	[signature]
4								
5								
6				n = 23				
7				♀ = 4,	♂ = 19.			
8								
9								

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Ms. N. Kanime (acting Director: Planning of Omusati Regional Council)

Venue and Date: Ongwediva RDC, 27/4/2017

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
ORC developmt projects	Discussion of the many developmental activities run by ORC, e.g. tomato processing plant, Okaanga irrigation	Project to support + expand
Most pressing needs	Equipment to make land arable + cultivate it	Project to investigate supporting procurement directly + indirectly by developing cooperative input supplies. Technical advice.
Previous projects	Short explanation of previous projects (eg. Land Degrad. Neutrality)	preparedness of communities previous efforts continuity of development
Institutionalisation of training	"Farmer Training Academy" linked to Regional Council	Direct objective of project

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Governor E. Endjala

Venue and Date: Governor's office, 27/4/2017

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Governor's development plans	many development activities planned, some of importance to project	Project to link up + support relevant developmental activities
Institutional cooperation	Governor's office in need of objective, quality technical advice & research	NUST to follow up offer of MOU.
Investment opportunities	We brain-stormed up-front investment opportunities for farmers and business planning.	Some project plans may require financing + business planning, link to regional investment opportunities
Institutionalisation of training	"Farmer Training Activity" linked to Governor's office	Direct objective (no. 4) of project.

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
FIELD WORK: PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
ATTENDANCE REGISTER

DATE: 26/4/2017 TIME: 08.00 VENUE: DVS office Outapi (Omusati region)

Name	Surname	Affiliation/Institution	Position	Email	Telephone
Axel	Rothange	AgriConsult Namibia		agriconsult@iway.na	0811403833
Josephat PETER	PETER	MAWF-DVS	SV	ndokofola@hotmail.com	0812780808
Laina K.	Hango	MAWF-DVS	SV	hangoke@yahoo.com	0718829202
Mutjinde	KATJIUA	NUST	Professor	mkatjiua@nust.na	0810328248
Absai	Taapopi	DVS-Outapi	CAHT	taapopia@hotmail.com	0812879668

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Alberto Jason (FSP/CLDP mentor, chairperson: Om. L/stock Mark. Coop).
Elise Haimbondi (Admin. Director: Omusati Livestock Marketing Cooperative)
Venue and Date: MAWF new bldg; 26/4/2017.

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Needs	identified pressing needs for distances + lack of transport for slaughter abattoir operations	systematic training & capacity building, demo plots cattle / facilitate solutions
Diversification opportunities	e.g. fish ponds, greenhouse grasses	to be investigated + developed
Human - wildlife conflict	elephant, lions	to be mitigated.

Meeting adjourned:
Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES : DVS meeting

Present: see attendance register

Venue and Date: DVS Office Outapi (Omusati region)

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Outapi abattoir	Opens June 2017, to be tendered out (private operator), Otampe-Omaue fattening facility?	Project to support supply chain, cattle condition + seasonality of marketing
Community Animal Health Workers	Status of CAHW with VCN, training, functions	expand function to Community Agricultural Resource Worker, training, refresher training
Fodder production in Omusati	- support/boost slaughter cattle condition - support VCF on Angolan border - on SSCF and MCK resettlement areas	Project to promote fodder production
Outapi Town Butchery	- status (NDC, MTISD), privately operated - many retailers in town	regionally preferential procurement by local bulk meat consumers.
Omusati Livestock Market Cooperative	- structure - operation - membership	- build capacity - boost supply chain - expand function (kicks, fencing, health etc.)
1.) Eartags 2.) Vaccinations 3.) Coordination of regional MAWF	free eartagging has stopped make CBPP + FMD compulsory Regional Dir. of Agric.	re-activate NamLITS training, subsidize start-up central coordinator - vital stakeholder!

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
FIELD WORK: PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
ATTENDANCE REGISTER

DATE: TIME: VENUE:

Name	Surname	Affiliation/Institution	Position	Email	Telephone
NDINELAO	WEYULU	Omahenene Crop Research Station	Chief Agric Technician	ndatelela@yahoo.com	065-259059
Irene	Mundjele	Omahenene Crop Research Station	Senior Agric. Scientific Officer	lituwete@webmail.co.za	065-259059 0812773501
Emilia	Thomas	Omahenene Crop Research Station	Agriculture Technician	kaunapower@webmail.co.za	065259059
Mufinde	KATJIUA	mkatjiua@nust.na	Nust	NUST Prof	0810328248
Axel	Rothauge	AgriConsult Namibia	Consultant	agriconsult@iway.na	0811 403833.

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Martin Petrus (Chief Control Officer, RWS)

Venue and Date: Ontapi RWS Bldg, 25/4/2017

Agenda point	Discussion/Action points	Responsible and By When / Applicability to project
Boreholes	New boreholes drilled + existing ones rehabilitated, for drought relief	Sustainable water supply
Irrigation	Using saline groundwater for irrigation of veggies: Elim, Okashana	Get info from GIZ-sponsored Cuve Waters Project to support project's irrigation plans
Desalination	Desalinate saline borehole water for human consumption: Akutsima Amarika	Avoid competition between humans and livestock for drinking water.

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Paulus Amutenya (Chairperson: Olushandja Horticultural Producers Association) (72 members, 2-20ha/farm, arable)

Venue and Date: Olushandja

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Marketing challenges	lack of markets " " marketing information	Project to boost marketing of fresh produce
Services by AMTA	no transport inadequate marketing slow payment	improve AMTA's institutional capacity, develop new markets with help of stake-holders like NAB
Production info	soil analysis fertilizer recommendation pest & weed control	FTA to include rapid field analysis service (e.g. by probes) for fertilizer recomm. & production hygiene
Training	farmers (Olushandja horticulture) always need training	FTA to provide systematic, repeated & applied training with practical participation
	Recommendation: OHPA farmers very eager to uplift themselves. Very suitable site for project intervention, incl. horticultural expert.	

Meeting adjourned:
Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Mahanene DARD staff; see attendance register

Venue and Date: Omahanene board room, 27/4/2017

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Challenges of station	plant breeding, pests & weeds, soil health, fodder production, crop storage	This is in line with ~~project~~ objectives, to be addressed.
Challenges of farmers	crop + fodder production issues, knowledge & skills transfer ~~institutional capacity~~	
Slow uptake of info	Farmers not reached by or slow to respond to new information, storage + processing ~~post harvest~~	Proposed farmer Training Academy to provide backstopping, value addition

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

1. Prof Katjiua Mutjinde (AF Team)
2. Ms Vetumbavi Mbaha

Venue and Date: Okarui (1 ha horticulture, 3 ha dry land and small nursery) Otjinene, 27/04/2017

Agenda point	Discussion/Action points	Applicability
• Horticulture Production	• Production of Carrots, tomatoes, beetroots, cabbages, cucumbers, green papers and onions	• Pest control • To be improved with drip irrigation
• Dryland	• Production of Maize and Cow peace	• Capacity building
•	•	•
•	•	•
•	•	•
•	•	•

Meeting adjourned:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Next meeting:

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

3. Dr Axel Rothauge (AF Team)
4. Prof Katjiua Mutjinde (AF Team)
5. Mr Josephat Peter (MAWF-DVS)
6. Ms Laina K Hango (MAWF – DVS)
7. Mr Abisai Tapopi (DVS-Outapi)

Venue and Date: DVS Office Outapi, (Omusati Region), 26/04/2017

Agenda point	Discussion/Action points	Applicability
• Outapi Abattoir	• Opens June 2017, to be tendered out (Private Opetaros) • Otampe-Omane fattening facility	• Project to support supply chain, cattle condition and seasonality of marketing
• Community Animal Health Workers	• Status of CAWH with VCN, training functions	• Expand function to Community Agricultural Resource Workers, training refresher training
• Fodder production in Omusati	• Support/boost slaughter cattle condition • Support VCF on Angola border • On SSCF and MLR resettlement areas	• Project to promote fodder production
• Outapi Town Butchery	• Status(NDC, MTISD) Privately operated • Many retailers in town	• Regionally preferential procurement by local bulk meat consumers

• Omusati Livestock Market Cooperative	• Structure • Operation • Membership	• Build capacity • Boost supply chain • Expand function (licks, fencing, health etc)
• Ear tags • Vaccinations • Coordination of regional MAWF	• Free ear tagging has stopped • Make CBPP & F& M compulsory • Regional Directorate of Agriculture	• Re-activate NamLIST • Training, subsidize, start-up central coordinator • Vital stakeholder

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

8. Mr E ENdjala (Governor of Omusati Regional)
9. Prof Katjiua Mutjinde
10. Dr Axel

Venue and Date: Ongwediva – Governor's Office, 27/04/2017

Agenda point	Discussion/Action points	Applicability
• Governor's Developmental Plan	• Many development activities planned some of important to the project	• Project to link up and support relevant developmental activities currently in place
• Institutional cooperation	• Governor's office in need of objective, quality technical advice and research	• NUST to follow up on offer of MOU

• Investment opportunities	• We brain-stormed up-front investment opportunities and business planning for farmers.	• Some project plans may require financing and business planning, link to regional investment opportunities
• Institutionalization of training	• "Farmer Training Activities" linked to the Governor's office	• Direct objective (no. 4) of project

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

11. Ms N Kanime (Acting Director: Planning of Omusati Regional Council)
12. Prof Katjiua Mutjinde
13. Dr Axel

Venue and Date: Ongwediva RDC, 27/04/2017

Agenda point	Discussion/Action points	Applicability
• ORC Development Projects	• Discussion of the many developmental activities run by ORC, e.g tomato processing plant, Okaanga Irrigation Project,	• Project to be supported and expand
• Most pressing needs	• Equipment to make land available and cultivate it	• Project to investigate supporting procurement directly & indirectly by developing cooperative input supplies. Technical advise

• Previous Projects	• Short explanation of previous project (e.g Land Degradation Neutrality	• Preparedness of community • Previous efforts • Continuity of development
• Institutionalization of training	• "Farmer Training Academy" linked to the Regional Council	• Direct objective of project

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

14. Dr Axel Rothauge (AF Team)
15. Prof Katjiua Mutjinde (AF Team)
16. Mr Paulus Autenya (Chairperson: Olushandja Horticultural Producers Association of 72 Members, 2-20 ha/Farm)

Venue and Date: Olushandja, 25/04/2017

Agenda point	Discussion/Action points	Applicability
• Marketing challenges	• Lack of markets and information	• Project to boost marketing of fresh produce
• Services by AMTA	• No transport inadequate marketing slow payment	• Improve AMTA's institutional capacity, develop new markets with help of stakeholders like NAB •

• Production information	• Sold analysis • Fertilizer recommendations • Pest and weed control	• FTA to include rapid field analysis service (e.g by probes) for fertilizer recommendation & production hygiene
• Training	• Farmers of Olushandja horticulture always need training	• FTA to provide systematic, repeated and applied training with practical participation
•	•	•
•	**Recommendations:** • OHPA farmers very eager to uplift themselves. Very suitable site for project intervention, including horticultural experts	•

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

17. Dr Axel Rothauge (AF Team)
18. Prof Katjiua Mutjinde (AF Team)
19. Mr Albertus Jason (FSP/CLDP Memtor and Chair Person Omusati Livestock Marketing Cooperative)
20. Ms Elise Haimbondi (Admin Director: Omusati Livestock Marketing Cooperative

Venue and Date: MAWF new Building, 26/04/2017

Agenda point	Discussion/Action points	Applicability

• Needs	• Identified pressing needs for distances and lack of transport for slaughter cattle • Abattoir operation	• Systematic training & capacity building, • Demo plots • Facilitate solutions
• Diversification opportunities	• E.g fish ponds, • Greyhens grasses	• To be investigated and developed
• Human-Wildlife conflict	• Elephant • Lion	• To be mitigated

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

21. Dr Axel Rothauge (AF Team)
22. Prof Katjiua Mutjinde (AF Team)
23. Mr Martin Petrus (Chief Control Officer, RWS)

Venue and Date: Outapi RWS Building, 25/04/2017

Agenda point	Discussion/Action points	Applicability
• Boreholes	• New boreholes drilled & existing • One rehabilitated for drought relief	• Sustainable water supply
• Irrigation	• Using saline groundwater for irrigation of veggies at Ellim and Okatana	• Get information from GIZ – sponsored Cuve Waters Project to support project's irrigation plans

		•
• Desalination	• Desalinate saline borehole water for human consumption : Akusima and Amarika villages	• Avoid competition between human and livestock for drinking water

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

24. Prof Katjiua Mutjinde (AF Team)
25. Klaudia Amutenya (Liaison Officer NAFOLA (2014-2019 Project)

Venue and Date: MAWF-DOF Office, 11/05/2017

Agenda point	Discussion/Action points	Applicability
• Community forest	• Aligning community forests to conservancy boundaries • Same management membership	• Forests/rangeland management plans • Allow for invader bush harvesting for charcoal or woody production •
• Conservation Agriculture	• Established demonstration plots for conservation agriculture - Otjombinde (4) - Eiseb (6)	• They could be expanded • Training can be enhanced • Otjombinde crop farmers coop can be a partner

• Rangeland condition assessment	• Collection of data: - 2 dry seasons 2015/2016 - 2 wet seasons 2016/2017 • Classified the rangeland conditions	• But needs capacity to analyze the data

Meeting adjourned:

Next meeting:

Annexure 3: Consultation Minutes: Omaheke Region (2017 and 2018)

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Omuthiya Governor's Office, 08/05/2018

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	- Governor welcomed the NUST-AF team and indicated outlined his role in the region. - NUST-AF Team introduced the project and briefed the Governor about the Project - Governor indicated that he is happy to include his region in the Project and he fully supports this project. - Governor indicated that the projects addresses the needs of the couples.	
2.	- The Governor will provide the letter of endorsement for the project without reservations.	
(*)	The PA to the Governor also came in the meeting and was briefed about the project (Mr Ngwate).	
3.	- The priorities of the couples are overlapping and are reflected in the proposed project. - PA indicated that there are challenges on raising livestock	
4.	- Adaptation initiatives are still lacking in this region, there is a need to increase resilience of farmers to CC impacts. - Dairy husbandry is needed, some studies on the feasibility studies have been carried out. - This project is an answer to the prayers of this region - according to the PA	

PA = Personal Assistant to the Governor!!!

COMMENT ON OUR SUPPORT — PA

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Regional Council (Mr Tjiyinda), Gobabis, 08/05/18 Director

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	- Introduce the project to the Director - CC.	Director
Director	- Climate change is a key issue affecting livestock production	
	- We need to improve our livelihood under CC	
	- Bush encroachment is a big challenge	
2.	- Overgrazing - we need to have interventions in place to increase resilience	
	- Range management is an issue	
	- Omaheke Regional profile clearly outline the developmental problems in the region	
3.		
4.		

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

☒

MINUTES OF MEETING

Venue and Date: Epukiro Constituency Office, 11/05/2018

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	Councilor gave an opening prayer and welcomed everyone to the meeting. The NUST-AF team introduced the project and linked it to the development aspirations of the community. The Team leader went on to introduce the NUST-AF team and community members introduced themselves.	
	- Bush encroachment is reducing the grazing capacity of the land.	
2.	- Limited grazing for livestock. - Climate change problems. - Poor veld management. - Forest Act by GRN which restricts the use of bushes in communal areas for charcoal. - Poisonous plants (mainly Aug – Sept) - Animal diseases like lumpy skin.	
3.	- Disease outbreaks from wildlife which escapes from protected game areas. - Linked trade on animal husbandry and research. - Vaccination challenges, GRN does less than the colonial times. - Coordination of livestock marketing among all the stakeholders.	
	- Poor control of stocking - Illegal fencing in communal areas - Overstocking of livestock	settlements
4.	- Limited marketing opportunities for livestock products. - Auction yards are not in good standards to meet export standards. - Infrastructure for animal diseases and other health issues. - Communication infrastructure is a challenge. - Quarantine stations close to borders. - Poor feeder roads to markets. - Collusion among big livestock buyers especially white in South Africa - Livestock theft escalating - Low prices from deteriorating abattoirs. - Drought subsidies should be robust. - Low rainfall/droughts - Dilapidated boreholes/boreholes drying out - Uncontrolled bush fires - Lack of agricultural implements - Variable rainfall	

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

☑

MINUTES OF MEETING

Venue and Date: Epukiro Constituency Office, 11/05/2018

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	Councilor gave an opening prayer and welcomed everyone to the meeting. The NWT-AF team introduced the project and linked it to the development aspirations of the community. The Team leader went on to introduce the NWT-AF team and county officials introduced themselves.	
	- Bush encroachment in reducing the grazing capacity of the land.	
2.	- Limited grazing for livestock. - Climate change problems. - Poor land management. - Forest Act by GRN which restricts the use of bushes in communal areas for charcoal. - Poisonous plants (mainly Aug – Sept) - Animal diseases like lumpy skin.	
3.	- Disease outbreaks, from wildlife that escapes from protected area. - Limited training on animal husbandry and research. - Vaccination challenges, GRN doing less than the colonial times. - Coordination of livestock marketing among all the stakeholders. - poor control of stocking settlements - Illegal fencing in communal areas - Overstocking of livestock.	
4.	- limited marketing opportunities for livestock products. - Auction yards are not in good standards to meet export standard. - Infrastructure for animal diseases and other health issues. - Communication infrastructure is a challenge. - Quarantine stations close to Botswana. - Poor feeder roads to markets. - Collusion among big livestock buyers especially white in South Africa - Livestock theft escalating - low prices from deteriorating exchange rates. - Drought subsidies should be robust. - Low rainfall/droughts - Dilapidated boreholes / boreholes drying out - Uncontrolled bush fires - Lack of agricultural implements - Variable rainfall	

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Otjombinde Community meeting 10/08/2018 12:00

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	The Councillor opened the meeting and welcomed his community members to the meeting. The NUST-AF team introduced the project by going through the project components. Emphasis was put on the need to include the views of the community in terms of their climate adaptation needs.	
Challenges	- Lack of water for human and livestock	
2.	- Overgrazing is a big challenge - Overstocking leading to less grasses - Bush encroachment - Quarantine fence is difficult to maintain - Poisonous plants - Animal diseases - Limited marketing opportunities	
3.	- Forest Act restricting the use of wood - Depleted grazing land - Inherited degraded land from whites. - Stock theft - Youth unemployment - need to use the youth for entrepreneurship - High rainfall variability and rainfall patterns have changed - Above leads to poor crop yields - Regular drought occurrence - Poor feeder road infrastructure & maintenance.	
4.	- Middle man effects	

Otniel Kurandgera

08/2738168

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Otjimuna Community meeting 09/05/18

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	Councilor welcomed all to the meeting and declared the meeting open. Nust-AF team introduced the project to the community	
challenges	- poisonous plants - Water scarcity - need for boreholes - Livestock diseases - need training on health problem solving techniques - Value addition machines to produce mango med - Bush encroachment is a challenges	
2.	- Lack of markets for crops - Farmers get price takers in terms of marketing their livestock - Drought - Can we convert bush to fodder for animals? - Rain is very variable - High temperatures	
3.	- Roaming Buffaloes transmitting diseases hence restricting animal movements in the NP - Land degradation - No knowledge on CC - Need to educate farmers to increase their preparations - No knowledge on financial mgt. - Road accidents involving livestock (Need for fencing to control livestock grazing. - Lack of network for communication - Lack of information centres for livestock prices etc.	
4.	- Expansion of urban land into grassland areas.	

