ADAPTATION FUND

AFB/PPRC.21/20
26 September 2017

Adaptation Fund Board
Project and Programme Review Committee
Twenty-First Meeting
Bonn, Germany, 10-11 October 2017

Agenda Item 6 p)

PROPOSAL FOR NAMIBIA (1)

Background

1. The Operational Policies and Guidelines (OPG) for Parties to Access Resources from the Adaptation Fund (the Fund), adopted by the Adaptation Fund Board (the Board), state in paragraph 45 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the endorsement of the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would ultimately require the Board's approval.

2. The Templates approved by the Board (OPG, Annex 4) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

> *For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.*

3. The first four criteria mentioned above are:
   1. Country Eligibility,
   2. Project Eligibility,
   3. Resource Availability, and
   4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
   5. Implementation Arrangements.

5. It is worth noting that since the twenty-second Board meeting, the Environmental and Social (E&S) Policy of the Fund was approved and consequently compliance with the Policy has been included in the review criteria both for concept documents and fully-developed project documents. The proposals template was revised as well, to include sections requesting demonstration of compliance of the project/programme with the E&S Policy.

6. In its seventeenth meeting, the Board decided (Decision B.17/7) to approve "Instructions for preparing a request for project or programme funding from the Adaptation Fund", contained in the Annex to document AFB/PPRC.8/4, which further outlines applicable review criteria for both concepts and fully-developed proposals. The latest version of this document was launched in conjunction with the revision of the Operational Policies and Guidelines in November 2013.

7. Based on the Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Fund was sent out on April 8, 2010.

8. According to the Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

9. The following fully-developed project document titled “Community-based Integrated Farming System for Climate Change Adaptation” was submitted by the Desert Research Foundation of Namibia (DRFN), which is the National Implementing Entity of the Adaptation Fund for Namibia.

10. This is the fourth submission of the proposal. It was first submitted as a fully-developed project document in the Board twenty-sixth meeting, and was not approved. Following the Board decision, the proponent had decided to resubmit the proposal as a project concept, which was submitted to the secretariat for the twenty-seventh meeting. However, the proposal was withdrawn following a request from the Designated Authority for Namibia, before the meeting.

11. The proposal was resubmitted in the twenty-eighth meeting as a project concept and the Board decided to:

a) Endorse the project concept, as supplemented by the clarification response provided by the Desert Research Foundation of Namibia (DRFN) to the request made by the technical review;

b) Request the secretariat to transmit to DRFN the observations in the review sheet annexed to the notification of the Board’s decision, as well as the following issues:

(i) The fully-developed project document should elaborate on the adaptation reasoning of output 1.2., including activity 1.2.2;

(ii) The fully-developed project document should confirm that an adequate water use agreement has been established with the neighbouring country for irrigation activities in the Kunene River in Angola;

(iii) The fully-developed project document should ensure that the costs related to the activities of bush thinning are not overestimated, as the targeted area covered 200,000 hectares;

(iv) The fully-developed project document should demonstrate the cost effectiveness of the project, with inclusion of the alternate options and their related costs;

(v) The fully-developed project document should demonstrate complementarities and synergies of the project with other relevant initiatives;

(vi) A comprehensive consultation process is expected at the fully-developed project document stage, in compliance with the relevant Adaptation Fund policies and guidelines;

(vii) The fully-developed project document should demonstrate that a proper environmental and social risk assessment has taken place, with adequate categorization of the project as a result of that process;

c) Approve the Project Formulation Grant of US$ 30,000;

d) Request DRFN to transmit the observations under item (b) to the Government of Namibia; and

e) Encourage the Government of Namibia to submit through DRFN a fully-developed project proposal that would also address the observations under item (b) above.

(Decision B.28/2)

12. The present submission of the fully-developed project document was received by the secretariat in time to be considered in the twenty-eighth Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number NAM/NIE/Agri/2015/2, and completed a review sheet.

13. In accordance with a request to the secretariat made by the Board in its 10th meeting, the secretariat shared this review sheet with DRFN, and offered it the opportunity of providing responses before the review sheet was sent to the PPRC.

14. The secretariat is submitting to the PPRC the summary and, pursuant to decision B.17/15, the final technical review of the project, both prepared by the secretariat, along with the final submission of the proposal in the following section. In accordance with decision B.25.15, a response table is also attached, explaining where and how the observations made by the Board when endorsing the project concept at its twenty-eighth meeting had been addressed by the proponent in the fully-developed project document submitted for this meeting. The proposal is also submitted with changes between the initial submission and the revised version highlighted.

Project Summary

Namibia – Community-based Integrated Farming System for Climate Change Adaptation

Implementing Entity: *DRFN*
Project/Programme Execution Cost: USD 437,734
Total Project/Programme Cost: USD 4,607,729
Implementing Fee: USD 391,657
Financing Requested: USD 4,999,386

Project Background and Context:

Namibia is the driest country in Sub-Saharan Africa and has limited surface-water sources; more than 50% of water used in Namibia comes from an estimated 50,000 boreholes. The Otjozondjupa and Omaheke regions are overlain with deep Kalahari and rely solely on groundwater resources. This proposed 5-year project with a budget of USD 4,999,386 will assist vulnerable small-scale communal farmers in the Omusati and Omaheke regions of Namibia to implement daptation actions and practices that strengthen their adaptive capacities and enhance resilience of their farming system to climate variability and change.

The project approaches adaptation of the agricultural and natural resource-based sector in Namibia to climate change in a holistic 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 primary focus of the proposed project is to strengthen the adaptive capacities of vulnerable communities, especially women-headed households, and enhance resilience of their farming system to climate variability.

Component 1: Improve ecosystem management (USD 1,378,537)

This component entails the implementation of climate-smart sustainable rangeland management by vulnerable communities. This will improve the resilience of their rangeland-based ecosystem and other agricultural resources to climate variability and change.

Component 2: Enhance rain-fed crop and livestock production (USD 593,152)

This component entails the implementation of climate-smart dry-land production and management techniques that will enhance the adaptive capacity of their crop and livestock production systems. Higher, more efficient, and more sustainable yield of rain-fed crops and of livestock production due to climate-smart management will result, and be supported by processing, value-addition, and improved marketing of produce to improve livelihoods.

Component 3: Enhance irrigated horticultural production (USD 404,481)

This component aims to enhance the production of irrigated horticultural produce and achieve higher, more efficient and more sustainable yields of irrigated horticultural produce due to climate-smart management, supported by processing, value-addition and improved marketing of produce, which results in improved livelihoods.

Component 4: Capacity building (USD 1,701,958)

This component will offer training and information supply to strengthen the capacity of farmers, farming institutions, students and learners to understand climate change, adapt to climate change and variability, and better manage the associated risks.

Component 5: Improve policy and legal and policy framework (USD 91,867)

This component is to review and improve the policy and legal framework relevant to climate change adaptation in communal areas so that resilience measures are promoted and the adaptive capacity of vulnerable communities is improved.

REF 1: E-Mail of Monday 14th August 2017 from AF Board Secretariat to DRFN

REF 2: Letter AF Board Secretariat dated 18th October 2016, Ref: 2016/100

Namibia: Community-based Integrated Farming System for Climate Change Adaptation (Project Concept; Desert Research Foundation of Namibia (DRFN); NAM/NIE/Agri/2015/2; US$ 750,000)

b) Request the secretariat to transmit to DRFN the observations in the review sheet annexed to the notification of the Board's decision, as well as the following issues: (i)-(vii)

Number	Observation	How and where addressed in full proposal
(i)	The fully-developed project document should elaborate on the adaptation reasoning of output 1.2., including activity 1.2.2.	Note: Output 1.2: Develop packaging and storage system to reduce post-harvest loss, and Activity 1.2.2: Select and store crops and varieties which are less susceptible to post-harvest pest attack are in the fully developed project document addressed as Activities 2.6 and 3.6. Adaptation reasoning for these activities is elaborated in PART II, Paragraph I, Component 2 for dry-land cropping and Component 3 for horticulture.
(ii)	The fully-developed project document should confirm that an adequate water use agreement has been established with the neighbouring country for irrigation activities in the Kunene River in Angola.	Such an agreement with Angola is indeed in place. Not confirming/mentioning this in the fully-developed project document was an oversight. The agreement will be added as an annexure to the full proposal during the anticipated review cycle, and is also attached to this document.
(iii)	The fully-developed project document should ensure that the costs related to the activities of bush thinning are not overestimated, as the targeted area covered 200,000 hectares.	The total targeted area for bush thinning (as part of rehabilitation of degraded rangeland) of 200 000 ha in the concept proposal has been reduced to 22 000 ha in the fully-developed project document. The unit cost for debushing in the latter document is considered to be realistic.