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE

ADAPTATION PROJECT IN NAMIBIA

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

MINUTES OF MEETING

Venue and Date: Otjiwarongo ~~Regional~~ Constituency Council, 09/05/2018

AGENDA POINTS	Discussion/Action points	COMMENT
1. Introduction	- Councilor welcomed the NUST-AF team. - NUST-AF team introduced the project to the councilor and how it fits in the developmental aspirations of the regions.	
2.	- Climate change is a big issue. - Rainfall pattern is unpredictable and community has to be sensitized about CC.	
	- Winters are becoming warmer. - No information on CC have been provided.	
3.	- Limited tractors - now only one tractor is available.	
	- [redacted] HWC conflicts - Bush encroachment - Farm policy doesn't allow people to harvest other bushes. There is a need to revise the policy to enable farmers to	
	prune other livelihood activities to adapt to the impacts of CC. - Community is eager to participate in	
	crop farming. - Lack of improved livestock and crop production activities.	
	- Inconsistent livestock prices (marketing is done by us, not by us). Prices are mostly dictated. - Livestock disease - Now a Buffalo is	
4.	roaming around and all livestock movements have been stopped. - Middleman is a problem in livestock marketing. - Abattoirs/kraals are not up to the required standards. - poor infrastructure.	

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

1. Prof Katjiua Mutjinde (AF Team)
2. Dr Jorry U Kausivi (Chief Extension Officer – MAWF)

Venue and Date: MAWF Offices, Gobabis, 90/05/2017

Agenda point	Discussion/Action points	Applicability
• Crop Production	• Irrigated crop production ca take place in Southern Omaheke – Aminus Constituency where opportunities is abundant. However – little is taking place due to cultural constraint • Dry land cropping, conservation agriculture is being implemented in Epukiro Otjinene, Eiseb and Otjombinde areas	• Revive small scale irrigation interventions in the area e.g Okonyama, Aminus RK etc to serve as a demonstration sites in Otjinene
• Rangeland Management and Livestock production	• Animal husbandry is doing well • Drought and diseases preparedness is lacking behind	• Resilience to drought, climate change is needed • Different grazing, and rangeland management
• Fodder production	• Baling of reserved grazing plots • Reseeding of degraded lands and resting	• Bales production • Deferred grazing management
• Capacity building	• Skills and knowledge creation and development	• Capacity building in: - Irrigated crops - Rangeland management - Fodder production and management

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

3. Prof Katjiua Mutjinde (AF Team)
4. Ms Bethel Kazapua (Extension Officer)

Venue and Date: Eiseb 10, MAWF, 27/04/2017

Agenda point	Discussion/Action points	Applicability
• Dry Land Crop Production	• CA is being applied at a new pilot site. • Challenges – Lack of implements • Lack of crop pest and carved cricket	• Expansion of cons. Agriculture • Stalls and know-how in fertilization and soil health
• Horticulture	• Need for all year crop production by use of drip irrigation	• Need for horticulture activities • Some sites for this are already identified and will be used for capacity building and will be equipped with horticulture activities/production
•	•	•
•	•	•
•	•	•
•	•	•

Meeting adjourned:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Next meeting:

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

5. Prof Katjiua Mutjinde (AF Team)
6. Dr Jorry U Kausivi (Chief Extension Officer – MAWF)

Venue and Date: MAWF Offices, Gobabis, 90/05/2017

Agenda point	Discussion/Action points	Applicability
• Crop Production	• Irrigated crop production ca take place in Southern Omaheke – Aminus Constituency where opportunities is abundant. However – little is taking place due to cultural constraint • Dry land cropping, conservation agriculture is being implemented in Epukiro Otjinene, Eiseb and Otjombinde areas	• Revive small scale irrigation interventions in the area e.g Okonyama, Aminus RK etc to serve as a demonstration sites in Otjinene
• Rangeland Management and Livestock production	• Animal husbandry is doing well • Drought and diseases preparedness is lacking behind	• Resilience to drought, climate change is needed • Different grazing, and rangeland management
• Fodder production	• Baling of reserved grazing plots • Reseeding of degraded lands and resting	• Bales production • Deferred grazing management
• Capacity building	• Skills and knowledge creation and development	• Capacity building in: - Irrigated crops - Rangeland management - Fodder production and management

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

7. Prof Katjiua Mutjinde (AF Team)
8. Mr Ewald Kaihiva
9. Abednego Mbazuvara (Vice Chairperson)
10. Nelson Kangootui (Secretary)
11. Tjandeka Putuaota (Chairperson)

Venue and Date: Otjinene Community Forest, Otjinene, 10/05/2017

Agenda point	Discussion/Action points	Applicability
• Formation	• 20 Registered members – open for expansion for membership • 12 villages identified for debushing • Registered with MAWF	• Can harvest invader bush for charcoal, fodder of wood production • Need an after care management plan
• Fences/	- Selection of some villages with amps to facilitate resting and rotational grazing	• Community forest works closely with the Otjinene farmers association and can assist with the selection of farmers
• Fodder Production	• New villages hae sufficient grass cover, this can be preserved and camps, harvested baled and marketed to support the village	• Fodder production and distribution during drought seasons to assist farmers in need

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

12. Prof Katjiua Mutjinde (AF Team)
13. Mr Tjandeka Putuaota (Otjjinene Farmers Association -Chairperson)

Venue and Date: Otjinene, 10/05/2017

Agenda point	Discussion/Action points	Applicability
• Weaner Production	• The biggest limiting factor in livestock production is the selling of young animals/weaners • No local value addition	• Farmers need to be encouraged to produce oxen/steers and other slaughter-ready animals (cattle) • Options to develop local value additions need consideration of butcheries and abattoirs
• Rangeland Management	• Challenge being - Overgrazing/bush encroachment - Those with camps are not practicing rotational grazing - Others have little options for rotational grazing	• Capacity building in grazing management • Demonstration sites for rotation and implementations
• Fodder Production	• Local fodder production will provide food to livestock during drought seasons • Reseeding and resting will allow for regeneration	• Application of reseeding strategies • Creation of fodder banks / grazing reserves for balling (grass harvesting)
• Capacity building	• Skills and knowledge creation and development	• Capacity building in: - Irrigated crops - Rangeland management - Fodder production and management

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

14. Prof Katjiua Mutjinde (AF Team)
15. Mr Aron Nangolo (Treasure)
16. Mr Stofos Marenga

Venue and Date: Otjozondjupa Conservancy, 27/04/2017

Agenda point	Discussion/Action points	Applicability
• Bush harvesting	• Awareness of bush encroachment • Employing youth to clear invader bush	• Challenges: Labour for de bushing, resting period for clear land
• Reseeding	• Resting cleared plots using branches to control grazing • Grass recruitment is a serious challenge • Herbaceous invaders get established	•
• Overgrazing • Absence of rotation grazing	• Odendaal fences are not maintained	• Rotational grazing is a challenge for much of the farmers • 3 community forests are formed and overlapping with conservancy boundary • This provide opportunities for bush harvesting

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present:

17. Prof Katjiua Mutjinde (AF Team)
18. Abednego Mbazuvara (representing Vizamehi Crop Farmers' Cooperative)

Venue and Date: Otjinene, 10/05/2017

Agenda point	Discussion/Action points	Applicability
• Establishment	• Established in 2012 • Main producers comes from Ovizuzu, Okauwa, Okami – focusing on dry cropping with very few in Horticulture	• Generally dry land cropping is carried out • Conservation Agriculture need to be encouraged
• Fodder Production	• Farmers use crop residue for livestock • Mainly maize and beans	• For goats and goats feed

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present:

1. Prof Katjiua Mutjinde (AF Team)
2. Ms Bazara Mbuende (Youth Officer Ministry of Sports Youth and National Services)

Venue and Date: Otjinene, 10/05/2017

Agenda point	Discussion/Action points	Applicability
• Facilitation of Youth Empowerment	• Creates opportunities for capacity building among the youth • Focusses on skills development and livelihood diversification	• Collaborate partnership in training at local level

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA
PREPARATION GRANT FUND
ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS
PROJECT MEETING MINUTES

Present: Ms Bethel Kazapua 12/5/2017

Venue and Date: Eiseb 10. MAWF / Extension Officer

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Dryland Crop production	CA is being applied at a few pilot sites Challenges: lack of implements	• Expansion of cons. agric • Skills & know-how on fertilizer and soil health • Pest control.
	- Crop pests (armed cricket-	
Horticulture	Need for all-year crop production eg by use of drip irrigation	• Need for horticulture, some sites for this are already identified. ↳ Capacity bldg need be acquired for horticultural production.

Meeting adjourned:
Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Ms Vetumbuavi Mbaha — Horticulture + Dryland

Venue and Date: Okavi, Ofinene — 1 ha horticulture 3ha Dryland + Small nursery

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Horticulture production	carrots, tomatoes, beetroots, cabbages, cucumbers green peppers, Onions.	Pest control - improve from furrow to drip irrigation needed.
Dryland	maize, cowpeas,	Capacity bldg.

Meeting adjourned:

Next meeting: 10 members

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Aron Nangolo (Treasurer) Gobabis Conservancy
Stofas Marenga

Venue and Date:

Agenda point	Discussion/Action points	Responsible and By When
Bush Harvesting	• Awareness of bush encroachment. • Employing youth to clear invader bush.	• Challenges: labour for debushing • resting period for cleared/ reseeded lands • Applicability
Reseeding	Resting cleared plots / using branches to control grazing. Grass recruitment is a serious challenge: herbaceous invaders get established	
Overgrazing absence of rotational grazing	• Odendaal fences are not maintained.	• Rotational grazing is a challenge for much of the farmers.
		• 3 Community forests are being formed each overlayed with conservancy boundaries. This provide an opportunities for bush harvesting.

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Klaudia Amutenya, Liaison Officer, NAFOLA (2014-2019 Project Duration) under MAWF/DoF

Venue and Date: 11/05/2017

Agenda point	Discussion/Action points	Responsible and By When Applicants
Community Forests	Aligning Community Forests to conservancy boundaries. Same management/membership	- Forests/rangeland management plans - allowing for invader bush-harvesting for charcoal or woody production
CA	Established demonstration plots for conservation agriculture < Otjombinde = 4, Eiseb 6 plots.	- These could be expanded - training can be enhanced - Otjombinde Crop Farmers' Coop can be a partner
Rangeland Condition Assessment.	• Collected data: 2 dry seasons 2015/2016, 2 wet seasons 2016/2017 • Classified the rangeland conditions.	but needs capacity to analyse the data.

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Ms. Bayara Mbuende ; Youth Officer

Venue and Date: 10/05/2017 Offices Ministry of Sports Youth and National Service

Agenda point	Discussion/Action points	Responsible ~~and~~ By When Applicable
Facilitation of Youth Empowerment	• Creates opportunities for capacity building among the youth	° Collaborate/ partnership in terms at local level
	• Focuses on skills development and livelihood diversification.	

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: DR. Jorry U. Kaurivi, Chief Extension Officer Omaheke.

Venue and Date: MAWF Offices / Gobabis 09 May 2017.

Agenda point	Discussion/Action points	~~Responsible and By When~~ Application
Crop production	• Irrigated crop production can take place in Southern Omaheke - Aminius Constituency, where groundwater is abundant. However - little is taking place - cultural constraint.	Revive small-scale irrigation interventions in the area e.g. Okonyama, ~~RK~~ Aminius RK, etc to serve as demonstration sites / Otjinene - Okamu; Horticulture
	• Dryland Cropping / Conservation Agriculture is being implemented in Epukiro, Otjinene, Eiseb and Otjombinde areas.	Expand existing application of CA in the Otjinene, Epukiro, Otjombinde, Eiseb areas. - Demonstration sites, Capacity bldg. / Silage production
Rangelands & Livestock prod.	• Animal husbandry is doing well. • Drought and disease preparedness is lacking behind.	• Resilience to Droughts, climate change is needed; • deferred grazing, baling, rangeland management.
Fodder Production	• Baling of reserved grazing plots. • Re-seeding of degraded lands & resting • For Silage production; Seeds & pods harvesting.	• bales production • deferred grazing management. •
Capacity bldg	Skills development / Ca... Knowledge creation &	~~CA~~ Capacity bldg: - irrigated crops - rangeland management - fodder production & management.

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Tjandeka Putuacta, Otjiene Farmers Association, Chairperson.

Venue and Date: 10 May 2017

Agenda point	Discussion/Action points	~~Responsible and By When~~ Application
Weaner production	The biggest limiting factor in livestock production is the selling of young animals weaners. No local value addition	• Farmers need to be encouraged to produce oxen/steers and other slaughter-ready animals (cattle). • Options to develop local ~~pro~~ value additions need consideration butcheries, abattoirs.
Rangeland Management	• Challenges: Overgrazing / bush encroachment. • Those with camps are not practising rotational grazing. • Others have little options for rotational grazing	• Capacity bldg in grazing management • Demonstration sites for ~~illegible~~ can be implemented
Fodder production	• Local fodder production will provide feeds to livestock during dry seasons (bales) • Reseeding and resting will allow for regeneration.	• Application of reseeding strategies. • Creation of fodder bank/grazing reserves for baling. (grass-bankers)

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES (Otjinene Community Forest)

Present: Ewald Kaihiva, Abednego Mbazuvera (vice-chair), Nelson Kangootui (Secretary), Tjandeka Putuaota (Chairperson).

Venue and Date: Otjinene 10 May 2017

Agenda point	Discussion/Action points	~~Responsible and By When~~ Applicability
Formation	20 registered members - open for further expansion of membership - 12 villages identified for debushing. Registered with MAWF.	Can harvest invader bush for charcoal, fodder of wood production need an after care management plan.
Fences/enclosures	Selection of some villages with camps to facilitate resting and rotational grazing	Community Forest works closely with the Otjinene Farmers association - can assist with farmer selection
Fodder Production	New villages have sufficient grass cover - this can be preserve in camps, harvested baled and marketed to villages in need	- Fodder production - distribution - assist farmers in need (drought affected).

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Mr. Abednego Mbazuvara

Venue and Date: 10/5/2017 Vizamehi Crop farmers' Cooperative.

Agenda point	Discussion/Action points	Responsible and By When Applicability
Established in 2012.	Main producers come from:	Generally dryland cropping is carried out. Conservation Agric need to be encouraged.
	Ovizezu, Okauua, Okavii: Focus is dryland cropping; Few in Horticulture	
Fodder Production	Farmers use crop residue for livestock mainly: maize and beans	For calves and goats – feed.

Meeting adjourned:

Next meeting:

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

PREPARATION GRANT FUND

ADAPTATION FUND PROPOSAL DEVELOPMENT PROCESS

PROJECT MEETING MINUTES

Present: Tjavanga Kamburona NAFOLA Field Officer Epukiro

Venue and Date: 09 May 2017, Gobabis

Agenda point	Discussion/Action points	~~Responsible and By~~ When Application.
→ of Community Forests Establishment).	. whole of Epukiro Constituency. . Forest inventories done . Management plans being worked on.	Community Forests will have the mandate to harvest forest resources eg bush (invader bush).
Wood harvesting.	. Wood harvesters are not permitted yet because of lack of Community Forest.	NUST implementation team can provide the management - and DoF will have no problem.

Meeting adjourned:

Next meeting:

Annexure 4: Endorsement Letters: Omusati Region (2017 and 2018)

REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

Ruacana Constituency Office

Tel: (065) 272133
Fax:(065) 272006
E-mail: ruacanaconst@gmail.com
Enquiries'A.K Komeya

P/Bag 523
Outapi
25 April 2018

TO WHOM IT MAY CONCERN

LETTER OF ENDORESEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTERGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA.

Dear Sir/Madam

Ruacana Constituency Office herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for Community-based integrated Farming System for Climate Change Adaptation "Project in Namibia in the framework to implement the Project Formulation Grant(PFG) which will result in full proposal submission for the approval of the Adaption Fund(AF).

Our Community is particularly interest in working with Namibia University of Science and Technology(NUST) to enable us to improve agricultural production and adaption to climate change through climate-smart technologies and innovations' is in a better position provide us with following:

1. Advise and exposure to appropriate technology and approach
2. Broker services between stakeholders and researchers to enhance their learning processes
3. Technical support extension services
4. Community capacity development

The Constituency Office therefore strongly endorses the Namibia University of Science and Technology 'proposal for project funding Adaptation Fund.

Regards,

A. Shintama
Regional Councillor

2018 -04- 25
PRIVATE BAG 523
OUTAPI
OMUSATI REGION

All official correspondence must be addressed to the Chief Regional Officer

REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

TSANDI CONSTITUENCY OFFICE

Tel: (065) 258239
Fax: 088643774
E-mail: tsandiconst@gmail.com
Enquiries' M. Uushona

P/Bag 523
Outapi
25 April 2018

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Tsandi Constituency Office herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia** in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

Our office is particularly interested in working with Namibia University of Science and Technology (NUST) to enable us to improve agricultural production and adaptation to climate change through climate-smart technologies and innovations. NUST is in a better position to provide us with the following:

1. advise and exposure to appropriate technology and approaches;
2. broker services between stakeholders and researchers to enhance their learning processes;
3. technical support (extension services);
4. community capacity development.

The Tsandi Constituency Office therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

.....
Hon. Junias Amunkete
Regional Councillor

All Official Correspondences must be addressed to Chief Regional Officer

REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

OKAHAO CONSTITUENCY OFFICE

Tel: (065) 252408
Fax: (065) 252111
E-mail: okahaoconst@gmail.com
Enquiries: L. Shikulo

P/ Bag 523
OUTAPI

25 April 2018

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Okahao Constituency Office herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia** in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

Our office is particularly interested in working with Namibia University of Science and Technology (NUST) to enable us to improve agricultural production and adaptation to climate change through climate-smart technologies and innovations. NUST is in a better position to provide us with the following:

1. advise and exposure to appropriate technology and approaches;
2. broker services between stakeholders and researchers to enhance their learning processes;
3. technical support (extension services);
4. community capacity development.

The Okahao Constituency office therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

LEONARD SHIKULO
COUNCILLOR

OKAHAO CONSTITUENCY OFFICE
25 APR 2018
Private Bag 523, Outapi
TEL: 065-252408
FAX: 065-252111

REPUBLIC OF NAMIBIA

OMUSATI REGION

OFFICE OF THE GOVERNOR

Tel: (065) 250614
Fax: (065) 251170
E-mail: **vekandjo@omusatirc.gov.na**

Private Bag 523
OUTAPI

Enquiries: ***E. Endjala***

27 April 2017

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Hon. Erginus Endjala, Governor of Omusati herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia.** The proposal will be developed with a Project Formulation Grant (PFG) which may result in full proposal submission for the approval of the Adaptation Fund (AF).