(iv)	The fully-developed project document should demonstrate the cost effectiveness of the project, with inclusion of the alternate options and their related costs.	These aspects are addressed in PART II, Paragraph C in the fully-developed project document.
(v)	The fully-developed project document should demonstrate complementarities and synergies of the project with other relevant initiatives.	In the fully-developed project document complementarities and synergies are demonstrated in PART II, Section F: Duplication with other funding sources.
(vi)	A comprehensive consultation process is expected at the fully-developed project document stage, in compliance with the relevant Adaptation Fund policies and guidelines.	The consultation process has taken place as elaborated under PART II, Section H: Consultative process.
(vii)	The fully-developed project document should demonstrate that a proper environmental and social risk assessment has taken place, with adequate categorization of the project as a result of that process.	Environmental and social risk assessment is addressed in PART II, Section K; and Environmental and Social risk management in PART II, Section C. In these two sections the proposed project has been categorised as Category B.

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular-sized Project

Country/Region: **Namibia**
Project Title: **Community-based integrated farming systems for climate change adaptation**
AF Project ID: **NAM/NIE/Agri/2015/2**
IE Project ID: Requested Financing from Adaptation Fund (US Dollars): **4,999,386**
Reviewer and contact person: **Andrew Chilombo** Co-reviewer(s): **Daouda Ndiaye**
IE Contact Person: **Martin B. Schneider**

Review Criteria	Questions	Comments on 16 August 2017	Comments on 12 September 2017
Country Eligibility	1. Is the country party to the Kyoto Protocol?	Yes	
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	Yes. Namibia is one of the driest countries in Southern Africa, with climate change predictions indicating that the country will continue experiencing erratic rainfall patterns, droughts, and reduced crop and animal production. This will lock the already poor 18 percent of the population into further poverty. The country's climate is predominantly semi-arid as it is situated at the interface between different climate systems.	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	Yes, dated July 12, 2017	

	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	The project approaches adaptation of the agricultural and natural resource-based sector in Namibia to climate change in a holistic manner that increases production efficiency and brings value-added products to market effectively, by investing in techniques, technologies and in people. At this stage of project development, the overall observation is that the information provided needs further clarification to enable an assessment of compliance with this particular review criterion. While the general narrative on the Climate Change (CC) impacts is sound, including the socio-economic rationale for choosing the two regions, specifics on CC impacts in Omaheke and Osamuti are insufficiently presented. Clarify. **CR1** Clarify the distinction between CC related natural resource degradation from those caused by anthropogenic influences. **CR2** Specificities are required on what the project will concretely to do address the laxity in the application of the policies. **CR3** In addition to CR3 above, clarify the rationale for investigating the non-applied law rather than focusing first on understanding the non-application of already existing regulations. In addition, clarify how and why this project intends to correct the legal problems, rather than making recommendations to the government structures (p71). **CR4**	**CR1:** Besides low yields, clarify if there aren't any specific CC related impacts that can be presented on Omaheke and Omusati. Specify, and where possible, indicate quantifiable CC impacts to strengthen the rationale for the two areas, in addition to high population and cattle export that have been cited. **CR2:** Addressed. **CR3:** Addressed. **CR4:** Not addressed. Please address this correction request. Component 5 does mention, 'It is the intention of this project component to identify such legal problems and correct them, for the benefit of Namibian society' (p73). This seems to contradict the response. In addition, address the rationale for investigating the non-applied law

		The objectives, components and activities are too many. Activities under component 1 and 5 are similar in that they focus on the policy environment in the country. Clarify if they cannot be more focused, merged and simplified to reduce the apparent redundancy. **CR5** Similarly, many proposed techniques are climate change smart techniques and interventions. However, they have been segregated and costed separately. Clarify this separation of related climate change smart interventions. **CR6** The coherence and logical connection between objectives, components and the broader context of the climate change and non-climate change challenges in the selected areas are not coming out very clearly to easily understand the adaptation reasoning of the project. **CR7** Clarify if the proposed market initiative will be demand-driven or the market itself will create demand. **CR8** Clarify how the project assets/equipment that will be maintained during the project and after the life of the project, and what regime of property rights will be established for them? **CR9** A strong justification linked to adaptation reasoning is required for the student training programs and scholarships. Clarify why table 6 does not have outcomes and outputs associated with student costs. **CR10**	rather than understanding the non-application of already existing regulations. **CR5:** Not addressed. Clarify if they cannot be more focused, merged and simplified to reduce the apparent redundancy. That doing that would reduce impact, cost-effectiveness, make supervision more difficult, is not convincing. **CR6:** Not addressed. For example, table 6, activities 1.1 and 1.2 could lead to the same outcome of improved SRM. Clarify the difference between activities 1.3 and 1.8 costed $57,138 and $35,499, respectively? Just two examples among others.

			CR7: Besides these pull and push factors, additional information will be needed to clearly demonstrate the logical flow and connection between proposed components within experienced CC and non-CC challenges to more clearly show adaptation reasoning. With many components and activities, it is difficult to clearly see how they all fit together. **CR8:** Include this clarification in the revised document. **CR9:** Include this clarification in the revised document**.** **CR10:** Addressed.

	3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	The information provided is not adequate to assess compliance with this particular review criterion. Systematically, provide additional information on the economic, social and environmental benefits of this proposed project. Specifically, for each of the benefits, be more specific with estimates or better articulation of benefits either by contribution or attribution. **CR11** Using the format of relating components to economic, social and environmental benefits, clarify if there are no benefits from improved policy and legal framework (table 8). **CR12** The project makes outright intention to support women. Clarify to what extent men (~60 percent) will be involved. **CR13** Clarify if woody plants encroachment is not an ecological system adapting itself to the CC and anthropological pressures (though it of course reduces rangeland). Additionally, clarify the ecological implications of thinning back woody plants in preference for grass production. **CR14** Clarify why the Namibian pasture grass *Cenchrus ciliaris* with higher success growth rate cannot be promoted with its taste improved, instead of venturing into seed multiplication of varieties that are more difficult to grow with costs associated with seed multiplication. **CR15** Clarify how the DoF will be institutionally involved in the wood market model when they are understaffed. **CR16** Clarify how the project intends to help communities to implement plans, and what will happen after the project comes to an end (p51). **CR17**	**CR11:** Not addressed. **CR12:** Addressed. **CR13:** Not addressed. Not clear where the explanation given reflects in the project document. **CR14:** Addressed. **CR15:** Addressed. **CR16:** Addressed. **CR17:** Addressed.

		Clarify with specifics how the project intends 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 (p53 and p54). Provide additional information to give specifics on the SME, clearly spelling out their role. **CR18** Activities lack specifics on the concrete nature, including scope of the rangeland training. Clarify the role that indigenous knowledge, as an asset to natural resource management and adaptation, how played and how it has been embedded in the design of these activities. **CR19** Since small-holder communal producers do not have transport, and this is already known as a challenge, clarify then the need for further awareness raising with the budget allocation of this activity (p67). **CR20** Clarify the adaptation reasoning behind the scholarships of 9 Masters/PhD as well as the samples of soils, water, plants and animals. **CR21** With prior knowledge about the conflicting laws that weaken the safeguarding of communal grazing areas, clarify the value addition in doing additional policy and legal framework review and advocacy (p72). **CR22**	**CR18:** Addressed. **CR19:** Not addressed. What indigenous knowledge on NRM/SRM exists in the two areas, and how has that knowledge been embedded in the design of this project? **CR20:** Not addressed. **CR21:** Not addressed. Investigation of problems by students in itself is peripheral to adaptation reasoning. This is not convincing. **CR22:** Partially addressed. To fully address this CR, this detail needs to reflect in the project document submitted.

	4. Is the project / programme cost effective?	No. The information provided is not adequate to assess compliance with this particular review criterion. See comments above. **CR23** Clarify sustainability of proposed components through the lens of scalability and replicability. **CR24** Outcome 5.2 (p80) clarify how this could fall within the implementation strategy of the project when the legislative arm of the government is in place. **CR25** Clarify if the engagement of students with their funding sources to contribute to this project through relevant research does not constitute cost-effectiveness compared to funding their studies with project resources. **CR26**	**CR23:** Partially addressed. Please, address 'apparent redundancy' of certain project activities that have been costed separately. **CR24:** Addressed. **CR25:** Not addressed. **CR26:** Not fully addressed. Include a convincing justification for engaging students as part of the implementing strategy of this project.
	5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	Yes	

	6. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund??	To table 12, add a third column for clearing authority. **CAR1**	**CAR1:** Addressed.
	7. Is there duplication of project / programme with other funding sources?	Cleared.	
	8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Clarify why the Knowledge Management has not been embedded in the project design as an independent component. **CR27** Include the engagement mechanism in knowledge sharing and communications with immediate beneficiaries and broader audiences beyond the project areas. **CAR2**	**CR27:** Though the added information gives better visibility of Knowledge Management, the CR is not addressed. Knowledge Management from the Adaptation Fund perspective is very important, and can contribute to cost-effectiveness of future AF funded projects. **CAR2:** Addressed.

	9. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	No. A clear gender-responsive consultative process needs to take place, and shall involve all direct and indirect stakeholders of the project/programme, including vulnerable groups and taking into account gender considerations. Tabulate participants' attendance, including their roles and outcomes/resolutions from meetings/consultations. **CAR3** Clarify why there was clear lack of inclusive meetings and consultations that should have involved communities. **CR28**	**CAR3:** Partially addressed. Include outcomes of each of the meetings in table 13. This will clarify how interests of grass-root communities were represented by representatives. See CAR3 above to demonstrate how outcomes of each meeting and community interests and perspectives were integrated.
	10. Is the requested financing justified on the basis of full cost of adaptation reasoning?	No. In addition to comments above, provide additional information to demonstrate further how the interventions will increase the *resilience* of both the communities in Omasuti and Omaheke and the ecological systems in the two areas. **CR29** Under component 2, (p103), clarify any evidence that justifies that after trainings received in the past, communities still lack awareness, knowledge and tools to practice soil, crop and animal husbandry, and therefore would benefit from proposed interventions. **CR30** Clarify if the hydrology of the area is well understood to ascertain that enhanced irrigation does not affect the underground water system (p104). **CR31**	**CR29:** Not fully addressed. Address comments above, and ecological resilience needs additional information. For example, how does making the areas more savannah by de-bushing (thwarting the natural process of ecological adaptation) constitute making the area ecologically resilient? **CR30:** Not addressed. If there have been trainings in the past, and people

			still lack awareness, what will make this project different in creating awareness then? **CR31:** Not fully address. Fully address the CR by reflecting this additional information in the project document?
	11. Is the project / program aligned with AF's results framework?	No. See comments see review comments raised under 'Project Eligibility' under sections 2 and 3 above	Not addressed. Consider comments raised under 'Project Eligibility.'
	12. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	Clarify sustainability by i) providing details on the maintenance of assets that will be procured for the project during and after the project life, and ii) by explaining the replicability and scalability of the envisaged adaptation activities and benefits of the proposed project. **CR32**	**CR32:** Addressed.
	13. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	Partially. The risks identification in table 14, II.K., is not substantiated and inconsistent with the nature of the proposed activities and the environment in which these will be implemented. All elements required for adequate ESP risks identification are present: the sites have been identified, the activities have (mostly, except for some irrigation interventions and some other small activities) been identified, consultations have been held, and the inherent risks of the proposed activities are apparent from the description of the activities. And yet the conclusions are for all but one ESP principle that there are no risks. This is inconsistent with the evident inherent risks associated with the described project activities and their environment, e.g. for the ESP principles on natural habitats, biodiversity, soils conservation, climate change, resettlement etc. for example, the project proposes soil sampling for tests. However, table 14 indicates that	**CR33:** Partially addressed. To fully address this CR, provide the outcome of the ESP risks identification process for all project activities that have been proposed, not taking mitigation or management measures into account. There are inconsistencies between tables 14 and 15 as mitigation and management measures are inappropriately considered in the risks

		‘Lands and Soil Conservation’ need no further assessment for compliance. **CR33:** Please provide the outcome of the ESP risks identification process for all activities, not taking mitigation or management measures into account. The findings are not accompanied with substantiation of the conclusions, and further on in the proposal there are references to mitigation and management measures. **CR34:** Please provide a justification of the risks identification conclusions for all the 15 ESP principles, for all of the project activities. ‘Outsiders’ to community lands in Omaheke and Osamuti, presumably Namibians, are ‘pasture-poachers.’ The project document doesn’t report any social conflicts with ‘pasture-poaching.’ Despite envisaged environmental benefits, clarify if by promoting the implementation of regulation that will legally keep ‘pasture-poachers’ away, that doesn’t potentially increase ‘pasture-scarcity’ to the level to ignite potential direct, indirect, transboundary conflicts. **CR35** The ESP requires that ESP risks are identified prior to submission of a funding application, in a comprehensive manner. This appears not to be the case, as (p.115) implementing partners at village level will screen all project activities for risks, and prepare management plans if required. The capacity at that level to identify risks in line with the AF ESP is not demonstrated. **CR36:** For the ESP risks identified, please include the findings of the impact assessment, as well as the identified mitigation and/or management actions, organised in an Environmental and Social Management Plan. The categorisation as B is not consistent with the absence of risks. Risk-free projects are categorised as C.	identification process. **CR34:** Not addressed as requested. **CR35:** Not addressed. **CR36:** Not addressed. The added table 15 cannot be considered an ESMP as it is lacking essential elements of an ESMP. **CR37:** Partially address. The project was rightly identified as a category B project, but the no-risk conclusion was not substantiated. Re-categorising the project as category C does not reflect the presence of ESP risks. Also, please, provide details on the gender-specific cultural (Omaheke and Omasati) and the legal context in which the project will operate.

		In addition to table 14, please provide details on the gender-specific cultural and/or legal context in which the project/programme will operate. **CR37**	
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	Yes	
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	Yes	
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	Yes	
Eligibility of IE	4. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	Yes, it has been submitted through the Desert Research Foundation of Namibia (DRFN), a national Implementing Entity	

Implementation Arrangements	1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	No. Clarify the inter-disciplinary and multi-sectoral approach in the project management, clearly describing the roles and responsibilities. **CR38** Clarify if the participation of communities in the project management will be limited to providing information and raising issues for research. **CR39** Clarify from which institutions the PCLs will be nominated. **CR40** The detailed local level implementation as presented in figure 6 is too complex. Clarify the roles and responsibilities by mapping stakeholders involved with envisaged activities. **CR41**	**CR38:** Not adequately addressed. In addition to information in Table 15 on the environmental and social impacts, provide more information in separate paragraph/s. **CR39:** Addressed. **CR40:** Addressed. **CR41:** Addressed.
	2. Are there measures for financial and project/programme risk management?	While it is not clear from the project document how communities were involved, and what aspects of the communities input have informed the project design, clarify the financial risks associated with potential dis-adoption of proposed interventions by communities in Omaheke and Omasuti. **CR42**	**CR42:** Include this information provided in the response sheet in the project document.

	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	No. The relevant section III.C is providing mixed and conflicting information. It contradicts the finding of the risks identification that there are no environmental or social risks. No effective arrangements are provided to identify and manage or mitigate ESP risks. For some of the activities, ESP risks have not yet been identified since these activities have not yet been identified in sufficient detail to make effective risk identification possible (referred to as unidentified sub-projects, USPs). In this case, a justification is required why these activities cannot be developed to this stage, and a project-wide ESMP is required to ensure that there activities, once sufficiently identified, will be subject to the same ESP requirements as all the rest. **CR43:** Please justify why the use of USPs is inevitable, and develop an ESMP accordingly. Alternatively, identify all project activities to the extent that effective risk identification is possible, and update the information provided.	**CR43:** Not addressed. The activities under component 3.1 are described as follows: "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." This description is of an activity that has not yet been identified in sufficient detail in terms of its specific environment (the Omusati region is 26,551 km2, Omaheke is 84,981 km2), beneficiaries and technical characteristics to make effective risk identification possible and is therefore considered a USP, requiring a specific approach to ensure ESP compliance. This characterization as USP is disputed by the IE in the response provided, but no further information is provided and risk identification is not presented.

	4. Is a budget on the Implementing Entity Management Fee use included?	Yes	
	5. Is an explanation and a breakdown of the execution costs included?	Yes	
	6. Is a detailed budget including budget notes included?	Table 19 from the way it is presented, indicates an average trip into the field every month. Clarify if the project activities will be in parallel/implemented simultaneously or will be sequenced. **CR4~~14~~** Clarify why each component has separate costs that can be combined if certain activities could be combined. For example, 1.4, 2.4, 3.4 among other such repeated costs and expenses. **CR4~~25~~** Clarify and justify, i) the criteria for selecting students who will benefit from the scholarship (Masters/PhD), ii) plans for these students when they graduate; iii) the number of excursions planned for. **CR4~~36~~** Clarify if buying a 4x4 for the project is not more cost-effective than leasing one as indicated. **CR447**	**CR44:** In terms of cost-effectiveness regarding this project implementation, this request needs to be clarified and reflected in the manner in which the project activities are budgeted and costed. **CR45:** See review above on CR5. **CR46:** Partially addressed. Clarify if student training by this project can be embedded in capacity development for CC and non-CC related challenges that the country faces, as well as a demonstration of sustainability of project interventions. **CR47:** Reflect this updated information in the project document.

	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	Include a budgeted M&E plan, which should be in compliance with the AF M&E guidelines and compliance with its Gender Policy, with an understanding that the M&E of this projects will address all environmental and social risks identified during project assessment, design and implementation. **CAR~~5~~4**	**CAR4:** Revise table 22 in compliance with AF M&E guidelines.
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	See CAR~~5~~4 above	See CAR~~4~~ above
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	See review comment under review criterion 11 'Is the project / program aligned with AF's results framework?' above	Not addressed.
	10. Is a disbursement schedule with time-bound milestones included?	Yes.	

Technical Summary	This project 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.