We are convinced that this important project will enhance sustainable livelihoods of farmers of Omusati Region by introducing innovative methods and technologies for climate change adaptation in Omusati Region. The NUST is particularly interested in strategic and sustainable alliances with sustainable local partners to implement projects jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for all parties involved especially for capacity development.

As Regional Governor of Omusati Region, I therefore strongly endorse the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

Erginus Endjala
Regional Governor

OMUSATI REGION
27 APR 2017

AMARIKA FARMERS COOPERATIVE LTD

P O Box 175
Okahao
Ongandjera
02 May 2017
0812514569

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Amarika Farmer's Cooperative Ltd herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia.** The proposal will be developed with a Project Formulation Grant (PFG) which may result in full proposal submission for the approval of the Adaptation Fund (AF).

We are convinced that this important project will enhance sustainable livelihoods of farmers in the Omusati region by introducing innovative methods and technologies for climate change adaptation to the region. The NUST is particularly interested in strategic and sustainable alliances with sustainable local partners to implement projects jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for all parties involved especially for capacity development.

The Amarika Farmer's Cooperative Ltd therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

Epafras Eshumba
Board Secretary

AMARIKA FARMERS COOPERATIVE LTD

P. O. BOX 175
OKAHAO
OMUSATI REGION
0816028855/0811474103
EMAIL: amarikafc@yahoo.com

All official correspondence must be addressed to the Chairperson

Olushandja Horticultural Marketing Centre

Epalela settlement, Opposite Onesi gravel road, Onesi Constituency, Omusati region, Namibia
P. O. Box 1127
Outapi
Namibia

Tel: 065 258736/ Fax: 0886519467
Cell: 0812443204
Email: Olushandjamc@iway.na

26 April 2017

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Olushandja Horticultural Producers Association herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia.** The proposal will be developed with a Project Formulation Grant (PFG) which may result in full proposal submission for the approval of the Adaptation Fund (AF).

We are convinced that this important project will enhance sustainable livelihoods of the Olushandja HPA by introducing innovative methods and technologies for climate change adaptation in Omusati Region. The NUST is particularly interested in strategic and sustainable alliances with sustainable local partners to implement projects jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for all parties involved especially for capacity development.

The Olushandja HPA therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

.....

Paulus Amutenya
Chairperson
Olushandja HPA

OLUSHANDJA H.P.A
TEL: 065-258736
FAX: 0886519467
2017 -04- 26
PO BOX 1127
OUTAPI, NAMIBIA

P.O.BOX 1285, Outapi, Namibia ●+264811273797 (Chairperson)/+264812623341(Office Admin) ●Email: okshiyagaya@gmail.com

28.04. 2017

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Omusati Regional Livestock Marketing Co-operative herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia.** The proposal will be developed with a Project Formulation Grant (PFG) which may result in full proposal submission for the approval of the Adaptation Fund (AF).

We are convinced that this important project will enhance sustainable livelihoods of farmers in the Omusati region by introducing innovative methods and technologies for climate change adaptation to the region. The NUST is particularly interested in strategic and sustainable alliances with sustainable local partners to implement projects jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for all parties involved especially for capacity development.

The Omusati Regional Livestock Marketing Co-operative therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

Opeipawa Shiyagaya ..... 2017/04/27.....
Chairperson (Omusati Regional Livestock Marketing Co-operative)

OMUSATI REGIONAL LIVESTOCK MARKETING COOPERATIVE
2017 -04- 28
P.O. Box 1285
OUTAPI
REPUBLIC OF NAMIBIA

REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND FORESTRY

Tel: +264 65 251420/ 251682/ 200000
Fax: +264 65 251649
Enq: Dr. J. Peter/ L.K. Hango

Directorate of Veterinary Services
North West Sub-Division-Animal Disease Control
Outapi State Veterinary Office
P.O. Box 144, Outapi

Date: 26th April 2017

TO WHOM IT MAY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir / Madam,

The Directorate of Veterinary Service (DVS) in the Ministry of Agriculture, Water and Forestry (MAWF) in Omusati Region is herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia.** The proposal will be developed with a Project Formulation Grant (PFG) which may result in full proposal submission for the approval of the Adaptation Fund (AF).

We are convinced that this important project will enhance sustainable livelihoods of the Omusati Farmers by introducing innovative methods and technologies for climate change adaptation in Omusati Region. The NUST is particularly interested in strategic and sustainable alliances with sustainable local partners to implement projects jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for all parties involved especially for capacity development.

The Directorate of Veterinary Service in the region is therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

J. P
LCH

Dr. J. Peter

(State Veterinarian – Omusati Region)

Dr. L. K. Hango

(State Veterinarian – Omusati Region)

Mr. A. Taapopi

(Chief Animal Health Technician – Omusati Region)

Annexure 5: Endorsement Letters: Omaheke Region (2017 and 2018)

REPUBLIC OF NAMIBIA

OMAHEKE REGION

OFFICE OF THE GOVERNOR

Enquiries: Ndina-Tate Imasiku
Tel: +264 62 563032
Fax: +264 62 564007
E-mail: nimasiku@omahekeog.gov.na

Kesslau Building
82 Church Street, 2nd Floor
P/Bag 2001
Gobabis, Namibia

May 08, 2018

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Office of the Governor – Omaheke Region herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia** in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

Our office is particularly interested in working with Namibia University of Science and Technology (NUST) to enable us to improve agricultural production and adaptation to climate change through climate-smart technologies and innovations. NUST is in a better position to provide us with the following:

1. advise and exposure to appropriate technology and approaches;
2. broker services between stakeholders and researchers to enhance their learning processes;
3. technical support (extension services);
4. community capacity development.

The Governor's office therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

F.T. Ueitele
Regional Governor

OFFICE OF THE GOVERNOR
Omaheke Region
08 MAY 2018
Private Bag 2001
Gobabis

Omaheke Regional Council
EPUKIRO CONSTITUENCY OFFICE

Enquiries: Hon. CV. Kanguatjivi
Tel. 062-567224
Fax. 062-567225
E-mail: c.kanguatjivi@parliament.na

11 May 2018

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir or Madam,

The Epukiro Community herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia** in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

Our Epukiro Community is particularly interested in working with Namibia University of Science and Technology (NUST) to enable us to improve agricultural production and adaptation to climate change through climate-smart technologies and innovations. NUST is in a better position to provide us with the following:

1. advise and exposure to appropriate technology and approaches;
2. broker services between stakeholders and researchers to enhance their learning processes;
3. technical support (extension services);
4. community capacity development.

The Councilor of the Epukiro Constituency therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely,

.....
Hon. Cornelius V. Kanguatjivi (MP)
Regional Councilor: Epukiro Constituency

OMAHEKE REGION
2018 -05- 11
EPUKIRO CONSTITUENCY OFFICE

Omaheke Regional Council

OTJINENE CONSTITUENCY OFFICE

Private Bag 1005
Otjinene

Tel: 062-567838
Fax: 062-567839

Enquiries: Hon. E. V. Katjizeu
0811607889

09 May 2018

Dear Sir/Madam

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

The Otjinene Constituency office herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for "Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

Otjinene Constituency office is particularly interested in working with Namibia University of Science and Technology (NUST) to enable us to improve agricultural production and adaptation to climate change through climate-smart technologies and innovations. NUST is in a better position to provide us with the following:

1. advise and exposure to appropriate technology and approaches;
2. broker services between stakeholders and researchers to enhance their learning processes;
3. technical support (extension services);
4. community capacity development.

The Otjinene Constituency office therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours sincerely

Honorable Erwin Vetarera Katjizeu
Regional Councilor Otjinene Constituency

Constituency Office
09 MAY 2018

Omaheke Regional Council
EPUKIRO CONSTITUENCY OFFICE

Enquiries: Hon. C.V. Kauguatjivi (MP)
Tel: (062) 567224
Fax: (062) 567225
E-mail: c.kauguatjivi@parliament.na

Private Bag 2277
Gobabis

31 July 2017

TO WHOM IT MY CONCERN

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTEGRATED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir/Madam,

The Epukiro Constituency Development Committee herewith expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"Community-based Integrated Farming Systems for Climate Change Adaptation" Project in Namibia** in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

The NUST is particularly interested in strategic alliances complementary to our quest to develop sustainable local partners through joint project implementation through the involvement of faculty and students. In line with this, the Epukiro Constituency Council, foresees its role in participating in this project as follows:

1. ensure that vulnerable members of selected communities are directly benefiting from the proposed project and thus improving their livelihoods;
2. local perspective, ownership, advise and exposure to appropriate technology and approaches are taken on board;
3. broker services between stakeholders and researchers to enhance their learning processes; and
4. continue to encourage communities to be masters of their own destiny by actively engaging in development interventions that contribute positively to their wellbeing;

We are convinced that this important project will enhance sustainable livelihoods by introducing innovative methods and technologies for climate change adaptation in selected villages of the constituency. If successful, this project would be mutually beneficial for all parties involved in terms of leveraging existing research platforms on

farming technology systems into new and unexplored dimensions of capacity development.

The Epukiro Constituency Development Committee therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours Sincerely,

Hon. Cornelius V. Kanguatjivi (MP)
Chairperson of the Constituency Development Committee
Regional Councilor: Epukiro Constituency

OMAHEKE REGIONAL COUNCIL

Tel: 063 273344
Fax: 063 273344

P/Bag 2277
Gobabis

AMINUIS CONSTITUENCY OFFICE
OFFICE OF THE REGIONAL COUNCILOR

Enquiries: Hon. P.K Kazongominja
Our Ref:

17 May 2018

To whom it may concern

LETTER OF ENDORSEMENT: WILLINGNESS TO PARTICIPATE IN THE COMMUNITY-BASED INTERGRADED FARMING SYSTEMS FOR CLIMATE CHANGE ADAPTATION PROJECT IN NAMIBIA

Dear Sir/Madam

The Aminius Constituency Office here with expresses its intention to collaborate with Namibia University of Science and Technology (NUST) on the project proposal for **"community- based Integrated Farming Systems for Climate Change Adaption 'Project in Namibia"** in the framework to implement the Project Formulation Grant (PFG) which will result in full proposal submission for the approval of the Adaptation Fund (AF).

Our Omaheke Regional Office is particularly interested in working with Namibia University of Science and Technology (NUST) to enable us to improve agricultural production and adaptation to climate change through climate-smart technologies and innovations. NUST is position to provide in a better us with the following:

1. Advise and exposure to appropriate technology and approaches;
2. Broker services between stakeholders and researchers to enhance their learning processes;
3. Technical support (extension services);
4. Community capacity development.

The Aminius Constituency Office therefore strongly endorses the Namibia University of Science and Technology's proposal for project funding from the Adaptation Fund.

Yours Sincerely

Hon. P.K Kazongominja (MP)
Regional Councilor
Aminuis Constituency

Otjinene community forestry

P. O. Box 100

Otjinene

Email:kangootuinelson@gmail.com

Cell no: 081 319 3880

10/05/2017

Dear Sir / Madam

The Otjinene community forestry herewith expresses in intention to collaborate with Namibia University of science and technology (NUST) on the project proposal for community based integrated farming system for climate change Adaption Project in Namibia. The proposal submission for the approval of Adaption fund (FA).

We are convinced that this important project will enhance sustainable livelihoods of the Otjinene community by introducing innovative methods and technologies for climate change adaption in Otjinene. The NUST in particularly interested in strategic and sustainable alliance with sustainable local partners to implement project jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for parties involves especially for capacity development.

The Otjinene community forestry therefore strongly endorses the Namibia University of Science and Technology proposal for project funding from Adaption fund.

Yours sincerely

.....

Nelson Kangootui CELL: 0813193880

The chairperson of (Otjinene community forestry)

Vizamehi cooprative

P. O. Box 120

Otjinene

Email: kangootuinelson@gmail.com

Cell no: 081 359 1048

10/05/2017

Dear Sir / Madam

Vizamehi cooperative herewith expresses in intention to collaborate with Namibia University of science and technology (NUST) on the project proposal for community based integrated farming system for climate change Adaption Project in Namibia. The proposal submission for the approval of Adaption fund (FA).

We are convinced that this important project will enhance sustainable livelihoods of the Otjinene community by introducing innovative methods and technologies for climate change adaption in Otjinene. The NUST in particularly interested in strategic and sustainable alliance with sustainable local partners to implement project jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for parties involves especially for capacity development.

Vizamehi cooperative therefore strongly endorses the Namibia University of Science and Technology proposal for project funding from Adaption fund.

Yours sincerely

.....

A.T. Mbazuvara CELL: 0813591048

The chairperson of (Vizamehi cooprative)

Otjinene farmer's Association

HEAD OFFICE

Erf No. 1&2
Otjinene
Enquiries :

P.O. Box 161
Otjinene
Fax/Tel: 062-567559

10/05/2017

Dear sir/Madam

The Otjinene Farmers Association herewith expresses in intention to collaborate with Namibia University of science and technology (NUST) on the project proposal for community based integrated farming system for climate change Adaption Project in Namibia. The proposal submission for the approval of Adaption fund (FA).

We are convinced that this important project will enhance sustainable livelihoods of the Otjinene farmers by introducing innovative methods and technologies for climate change adaption in Otjinene. The NUST in particularly interested in strategic and sustainable alliance with sustainable local partners to implement projects jointly through involving faculty staff and students. If successful, this project would be mutually beneficial for parties involves especially for capacity development.

The Otjinene Farmers Association therefore strongly endorses the Namibia University of Science and Technology proposal for project funding from Adaption fund.

Yours sincerely.

Tjandeka Putuaota

Chairperson of (Otjinene farmers association)

Contact number (0816575934)

Annexure 6: Environment and Social Impact Assessment Report

Community-based integrated farming systems for climate change adaptation project in Namibia

Environmental and Social Impact Assessment

and

Environmental and Social Management Plan

31 July 2018

Executive Summary

This Environmental and Social Impact Assessment (ESIA) has been prepared in support of a project proposal entitled "*Community-based integrated farming systems for climate change adaptation project in Namibia"* (the project) by the Government of Namibia (GRN) to the Adaptation Fund (AF). The project has been screened against the AF Social and Environmental Standards Procedure and deemed a Moderate Risk (Category B) project. As such, an ESIA has been prepared for the project.

This report covers findings of the Environmental and Social Impact Assessment (ESIA) study that was carried out as part of the Project Proposal development. The higher-level development objective of the project is to increase food production and food security, including access to better nutrition and enhanced standards of living for the local communities in the project areas. This objective is in line with the country's agricultural development policy as encapsulated in the National Development Plan and Namibia's Vision 2030.

The Ministry of Environment and Tourism (MET) as the National Designated Authority and the Namibia University of Science and Technology (NUST) as the executing entity will lead the project. The MET and NUST will be supported by a Project Steering Committee (PSC) for the implementation of the project and compliance with this ESIA.

The project will target 324,514 people in Omaheke and Omusati Regions of Namibia that are highly vulnerable to climate change induced extreme events. It will improve the resilience of communities through various actions which will improve farmers' resilience to the negative impacts of climate change on their livelihoods. The project is aligned with Namibia's Nationally Determined Contribution (NDC) in terms of the Paris Agreement, whose adaptation priorities include sustainable agriculture production. It is also aligned with Namibia's National Policy on Climate Change and anchored in the National Development Plan. The proposed project will seek to reduce the impacts and risks of combined effects of natural variability and climate change-induced increases in rainfall variability, temperature and water deficit by proposing more adaptive management of dry-land cropping, irrigated horticultural and extensive livestock and wildlife ranching systems and more sustainable ecosystem management in these predominantly communal regions of Namibia.

The project has the potential to cause moderate environmental and social impacts. Risks on biodiversity may emanate from rehabilitation work on the encroacher bush as well as support to agriculture production systems such as production of fodder for livestock which could have an effect on native species.

The project has developed a Grievance Redress Mechanism to deal with any complaints and issues that may arise as a result of the project. This Grievance Redress Mechanism complies with Namibian and AF Safeguard procedures.

Appropriate and relevant avoidance and mitigation options have been proposed in the ESIA, which if put in place, will significantly reduce the potential impacts of the project to an acceptable level. Moreover, the project will have significant environmental and social benefits that will be achieved more generally.

Budgeting for environmental and social interventions and the application of mitigation measures to enhance positive impacts for the project is an investment in the future as it will reduce the environmental and social liability on NUST and communities. The end result of this budget will be that there will be improved resilience to the impacts of climate change, healthy ecosystems, more knowledgeable communities and overall improvement in the quality of life of the population as an investment in the future of the people of Namibia, which if implemented

as per the project proposal, will be repaid many times over through reduced long-term operation and maintenance costs of implementing the project.

Economically, the project will result in positive externalities to the country as economic benefits are more than the economic costs of the project. Additionally, the provision of food to the country, creation of employment opportunities and generation of foreign exchange from tradable commodities will positively contribute towards the country's gross domestic product GDP and Balance of Payments (BOP). Compared to these benefits, the major negative externality relates to the potential pollution of the soil and water resources following use of agrochemicals and the alteration of natural flora and fauna as a result of farming activities. However, a sound social and environmental management plan has been developed against these negative externalities.

Based on the direct and indirect project benefits, a No Project option is not a viable alternative for this project. Considering the fact, the potential project impacts can be avoided or mitigate effectively, the project benefits outweigh the costs in terms of adverse impacts.

Contents

Glossary of Terms

Baseline information: Information usually consisting of facts and figures collected at the initial stages of a project. It provides a basis for measuring how far the achieves its objectives

Civil society: The many organizations and individuals throughout society but excluding government

Cumulative impacts: An action that in itself is not significant, but is significant when added to the impact of other similar actions

Environment: The term "environment" is used in its broadest definition during an environmental assessment process. As such, it includes the biological environment, physical environment, social environment, economic environment, cultural environment, historic environment, etc.

Interested and affected parties (IAPs): Individuals, communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. These may include local communities, investors, business associations, trade unions, customers, consumers, farmers, residents, environmental interest groups and a host of others. Environmental consultants or stakeholder engagement practitioners are not considered I&APs due to the requirement that they remain independent and objective

Impacts: The positive or negative effects of a specific project or projects

Mandate: The authority given to a group or individual to represent and act for others

Participation: To take part in or becomes involved in a particular activity; a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them.