	This is the second review of the proposed project. While efforts have been observed and appreciated to respond to corrective action requests as well as corrective requests, the current review observes that some requests were either not all addressed, not fully addressed or information was not included in the updated version of the project document. In general, to strengthen the adaptation reasoning of the project, specifics on critical issues need to be addressed to highlight the coherence and logic between the climate change and non-climate change challenges, proposed objectives and their respective activities and components. In addition, certain areas of the project need to be further clarified. Thus, this technical review makes the following to be addressed: **(A) Corrective action requests (CARs):** • Include outcomes of each of the meetings in table 13 to clarify how interests of grass-root communities were represented by representatives; and • Revise table 22 in compliance with AF M&E guidelines. **(B) Clarification requests (CRs):** • Besides low yields, clarify if there aren't any specific CC related impacts that can be presented on Omaheke and Omusati. Additionally, specify, and where possible, indicate quantifiable CC impacts to strengthen the rationale for the two areas, in addition to high population and cattle export that have been cited; • Clarify the apparent contradiction in the response given previous review request regarding, 'It is the intention of this project component to identify such legal problems and correct them, for the benefit of Namibian society' (p73). In addition, address the rationale for investigating the non-applied law rather than understanding the non-application of already existing regulations; • Clarify how keeping objectives, components and activities less focused, separated when they can be merged will reduce the apparent redundancy. Clarify the impacts on, cost-effectiveness, make supervision more difficult; • Clarify the difference between activities 1.3 and 1.8 costed $57,138 and $35,499, respectively, and other activities; • Besides the pull and push factors, additional information will be needed to clearly demonstrate the logical flow

	and connection between proposed components within experienced CC and non-CC challenges to more clearly show adaptation reasoning. With many components and activities, provide additional information to demonstrate how they all fit together; • Clarify the kind of indigenous knowledge on NRM/SRM that exists in the two areas, and how that has been integrated in the design of this project; • Please, address 'apparent redundancy' of certain project activities that have been costed separately; • Include a convincing justification for engaging students as part of the implementing strategy of this project; • Clarify how outcomes of each meeting and community interests and perspectives were integrated; • Clarify how making the areas more savannah by de-bushing (thwarting the natural process of ecological adaptation) constitute making the area ecologically resilient; • Clarify what will make this project different in creating awareness, learning from past failed experiences of awareness raising; • Provide the outcome of the ESP risks identification process for all project activities that have been proposed; • Provide details on the gender-specific cultural (Omaheke and Omasati) and the legal context in which the project will operate; • In addition to information in table 15 on the environmental and social impacts, provide more information in separate paragraph/s; • Identify all the activities to the extent that effective risk identification is possible, and update the information provided; and • Clarify if student training by this project can be embedded in capacity development for CC and non-CC related challenges that the country faces, as well as a demonstration of sustainability of project interventions.
Date:	12 September 2017

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 4,999,386

Executive summary

This proposed 5-year project with a budget of USD 4,999,386 will assist vulnerable small-scale communal farmers in the Omusati and Omaheke regions of Namibia to implement daptation actions and practices that strengthen their adaptive capacities and enhance resilience of their farming system to climate variability and change.

The project approaches adaptation of the agricultural and natural resource-based sector in Namibia to climate change in a holistic 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 primary focus of the proposed project is to strengthen the adaptive capacities of vulnerable communities, especially women-headed households, and enhance resilience of their farming system to climate variability.

The proposed project has the following 5 major components that are hinged on improved ecosystems management.

Component 1 entails the implementation of climate-smart sustainable rangeland management by vulnerable communities. This will improve the resilience of their rangeland-based ecosystem and other agricultural resources to climate variability and change.

Component 2 entails the implementation of climate-smart dry-land production and management techniques that will enhance the adaptive capacity of their crop and livestock production systems. Higher, more efficient, and more sustainable yield of rain-fed crops and of livestock production due to climate-smart management will result, and be supported by processing, value-addition, and improved marketing of produce to improve livelihoods.

Component 3 aims to enhance the production of irrigated horticultural produce and achieve higher, more efficient and more sustainable yields of irrigated horticultural produce due to climate-smart management, supported by processing, value-addition and improved marketing of produce, which results in improved livelihoods.

Component 4 will offer training and information supply to strengthen the capacity of farmers, farming institutions, students and learners to understand climate change, adapt to climate change and variability, and better manage the associated risks.

Component 5 is to review and improve the policy and legal framework relevant to climate change adaptation in communal areas so that resilience measures are promoted and the adaptive capacity of vulnerable communities is improved.

The proposed project is categorised as Category B, considering 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 the all 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 cognisance, in particular Goal 15, which pertains to “managed forests, combat desertification, halt and reverse land degradation and halt biodiversity loss”, 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
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
PCL:	Project Component Leader
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

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A. Project background and context

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.

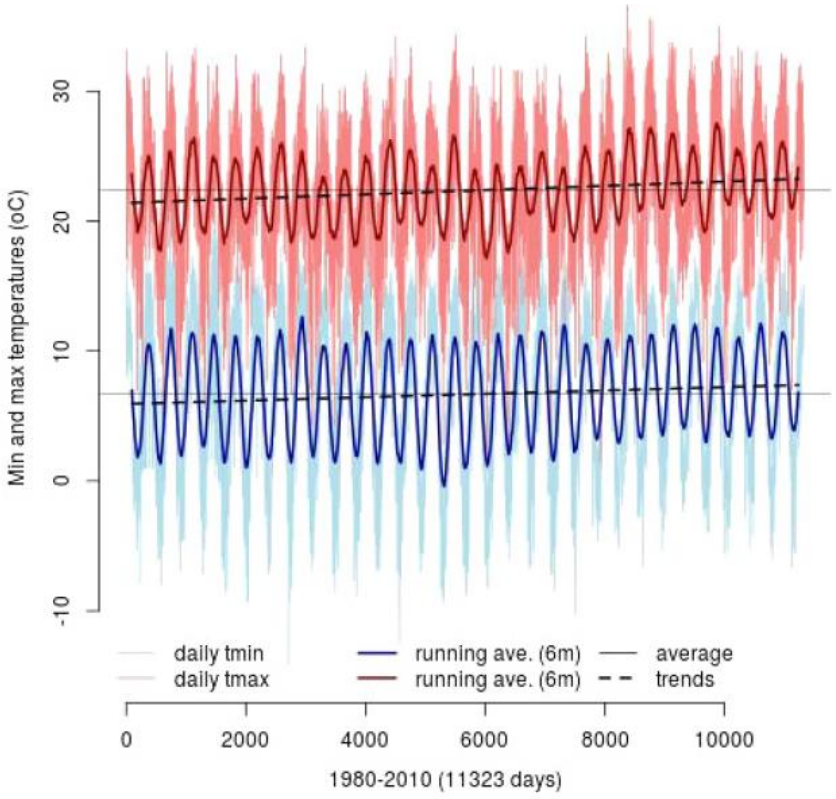

Figure 1: Long-term projection of temperature (min.: blue, max.: red) for Namibia

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).

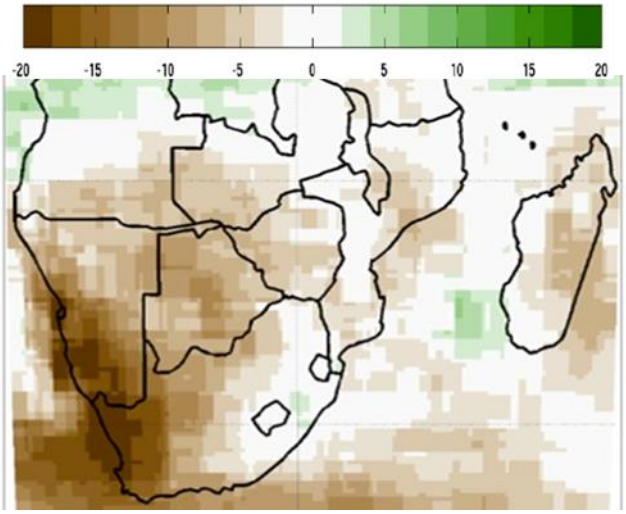

Figure 2: Unpredictable precipitation in Namibia

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 CO2 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.

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. The implications for climate change adaptation are as follows:

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.

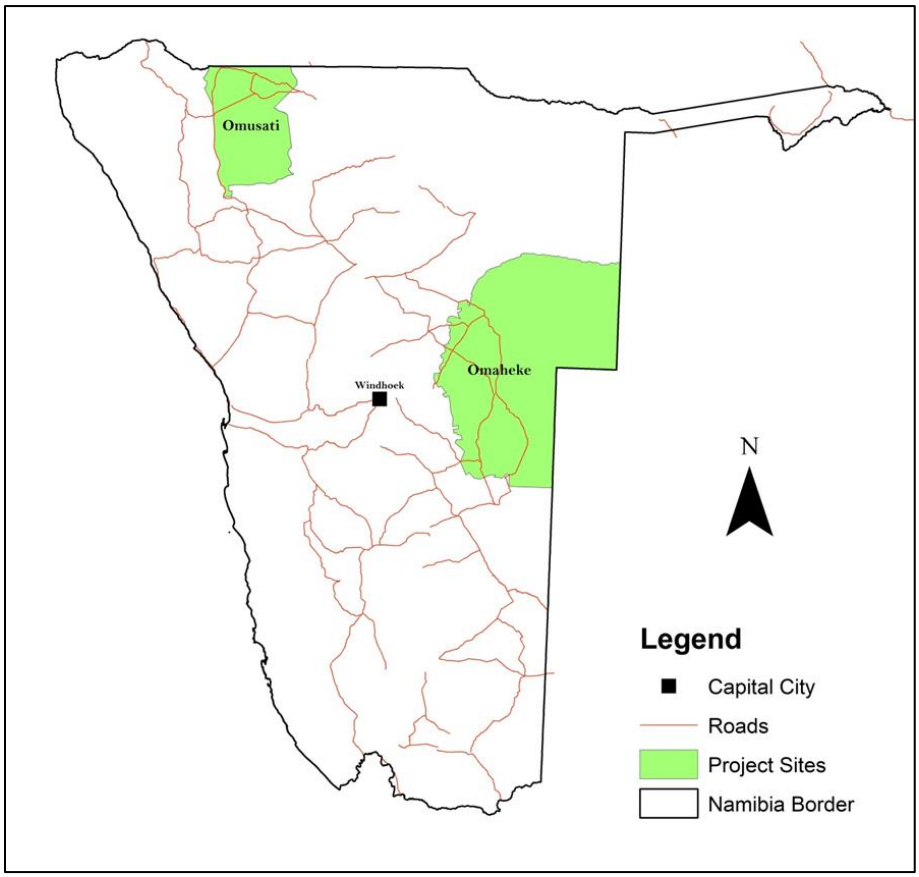

Figure 3: Project sites

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 between 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 2) and is mainly a beef cattle producing region (Table 3).

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:

1. 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.
2. 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.
3. "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).
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.

B. Project objectives

The overall objective or goal of the proposed project is to assist vulnerable communities to implement adaptation actions and practices that strengthen their adaptive capacities and enhance resilience of their farming system 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”. This goal 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. During the formulation of this project, several questions were considered to ascertain the degree to which women will participate effectively. The central 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 designed in this project are accessible to women. The novel design of this project is to include women in 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.

In both the Omusati and Omaheke 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 two predominantly communal regions of Namibia, Omusati (in the north-west) and Omaheke (in the central-eastern part of the country). However, maintaining or even increasing physical production of agricultural produce in the face of climate change (the “push” factor) 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. Hence, increased value addition and improved marketing (the “pull” factor) 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 components are included in the proposed project.

Conventionally, “push” factors are factors such as climate-smart production techniques, rehabilitated and more productive environments, adaptive livestock and crop management etc. that push (enable) agricultural production 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 control encroacher bush and sell the accumulated encroacher wood), then climate-smart production techniques alone will not be adopted. Factors such as value addition, improved marketing and a conducive regulatory framework are conventionally referred to a “pull” factors as they pull (encourage) agricultural production forward. That is why the proposed projects follows a holistic approach where the so-called “pull” factors (less exposed to climate change impacts) enjoy as much attention as the so-called “push” factors (more exposed to climate change impacts). 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 self-interest to keep on implementing adaptive approaches as they improve his income-earning capacity. This is achieving real sustainability of project impacts.

The proposed components, activities and outcomes of the project are described in detail in Part II A of this proposal.

The proposed project intends to achieve its overall goal by breaking it down into a number of more specific objectives:

1. To further the implementation of climate-smart, SRM by vulnerable communities that improves the resilience of their rangeland-based ecosystem and other agricultural resources to climate variability and change.

2. To further the implementation of climate-smart production and management techniques by vulnerable communities that enhance the adaptive capacity of their dry-land (i.e. rain-fed) crop and livestock production systems to climate variability and change.

3. To further the implementation of climate-smart production and management techniques by vulnerable communities that enhances the adaptive capacity of their irrigated horticultural production system to climate variability and change.

4. To reduce pressure on the natural resources accessed by vulnerable communities by promoting offtake from their production system, emphasising value addition to raw products and effective marketing. The achievement of this specific objective is integrated into each one of the first three specific objectives so as not to fragment the value chain and artificially separate production from the product.

5. 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.

6. To review and improve the legal framework relevant to climate change adaptation in communal areas so that resilience measures are promoted and the adaptive capacity of vulnerable communities is improved.

For planning and implementing the proposed project, these 6 specific objectives are translated into 5 project components as shown in Table 5, each with distinct outcomes, outputs and a budget. 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 in the proposed project.

Table 5: Alignment of project outcomes with AF RF outcomes

Project component	Component outcomes	Relevant outcome of AF RF *(numbers refer to AF RF numbering system)
1**. Improve ecosystem management**	1.1 More adaptive management of open-access rangelands by all resident communities, including women and other vulnerable groups, improves carrying capacity, increases biodiversity, reduces impact of climate change and improves drought resilience.	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	1.2 Legal provisions to empower communities to better control their natural resources (especially rangeland grazing) are explored, enhancing land and livestock productivity and improving livelihoods.	6. Diversified and strengthened livelihoods and sources of income for women and other vulnerable groups in targeted areas (Indicator 6.1.1)
	1.3 Improvement in rangeland condition improves production in summer (rainy season) and supplies for winter (dormant season). This improves peoples' livelihoods and ecosystem resilience.	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	1.4 Judicious bush and erosion control followed by re-introduction of locally extinct grasses rehabilitates rangeland condition and productivity, a prerequisite to adapt to climate change successfully	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	1.5 Dry-land grass pastures are widely accepted as intensification and drought adaptation method. Pastures take grazing pressure off natural rangelands, making it easier to rehabilitate them and strengthen resilience.	4. Increased adaptive capacity within relevant development and natural resource sectors
	1.6 Re-structuring of existing, barred and unsustainable charcoal enterprises to obtain regulatory approval. Improve efficiency (involve NUST engineering	4. Increased adaptive capacity within relevant development and natural resource sectors

Project component	Component outcomes	Relevant outcome of AF RF *(numbers refer to AF RF numbering system)
	experts) to serve as a role model for other areas.	
	1.7 More adaptive management of conservation areas (existing and new) improves resilience to climate change and creates employment	4. Increased adaptive capacity within relevant development and natural resource sectors
2. Enhance rain-fed crop and livestock production	2.1 Production management and efficiency of dry-land crop farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	4. Increased adaptive capacity within relevant development and natural resource sectors
	2.2 Climate change resilience and sustainability is improved by grass ley crop rotation via improved soil health and fertility and reduced erosion	5. Increased ecosystem resilience in response to climate change and variability-induced stress
	2.3 Food security from dry-land cropping is improved by diversification into drought-tolerant cultivars and species	4. Increased adaptive capacity within relevant development and natural resource sectors
	2.4 Improved fodder production from pastures enhances beef production by better slaughter condition & balanced seasonal supply of slaughter cattle (Omusati) & retaining otherwise exported weaners for local processing (Omaheke). Fodder-banked hay increases resilience against droughts and climate shocks.	4. Increased adaptive capacity within relevant development and natural resource sectors
	2.5 Improved livestock husbandry skills support increased livestock output due to improved fodder flow, which improves livelihoods of women and other vulnerable groups. Emphasis is on beef cattle and goats.	
	2.6 Production of dry-land cropping and livestock systems will increase without increasing the pressure on natural resources only if improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	
	2.7 Dairy-ranching with Sanga cows crossed with Jersey bulls on dry-land grass pastures to serve a well-populated market with fresh milk and	4. Increased adaptive capacity within relevant development and natural resource sectors

Project component	Component outcomes	Relevant outcome of AF RF *(numbers refer to AF RF numbering system)
	processed dairy products is an obvious intensification and diversification strategy	
	2.8 The women headed households who have only goats (no cattle) benefit from goat meat sold in retail outlets in urban areas in addition to the informal market, but this potential first needs to be tested for feasibility	4. Increased adaptive capacity within relevant development and natural resource sectors
	2.9 Optimal management of wildlife conservancies demonstrates higher productivity than livestock ranching in climate-stressed environments, also by diversification into tourism (Omusati and northern part of Omaheke region).	2. Strengthened institutional capacity to reduce risks associated with climate-induced socio-economic and environmental losses
3. Enhance irrigated horticultural production	3.1 Production management and efficiency of irrigating horticultural farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	4. Increased adaptive capacity within relevant development and natural resource sectors
	3.2 Horticultural production will increase without increasing the pressure on natural resources only if improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	
4. Capacity building	4.1 Systematic training based on local experience and incorporating much practical and experiential 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	3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
	4.2 Improved capacity to manage institutions and processes properly and realise long-term strategic interests provides quality support to producers, enhances offtake, value addition and profitability. NUST School of Business is involved in sectoral development activities.	2. Strengthened institutional capacity to reduce risks associated with climate-induced socio-economic and environmental losses
	4.3 Regular climate risk and production information dissemination supports	3. Strengthened awareness and ownership of