Proponent: Any individual, government department, authority, mining company, industry or association putting forward a proposal for a proposed development. In the mining industry, “proponent” would refer to the mining company proposing to embark on for example mineral exploration, an expansion to an existing mine or minerals processing facility, a proposed new mine or minerals processing facility, or closure of a mine

Specialist: An expert who is devoted to one occupation or branch of learning

Stakeholders: include, businesses, government and civil society

List of Abbreviations

AF	Adaptation Fund
DEA	Department of Environmental Affairs
DRFN	Desert Research Foundation of Namibia
EA	Environmental Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EMS	Environmental Management System
ESA	Environmental Scoping Assessment
I&AP	Interested & Affected Party
MET	Ministry of Environment & Tourism
NUST	Namibia University of Science and Technology

1. Introduction

This Environmental and Social Impact Assessment (ESIA) has been prepared in support of a project proposal for "*community-based integrated farming systems for climate change adaptation project in Namibia*" by the Government of Namibia to the Adaptation Fund (AF). The Ministry of Environment and Tourism (MET) as the National Designated Authority and the Namibia University of Science and Technology (NUST) as the executing entity will lead the project. As this project is supported by the Desert Research Foundation of Namibia (DRFN) in its role as a AF Accredited Entity, the project has been screened against both DRFN's Social and Environmental Standards Procedure and the AF Environmental and Social Assessment Policy and is deemed a Moderate Risk (AF Environmental and Social Assessment Policy Category B) project. As such, an ESIA has been prepared for the project.

The ESIA seeks to both enhance environmental and social development benefits of the programme and mitigate any adverse impacts, in line with Namibian regulations and the Fund's Environmental and Social Policy. This document provides the outcome of the environmental and social assessments of the project that are foreseen as part of the project implementation.

The report therefore:

- ✓ specific environmental and social due diligence provisions necessary to avoid, minimize or mitigate potential risks associated with projects, and monitor their outcomes.
- ✓ specifies appropriate roles and responsibilities,
- ✓ outlines the necessary reporting procedures for managing and monitoring environmental and social issues related to the projects covered by the programme,
- ✓ determines the training, capacity building and technical assistance needed to successfully implement the provisions of this report.

2. Project Overview

Agriculture is the dominant economic activity in Namibia. The livelihood of communities mainly depends on rain fed farming and animal husbandry. More than 70% of the population in Namibia are dependent on subsistence agriculture for their livelihoods. The Country's Poverty Sectoral Plan and the Fifth National Development (NDP 5) includes a component on increasing household food security. Some of the activities aimed at achieving this plan include distribution of subsidized inputs, support to "back yard horticulture", allocation of grazing and cropping land, improving food relief and target the poor rural, urban and peri-urban populations.

However, under the conditions of climate change (erratic rainfall patterns, more frequent droughts) people will struggle to cope with the adverse effects (including crop failure and livestock deaths). Therefore, the country's targeted interventions may fail to deliver due to the effects of climate change.

The Community-based integrated farming systems for climate change adaptation project in Namibia project is aimed at supporting various actions which will improve farmers' resilience to the negative impacts of climate change on their livelihoods in the Omaheke and Omusati Regions of Namibia. It is fully aligned with Government strategies, addresses key concerns

related to climate change in the region, builds on recent advances in research and technology and is, as an open programme, driven by local demand.

The overall objective or goal of the proposed project is to assist vulnerable rural communities to implement adaptation actions and practices that strengthen their adaptive capacities and enhance resilience of their farming systems and value chains to climate variability and change over a project period of 5 years. These "vulnerable communities" are the small-scale communal farmers residing in the Omusati and Omaheke regions of Namibia, identified as "highly vulnerable" in two of Namibia's fourteen regions chosen to model and demonstrate climate adaptation.

In both the chosen model regions, anthropogenic factors accelerate the rate of degradation of natural resources, enhanced by the impact of climate change. The proposed project will seek to reduce the impacts and risks of combined effects of natural variability and climate change-induced increases in rainfall variability, temperature and water deficit by proposing more adaptive management of dry-land cropping, irrigated horticultural and extensive livestock and wildlife ranching systems and more sustainable ecosystem management in these predominantly communal regions of Namibia. However, maintaining or even increasing physical production of agricultural produce (the "push" factor) in the face of climate change is not enough to improve livelihoods of people and reduce the vulnerability of societies. Produce must be marketed effectively to earn farmers an income and if possible, processed to add more value to raw products (the "pull" factors). Hence, increased value addition and improved marketing are essential to secure economic and societal gain and are important components of the proposed project. "Pushing" and "pulling" agricultural and natural resource-based production along is best achieved by building the capacity of individual and groups of producers and of institutions serving the agricultural sector and its producers. Such progress is best supported by a conducive legal, policy and regulatory framework, and hence these aspects are described as distinct project components in the proposed project.

To better achieve the overall objective or goal of the proposed project, three more specific objectives were identified:

1. To improve ecosystem management in the chosen model regions by implementing climate-smart management and rehabilitation techniques that improve the fodder flow and ecological services provided by natural rangelands and "forests"[1], thus making local communities more resilient against climate change impacts.
2. To further the implementation of climate-smart production, management and value-addition techniques in local and regional crop and animal (wild game and livestock) production systems and value chains, to enhance the adaptive capacity of vulnerable communities to climate variability and change along the whole value chain.
3. To strengthen the knowledge and skills of vulnerable communities required to adapt and become more resilient to climate change and variability by building their capacity along the whole value chain(s) that they are involved in.

3. Methodology

Different institutions and individuals participated in stakeholder consultation workshops organized by NUST from 23 April to 11 May 2018. During these workshops, environmental and

[1]: These two regions of Namibia are too arid to harbour true forests. However, they have dry woodlands that are managed as forests, therefore the term "forest" is used conveniently and in the wider sense.

social risks and associated mitigation measures were identified, in consultation with the stakeholders. Following from the meetings, stakeholders participated in further stakeholder consultations through telephonic interviews and email. In this section the methods and approaches use to engage stakeholders to collect the environmental and social risks are presented.

3.1 Approach

To ensure the collection of representative risks and impacts of the envisage projects, the following approaches were used; (a) Workshops with community members in the two target regions and, (b) consultative meetings with keys stakeholders in Windhoek and in the regions (c) study of literature and maps of the two target regions including biophysical features. These approaches were found to be adequate and representative as sufficient information was collected for the ESIA.

A wide range of stakeholders, particularly local communities, were consulted during preparation of the proposal. At the outset of the design process, NUST led the first two phases, namely the consultative meeting involving stakeholders at national, regional, and local levels. To ensure sustainability of the information, strategies and processes followed, due diligence was ensured by the members of the National Climate Change Committee (NCCC), a multi-sectoral platform that includes private, public and civic organisations.

3.2 Scoping Phase

Scoping of the two Regions and familiarization of the study area, existing environmental set up, including settlements, land uses, boundaries of the project area, and human activities among others was undertaken.

Specific scope and coverage of the project study included the following:

- ✓ Analysis of socio-economic and socio-cultural baseline parameters of the proposed project area and area of influence.
- ✓ Develop an Environmental and Social Management Plan that outlines, possible impacts, mitigation measures necessary to address negative impacts and a monitoring framework.
- ✓ Assess level of compensation for impacts that cannot be avoided.
- ✓ Prepare an emergency response procedure as appropriate

The scoping exercise also resulted in the formulation of an initial Environmental Impact Identification Matrix (IIM) which was further refined as the study progressed.

3.3 Consultative framework

Public consultation was conducted through stakeholder consultation meetings and individual interviews. The aim of these meetings was to explain to the local community and other stakeholders about the project objectives, the proposed activities including, construction and operations and expected outputs.

This exercise was critical in assisting the team to understand the local conditions and use of Indigenous Knowledge Systems (IKS) existing and inherent within the local communities and institutions in the project area. The stakeholders' consultation also helped in highlighting the serious socio-economic and environmental concerns and impacts that could arise from the

project and was instrumental in helping to come up with feasible mitigation measures. To ensure a holistic approach and the inclusion of marginalized and vulnerable groups in the discussion, more especially women, the following approaches were used to engage the stakeholders at each and every workshop:

Approach 1: Presentation to all attendees

At each workshop, an overview of what ESS is, its objectives and the performance standards criteria were presented to the participants to (re)-introduce them to the concept, engage their understanding on the matter, and provide clarifications where needed. This set the scene for the group work activities conducted later in the day, following another brief recap of the concept.

Approach 2: Focus group discussions with a facilitator

Participants were then divided into groups and asked to identify potential environmental and social risks in their respective areas, which emanate from potential tourism related activities and impact their livelihoods. These were listed on flip charts. To each risk identified, the mitigation measures were identified collectively with the communities

This exercise provided the key environmental and social risks that threaten the sustainability of agriculture in the respective areas. Following these intensive consultative 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 (10 females out of 25 males) as contributions to the policy and strategy development process. To ensure that there is direct buy-in by the governors and regional councillors of the Omusati and Omaheke regions, local agricultural unions, farmers' cooperatives and individual farmers that are involved in crop production, horticulture and livestock production were consulted during the project formulation (Table 1 below).

Table 1: Stakeholders consulted during the project formulation

Name and affiliation	Gender	Institution	Contacts
Omusati			
Hon. Endjala, Governor of Omusati Region	Male	Political head of Omusati region	+26465 250614
Ndapanda Kanime, RC	Female	Deputy Director Rural Services	+26481 124 7683
Martin Petrus, Chief Controller	Male	Rural Water Supply/MAWF	Outapi
Dr Laina Hango, Department of Veterinary Services (DVS);	Female	State Veterinarians/ MAWF	+26481 82 9202
Dr Josaphat Peters, (DVS)	Male	State Veterinarians	+264 65 251420
Albertus Jason, Omusati Livestock Marketing Cooperative	Male	Deals with Ohamajongwe Farmers' Coop, Amarika Farmers' Coop; and Group Livestock Management Scheme at Otjitjekwa and Omutambomaue.	+264813447815; jasonalbertus@yahoo.com
Elise Haimbondi, Admin Officer - Omusati Livestock Marketing Coop	Female	Administration of livestock marketing and transportation	+264812623341

Name and affiliation	Gender	Institution	Contacts
Weyulu, Mahenene Research Station Manager	Female	Research on: Crop varieties, pasture and fodder production, pest management and control,	ndatelela@yahoo.com
Suama Nangolo (Secretary), Eriki Shituomunu (Chairperson of the Board)	Female	Northern Namibia Farmers Seed Growers Cooperative	+264 812601154
Paulus Amutenya, Chairperson; Ms Johanna Admin Officer	Male	Olushandja Horticultural Producers Association	Chairperson: +264812443204, +264812961496. Admin Officer +264813840681
Martin Embundile, Chief Extension Officer,	Male	DAPEES / MAWF	+264 65 251028
Omaheke			
Hon. Erwin Katjizeu, Otjinene Constituency Councillor	Male	Political Head of the constituency	+264811607998
Hon. Chester Kaurivi, Otjombinde Constituency	Male	Political Head of the constituency	+264811657779
Hon. Tjaitonga Kanguatjivi, Epukiro Constituency Councillor	Maile	Political Head of the constituency	+264812629263
Tweumuna Tjaronda Treasurer of Epukiro Crop Farmers' Cooperative	Female	Dry-land crop production in Epukiro Constituency	
Nguezeeta Hange Kazondunge, Otjombinde Crop Farmers' Cooperative	Female	Dry-land crop production in Otjombinde Constituency	
Bethel Kazapua, Extension Officer – DAPEES/MAWF Eiseb Block	Female	Dry-land crop production in Otjombinde Constituency	+264812998292
Vetumbuavi Mbaha Cchairperson of Okarui Women Horticulture	Female	Horticultural production Otjinene constituency	+2642967827 +2644354900
Mbazuvara, Vizamehi Crop Farmers' Cooperative	Male	Dry-land crop production in Otjinene Constituency	+264 813591048
Aron Nangolo, Treasurer of Otjombinde Conservancy	Male	Wildlife conservation, rangeland management	+264816967722
Mbazuvara, Chairperson of Otjinene	Male	Otjinene constituency – bush harvesting and charcoal production	+264 813591048
Ms Klaudia Hamutenya, NAFOLA Liaison Officer	Female	Responsible for community forests in Otjombinde Constituency	+264814682164
Tjavanga Kamburona, NAFOLA Liaison Officer	Male	Responsible for community forests in Epukiro Constituency	+264812050674

3.4 Outcomes

From regional workshops, participants were found to support the proposed project as it will bring to their areas the following benefits:

- Job opportunities for the locals
- Better marketing and networking opportunities
- Skills development & transfer (benefits to local communities)
- Improved food security
- Better income from the sales of their livestock and farm produce

Stakeholders consulted proposed that the project should consider the following possible risks:

- Over abstraction of groundwater
- Destruction of habitats and land degradation
- Surface and groundwater water pollution
- Introduction of invasive vegetation
- Overharvesting of natural resources
- Destruction of grazing areas
- Changes in vegetation cover
- Land degradation
- Climate change may pose a risk to the sustainability of activities
- Increased GHG emissions in transport
- Health and safety
- Employment creation
- Unfair labour practices
- Increased human-wildlife conflict
- Indirect changes in land uses
- Unequal distribution of benefits from the proposed initiatives

3.5 Limitations with stakeholder consultations

The risks and mitigation measures were discussed in a one-day meeting, with a crowded agenda, covering different aspects on project development (such as confirmation of project concept, ESIA, gender and communication requirements). Detailed environmental assessment should be conducted for each specific project of the proposal. This will assist in the interrogation of major or approach risks and mitigation measures that were identified at the workshops and consultative meeting. However, for the purpose of this exercise the collected information for the identification of the risk and the proposed mitigation measures are sufficient.

4. Relevant Policies and Guidelines

The ESIA Policy of the AF is consistent with Namibia's Environmental Management Act, other related laws and policies which ensure that developmental projects do not affect the environment and people but enhances benefits to the environment and the people. Below is a list of the laws and policies which are applicable to the proposed project.

The Constitution of the Republic of Namibia (1990)

There are two clauses contained in the Namibian Constitution that are of particular relevance to sound environmental management practice, viz. articles 91(c) and 95(l). In summary, these refer to:

- Guarding against over-utilization of biological natural resources;
- over-exploitation of non-renewable resources;
- Ensuring ecosystem functionality;

- Protecting Namibia's sense of place and character;
- Maintaining biological diversity; and
- Pursuing sustainable natural resource use.

The above-mentioned guides commit the State to actively promote and sustain environmental welfare of the nation by formulating and institutionalizing policies to accomplish the sustainable development objectives. These should also be upholding in the development and implementation of the envisaged project.

Namibia's Environmental Management Act (EMA) (Act No 7 of 2007)

As the main legal document on environmental sustainability, the EMA has formulated principles for sound management of the environment and natural resources in an integrated manner. Part 1 of the Act describes and puts into perspective the importance of an environment that does not pose threats to human health, proper protection of the environment, broadened focus on the part of individuals and communities, and reasonable access to information regarding the state of the environment. Part 2 of the Act is of particular significance to ESS and sets out 12 principles of environmental management, as follows:

1. Renewable resources shall be utilized on a sustainable basis for the benefit of current and future generations of Namibians.
2. Community involvement in natural resource management and sharing in the resulting benefits shall be promoted and facilitated.
3. Public participation in decisions affecting the environment shall be promoted.
4. Fair and equitable access to natural resources shall be promoted.
5. Equitable access to sufficient water of acceptable quality and adequate sanitation shall be promoted and the water needs of ecological systems shall be fulfilled to ensure the sustainability of such systems.
6. The precautionary principle and the strategy of preventative action shall be applied.
7. There shall be prior environmental assessment of projects and proposals which may significantly affect the environment or use of natural resources.
8. Sustainable development shall be promoted in land-use planning.
9. Namibia's movable and immovable cultural and natural heritage, including its biodiversity, shall be protected and respected for the benefit of current and future generations.
10. Generators of waste and polluting substances shall adopt the best practicable environmental option to reduce such generation at source; and the polluter pays principle shall be applied.
11. Reduction, reuse and recycling of waste shall be promoted.
12. Promotion of the coordinated and integrated management of the environment;

In terms of the Environmental Assessment Policy of 1994 and the Environmental Management Act (Act No 7 of 2007) (EMA), the activities required for tourism in the CBNRM areas require authorization from the Directorate of Environmental Affairs at the Ministry of Environmental and Tourism (MET: DEA).

Namibia's Vision 2030

Vision 2030 states that natural environments are disappearing quickly and the natural beauty that many areas in Namibia provide are becoming sought after commodities; and must therefore be regarded as valuable natural assets. This is accompanied by promoting healthy environments basic services, economic growth and sustained livelihoods. The principles that underpin Vision 2030, a policy framework for Namibia's long-term national development, complement the ESS performance standards in tourism related activities through:

1. Good governance;
2. Partnership;
3. Capacity enhancement;
4. Comparative advantage;
5. Sustainable development;
6. Economic growth;
7. National sovereignty and human integrity;
8. Environment; and
9. Peace and security.

This envisaged project should support the goals set out in Vision 2030, by aligning its development and management plans to the principles because tourism activities in CBNRM areas have the potential to create employment and ultimately contribute to national wealth.

National Policy on Climate Change for Namibia (2011)

The National Policy on Climate Change (NPCC) pursues constitutional obligations of the Government of the Republic of Namibia, namely for "the state to promote the welfare of its people and protection of Namibia's environment for both present and future generation." The policy recognises Namibia's environmental constraints and vulnerabilities, and seeks to outline a coherent, transparent and inclusive framework on climate risk management in accordance with Namibia's national development agenda and legal framework. Similarly, the policy takes cognizance of Namibia comparative advantages with regard to the abundant potential for renewable energy exploitation, of which this project should take into account. The overall goal of the policy is to strengthen national capacities to reduce climate change risks and build resilience for any climate change shocks. The project may therefore contribute by sensitizing local communities on matters of climate change and intensify awareness education and developing training packages on climate-resilient and sustainable management practices or techniques.

National Climate Change Strategy & Action Plan (NCCSAP) 2013 – 2020

Climate change is a complex and cross-cutting issue and its impacts directly on the entire chain of national development. The NCCSAP was developed as a result of the growing concern and discourse focusing on climate variability and climate change risks and impacts affecting Namibia's social, environmental and economic developmental potential. Therefore, in order to implement the NPCC, the NCCSAP was adopted in 2013 as a key instrument and comprehensive practical tool, which offers guidance on the mechanisms, means and manner of implementation. It is clear that climate change awareness, knowledge and understanding, both in terms of the risks, impacts and responses is rapidly developing. This may call for a mid-term review process of the implementation and impact of the NCCSAP in order to better the adaptation mechanisms and guide future projects such as those related to CBNRM.

Water Resources Management Act (Act no. 11 of 2013)

This Act provides a framework for managing water resources based on the principles of integrated water resources management (IWRM). It provides for the management, development, protection, conservation, and use of water resources. This relates to the performance standards assessing resource efficiency and pollution prevention; as well as biodiversity conservation and sustainable management of living natural resources.
Relevant principles of the Act include, inter alia:

- Equitable access for all people to safe drinking water is an essential basic human right to support a healthy productive life;

- Harmonization of human water needs with the requirements of environmental ecosystems and the species that depend on them, while maintaining the water quality;
- Promotion of the sustainable development and integrated management of water resources which incorporates social, technical, economic, and environmental issues;
- Development of the most cost-effective solutions, including conservation measures, to infrastructure for the provision of water; and
- Prioritizing water awareness and the participation of interested and affected stakeholders in the decision-making process of any water resource development initiative.