Project component	Component outcomes	Relevant outcome of AF RF *(numbers refer to AF RF numbering system)
	training efforts, reaches a wider audience than training and creates awareness especially for women. Easily linked with advertising companies, media houses, and corporate social responsibility programmes.	adaptation and climate risk reduction processes at local level
	4.4 Improved marketing of agricultural produce acts as “pull” factor that encourages production but is often inadequate, unimaginative and downright inhibitive in Namibia’s communal areas. Strategies and the capacity to overcome these challenges are synchronised with national stakeholders to improve livelihoods and reduce rural poverty among women, their dependants and other vulnerable groups.	4. Increased adaptive capacity within relevant development and natural resource sectors
	4.5 A permanent training capacity is established at regional level to ensure systematic, structured and relevant farmer training and maintain training and information dissemination beyond project end. A successful regional role model can easily be up-scaled to national level.	2. Strengthened institutional capacity to reduce risks associated with climate-induced socio-economic and environmental losses
	4.6 Field Facilitators, based in participating communities link project implementers with beneficiaries. They evolve into embedded “Community Agriculture Resource Persons”, associated with the Farmers’ Academy (FA), helping to sustain capacity building beyond project end.	3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
	4.7 Students are exposed to practical project work and to farmers, learning how to apply knowledge (hard skills) and interact with farmers (soft skills) for a more rounded trainee	3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
	4.8 Capacity in applied research is built in the institution (NUST) especially for female post-graduate students. It also makes the institution relevant to communal agriculture by solving real-life problems and improving resilience.	2. Strengthened institutional capacity to reduce risks associated with climate-induced socio-economic and environmental losses

Project component	Component outcomes	Relevant outcome of AF RF *(numbers refer to AF RF numbering system)
	4.9 Acknowledge donor and stakeholders appropriately to ensure good relations. External communications on a regular basis (e.g. annual reporting) and of a high standard to ensure dissemination of project information mainly through means of workshops	
	4.10, 11, 12 Ensure that money spent is kept track of and that it is spent in the planned, intended manner to maintain credibility with self and donor	
	4.13 Communication and visibility actions to ensure adequate knowledge management and project results dissemination is conducted in a manner where it can make an impact.	
5. Improve legal and policy framework	5.1 Identify and address unintended consequences and strengthen desired impacts of the existing legal framework so that it provides a conducive framework to communal agriculture and for climate change adaptation	7. Improved policies and regulations that promote and enforce resilience measures
	5.2 Update legal framework, simplify for ease of understanding and harmonise to reduce contradictions and confusion, making it easier for the communal producer to abide by the law	7. Improved policies and regulations that promote and enforce resilience measures
	5.3 Interaction with lawmakers influences them to enact laws that make sense on the ground and help farmers cope with climate change	1. Reduced exposure at national level to climate-related hazards and threats

C. Project components and financing

The project consists of the 5 components with their 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	**Improved rangeland condition due to SRM, encroacher bush thinned on commonage and rangeland rehabilitated, value added to encroacher wood, dry-land cultivated grass pastures established to support fodder production, seasonal availability and drought resilience**	**SRM improves rangeland condition and productivity, enhancing livestock production and strengthening livelihoods. Rangeland production is better able to adapt to climate change and becomes more drought resilient, providing a more reliable foundation for agro-pastoral farming systems.**	**1,378,537**
1.1 Implement SRM	Principles of SRM as espoused by National Rangeland Management Policy and Strategy (2012) applied to 100,000 ha in Omusati communities supplying slaughter cattle, and 300,000 ha in Omaheke growing weaners out on pastures (includes fire, poisonous plants)	More adaptive management of open-access rangelands by resident communities improves carrying capacity, increases biodiversity, reduces impact of climate change and improves drought resilience.	60,987
1.2 Assist open-access communities to secure their commonage grazing	Apply current and future legislation to enable resident communities to ward off “pasture poaching” by non-residents and secure their core grazing areas. Benefits complete Omusati and Omaheke regions.	Policy and legal provisions that empower communities to better control their natural resources (especially rangeland grazing) are applied, enhancing land and livestock productivity and improving livelihoods.	86,575
1.3 Improve drought resilience	Increase the provision of baled and standing hay (foggage, by +20%) for the dry season (winter) so that communities can survive a drought with more livestock intact and producing. Arrange for the supplies of inputs.	Improvement in rangeland condition improves production in summer (rainy season) and supplies for winter (dormant season). This improves peoples’ livelihoods and ecosystem resilience.	57,138
1.4 Rehabilitate degraded rangeland	Selectively thin encroacher bush on 20,000 ha of degraded rangeland in Omaheke and 2,000 ha in Omusati, control soil erosion and	Judicious bush and erosion control followed by re-introduction of locally extinct grasses rehabilitates rangeland condition and	10,244

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
	over-seed with desirable indigenous, perennial grass species	productivity, a prerequisite to adapt to climate change successfully	
1.5 Purchase equipment (hay- & charcoal-making, cultivation, solar-electric fencing, etc.)	Equipment procured to cultivate pastures, make hay and charcoal, fence and graze pastures, count game, etc.		122,772
1.6 Establish dry-land, cultivated pasture of climax grazing grasses	Establish 1,000 ha of pastures in Omusati (in crop fields, integrated into crop rotation) to support cattle destined for slaughter and 4,000 ha in Omaheke (on-farm) to grow out weaners to slaughter	Dry-land grass pastures are widely accepted as intensification and drought adaptation method. Pastures take grazing pressure off natural rangelands, making it easier to rehabilitate them and strengthen resilience.	690,771
1.7 Re-organise communal charcoal-making	Re-structure charcoal operation at Lister (Omaheke) by demonstrating a sustainable pilot model approved by the regulator (Directorate of Forestry, Forest Stewardship Council (FSC). Design efficient, industrial-scale charcoal kiln.	Re-structuring of existing, barred and unsustainable charcoal enterprises to obtain regulatory approval. Improve efficiency (involve NUST engineering experts) to serve as a role model for other areas.	34,576
1.8 Improve drought resilience			35,499
1.9 Improve ecosystem management in communal conservancies and community forests	Compile management plans for communal conservancies and community forests (where these do not exist, or need updating/revising) and assist communities to implement them successfully	More adaptive management of conservation areas (existing and new) improves resilience to climate change and creates employment	41,873
1.10 Rangeland rehabilitation actions	Erosion structures, re-seeding and other rehabilitation measures		36,205
1.11 Field facilitator (wage, transport)	4 field facilitators to work in project areas full-time		36,547
1.12 Student field excursion costs	9 field excursions by NUST students to project areas		39,698

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
1.13 Post-graduate student & research costs	Academic fees, research equipment of 6 post-graduate students		51,806
1.14 Project implementation mobility	Double cabin 4x4 LDV fully equipped acquired for access to project sites		73,846
2. Enhance rain-fed crop and livestock production	**Raw and processed produce from rain-fed crop and livestock production is increased. The management ability and resilience of farmers and farming institutions is improved.**	**Higher, more efficient and more sustainable yield of rain-fed crops and of livestock production due to climate-smart management, supported by processing, value-addition and improved marketing of produce, resulting in better livelihoods**	**593,152**
2.1, 2.2 Dry-land crop farmers use climate-smart production techniques to increase crop yields	130 dry-land crop farmers (100 in Omusati, 30 in Omaheke) use soil improvement, grass ley crop rotation, rainwater harvesting, fertilisation, conservation agronomy, integrated pest management (IPM), etc. to increase crop yields. Arrange for the supplies of inputs. (include travelling, associated per diems and consumables)	Production management and efficiency of dry-land crop farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	125, 059
2.3 Dry-land crop farmers improve soil health and fertility and contain soil erosion	Soil organic matter content is increased by incorporating grass leys into crop rotation, thus improving soil condition and crop yield, on 130 crop farms (100 in Omusati, 30 in Omaheke) (include soil analysis and related equipment)	Climate change resilience and sustainability is improved by grass ley crop rotation via improved soil health and fertility, soil moisture retention and reduced erosion	42, 225
2.4 Dry-land crop farmers diversify crop and cultivar use	130 dry-land crop farmers (100 in Omusati, 30 in Omaheke) use more adapted, drought-tolerant cultivars of existing crops and diversify into new, better adapted crops (e.g. sunflower)	Food security from dry-land cropping is improved by diversification into drought-tolerant cultivars and species	18,181