The Department of Water Affairs and Forestry (DWAF) in the Ministry of Agriculture, Water and Forestry (MAWF), is the legal custodian for the implementation of the Act. Key components of the Act, of relevance to the proposed project are with regards to wastewater management and ground and surface water abstraction. In accordance with Sections 68 to 75 of the Water Act No 11 of 2013, details of any water treatment facility must be submitted to the DWAF for the issuing of a water abstraction/water treatment/wastewater / brine discharge licence. It is therefore necessary that any facility which would be considered in the CBNRM project meets these requirements.

Water Act (Act 54 of 1956)

This Act is partially replaced by the Water Resource Management Act, which consolidates and amends the laws relating to the control, conservation and use of water for domestic, agricultural, urban and industrial purposes. The Act will phase out once Regulations for the Water Resources Management of 2013come into effect. The main purpose of the Water Act is to provide for the sustainable development and use of water resources, and restricts the pollution of waters by means of any activity. This Act requires proposed developments to investigate and implement measures to ensure sustainable use of water resources and ensure that no pollution of any above or below ground water takes place.

Water & Sanitation Policies

The existing water and sanitation policy in place is Water Supply and Sanitation Sector Policy (WSASP) which was adopted in 2008, to replace the National Water Policy of 2000 and the National Sanitation Strategy of 2009, which is based on this WSASP policy.
In terms of the Water Resources Management Act of 2013 and the Water Supply and Sanitation Policy, a developer or client will:

- Take steps to prevent “any public or private water on or under that land, including rainwater that falls on or flows over or penetrates such land” from being polluted.
- Require a permit for the disposal of effluent/brine and or industrial wastewater.

Of particular concern in the Policy is the prevention of surface- and groundwater pollution, therefore the collection, storage, disposal waste from toilets facilities and others should be conducted accordingly or to comply with the permit requirements.
In terms of the National Sanitation Strategy 2010/11 – 2014/15, the developer/contractor must put in place strategies:

- Guaranteeing safe and affordable sanitation, encouraging decentralized sanitation systems where appropriate.
- That should promote recycling through safe and hygienic recovery and use of nutrients, organics, trace elements, water and energy, and the safe disposal of all human and other wastes, including sewage and industrial effluent, in an environmentally sustainable fashion.

Code of Practice: Volume 2 – Pond Systems (2008)

In the Water Resources Management Act, 2013 (Act No. 11 of 2013), there are conditions laid down to ensure that proper wastewater treatment is provided and to facilitate good operation of different wastewater treatment systems and their methods of disposal. One of the main objectives is to use and protect our most valuable natural resources, namely water, and to encourage reuse of the treated wastewater where possible. Biological treatment processes, which include activated sludge processes, trickling filters (bio filters), oxidation ponds and even the self-purification powers of rivers, all operate on essentially the same fundamental biochemical principles. They differ from one another primarily in the method of utilising dissolved oxygen. Appropriate wastewater treatment and reuse methods will significantly reduce the various demands and pressure on the water resource in the areas; and lessen adverse impacts to the environment. Therefore, proposed projects must identify and incorporate cost-effective and environmentally friendly wastewater treatment options in their developmental plans. Human health and safety aspects should also be prioritized.

Code of Practice: Volume 6 – Wastewater Reuse (2012)

In this manual, the treatment and reuse of wastewater are discussed, and Water Quality Standards for Effluent are also listed in Appendix A of the manual. This guideline addresses the use of grey water and treated domestic and industrial effluents / waste water for reuse in industrial, agricultural and aqua cultural applications. Namibia is an arid country and the Water Resources Management Act 2013 (Act No. 11 of 2013) therefore also encourages the reuse of suitably treated wastewater. Conversely, it is important to realize that there is a certain risk to the general public coupled to wastewater reuse and carelessness can lead to widespread public health hazards, water borne diseases and can even result in epidemics and fatalities.

Although wastewater reuse can be beneficial because it can prevent over-exploitation of natural water resources, emphasis must be placed on continuous monitoring and safe use thereof, especially where treated wastewater ultimately comes into direct contact with humans, or plants and animals consumed by humans, in order to guarantee public health and safety at all times.

Also, wastewater contains valuable nutrients and no fertiliser needs to be added when reusing treated, domestic effluent for agricultural purposes. Thus the advantages and disadvantages of wastewater reuse must be carefully weighed up when determining areas of application for such reuse. For the envisage project, appropriate methods patterning to waste water reuse as outline in this manual should be identified and incorporated in the proposed project development plans.
.

Guideline for disposal of solids from water and wastewater treatment processes (2012)

This guideline addresses the use and disposal of solids generated during the treatment process by both drinking water and wastewater treatment plants. Due to the costs associated with landfill disposal options, environmental concerns and globally increasing awareness about waste reduction and recycling, the purpose of this guideline is to inform plant owners how to safely discard their solid waste and to promote the safe and feasible reuse of such waste. Possible risks and hazards related to sludge use include:

- Water-borne diseases caused by helminthes, bacterial, viral and/or protozoan infections.
- Aesthetic issues like odor pollution or decreased product sales due to consumers not wanting to buy products that were produced using wastewater.
- Environmental issues including groundwater contamination, endangering of marine life and pollution of water bodies used for recreational purposes.

For the envisaged projects, monitoring and evaluation measures for safe use of wastewater sludge, especially where it comes into direct contact with humans, or plants and animals consumed by humans, must be developed.

Forestry Act (Act 12 of 2001), As Amended

The Act deals with forests in general and matters incidental thereto. Of importance to the proposed development is that the Act affords general protection of the environment (Part IV). Section 22 affords protection to natural vegetation stipulating that no living tree, bush or shrub within 100 m from any river, stream or watercourse may be removed without the necessary license. Permits are required for the removal of trees, bushes or shrubs, or any indigenous plants. Therefore, proposed developments must comply with these requirements.

Soil Conservation Act (Act 76 of 1969), As Amended

Partially similar to the other Acts and ordinances in 5.7 – 5.13.13 above, this Act addresses the issues of vegetation and ground water, but also includes the matter of soil. In specific the Act focuses on combating and preventing soil erosion; the conservation, protection and improvement of soil and vegetation and water sources and resources. The propose project should therefore comply with the soil conservation measures outline in this Act to prevent soil erosion in the proposed areas.

Pollution Control and Waste Management Bill (in preparation)

This Bill seeks to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management. The Bill will repeal the Atmospheric Pollution Prevention Ordinance (11 of 1976) when it comes into force. In terms of water pollution, it will be illegal to discharge of, or dispose of, pollutants into any watercourse without a Water Pollution Licence (apart from certain accepted discharges). Similarly, an Air Quality Licence will be required for any pollution discharged to air above a certain threshold. The Bill also provides for noise, dust or odour control that may be considered a nuisance; and advocates for duty of care with respect to waste management affecting humans and the environment and calls for a waste management licence for any activity relating to waste or hazardous waste management in a CBNRM area.

Atmospheric Pollution Prevention Ordinance (No.11 of 1976), As Amended

The Atmospheric Pollution Prevention Ordinance (APPO) (No. 11 of 1976) addresses the following:

- Part II: Controls of noxious or offensive gases;
- Part III: Atmospheric pollution by smoke;
- Part IV: Dust control; and
- Part V: Air pollution by fumes emitted by vehicles.

This Ordinance serves to control air pollution from point sources, but it does not consider ambient air quality. Any person carrying out a 'scheduled process' which is defined as a process resulting in noxious or offensive gases typically pertaining to point source emissions, have to obtain a registration certificate from the Department of Health. The Ordinance is clear in requiring that:

(1) Any person who in a dust control area –

(b) has at any time or from time to time, whether before or after the commencement of this Ordinance, deposited or caused or permitted to be deposited on any land a quantity of matter which exceeds, or two or more quantities of matter which together exceed, twenty thousand cubic meters in volume, or such lesser volume as may be prescribed, and which in the opinion of the Director causes or is liable to cause a

nuisance to persons residing or present in the vicinity of such land on account of dust originating from such matter becoming dispersed in the atmosphere.

Although it is not anticipated that the project would generate any significant levels of noxious or offensive gasses, the proponent needs to ensure that a registration certificate (air pollution permit) is obtained, if required. As duty of care, the proponent should implement the necessary mitigation measures set out in in order to limit emissions to air in the form of dust and emissions during construction and operations where applicable.

Hazardous Substance Ordinance (No 14 of 1974), As Amended

This ordinance provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. It covers manufacturing, sale, use, disposal and dumping as well as import and export. These substances are grouped (Group I, II, III, and IV) in terms of section 3(1) of the mentioned Ordinance. The responsibility lies with the proponent of the project to conform to the Hazardous Substances Ordinance (No 14 of 1974). Caution is required in the storage and handling of any hazardous substances as it pose potential harm to humans and the natural environment if incorrectly applied or handled.

The Public Health Act (Act no 36 of 1919)

This Act covers a variety of aspects with relevance to the general wellbeing and health of the public. With relevance to the development and associated infrastructure this Act refers to the control of nuisance, but also the prevention of pollution of public waters.
Section 119 of the Act prohibits the existence of a 'nuisance' on any land owned or occupied by any person. Having relevance to the proposed development, the Act defines 'nuisance' as:

- *any stream, pool, lagoon, ditch, gutter, watercourse, sink, cistern, water closet, earth closet, privy, urinal, cesspool, drain, sewer, dung pit, slop tank, ash pit or manure heap so foul or in such a state or so situated or constructed as to be offensive or to be injurious or dangerous to health;*
- *any well or other source of water supply or any cistern or other receptacle for water, whether public or private, the water from which is used or is likely to be used by man for drinking or domestic purposes or in connection with any dairy or milk shop or in connection with the manufacture or preparation of any article of food intended for human consumption, which is polluted or otherwise liable to render any such water injurious or dangerous to health;*
- *any factory or trade premises not kept in a cleanly state and free from offensive smells arising from any drain, privy, water closet, earth closet, or urinal, or not ventilated so as to destroy or render harmless and inoffensive as far as practicable any gases, vapors, dust or other impurities generated, or so overcrowded or so badly lighted or ventilated as to be injurious or dangerous to the health of those employed therein;*
- *any factory or trade premises causing or giving rise to smells or effluvia which are offensive, or which are injurious or dangerous to health;*
- *any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health;*
- *Any other condition whatever which is offensive, injurious or dangerous to health.*

Part III of the General Regulations promulgated under the Health Act (Act 36 of 1919) focus on the prevention of pollution of public surface or ground water by various means.

The Ministry of Environment and Tourism (MET) Policy on HIV & AIDS

The relevance of this policy for the proposed project stems from the fact that clearing, and development activities may involve the establishment of temporary workforce within the rural areas. Experience with other construction projects in a developing-world context has shown that, where construction workers have the opportunity to interact with local community, a significant risk is created for the development of social conditions and behaviours that contribute to the spread of HIV and AIDS. In response to the threat the pandemic poses, MET has developed a policy on HIV and AIDS. This policy provides for a non-discriminatory work environment and for workplace programs managed by a Ministry-wide committee. Adhering to these programs should be mandatory.

The Labour Act (Act no 27 of 2004)

In this Act, occupational exposure to employees is covered under the regulations relating to the Health and Safety of employees at work. Sub-contractors however will not be subject to any provisions of the Act, as sub-contractors are not considered to be employees in terms of Namibian common law.
Section 3 (1) of the Regulations stipulates that in areas where it is suspected that noise levels are above 85dB(A) over an eight-hour period, the employer shall take reasonable steps to reduce the levels to below 85dB(A). If this is not possible, noise areas (those above 85 dB (A)) must be clearly marked and measured every 36 months. Employees who work in noisy areas must be provided with hearing protection devices free of charge and must undergo medical surveillance at least once every 36 months. Employees who are exposed to levels exceeding 85 dB (A) must be adequately and comprehensively informed and trained regarding the wearing of personal protective equipment and the potential risks of exposure to noise and the precautions to be taken to protect against the risks associated with the exposure to noise.

Chapter IV of the Regulations stipulates that all employees have the right to health and safety at the workplace. A Health and Safety Officer must be appointed in order to maintain a healthy and safe environment to all workers during the Construction phase. Prior to the promulgation of the Labour Act (Act of 1997), a large number of regulations had been gazetted dealing with different aspects of employer and employee rights and obligations. Included in these are regulations relating to health and safety in the workplace. The administration of these regulations, however, is assigned to various ministries by Proclamation 10/1997, as published in Government Gazette 1615.

The National Heritage Act (Act no 27 of 2004)

The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. The National Heritage Council has been established to identify, conserve, manage and protect places and objects of heritage significance.

Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or remains (defined in Part 1, Definitions 1), while Section 48 F sets out the procedure for application and granting of permits such as might be required in the event of damage to a protected site or object occurring as an inevitable result of development. Section 51 (3) sets out the requirements for impact assessment. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council.

International Conventions and Treaties

United Nations Convention on Biological Diversity (UNCBD), 1993

As the demands on natural resources such as soil, water and vegetation increases, the state of the resources continues to deteriorate. The pressures are aggravated by changes in the climate and these impacts heavily on already vulnerable communities. The objective of the

UNCBD is therefore to maintain biological diversity, ensure the sustainable use of its components, and ensure equitable sharing of benefits derived from these resources including access thereto.

The proposed project may contribute to achieving this objective by ensuring that its activities conform to the requirements of the Convention and are monitor their impacts.

United Nations Framework Convention on Climate Change (UNFCCC), 1992

Namibia is signatory to this international environmental treaty committed to develop programs to reduce its anthropogenic emissions of greenhouse gases by sources and removal by sinks. The overall objective of this Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. This should be done in accordance with the relevant provisions of the Convention.

This legal instrument ties in well with the direction of the proposed project to reduce effects of climate change in the tourism industry; and thus the proposed activities should take into considerations the commitments provided for in this convention during development.

BAMAKO Convention, 1991

The African States signatory to this convention, of which Namibia is part of, are mindful of the growing threat to human health and the environment due to the increased generation of hazardous waste; and acknowledges that mechanisms must be put in place to ensure that the producer of the waste carries the responsibility of transporting and disposing the waste in a manner that protects human health and the environment. The BAMAKO Conventions emphasizes the importance of a 'toxic free' environment by the implementation of environmentally sound legal instruments and management systems for the welfare of current and future generations.

The above policies, laws and regulations are consistent with the AF interim performance standards. Therefore, the envisage project proposal should take into consideration of the above policies, laws and regulation during the proposal development to ensure the acceptance of the project by community members found in the target areas and also compliance to the national and international standards and laws.

5. Environmental Context

5.1 Omaheke

The Omaheke region lies central east of Namibia with a regional area of 84,981km2 and a population size of 70,800. The regional capital is Gobabis. The region's landscape is composed of Kalahari Sandveld (contains a large extend of the Kalahari Desert) and pans. The region's economic activities are game and livestock farming through meat and dairy product sales. It is the link to landlocked Botswana through the Trans-Kalahari, linking the country to the Walvis Bay port. Habitat destruction and overgrazing due to farming are some of the biggest threats to the region. Overgrazing also contributes to the bush encroachment problems experienced in the north eastern areas of the region.

5.2 Omusati

Omusati region lies in the northern part of Namibia with a regional area of 26,551 km2 and a population size of 243,166. The regional capital is Outapi. The landscape of Omusati Region

is made up of a successive series of sand dunes of varying depths, separated by waterways. The Mopani tree (*Colophospermum mopane*) is the dominant plant species and is spread across the region on the shallower sand dunes. The Region is predominantly an agricultural region, with both crop and livestock farming taking place. Tourism holds a potential to become the Region's most important industry subject to major investment and marketing initiatives from the private sector. This region forms part of the four O's regions which occasionally receive heavy rainfalls and with the overflowing of the Cuvelei basin from Angola experience major flooding. Most of the houses and kraalsin this region is made of wood which lead to overharvesting of wooden species. The large number of cattle in the region also contribute to overgrazing

5.3 Ecology

Namibia has a high diversity of flora and fauna. There are a range of habitats across the country including:

- ✓ Desert vegetation;
- ✓ Savannas; and
- ✓ Dry woodlands.

The Namib Desert stretches in a band along the coast, and vegetative cover increases with rainfall away from the coast. The dunes of the northern Namib and the plains of the central Namib are largely bare, but support scattered annual grasses (*Sporobolus* and *Stipagrostis spp*. after rain). In the southern Namib dune sea, the areas between the dunes become carpeted with *Stipagrostis gonatostachys* after rain. The southernmost part of the Namib is composed of gravel and sandy plains, interspersed with isolated mountains (inselbergs) towards the escarpment. The vegetation is described as succulent steppe and characterised by a dominance of leaf-succulents, such as several *Brownanthus* and *Ruschia* species. The eastern plains of the Namib, known as the pro-Namib become covered with dense stands of perennial grasses such as *Stipagrostis obtusa* and *S. ciliata* after the sporadic rains. In the main, these desert areas (<50mm annual rainfall) support too little vegetation to be useful for any form of livestock grazing.

In the north-central part of Namibia (rainfall >400 mm) is the Etosha pan which is a saline desert with a dwarf shrub savanna fringe composed of *Leucosphaera bainesii*, *Monechma genistifolia*, *Petalidium engleranum, Salsola etoshensis* and other shrubs providing valuable browse. The grass cover consists mainly of *Sporobolus* and *Eragrostis* species. This area forms part of the Etosha National park and supports a diverse and abundant wildlife population.

The savannas can be divided into three main veld (range) types, namely the dwarf shrub savanna in the central-south, the various acacia-based tree and shrub savanna associations in the centre and eastern parts, and the mopane savanna in the north-west. The dwarf shrub savanna (mainly <200 mm rainfall) is characterised by *Rhigozum trichotomum*, *Catophractes alexandrii*, *Eriocephalus* species and various small Karoo bushes. The unpalatable *Euphorbia gregaria* covers large areas of the southern dwarf shrub savanna. The most common grasses are Stipagrostis species (*S. uniplumis, S. brevifolia, S. obtusa and S. anomala*) but vary with soil types and can include valuable species such as *Panicum arbusculum, Setaria appendiculata, Antephora pubescens and Digitaria eriantha*. The dwarf shrub savanna is mainly used for sheep and goat farming.

There are a number of tree and shrub savanna associations in the central and east-central parts of the country. With exception of the Mixed Tree and Shrub Savanna, which is more suited to sheep, the savanna associations are suited to cattle farming (Bester, unpublished data). The mixed tree and shrub savanna of the southern Kalahari is characterised by deep sand and *Acacia haematoxylon*, with various species of Acacia and Boscia on the harder ground between the parallel dunes. Perennial grasses include *Centropodia glauca, Antephora pubescens, Eragrostis lehmanniana, Stipagrostis uniplumis* and *S. ciliata*, with the annual *Schmidtia kalahariensis*

dominating in disturbed veld. This savanna, like the dwarf shrub savanna to the west, is used for sheep farming.