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
2.5 Cultivated, dry-land grass pastures established to support beef cattle production	In Omusati, about 1,000 ha of grass pastures are used to maintain cattle destined for slaughter. In Omaheke, about 15,000 weaner cattle (10% of exports) are grown out to slaughter on about 5,000 ha of grass pasture. Surplus pasture grass is hayed and fodder-banked for droughts.	Improved fodder production from pastures enhances beef production by better slaughter condition & balanced seasonal supply of slaughter cattle (Omusati) & retaining otherwise exported weaners for local processing (Omaheke). Fodder-banked hay increases resilience against droughts and climate shocks.	71,912
2.6 Processing and marketing of crop and livestock produce enhances offtake to improve livelihoods and decrease pressure on the land	130 dry-land crop farmers apply better post-harvest storage of crops. Their produce and that of 10 pastoral communities is processed to add value. Cooperative marketing of produce is developed and promoted in these beneficiaries and new markets are developed to increase offtake by 10-20%.	Production of dry-land cropping and livestock systems will increase without increasing the pressure on natural resources *only if* improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	28,698
2.7 Livestock production is enhanced by climate-smart husbandry techniques	In 10 pastoral communities supplying slaughter cattle (Omusati) or growing weaners out on pasture (Omaheke), livestock productivity is increased by improved breeding management and selection, feeding (esp. mineral and vitamin supplementation). Arrange for the supplies of inputs.	Improved livestock husbandry skills support increased livestock output due to improved fodder flow, which improves livelihoods. Emphasis is on beef cattle and goats.	66,923
2.8 Develop small-scale dairy ranching industry • Investigate market development for goat meat	Investigate and support the establishment of a small-scale dairy-ranching industry in both regions, based on grass pastures, by launching pilot projects that demonstrate feasibility and enable learning and optimisation • Investigate the potential to formalise informal goat meat marketing by feasibility study	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 an obvious intensification and diversification strategy	62,862

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
2.9 Optimise management of existing and investigate potential for a new public-private partnership enterprise game lodge in wildlife conservancy areas	Compile participatory management plans for Uukwaluudhi Core Conservancy (Omusati) and Ondjou Conservancy (Omaheke/Otjozondjupa bi-regional conservancy) and support its implementation. Investigate the potential of establishing mutually beneficial joint-venture with private entrepreneur in Omaheke's southern Gam area.	Optimal management of wildlife conservancies demonstrates higher productivity than livestock ranching in climate-stressed environments, also by diversification into tourism (Omusati and Omaheke/Otjozondjupa bi-regional wildlife conservation area).	61,346
2.10 Field facilitator (wage, transport)		3 field facilitators to work in project areas full-time	29,620
2.11 Student field excursion costs		9 field excursions by NUST students to project areas	39,699
2.12 Post-graduate student & research costs		Academic fees, research equipment of 6 post-graduate students	46,627
3. Enhance irrigated horticultural production	**Raw and processed produce from irrigated horticulture is increased. The management ability and resilience of farmers and farming institutions is improved.**	**Higher, more efficient and more sustainable yield of irrigated horticultural production due to climate-smart management, supported by processing, value-addition and improved marketing of produce, resulting in better livelihoods**	**404,481**
3.1 – 3.5 Irrigating horticultural producers increase their yield by using climate-smart production techniques	75 small-scale horticultural producers in Omusati and 25 in Omaheke use adapted cultivars, plant new crops, apply water-wise irrigation techniques, use shading and composting etc. to increase yields. Arrange for the supplies of inputs. (include travelling, associated per diems, equipment, consumables and sampling)	Production management and efficiency of irrigating horticultural farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	275, 463

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
3.6 Processing and marketing of horticultural produce enhances offtake to improve livelihoods and decrease pressure on the land	100 small-scale horticultural producers apply better post-harvest storage of crops. Their produce is processed to add value. Cooperative marketing of produce is developed and promoted in these beneficiaries and new markets are developed to increase offtake by 10-20%. (post-processing harvesting and student excursions and research)	Horticultural production will increase without increasing the pressure on natural resources *only if* improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	28,765
3.7 Facilitate field work	Appoint 9 Field Facilitators full-time to assist with project implementation. Train, empower and re-train occasionally.	Field Facilitators, based in participating communities link project implementers with beneficiaries. They evolve into embedded "Community Agriculture Resource Persons", associated with the FA, helping sustain capacity building beyond project end.	29,346
3.8 Horticulture expert		External expert solicited to complement NUST capacity	29,539
3.9 Student field excursion costs		5 field excursions by NUST students to project areas	21,773
3.10 Post-graduate student & research costs		Academic fees, research equipment of 1 post-graduate student	19,595
4. Capacity building	**Transmit knowledge, skills and information to enhance sustainable and profitable production that can adapt to climate change**	**Informed producers and competent institutions can manage climate change risks and secure food and livelihoods**	**1,701,958**
4.1 and 4.2 Improve capacity of benefitting farmers and communities to manage resources more sustainably	Train more than 5,000 farmers from benefitting communities (at least 30% women, 10% marginalised and vulnerable, 5% training-of-trainers) in sustainable resource management and surplus-oriented farming over 600 meeting-days. All training	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	555,108

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
	materials compiled in a training kit and distributed to stakeholders.	adapt to climate change, which improves their livelihoods	
4.3 and 4.4. Improve capacity of institutions serving regional farmers to fulfil their mandate effectively	Train at least 20 regional and national institutions that serve farmers in Omusati and Omaheke in operational, strategic and business management (e.g. abattoirs, AMTA, charcoal and producers' associations, farmers' organisations, forest management committees)	Improved capacity to manage institutions and processes properly and realise long-term strategic interests provides quality support to producers, enhances offtake, value addition and profitability. NUST School of Business is involved in sectoral development activities.	
4.5 Disseminate relevant production, marketing and climate risk information through appropriate media • Improve and expand cooperative marketing of processed products	Disseminate relevant production, marketing and climate risk information weekly, using popular, accessible print, verbal, visual and electronic media. All information to be compiled into info packs and distributed to stakeholders. • Arrange processing, value addition and cooperative marketing at regional level and involve authorities like RCs, Ministry of Industrialisation, Trade and SME Development, etc. Explore and penetrate new markets with relevant crop, horticultural, livestock, rangeland and forestry products. Devise innovative strategies to overcome marketing and offtake bottlenecks.	Regular climate risk and production information dissemination supports training efforts, reaches a wider audience than training and creates awareness. Easily linked with advertising companies, media houses, and corporate social responsibility programmes to expand scope. • Improved marketing of agricultural produce acts as "pull" factor that encourages production but is often inadequate, unimaginative and downright inhibitive in Namibia's communal areas. Strategies and the capacity to overcome these challenges are synchronised with national stakeholders to improve livelihoods and reduce rural poverty.	79,774
4.6 Establish a (regional) FA	Establish a farmers' training institution (also training-the-trainers) at regional level (Omusati and Omaheke) within the RC, concentrating on content and delivery while using Council and existing infrastructure.	A permanent training capacity is established at regional level to ensure systematic, structured and relevant farmer training and maintain training and information dissemination beyond project end. A	31,539

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
	Obtain Namibia Training Authority (NTA) accreditation and secure demonstration plots.	successful regional role model can easily be up-scaled to national level.	
4.7 Train students	Take NUST agriculture and natural resource students on 35 practical excursions (7/year) to Omusati and Omaheke projects	Students are exposed to practical project work and to farmers, learning how to apply knowledge (hard skills) and interact with farmers (soft skills) for a more rounded trainee	39,699
4.8 Research and develop	Grant 9 post-graduate research opportunities to MSc and PhD candidates, researching local problems and developing applied solutions. Includes analysis of 360 samples of soil water, plant and animal tissue.	Capacity in applied research is built in the institution (NUST) and the post-graduate student. It also makes the institution relevant to communal agriculture and conservation by solving real-life problems and improving resilience.	19,595
4.9 Workshops, meetings		Mostly management event and training events	137,284
4.10, 4.11, 4.12 Project implementation and coordination and ensure fiduciary standards through financial administrator services	Dedicated project leader, Implementation assistant and finance administrator to implement project timeously and efficiently. Accounting and auditing of processes and expenditure on daily basis to ensure financial due diligence	Ensure that money spent is kept track of and that it is spent in the planned, intended manner to maintain credibility with self and donor	780, 847
4.13 Be visible, communicate and report	Provide exposure to donors by branding and signposting. Communicate with and report to stakeholders in a professional manner and at certain milestones	Acknowledge donor and stakeholders appropriately to ensure good relations. External communications on a regular basis (e.g. annual reporting) and of a high standard to ensure dissemination of project information	58,112
5. Improve policy and legal and policy framework	**Examine and improve the existing policy and legal framework applicable to climate change adaptation in communal areas**	**Suggested improvements in policy and legal framework will provide conducive conditions for climate change adaptations and strengthening resilience**	**91,867**

Project Components and activities	Expected Concrete Outputs	Expected Outcomes	Amount (USD)
5.1 Evaluate the impact of existing policy and legal framework	Evaluate the impact of existing acts, laws and policies relevant to climate change adaptation in communal areas to evaluate if intended outcomes were achieved, identify flaws and propose corrections	Identify and address unintended consequences and strengthen desired impacts of the existing legal framework so that it provides a conducive framework to communal agriculture, conservancies and community forests and for climate change adaptation	21, 313
5.2 Review policy and legal framework to update and harmonise	Review and evaluate existing acts, laws and policies relevant to climate change adaptation in communal areas and suggest updates, corrections and harmonise different components	Update legal framework, simplify for ease of understanding and harmonise to reduce contradictions and confusion, making it easier for the communal producer to abide by the law	
5.3, 5.4 Policy and legal advocacy	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. Includes workshops with stakeholders	Interaction with lawmakers influences them to enact laws that make sense on the ground and help farmers cope with climate change	37, 844
5.5, 5.6 Student field excursions and post-graduate student and research costs			32, 710
Project Activities Cost (A)			**4,169,995**
Project Execution Cost (B) – charged by EE			**437,734**
Total Project Cost (A+B)			**4,607,729**
Project Cycle Management Fee (C) - charged by NIE			**391,657**
Amount of Financing Requested (A+B+C)			**4,999,386**

D. 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	1 April 2018
Mid-term Review	April 2021
Project Closing	September 2023
Terminal Evaluation	December 2023

PART II: PROJECT JUSTIFICATION

A. Project components

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 resilience of their rangeland ecosystem and other agricultural resources to climate variability and change. It is perfectly aligned with Outcomes 3, 4, 5 and 6 of the AF Results Framework.