The camelthorn savanna (300-400mm rainfall) of the central Kalahari is an open savanna with *Acacia erioloba* as the dominant tree. Common shrubs include *Acacia hebeclada, Ziziphus mucronata, Tarconanthus camphoratus, Grewia flava, Ozoroa paniculosa and Rhus ciliata*. There is a good grass cover but of coarse, unpalatable grasses such as *Eragrostis pallens* and *Aristida stipitata. Schmidtia* kalahariensis is an indicator of veld deterioration.

The thornbush savanna (400-500 mm rainfall) is the dominant vegetation type in the central part of the country. Bush encroachment by *Acacia mellifera* and *Dichrostachys cinerea* is widely problematic. Other characteristic species include *Acacia reficiens*, *A. erubescens* and *A. fleckii*.

Common grasses include *Antephora pubescens, Brachiaria nigropedata, Digitaria spp., Stipagrostis uniplumis and Schmidtia pappophoroides*

The highland savanna (300-400 mm rainfall), situated south of the thornbush savanna, is characterised by trees such as *Combretum apiculatum, Acacia hereroensis, A reficiens and A. erubescens*. The grass cover includes *Antephora pubescens, Brachiaria nigropedata, Digitaria eriantha* and other good fodder species.

The mountain savanna (500-600 mm rainfall), found north of the thornbush savanna, has less Acacia and is characterised by trees such as *Kirkia acuminata, Berchemia discolor, Pachypodium lealii* and *Croton Spp.* Grasses include the valuable fodder species *Brachiaria serrata, Digitaria seriata* and Panicum maximum. The annual *Danthoniopsis dinteri* is characteristic of the vegetation type. A complex of this region is the Karstveld (areas with recent surface limestone deposits and shallow soil) which supports *Combretum imberbe, Dichrostachys cinerea* and *Terminalia prunioides*.

The mopane savanna is a distinct vegetation type dominated by *Colophospermum mopane*, which occurs in tree and shrub forms, in the north-west of the country. It spans a wide rainfall range from 50-500 mm rainfall and is suited to both cattle and smallstock farming. In the lower rainfall western areas, the grasses are mainly annuals such as *Stipagrostis hirtigluma, Schmidtia kalahariensis* and *Entoplocamia aristulata*; in the higher rainfall eastern parts there are perennial grasses including *Stipagrostis uniplumis, Schmidtia pappophoroides, Digitaria spp.* and *Antephora pubescens*.

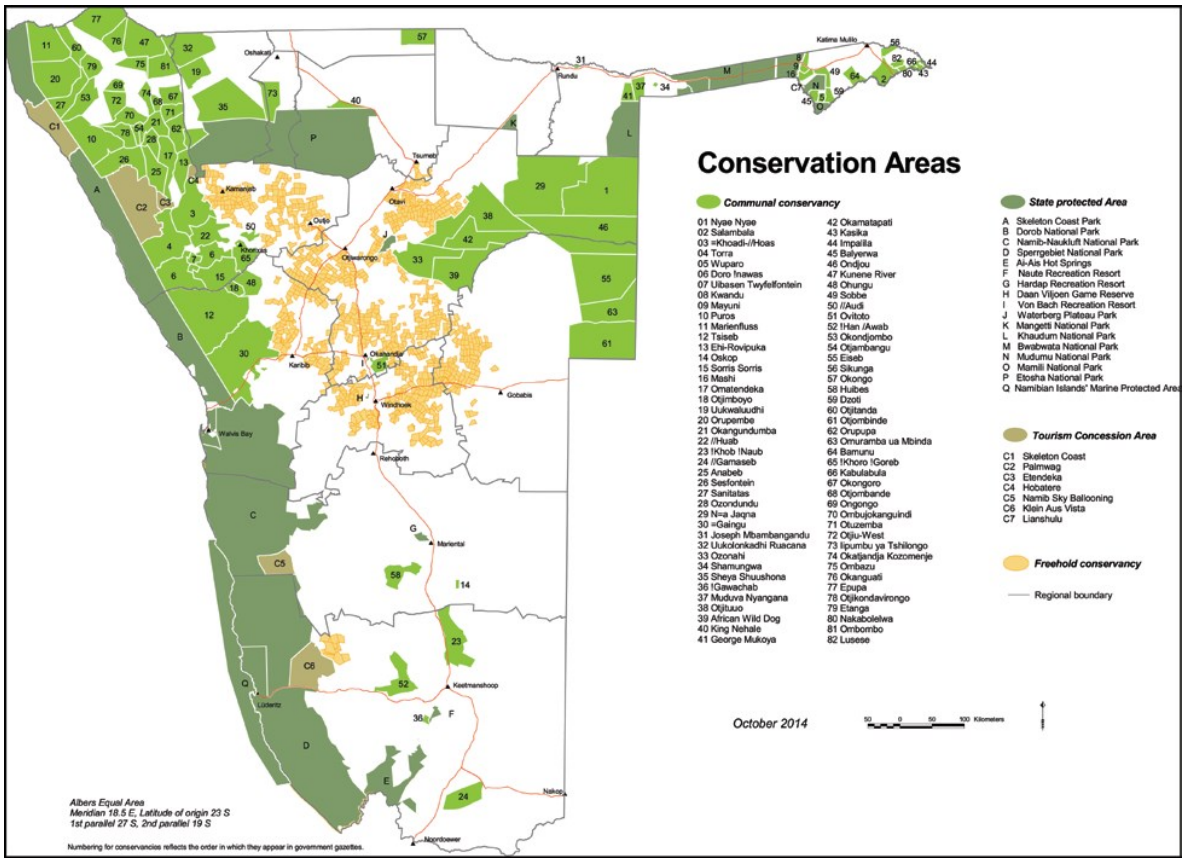
The escarpment area has been characterised as a semi-desert savanna transition zone characterised by a mix of savanna and desert species. While Acacia species are dominant in many parts, various stem-succulents such as Commiphora and Cyphostemma species occur. Various Stipagrostis species form the most important grass component.

The dry woodlands of the north-east are in the highest rainfall part of the country (500-700 mm) and merge from the tree savanna of the north-central area. They are characterised by *Baikea plurijugia, Burkea africana, Guibourtia coleosperma* and *Pterocarpus angolensis*. The grasses tend to be coarse and unpalatable species including *Eragrostis pallens, Sporobolus spp*., *Aristida spp*. and *Pogonarthria squarrosa*, however more palatable ones including various *Brachiaria, Digitaria* and *Eragrostis* species also occur. This area is considered best suited to cattle (Bester, unpublished data) but goats are also widely owned by the communal area farmers.

This vegetation type comprises the riverine woodlands and associated dry riverbed and floodplains ephemeral river floodplains. Typically, the structure is a closed thicket (about 50 to 75 % cover) dominated by the woody species *Acacia karoo* (sweetthorn) and the associated species *Ziziphus mucronata* (buffalo thorn), *Rhus lancea* (Red karee) and *Acacia hebec/ada* subsp. *hebeclada* (candle-pod acacia). Typical herbaceous species are the grasses *Setaria verticilata, Eragrostis echionchlodea, E. rotifer* as well as various other annual herbs. Also occurring widespread within this vegetation type are the (naturalised) exotic herbs *Tagetes minuta, Bidens pilosa, Datura inoxica, D. ferox, D. strumaria, Achyranthes aspera* var. *sicu/a, Argemone ochroleuca* and *Pupalia Japaceae.* Typical for the sandbanks in the dry river beds are *Stipagrostis namaquensis.*

5.3 Protected Areas

The protected areas of Namibia include its national parks and reserves. With the 2010 declaration of Dorob National Park, Namibia became the first and only country to have its entire coastline protected through a national parks network. Protected areas are subdivided into game reserves and/or nature reserves, such as special protected area, wilderness areas, natural areas, and development areas. There are also recreation reserves. Facilities in the national parks are operated by Namibia Wildlife Resorts. Over 19% of Namibia is protected, an area of some 130,000 square kilometres. However, the Ministry of Environment & Tourism auctions limited hunting rights within its protected areas. Communal Wildlife Conservancies in Namibia help promote sustainable natural resource management by giving local communities rights to wildlife management and tourism.



Map 1: Protected Areas in Namibia

6. Environmental and Social Risk Assessment and Management Plan

As this project is supported by DRFN in its role as an AF Accredited Entity, the project has been screened against both DRFN and AF's Social and Environmental Policy and Standards. The Social and Environmental Screening Template was prepared, and the project deemed to be a moderate risk (Category B) project. Discussions on the impact assessment are provided in the Social and Environmental Screening Template, which provided the rationale for the project being classified as a moderate risk. This ESIA provides further discussion below.

6.1 Assumptions Underpinning the Development of this ESIA

The following assumptions have been made in the preparation of this ESIA:

- none of the interventions will require the displacement of people and/or the need for land acquisition;
- none of the interventions will be conducted in protected areas or sensitive locations;
- all material removed from the works will be remediated as required to ensure limited impact on the surrounding environment;
- none of the water used to recharge the aquifer will be contaminated;
- environmentally sensitive water-based drill grease will be used for all bore hole drilling;
- none of the interventions will be in proximity to any archaeological and/or culturally sensitive location;
- appropriate erosion and sediment control will be undertaken during all stages of the projects; and
- there will be no release of pollution and/or chemicals as a result of the projects.

6.2 Purpose and Objectives of the Environmental and Social Impact Assessment

An ESIA is a management tool used to assist in minimising the impact to the environment and socially; and establish a set of environmental and social objectives. To ensure the environmental and social objectives of the projects are met, this ESIA will be used by the project implementers to structure and control the environmental and social management safeguards that are required to avoid or mitigate adverse effects on the environment and communities. The environmental and social objectives of the projects are to:

- encourage good management practices through planning, commitment and continuous improvement of environmental and social practices and the impacts of climate change;
- minimise or prevent the pollution of land, air and water pollution;
- protect native flora, fauna and important ecosystems;
- ensure gender equality and inclusion across all facets of the project;
- comply with applicable Namibian laws, regulations and standards for the protection of the environment;
- adopt the best practicable means available to prevent or minimise environmental and social impacts;
- describe monitoring procedures required to identify impacts on the environment; and
- provide an overview of the obligations of MET, NUST and DRFN staff and contractors in regard to environmental obligations.

The ESIA will be updated from time to time by the implementing Project Steering Committee (PSC)/contractor in consultation with the NUST staff, MET and DRFN to incorporate changes in the detailed design phase of the sub-projects.

Land Issues

All of the project activities will be undertaken on government land with defined land rights.

For some activities under project components 1 and 2 it is difficult to specify an ESMP at this early stage as the exact activity will depend on the situation on the ground. For example, it is

legally required that any area larger than 150 ha on which encroacher bush will be selectively thinned requires environmental clearance by the Ministry of Environment and Tourism (MET) following a (generic) ESIA. However, the intervention areas have not yet been decided so we do not know the extent of bush encroachment or the amount and type of bush thinning that will be applied. Similar conditions apply to the establishment of cultivated dry-land grass pastures, the establishment of demonstration plots on the farms of participating farmers, and the increased extraction of groundwater to irrigate horticultural crops. To an extent, this makes such assessment activities unidentified sub-projects (USP).

It was therefore decided to rather provide for generic ESIAs and ESMPs and to list the activities that are most likely to be involved in such assessments, viz.:

- Activity 1.3: Rehabilitation of degraded rangelands,
- Activity 1.4: Cultivation of dry-land grass pastures,
- Activity 2.1: Climate-smarting of crop and animal production systems,
- Activity 2.3: Introduction of complimentary/alternative climate-smart crop and animal production systems, and
- Activity 3.1: Farmer training and capacity-building of institutions (mainly demonstration plots).

These expected ESIAs and ESMPs are the reason that an amount of US$176,000 has been budgeted for this activity under project component 3, which is the over-arching component that binds components 1 and 2 together.

Indigenous People

As part of due diligence, an analysis and consultations were undertaken as to the probability of any of the project's activities involving indigenous people and/or ethnic minorities. Indigenous and ethnic people in the project areas includes the Ovazemba and San communities who are classified as marginalised communities by the Government of the Republic of Namibia.

6.3 Assessment of Impacts

An impact risk assessment was undertaken using the AF Social and Environmental Screening Procedure to assess the probability (expected, highly likely, moderately likely, not likely) and the impact of the risk (critical, severe, moderate, minor, negligible). From this, a significance value was attributed to the potential impact (negligible, low, medium, high and extreme).

Table 2 Rating of Impact of Risk

Score	Rating	Definition
5	High	Significant adverse impacts on human populations and/or environment. Adverse impacts high in magnitude and/or spatial extent (e.g. large geographic area, large number of people, transboundary impacts, cumulative impacts) and duration (e.g. long-term, permanent and/or irreversible); areas impacted include areas of high value and sensitivity (e.g. valuable ecosystems, critical habitats); adverse impacts to rights, lands, resources and territories of indigenous peoples; involve significant displacement or resettlement; generates significant quantities of greenhouse gas emissions; impacts may give rise to significant social conflict

3	Moderate	Impacts of low magnitude, limited in scale (site-specific) and duration (temporary), can be avoided, managed and/or mitigated with relatively uncomplicated accepted measures
2	Low	Very limited impacts in terms of magnitude (e.g. small affected area, very low number of people affected) and duration (short), may be easily avoided, managed, mitigated

Table 3: Environmental and Social Impact Assessment and Mitigation

Risk Description	Impact (I) and Probability (P) of risk (I:1= Low; 5= High) (P:1=Slight; 5 expected)	Significance of risk (Low, Moderate, High)	Comments	Environmental and social management measures required to address the risks
Environmental Risks				
Destruction of habitats	I=1 P=1	Low	During the construction of new or renovation of existing farm land, the land may be cleared for the development. This could result in the destruction of biodiversity habitats.	• Awareness creation and community education about the importance of habitats for biodiversity. • Enact tailored land use plans in the respective areas to minimize project impacts to the environment. • Strengthen and enforce environmental conservation and protection guidelines to ensure compliance and take to task those failing to comply. • EIAs must be conducted for any development and environmental clearance must be obtained before commencement of any project activity. • EIAs conducted should consider the impact of the proposed development on the land and proposed mitigation measures for such to be identified and implemented in Environmental Management Plans (EMPs): • Stock piling of top soil in 30cm for all trenches. The top soil should be returned back and re-vegetated to its normal state.
Introduction of invasive vegetation	I=1 P=1	Low	The transportation of construction and other materials from different regions could act as a means of transporting invasive species and seeds into the target areas.	• All materials transported into the project site for construction or other purposes should be checked for potential seeds and if possible cleaned or sprayed with water by placing the seeds on plastic papers. • Landscapes with water ways or

				rivers should ensure that boats coming from other regions are clean prior to entering their water ways. • The colonization of disturbed areas by invasive alien species should be monitored and measures taken to eliminate any alien species.
Overharvesting of natural resources	I=3 P=3	Moderate	Natural resources could be overharvested if not controlled for the construction of houses and infrastructure.	• Strengthen enforcement efforts target areas and community forest level to ensure that overharvesting of resources is controlled.
Veld fires	I=3 P=3	Moderate	Destruction of grazing areas could happen if there will be more people visiting and if minimal control measures are in place.	• Establish fire cut-lines and practice early burning to avoid / contain the spread of fires. • Capacitate fire fighters through skills training. • Develop the capacity of landscapes organisations to manage un-wanted fires effectively. • Support the development and implementation of integrated fire management plans in fire-prone areas to manage the impact of frequent anthropogenic fires.
Increased human-wildlife conflict	I=4 P=2	Moderate	The increase in the number of facilities and improved infrastructure could lead to human and wildlife conflicts if not properly managed. However, given the good practices in the country, this risk should not be a major concern to manage. The increased facilities could also lead to more cases of wildlife poaching if not managed and controlled.	• Improve awareness and education of landscape committees to enable them to co-exist with wildlife. • Develop water points for wildlife away from human settlements. • Strengthen patrols and capacitate game guards (skills and equipment). • Intensify awareness campaigns to combat poaching. • Establish penalties and take punitive measures against those in defiance of laws and regulations. • Strengthen law enforcement patrols. • Control wildlife hunting quotas. • The Government is deeply committed to eliminating to poaching and measures are in place and are sufficient to control the current and future challenge of poaching in the target areas.
Social Risks				
Health and safety	I=3 P=3	Moderate	During the construction of new facilities or renovation of existing facilities, the safety of employees involved in	• Capacity building and awareness creation on health and safety should be undertaken. This should greatly enhance the health and safety

			the construction of the facilities could be a concern if not well managed. The lack of effective sanitation systems, waste disposal sites / facilities and good quality water is a significant health risk in all landscape. The collection and storage of rainwater in earth-dams may increase the risk and spread of waterborne diseases such as malaria and cholera.	consciousness of community members found in the target areas. • Devise incentives or compensation packages for resettlement due to injuries incurred due to proposed project activities. • Demarcate waste disposal sites and ensure the appropriate design of structures to mitigate health and safety risks. • All target areas Committees must put in place a basic health and safety policy to ensure that the wellbeing and safety of all people affected by the project activities are not exposed to risks. • Measures must be put in place, in consultation with the Ministry of Health and Social Services, to ensure that rainwater collection and storage does not contribute to the ill-health of affected communities.
Unfair labour practices	I=3 P3	Moderate	Local workers could be exploited and subjected to poor working conditions and low wages.	• Implement and enforce principles of good labour practice in the project development process to ensure the welfare and dignity of workers. • Provide workers with capacity building and skills training in each landscape. • Local first principles should apply so that local workers are employed. • Local headmen/leaders should be involved in the recruitment process.
Competing demands for water at local level due to drought.	I=4 P=2	Moderate	Namibia is an arid country and therefore the possibility of drought occurring is very high. If this happens, the water demand of competing users will be difficult to meet and could lead to conflict. Alternative water sources for emergency or for usage during drought periods need to be discovered to ensure the	• Determine water allocations for different users. • Strengthen and enforce environmental conservation and protection guidelines. • EIAs should determine water resource capacity versus land-use demands in the area. •

			sustainability of the proposed project.	
Changes in traditional and cultural practices	I=2 P=2	Low	New and modern facilities and approaches could interfere with the cultural identity of the people residing in certain landscapes.	• Ensure representation of the marginalized and the poor in all project structures at local level. • Make stakeholder consultations an integral part of all project activities. • Ensure that capacity building interventions also target indigenous people through including mentoring as part of capacity development. • Support indigenous people through value-addition to local nature-based products. • Preserve and protect cultural heritage and practices as well as indigenous knowledge through granting patents and protection to indigenous communities. • Undertake community consultations and engagement. • Comply with the authorization procedures of traditional leaders. • Put in place clear benefit distribution plans that promote equity principles. • Ensure the protection of identified endangered (indigenous) flora and fauna species. • Create awareness among the community members that the changing climate may require changes in traditional methods of farming such as farming with smaller herds of locally-adapted livestock instead of with big herds that degrade the rangelands and reduce the resiliency of the ecosystem, thereby compounding droughts and poverty.
Unequal distribution of benefits from the Project	I=4 P=3	Moderate	Benefits from project activities could be unfairly distributed among the members leading to the marginalization of some community members. Households could be displaced to make room for the development of climate proof infrastructure	• Use Grievance Mechanisms through existing community-based organisations and other methods. • Develop measures and initiatives to ensure that vulnerable and marginalized communities within the project implementation areas are specifically targeted and involved in project activities.

			such as earth dams for water harvesting.	

7. Checklist of project activities for ensuring compliance with Adaptation Fund Environmental and Social principles

Table 4: Project activities analysed against AF principles

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
1. Compliance with the law	No project component or activity contravenes any laws or regulations currently in force in Namibia. The project will comply with Namibian national laws and possibly international standards when national standards are lacking. The project complies with the country's legal framework for Agriculture, Labour, Water abstraction and Environmental Protection.	Environmental Impact Assessments will be required at project implementation for unidentified sub-project such as land clearing, and invader bush harvesting to ensure compliance with the Environmental Management Act.
2. Access and Equity	The project will not impede access to basic health services, clean water and sanitation, energy, education, housing, safe and decent working conditions to any group of the population. Further assessment will be carried out to mitigate discrimination and inequalities regarding access to project benefits, taking into consideration the gender inequalities. The project implementation will guarantee access and equity to sensitive groups including women, the poor, and the youth.	Vulnerability studies and stakeholder mapping was done in May-June 2017, covering potential gender inequalities. Further environmental and social impact assessments will be required at project implementation for the Unidentified sub-project.
3. Marginalized and vulnerable groups	The risks, which were identified in the workshops, included the unequal distribution of benefits from the projects, whereby the marginalized are likely to be excluded from benefits. Marginalized groups often have strong links to cultural practices and heritage sites, and induced changes in cultural practices were also identified as risks.	The project will not impose any disproportionate adverse impacts on marginalized and vulnerable groups including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS. The poor, women, young, old will have the opportunity to improve their income and living conditions due to the project.

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
4. Human rights	The project does not have potential risks regarding human rights. issues. The Namibian Constitution guarantees human rights to all citizens in accordance with international law to which the all Project activities will abide.	The ESMP includes monitoring indicators on human rights
5. Gender Equity and Women's Empowerment	Women and men will be able to participate fully and equitably in the project and both will receive equitable social and economic benefits. Women's access to financial services will be strengthened notably through a preferential support that the project will provide to women for value addition to their farm products.	• Ensure gender-balanced participation in setting up and strengthening governance system over the project implementation period • Collaborate with local NGOs that work with women to address women-specific needs in order to remove barriers on participation in agriculture, water management, and biodiversity conservation. • Ensure equitable representation of women and men from different ethnic groups, social classes and age groups on funded project management committee, planning and activity meetings
6. Core Labour Rights	The Principle recognizes that economic growth through employment creation and income generation should be accompanied by the protection of the fundamental rights of workers. The workforce is the most valuable asset of any business for the successful implementation of its plans and operations. Therefore, the principle looks at the overall basic conditions of employment provided to enhance productivity and economic growth. Health and safety issues were identified by the stakeholders as risks even though local communities benefit from job opportunities created	The project will be managed with respect to the Namibian and International labour law which forbids forced labour, child labour and discrimination, and which allows freedom of association. Monitoring of core labour rights will be undertaken through the project's M&E framework, to ensure compliance.

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
	by project developments. These risks resonate most among local communities where the potential loss of income resulting from injury and or loss of life would impact heavily on a wide number of dependants. Therefore, the proposed project should incorporate measures to ensure that health and safety issues are considered in planned activities. Although generic CA activities are meant to benefit all stakeholders involved, the participants of consultative meetings felt that the unequal distribution of benefits was still rife due to inadequate directives or limited governance structures with regard to the benefits generated and how these benefits are shared. The proposed project must ensure that all labour-related opportunities, arising from the project, respect and adhere to the labour laws of Namibia, and that gender equity is ensured. Measures must be taken to ensure that working conditions are safe and conducive.	
7. Indigenous people	Indigenous people in this context refer to social groups with identities that are distinct from mainstream groups in national societies. Indigenous people are often among the most marginalized and vulnerable segments of the population. They are characterized by self-identification, attachment to territory and their distinct languages. In many cases, their economic, social, and legal status limits their capacity to defend their rights to and interests in lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, indigenous peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may expose them to loss of identity, culture, and natural	The project will not impose any disproportionate adverse impacts on indigenous people. They will have the opportunity to improve their income and living conditions through the project.

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
	resource-based livelihoods as well as to impoverishment and diseases.	
8. Involuntary Resettlement	The project will not generate involuntary resettlement as there will no physical displacement (relocation or loss of shelter) or permanent economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood).	N/A
9. Protection of Natural Habitats	The potential of the project to impact upon natural habitats is low, as the target areas in both Omaheke and Omusati Regions are brownfield sites that are already highly disturbed with agricultural production taking place on the land. In Omusati Region there are three communal conservancies which are zoned according to habitat sensitivity and these will need to be impacted by the project.	• This ESIA has assessed and proposed mitigation for project impacts on natural habitat and biodiversity in the target area as well as underground water abstraction. • Further environmental and social impact assessments will be required at project implementation for Unidentified sub-projects.
10. Conservation of Biological Diversity	The project will not generate significant or unjustified reduction or loss of biological diversity or the introduction of known invasive species. The project area has been exploited for many years and hence it is a Brownfield Site. The project will not significantly disrupt the current biodiversity. No invasive species will be introduced into the area, and the type of crops to be used in the project are those currently used. The following risks were identified: • Increased human-wildlife conflict; • Increased wildlife poaching; • Competing demands for water at local level due to drought and increasing temperatures (climate change induced); • Impacts of climate change on the sustainability of nature based development; • Land degradation;	This ESIA includes an assessment of project impacts on natural habitat and biodiversity in the target area. Further environmental and social impact assessments will be required at project implementation for Unidentified sub-project.
11. Climate Change	• Extreme temperatures, floods affect viability of the project • Reduced harvest from subsistence agriculture	The project activities will not result in a significant or unjustified increase in greenhouse gas emissions or other drivers of climate

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
	• Increased GHG emissions from agricultural practises	change. The project will minimize the production of greenhouse gas by adopting solar energy instead of thermal power for pumping water around the farm sites. Plantations of shrubs and planned reforestation will capture CO2 and capture surplus of greenhouse gases.
12. Pollution Prevention and Resources Efficiency	Over abstraction of groundwater was identified as a risk. Groundwater was found to be the dominant source of water in most of the target areas. Therefore, the over abstraction of groundwater needs to be prevented to ensure the sustainability of existing and future projects. Applications for water abstraction permits should be made for all project-related infrastructure developments from the Department of Water Affairs. The destruction of habitats and land degradation were also identified as risks under this principle. Water pollution is also a major risk under this principle. Most establishments in the areas concerned make use of septic tanks, which are outdated or of an inadequate standard to handle the growing number of tourists. There are also inadequate landfill facilities for the treatment of waste. If not well addressed and managed, this could lead to the potential pollution of groundwater resources and put pressure on this precious and scarce resource. Local communities depend heavily on natural resources for their day-to-day livelihoods, such as trees for firewood and craft making. Deforestation or over harvesting of natural resources was identified as a risk to be addressed in any future projects.	• The ESIA and related ESMP propose the formulation of a pesticide management framework. This and its implementation and monitoring will be key in ensuring compliance, and pollution prevention and resource efficiency. • There will be effective awareness and education for both core project management and project beneficiaries.
13. Public Health	Efforts to provide a safe and healthy work environment should be consistent with good international and industry practices and take into account the nature of potential hazards including physical, chemical, biological, and radiological hazards, and specific threats to women.	• Preventing any health hazards will depend on effective implementation and monitoring of the ESMP.

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
	Therefore, in order to safeguard personnel and property, the project will ensure that competent professionals are involved in the design, construction and certification of infrastructure where structural elements are required. Increased human-wildlife conflict was identified as a safety and security risk to the livelihoods of communities. The main driver of this risk was highlighted as being the increased construction of infrastructure as well as the limited availability of water to satisfy the various competing demands on the resource. Destruction of grazing areas, forests and properties by veld fires was identified as a risk which needs to be considered in any future projects. This risk affects the co-habitation of humans, livestock and wildlife resulting in the loss of animals and migration to areas of safety. This has adverse impacts on income generating activities in strategic areas. The construction of new facilities may require the clearing of land. Land clearing was identified as a risk if not well managed and addressed in any future projects. It is considered that this could lead to the intensification of flooding as some of the areas are located within floodplains. In an event of intense rainfall, livelihoods could be disrupted through loss of lives, homes and livestock. This disruption of livelihoods could increase the vulnerability and health and safety-related risks of the communities found in rural conservancies.	• There must be effective awareness and education for both core project management and project beneficiaries.
14. Physical and Cultural Heritage	This Principle recognizes the importance of cultural heritage for current and future generations and the equitable sharing of resources. It refers to immovable objects, property, sites, structures, natural features, religious and cultural values and cultural knowledge. The project and its components are not in an area known to have physical cultural resources, cultural sites, and sites with unique natural values. In case of discovery of any cultural resources, the Namibian Ministry	For the proposed project, care should be taken if and when sites and objects (historical sites, historical artefacts, rock art sites, ruins, fossils and archaeological objects etc.) protected by law are encountered, that these are reported to the National Heritage Council of Namibia as prescribed by the National Heritage Act.

AF Environmental and Social Principles	Possible Risks for Non-Compliance	Mitigation Measures
	of Culture will be notified for further dispositions.	
15. Lands and Soil Conservation	Measures to prevent mitigate or control soil erosion and degradation will be implemented during the implementation of the project. For example, the project will include anti-erosion measures such as protection of banks of crop fields with shrubs that will prevent soil degradation. The project will also contribute to the restoration of soil fertility by promoting the use of organic manure instead of chemical fertilizers. The existing soils are in most cases already used for agricultural purposes, there will be no significant change on land use.	Preventing soil degradation and conservation will depend on effective implementation and monitoring of the ESMP. There must be effective awareness and education for both core project management and project beneficiaries.

8. Monitoring, Reporting and Evaluation

Environmental monitoring is the continuous evaluation of the status and condition of environmental elements whereas, environmental auditing is the process of comparing the impacts predicted with those which have actually occurred during implementation. The ultimate purpose of environmental monitoring and auditing is to confirm that all relevant programmes, legislation, laws, and policies are adhered to and abided by and that the environmental specifications are being implemented in an effective and correct manner. Monitoring and auditing is intended to promote environmental best practice, ensure protection of resources and support sustainable development.

Monitoring will be done by the Project ESIA focal person in collaboration with various other institutions. To ensure effective and reliable data collection, the key persons from the institutions to be involved in the monitoring will be trained on the indicators to be monitored, sampling methods, and data collection project staff and stakeholders. The key resource persons for this training will be the Project ESIA focal person and the environmental specialist hired by the Project.

During monitoring activities, Project Environmental Safeguard Focal person will regularly consult with the Public Health Officer to obtain data on public health status especially on waterborne or water related diseases. Appropriate mitigation measures where necessary will be arrived at through consultations between the Project Environmental Officer, site engineer, and the Public Health Officer and other related government officers as well as the Constituency Councillor. Monitoring, development of mitigation measures and implementation of the same will always include the local community leaders to improve rate of success and strengthen the environment management capacities of local communities.

8.1 Monitoring methods

In order to ensure that the above objectives are adhered to, the following monitoring methods will be employed:

- Aspect monitoring;
- Incident reporting;
- Site inspections;
- Site monitoring and reporting;
- Independent external auditing.

8.2 Compliance

Compliance involves actions and programmes designed to ensure that all relevant environmental laws, legislations, standards and other requirements such as permits are followed and adhered to.

8.3 Non-compliance

Failure by any individual or institution (contractor, operator and their staff together with their suppliers) to comply with all relevant programmes, laws, legislations, policies and mitigation measures laid out in this Environmental and Social Management Plan will result in the following actions and consequences:

- Failure to comply or respond to notifications and recommendations within a specified timeframe will result in written warning being issued;

- Failure to comply or respond to warnings within a specified timeframe will result in fines being issued;
- Continued and wilful failure to comply or respond will result in the suspension of site activities until compliance is reached to the satisfaction of the ECO. In the event of severe negligence or failure to comply, all site activities may be terminated.

One of the most effective impact management tools is planning and implementation of mitigation measures in accordance with the schedule of actions contained in the ESMP. Frequent follow-up of activities and adjustment to respond for unforeseen impacts/ other changes is extremely critical component of ESMP. This is because ESIA involves considerable uncertainty concerning in identifying significant impacts “risk assurance”.

The following are indicators that will be used for the monitoring of the impacts of the Project:

- Water consumption and alternative source development;
- Volume of waste generated and handling & disposal mechanisms;
- Complains associated to waste disposal and amenities (odour, environmental hygiene etc);
- Traffic accidents occurred;
- Over all environmental hygiene and sanitation of the project site and its influence area;

Considering these indicators monitoring plan along with the costs is prepared and presented on Table 5. A monitoring team from the identified stakeholders should be organized to undertake the monitoring of environmental and social impacts of the Irrigation Farm. The team is expected to comprise representatives of NUST, Project Manager as the project implementer or proponent, MoHSS, MAWF, MLR, MET, Omusati/Omaheke Regional Council, Constituency Councillor office, and the Traditional Authority, design engineers, contractors.

9. Institutional Framework

9.1 Project Management

Project management is proposed to be confined to the Project Management Unit (PMU). NUST will contract a fulltime Project Manager who will work closely with NUST Component Managers. The Manager will be responsible for coordination with various implementing agencies at the central and local level and service providers with respect to:

- Preparation of the Operations and Financial Reports,
- Development of annual operational plans and budgets,
- Procurement support to the Regions
- Collaboration with and technical support to associated implementing agencies,
- Applying the ESIA,
- Concluding framework service agreements with service providers (where applicable),
- Accounting and financial management,
- Monitoring and reporting on the performance of sub-projects,
- Preparation of a training and capacity building framework.

Apart from the Project Manager who will be an external person contracted to manage the Project, the PMU management team is proposed to consist of staff seconded from NUST. The PMU shall designate one staff member as the ESIA officer to develop a set of procedures that ensure compliance with both Namibian environmental regulations and AF safeguards.

She/he will also be the point of contact for all ESIA related matters and will, as and when required, be supported by environmental and social management consultant, who will be mobilized by the Project Manager.

The PMU as a whole will be instrumental in communicating the principles of sustainable investment to stakeholders in both the public and private sector. To accomplish this mandate the PMU will have the capacity to keep stakeholders informed regarding environmental and social issues surrounding its development interventions in the regions. Finally, the PMU will undertake annual reporting to DRFN/AF on safeguard progress across the implementing agencies and organizations.

Successful implementation of the ESIA will rely on (a) establishing the PMU's capability to ensure that the projects are screened and appraised appropriately; (b) regular monitoring and reporting to track performance against the Environmental and Social Management Plan (ESMP) for the projects, and (c) building additional checklists and guidance as the programme matures.

The Project Manager

The implementation of a multi-sectoral programme in agriculture, and natural resources management can easily be accommodated by the existing regional and local governance capacities. Thus, it is recommended to enhance the programme management of the PMU, national and Regional Steering Committees through capacity building measures which will be developed and implemented by external consultants. These capacity building measures shall relate to preparing annual operational plans and budgets, financial management, procurement management training, managing procurement, environmental and social management, community mobilization and communication.

The Project Manager will have at his disposal a pool of experts to undertake specialist studies on a short-term basis. Such studies will cover environmental and social reviews and appraisals; developing ESAPs and Stakeholder Engagement Plans (SEPs).

Environmental and Social Consultant

The PMU will contract an Environmental and Social Consultant in order to support the screening and appraisal of projects and the related reporting. The Consultant will be selected based on their experience and skills and should have familiarity with screening, appraisal, and monitoring and evaluation of projects from similar assignments. His/her role will be to assist the PMU in ensuring that environmental and social management requirements are being applied (i.e. projects are screened properly, ESAPs are prepared which are fit for purpose, audits are carried out and corrective actions identified, etc. They will also countersign documents that are sent to the SC for approval. The Consultant will report to the Project Manager.

The consultant may need to provide training on the application of the ESMP depending on the experience of the appointed PMU staff. Familiarization with AF Performance Standards, DRFN Guidelines and Safeguards is recommended; thus, a budget for training in these topics should be allocated from the overall programme budget, or be taken from contingency funds.

Early discussions surrounding the function and financing of the programme show that the grant and investment portfolio is open. Consequently, the Environmental Consultant will need to refine and develop additional project checklists, tools and technical guidance as the programme evolves.

9.2 Training and Capacity Building

In order to enable all parties involved to play their roles and perform their responsibilities, training and capacity building measures will be provided. The table below provides an overview of what is proposed.

Table 5: Training and capacity building

Types of training/ capacity building support	Target groups	Training topics / aspects of ESIA	Potential Trainers	Duration and Time of Training
Training	PMU and Project technical staff	Environmental Assessment (EA), ESAP, ESIA • Safeguard policies, environmental policies • ESMP implementation processes • Review and reporting procedures • Implementation of mitigation measures	Short term consultants;	Inception phase
Awareness creation training/workshop	Decision Makers at village, district and regional level, selected steering committee members	• Safeguard policies, • Environmental policies and guidelines • ESMP implementation	Consultants	Minimum 1 day between inception and planning phase
Awareness creation training	Local community members	• Participatory planning • Environmental issues • Monitoring of implementation	Extension officers	minimum 2 days after inception phase

9.3 Personal Capacity and Budgetary Aspects

With the PMU designated project officer for ESMP and the Project Manager having long term presence and a pool of short term consultants to mobilise, there is sufficient expertise within the project to handle the respective ESMP management tasks. Independent reviews can be financed out of the person-months allocated to the Project Manager, or from contingencies.

10. Public Consultation and Environmental and Social Disclosure

The ESIA includes public consultation as part of the stakeholder engagement plan. The project was discussed with a wide range of stakeholders including relevant government departments, industry groups, NGOs, and individual community members and approved by GRN. Extensive on-ground consultation has been undertaken during the design of the project (as well as during the earlier projects that this project is aiming to upscale) and it is expected that consultation with any affected communities will continue. It is anticipated that based on the communities' needs, the projects will be fully accepted.

NUST and MET will develop and release updates on the project on a regular basis to provide interested stakeholders with information on project status. Updates may be via a range of media eg print, radio, social media or formal reports. A publicised telephone number will be maintained throughout the project to serve as a point of contact for enquiries, concern, complaints and/or grievances. All enquiries, concern, complaints and/or grievances will be recorded on a register and the appropriate manager will be informed. All material must be published in English and Local languages as appropriate.

Where there is a community issue raised, the following information will be recorded:

- time, date and nature of enquiry, concern, complaints and/or grievances;
- type of communication (e.g. telephone, letter, personal contact);
- name, contact address and contact number;

- response and investigation undertaken as a result of the enquiry, concern, complaints and/or grievances; and actions taken and name of the person taking action.

Some enquiries, concern, complaints and/or grievances may require an extended period to address. The complainant(s) will be kept informed of progress towards rectifying the concern. All enquiries, concerns, complaints and/or grievances will be investigated, and a response given to the complainant in a timely manner. A grievance redress mechanism has been included in the ESIA to address any complaints that may not be able to be resolved quickly. Nominated PSC/contractor staff will be responsible for undertaking a review of all enquiries, concern, complaints and/or grievances and ensuring progress toward resolution of each matter.

11. Complaints Register and Grievance Redress Mechanism

- During the implementation phase of the project, a person or group of people can be adversely affected, directly or indirectly due to the project activities. The grievances that may arise can be related to social issues such as eligibility criteria and entitlements, disruption of services, temporary or permanent loss of livelihoods and other social and cultural issues. Grievances may also be related to environmental issues such as excessive dust generation, damages to infrastructure due to construction related vibrations or transportation of raw material, noise, traffic congestions, decrease in quality or quantity of private/ public surface/ ground water resources during irrigation rehabilitation, damage to home gardens and agricultural lands etc.

- Should such a situation arise, there must be a mechanism through which affected parties can resolve such issues in a cordial manner with the project personnel in an efficient, unbiased, transparent, timely and cost-effective manner. To achieve this objective, a grievance redress mechanism has been included in ESIA for this project.

- The project allows those that have a complaint or that feel aggrieved by the project to be able to communicate their concern, complaints and/or grievances through an appropriate process. The Complaints Register and Grievance Redress Mechanism set out in this ESIA are to be used as part of the project and will provide an accessible, rapid, fair and effective response to concerned stakeholders, especially any vulnerable group who often lack access to formal legal regimes.

- While recognizing that many complaints may be resolved immediately, the Complaints Register and Grievance Redress Mechanism set out in this ESIA encourages mutually acceptable resolution of issues as they arise. The Complaints Register and Grievance Redress Mechanism set out in this ESIA has been designed to:
    - ✓ be a legitimate process that allows for trust to be built between stakeholder groups and assures stakeholders that their concerns will be assessed in a fair and transparent manner;
    - ✓ allow simple and streamlined access to the Complaints Register and Grievance Redress Mechanism for all stakeholders and provide adequate assistance for those that may have faced barriers in the past to be able to raise their concerns;
    - ✓ provide clear and known procedures for each stage of the Grievance Redress Mechanism process, and provides clarity on the types of outcomes available to individuals and groups;
    - ✓ ensure equitable treatment to all concerned and aggrieved individuals and groups through a consistent, formal approach that, is fair, informed and respectful to a concern, complaints and/or grievances;
    - ✓ to provide a transparent approach, by keeping any aggrieved individual/group informed of the progress of their complaint, the information that was used when assessing their complaint and information about the mechanisms that will be used to address it; and

- ✓ enable continuous learning and improvements to the Grievance Redress Mechanism. Through continued assessment, the learnings may reduce potential complaints and grievances.

- Eligibility criteria for the Grievance Redress Mechanism include:
-
  - ✓ Perceived negative economic, social or environmental impact on an individual and/or group, or concern about the potential to cause an impact;
  - ✓ clearly specified kind of impact that has occurred or has the potential to occur; and explanation of how the project caused or may cause such impact; and
  - ✓ individual and/or group filing of a complaint and/or grievance is impacted, or at risk of being impacted; or the individual and/or group filing a complaint and/or grievance demonstrates that it has authority from an individual and or group that have been or may potentially be impacted on to represent their interest.

- Local communities and other interested stakeholders may raise a grievance/complaint at all times to the MET and NUST. Affected local communities should be informed about the ESIA provisions, including its grievance mechanism and how to make a complaint.

11.1 Complaints Register

Where there is a community issue raised, the following information will be recorded:

- A complaints register will be established as part of the project to record any concerns raised by the community during construction. Any complaint will be advised to the MET and NUST within 24 hours of receiving the complaint. The complaint will be screened. Following the screening, complaints regarding corrupt practices will be referred to the NUST for commentary and/or advice along with the MET and NUST.
- Wherever possible, the project team will seek to resolve the complaint as soon as possible, and thus avoid escalation of issues. However, where a complaint cannot be readily resolved, then it must be escalated.
- A summary list of complaints received, and their disposition must be published in a report produced every six months.

11.2 Grievance Redress Mechanism

- The Grievance Redress Mechanism has been designed to be problem-solving mechanism with voluntary good-faith efforts. The Grievance Redress Mechanism is not a substitute for the legal process. The Grievance Redress Mechanism will as far as practicable, try to resolve complaints and/or grievances on terms that are mutually acceptable to all parties. When making a complaint and/or grievance, all parties must act at all times, in good faith and should not attempt to delay and or hinder any mutually acceptable resolution.

- In order to ensure smooth implementation of the Project and timely and effectively addressing of problems that may be encountered during implementation, a robust Grievance Redress Mechanism, which will enable to the Project Authorities to address the grievances of the stakeholders of the Project has been established.

- All complaints and/or grievances regarding social and environmental issues can be received either orally (to the field staff), by phone, in complaints box or in writing to the DRFN, MET and NUST or the Contractor working on site. A key part of the grievance redress mechanism is the requirement for the MET and NUST/PSC and construction contractor to maintain a register of complaints and/or grievances received at the respective project site offices. All complainants shall be treated respectfully, politely and with sensitivity. Every possible effort should be made by the MET and NUST/PSC and construction contractor to resolve the issues referred to in the complaint and/or

grievance within their purview. However, there may be certain problems that are more complex and cannot be solved through project-level mechanisms. Such grievances will be referred to the Grievance Redress Committee. It would be responsibility of the MET and NUST to solve these issues through a sound / robust process.

- The Grievance Redress Mechanism has been designed to ensure that an individual and/or group are not financially impacted by the process of making a complaint and/or grievance. The Grievance Redress Mechanism will cover any reasonable costs in engaging a suitably qualified person to assist in the preparation of a legitimate complaint and/or grievance. Where a complaint and/or grievance is seen to be ineligible, the Grievance Redress Mechanism will not cover these costs.
- Information about the Grievance Redress Mechanism and how to make a complaint and/or grievance must be placed at prominent places for the information of the key stakeholders.
- The Safeguards officer in the PSC will be designated as the key officer in charge of the Grievance Redress Mechanism. The Terms of Reference for these positions (as amended from time to time) will have the following key responsibilities:
    a. coordinate formation of Grievance Redress Committees before the commencement of constructions to resolve issues;
    b. act as the focal point at the PSC on Grievance Redress issues and facilitate the resolution of issues within the PSC;
    c. create awareness of the Grievance Redress Mechanism amongst all the stakeholders through public awareness campaigns;
    d. assist in redress of all grievances by coordinating with the concerned parties;
    e. maintain information on grievances and redress;
    f. monitor the activities of MET and NUST on grievances issues; and
    g. prepare the progress for monthly/quarterly reports.
- A two-tier Grievance Redress Mechanism structure has been developed to address all complaints and/or grievances in the project. The first trier redress mechanism involves the receipt of a complaint and/or grievance at national level. The stakeholders are informed of various points of making a complaint and/or grievance (if any) and the PSC collect the complaints and/or grievances from these points on a regular basis and record them. This is followed by coordinating with the concerned people to redress the grievances. The Safeguards Officer of the PSC will coordinate the activities at the respective District level to address the grievances and would act as the focal point in this regard. The Community Development Officer of the Local Authority or in the absence of the Community Development Officer, any officer given the responsibility of this would coordinate with the Safeguards and Gender Manager of the PSC, MET and NUST in redressing the grievances. The designated officer of the Local Authorities is provided with sufficient training in the procedure of redress to continue such systems in future.
- The grievance can be made orally (to the field staff), by phone, in complaints box or in writing to the NUST, and MET or the Construction Contractor. Complainants may specifically contact the Safeguards Officer and request confidentiality if they have concerns about retaliation. In cases where confidentiality is requested (i.e. not revealing the complainant's identity to MET and NUST and/or the Construction Contractor). In these cases, the Safeguards Officer will review the complaint and/or grievance, discuss it with the complainant, and determine how best to engage project executing entities while preserving confidentiality for the complainant.
- As soon as a complaint and/or grievance is received, the Safeguards Officer would issue an acknowledgement. The Community Development Officer receiving the

complaint and/or grievance should try to obtain relevant basic information regarding the grievance and the complainant and will immediately inform the Safeguards Officer in the PSC.

- The PSC will maintain a Complaint / Grievance Redress register at the national Level. Keeping records collected from relevant bodies is the responsibility of PSC.
- After registering the complaint and/or grievance, the Safeguards Officer will study the complaint and/or grievance made in detail and forward the complaint and/or grievance to the concerned officer with specific dates for replying and redressing the same. The Safeguards Officer will hold meetings with the affected persons / complainant and then attempt to find a solution to the complaint and/or grievance received. If necessary, meetings will be held with the concerned affected persons / complainant and the concerned officer to find a solution to the problem and develop plans to redress the grievance. The deliberations of the meetings and decisions taken are recorded. All meetings in connection with the Grievance Redress Mechanism, including the meetings of the Grievance Redress Committee, must be recorded. The Safeguards Officer for the Grievances Redress Mechanism will be actively involved in all activities.
- A Community Project Implementation Committee would be formed to oversee the first tier of the Grievance Redress Mechanism. The Community Project Implementation Committee would be established in each of the two regions.
- The resolution at the first tier will be normally be completed within 15 working days and the complaint and/or grievance will be notified of the proposed response through a disclosure form. The resolution process should comply with the requirements of the Grievance Redress Mechanism in that it should, as far as practicable, be informal with all parties acting in good faith. Further, the Grievance Redress Mechanism should, as far as practicable, achieve mutually acceptable outcomes for all parties.
- Should the grievance be not resolved within this period to the satisfaction of the complainant, the grievance will be referred to the next level of Grievance Redress Mechanism. If the social safeguard and gender officer feels that adequate solutions can be established within the next five working days, the officer can decide on retaining the issue at the first level by informing the complainant accordingly. However, if the complainant requests for an immediate transfer to the next level, the matter must be referred to the next tier. In any case, where the issue is not addressed within 20 working days, the matter is referred to the next level.
- Any grievance related to corruption or any unethical practice should be referred immediately to the Namibian Office of the Attorney General and the Office of Investigation within NUST in Windhoek.
- The Grievance Redress Committee formed at the upper level would address the grievance in the second tier.
- The Safeguard Officer from the PSC will coordinate with the respective Commissioner of Local Government in getting these Committees constituted for each Province and get the necessary circulars issued in this regard so that they can be convened whenever required.
- The Terms of Reference for the Grievance Redress Committee are:
    - providing support to the affected persons in solving their problems;
    - prioritise grievances and resolve them at the earliest;
    - provide information to the PSC, MET and NUST on serious cases at the earliest opportunity;
    - Coordinate with the aggrieved person/group and obtain proper and timely information on the solution worked out for his/her grievance; and

  - study the normally occurring grievances and advise PSC, National and District Steering Committee on remedial actions to avoid further occurrences.

- The Grievance Redress Committee will hold the necessary meetings with the aggrieved party/complainant and the concerned officer and attempt to find a solution acceptable at all levels. The Grievance Redress Committee would record the minutes of the meeting.
- Grievance Redress Committee will communicate proposed responses to the complainant formally. If the proposed response satisfies the complainant, the response will be implemented, and the complaint and/or grievance closed. In cases where a proposed response is unsatisfactory to the complainant, the Grievance Redress Committee may choose to revise the proposed response to meet the complainant's remaining concerns, or to indicate to the complainant that no other response appears feasible to the Grievance Redress Committee. The complainant may decide to take a legal or any other recourse if s/he is not satisfied with the resolutions due to the deliberations of the three tiers of the grievance redress mechanism.
- The Stakeholder Response Mechanism offers locally affected people an opportunity to work with other stakeholders to resolve concerns, complaints and/or grievances about the social and environmental impacts of a NUST project. Stakeholder Response Mechanism is intended to supplement the proactive stakeholder engagement that is required of NUST and its Implementing Partners throughout the project cycle. Communities and individuals may request a Stakeholder Response Mechanism process when they have used standard channels for project management and quality assurance and are not satisfied with the response (in this case the project level grievance redress mechanism). When a valid Stakeholder Response Mechanism request is submitted, NUST focal point will work with concerned stakeholders and Implementing Partners to address and resolve the concerns. The relevant form is attached at the end of the ESIA.

12. Conclusions

This ESIA and associated ESMP presents generic and preliminary ES risks for the Project in the two target regions of Namibia to be supported by the project. The paper provides comprehensive guidance on potential risks and mitigation measures to be used in project design and implementation. The identified risks were screened and aligned with AF environmental and social principles. Most of the identified environmental risks were found to be of moderate to low risk before mitigation measures and it is considered that after mitigation measures the risks could be reduced to minimal. As a result, the project is Classified as Category B under the AF environmental and social policy. From a social risk perspective, some identified risks were found to be of significance. To ensure the success of the project and environmental sustainability, critical mitigation measures were proposed for these risks. Overall, the proposed project risks or impacts are manageable if the proposed mitigation measures are taken into consideration and implemented.

Development related impacts must be prevented or mitigated by appointing reputable contractors and by implementing strict monitoring and control. All permits and approvals must be obtained from relevant ministries or authorities for the development and operations of the project. Fire prevention measures should be adequate to prevent fires that may cause potential damage to the area and may cause conflicts with neighbouring landowners. Health, safety and security regulations should be adhered to in accordance with the regulations pertaining to relevant laws and standards. Educating workers on the importance of conservation of the environment would prevent or minimize problems associated with poaching or illegal harvesting of forest produce.

Overall the project will play a positive role in Omaheke and Omusati due to job creation and economic stimulus in an otherwise poor population with a high rate of unemployment. Economically, the project would result in positive externalities in the country as economic benefits are more than the economic costs of the project. Compared to these benefits, the major negative externality relates to the potential pollution of the soil and water resources and the alteration of natural flora and fauna as a result of farming activities. However, a sound social and environmental and social management plan has been developed against these negative externalities.

Based on the direct and indirect project benefits, a No project option is not a viable alternative for this project. Considering the fact, the potential project impacts can be avoided or mitigate effectively, the project benefits outweigh the costs in terms of adverse impacts. Based on the above considered factors, a “no-project scenario” is not an attractive alternative.

The Environmental and Social Management Plan should be used as an on-site reference document during all phases (planning, development, operation and decommissioning) of the project. Parties responsible for transgression of the ESMP should be held responsible for any activities that may need to be undertaken.

13. References

1. BIWAC (2002) : Environmental Profile of the Kavango Region : Hydrogeology of the Kavango Region.
2. Branch, B., 1998. Field guide to snakes and other reptiles of southern Africa. Cape Town: Struik.
3. Crerar S., Church J.(1988) : Evaporation Map for South West Africa/Namibia, Department of Water Affairs South West Africa/Namibia, Report No.: 11/1/8/1/H1
4. Dean, W. R., Milton, S. J. & Jeltsch, F., 1999. Large trees, fertile islands and birds in arid savanna. Journal of Arid Environments, Volume 41, pp. 61-78.
5. Du Preez, L. & Carruthers, V., 2009. A complete guide to the frogs of southern Africa. Cape Town: Struik Nature.
6. DWA 1991: The Water Act (Act 54 of 1956), "The Namibian National Water Quality Standards", Department of
7. Water Affairs, Ministry of Agriculture, Water and Rural Development, Government of the Republic of Namibia.
8. Griffin, M., 2003. Checklist and provisional national consecration status of amphibians, retiles and mammals known, reported, or expected to occur in Namibia. Windhoek: Ministry of Environment and Tourism.
9. Hockey, P., Dean, W. & Ryan, P., 2005. Roberts Birds of Southern Africa. 7th ed. Cape Town: The Trustees of the John Voelcker Bird Book Fund.
10. Hudson, A. & Bouwman, H., 2007. Different land use types affect bird communities in the Kalahari, South Africa. African Journal of Ecology, Volume 45, pp. 423-430.
11. IUCN, n.d. The IUCN Red List of Threatened Species. Version 2015 -4. [Online] Available at: <http://www.iucnredlist.org>
12. Kinahan, J. 2011. From the beginning: the archaeological evidence. In Wallace, M & Kinahan, J. A History of Namibia. London, Hurst.
13. MacArthur, R. H., 1964. Environmental factors affecting bird species diversity. The American Naturalist, Volume 98(903), pp. 387-397.
14. Mannheimer, C. & Curtis, B., 2009. Le Roux and Muller's field guide to the trees and shrubs of Namibia. Windhoek: Macmillan Education Namibia.
15. Marais, J., 2004. A complete guide to the snakes of southern Africa. Cape Town: Struik Nature.
16. McLaughlin, A. & Mineau, P., 1995. The impact of agricultural practices on biodiversity. Agriculture, Ecosystems and Environment, Volume 55, pp. 201-212.
17. Mendelsohn, J., Jarvis, A., Roberts, C. and Roberts, T., (2002) : "Atlas of Namibia: A portrait of the land and its people". David Philip Publishers, Cape Town, RSA.
18. Mendelsohn J. et al eds 2002. Atlas of Namibia. Cape Town, David Phillip.
19. Mendelsohn, J. & El Obeid, S., 2004. Okavango River: The flow of a lifeline. Windhoek: Spearhead Press.
20. Mendelssohn, J., Jarvis, A., Roberts, C. & Robertson, T., 2002. Atlas of Namibia a portrait of the land and its people. Windhoek: Spearhead Press.
21. Miller, R. (2008): The Geology of Namibia. Volume 1-3, The Geological Survey of Namibia, Windhoek, Namibia.
22. Namibia, N. H. o., 2015. BRAHMS Database. National Botanical Research Institute, MAWF. Windhoek: s.n.
23. Simmons, R., Brown, C. & Kemper, J., 2015. Birds to watch in Namibia: red, rare and endemic species. Windhoek: Ministry of Environment and Tourism and Namibia Nature Foundation.
24. Skinner, J. & Chimiba, C., 2005. The mammals of the Southern African sub-region. Cambridge: Cambridge University Press.
25. WHO (2011): WHO Guidelines for Drinking-water Quality (fourth edition). World Health Organisation 2011. ISBN: 978 92 4 154815 1

Annex 1: Budget for ESMP Implementation

A budget has been prepared for the implementation of the ESMP over the five-year Project implementation period as follows:

Item	Frequency	Cost (for five years)
ESIA and ESMP Updating and development of an auditing framework	Once off	US$20,000
Training of PMU and stakeholders in ESMP implementation	Twice (beginning and midterm)	US$16,000
Estimated EIAs and EMPs for target sites	Beginning of Project implementation	US$70,000
Annual Environmental and Social Monitoring Report	Annual	US$50,000
Implementation of Grievance Redress Mechanism	When required	US$20,000
Total		**US$ 176 000**