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. 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 and the virtual exclusion of severe late-season fires that kill bush and inhibit its encroachment. Natural factors enhance the degradative effects of inappropriate management 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). 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 a likely outcome of rangeland degradation, as it is in other regions of Namibia with more finely textured soils.

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) as they 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 will increase, aided by increasing 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).

Bush encroachment is an ecological process in response to increased carbon-dioxide in the atmosphere (Norby et al. 1999, Kimball et al. 2002, Nowak et al. 2004) and competitive advantage of woody plants in overgrazed rangelands. Selective debushing re-establishes the savannah ecosystems and improves its productivity to sustain large herbivores and associated species. Perennial grasses will be better able to cope with extended periods of warmth with 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 will be reduced, 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.

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,* the re-establishment of perennial grass sward will be aided by manual 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 summer (rainy season)-resting 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 off the rangeland (if other factors affecting animal husbandry remain equal), offering pastoralists and extensive livestock farmers an opportunity to improve their livelihood.

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. 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. This "cheaper" version of a cultivated pasture may be more appropriate in many areas where communal farmers are resource-poor and don't have practical knowledge of cultivating the soil.

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, can even be fertilised and most competition to grasses (i.e. by woody plants, weeds) has been removed by cultivation. 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. 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 (improved resilience).

Furthermore, cultivated grass pastures will be established in the 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 natural rangelands. It also gives the farmer an opportunity to implement a crop rotation system based on grass leys that improves the fertility and structure of eutric 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 the "ekove". Every farmer is allowed to privatise a sizeable area of rangeland (10-50 ha in extent is common) and keep it for further extension of his enterprise, primarily for his/her children. Most ekoves are fenced and grazed, so they are an ideal target for establishing improved grass pastures without denying the farmer or his/her children an expansion opportunity.

Shifting grazing pressure from natural to artificial pasture in summer, during the vegetative growing (rainy) season not only gives rangeland grasses a chance to recover at the time of year they need resting most, but also causes standing grass hay to accumulate 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 and 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 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 and improves their 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. 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 at least 90% perennial with 50-67% climax grasses, but it shows that improved rangeland management results in better, more productive rangeland. Improved rangelands are better able to buffer climate variability, i.e. are more resilient and are a superb adaptation 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).

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.

Therefore, under this component to improve ecosystem management, the following activities are proposed to achieve the following outcomes:

1.1 Implement sustainable rangeland management

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

- Know the resource base and its adaptation to the environment
- Manage for effective recovery and rest of grasses
- Manage for effective utilisation of grasses and shrubs
- Improve soil condition
- Address bush encroachment
- Plan for droughts
- Monitor the resource base regularly to observe changes and trends
- Plan for appropriate farm infrastructure

Communities will be trained in these techniques and mentored to apply them within their grazing lands. 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).

The communities in Omusati region targeted for intervention are those supplying the cattle abattoir 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 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 in the regional capital of Outapi and 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 their weaner cattle to South African feedlots for many years. The intention of this proposal is to retain at least 10% of the exported weaners annually (about 15,000) 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 about 2 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 rangeland. If its condition and productivity could be improved by SRM, 30,000 cattle could successfully be kept on 300,000 ha without inducing 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 want 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.

1.2 Assist open-access communities to secure their commonage grazing

Despite a plethora of laws governing communal areas, resident communities 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 an 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. An amendment is 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.

Granted, 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 first before more technical measures can be expected to contribute to making communities more resilient and adapted to change. The proposed projects intend to collaborate with stakeholders to find a solution to this conundrum that works in practice, i.e. 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 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 payment for water, thus securing the livelihoods of the "canal vegetable farmers".

1.3 Improve drought resilience

With climate change, Namibia is expected to suffer droughts more frequently. This increases vulnerability of ecosystem services (e.g. nutrient recycling). Due to maladaptive rangeland management, "man-made drought" is experienced regularly. Any rainy season that is not of

average of above-average productivity is likely to cause a “man-made drought”: farmers running out of fodder for their livestock because their rangeland is in too poor a condition to produce adequately with average or below-average rainfall. Instances are known were rangeland in good condition received only 60% of average rainfall but produced 90% of its average carrying capacity. This is only possible with a strong perennial grass sward not inhibited by too much competition from woody plants, able to use the least bit of rain that falls because the top layer of soil is permeable and allows rainwater to infiltrate easily.

As rangeland condition improves on the 400,000 ha targeted with SRM, resilience will increase and fodder production will become more stable than before, though still variable. As the legal framework facilitates conducive conditions for planned grazing in communal areas, more grass can be left standing for the annual dry season without fear that strangers will remove it, as foreseen by Namibia’s Drought Policy and Strategy of 1997. These impacts are likely to take time and may only fully develop after project end.

However, in the short term, drought resilience can also be improved by fodder-banking surplus grass hayed from cultivated pasture. The same 6,000 ha of cultivated pasture that will support cattle productivity in Omusati and Omaheke will also produce surplus grass in above-average rainfall years that should be turned into hay and stored under adequate protection for the next period of fodder deficit. Hay does not have to be made mechanically if farmers lack the means and equipment; it can easily be made manually as in pre-industrial times or farmers can band together cooperatively to share hay-making equipment. The drought fodder bank will be supplemented by drought-tolerant fodder shrubs planted in hedgerows alongside crop fields to serve as windbreaks, as will be explained in a later section. In this manner, farmers will be encouraged to adopt self-reliant approaches to drought risk as foreseen by the National Drought Policy and Strategy. This is an ultimate manner to adapt to climate change and become more resilient to shocks such as drought, expected to occur much more often in Namibia due to climate change.

The current baseline is that neither standing nor baled hay is made in the communal areas of Omusati and north-eastern Omaheke regions.

1.4 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.

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.

Fortunately, 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, 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, but this will be addressed in Section 2.2. 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 and close them over time) 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, especially in the Omaheke region. 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. 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. It also reduces soil moisture and lowers ground water levels. 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.

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 the environment and an economic loss in terms of land productivity. Climate-induced bush encroachment interacting with other human stressors exacerbate prevailing natural problems like variable dry environment, limited arable land, and increasing heat waves and temperatures. These further affect food security and nutrition, limit efforts to maintain living standards and improve livelihoods, despite efforts by government to improve them. Losses related to increased drought events caused by newer climate risks 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).

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 next door at 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. 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.

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 in a subsequent 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 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 most of the time when more palatable grasses are available. This species is suitable for use as cultivated pasture, where animals can be forced (by fencing) to graze it, but not for open rangeland where 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 in compared ecological zone. These seeds then have to be multiplied in enclosures to get sufficient quantities to over-sow or broadcast on rangelands depleted of such species in the 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 which 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 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 thorny canopy also protects grass seedlings emerging underneath it from 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 canopies of controlled 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.

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. These initiatives will be supported and expanded and the lessons learned transferred to other beneficiaries of the proposed project, e.g. the communities that use the 400,000 ha on which SRM will be practised.

1.5 Establish dry-land cultivated pasture of climax grazing grasses

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. Suffice to say that 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 intends to establish 1,000 ha of cultivated pasture in Omusati and 5,000 ha in Omaheke region. This innovative approach has not been tried in Namibia before. 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 land 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. Inevitably, ploughing 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. In this manner, grass pastures improve food security of staple grains.

1.6 Re-organise communal charcoal-making

In Namibia, making charcoal is intimately connected to the rehabilitation of degraded rangelands. As explained in the Section 1.4, 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. 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.

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.

That's the theory. In practice, the way we make charcoal in Namibia is more problematic. 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. 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.

The way we make charcoal is practically unsustainable. 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 this 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.

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. 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 formulate bush harvesting management plans and marketing of 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 Constituency development committees) will be part of the project implementation, monitoring, evaluation and project closure. Also, the proposed interventions are based on existing community projects in the targeted areas.

1.7 Improve ecosystem management in communal conservancies and community forests

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 (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.

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 next year, probably before all management plans are completed and certainly before communities have been mentored to apply them, thus potentially negating the whole worthwhile effort.

This project proposes that communities in Omusati and Omaheke with conservancies or communal forests be assisted to implement the relevant management plans, which can even be revised and updated if 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.

2. Component 2: Enhance rain-fed crop and livestock production

This component 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 outcome 4 of the AF's Results Framework, to increase the adaptive capacity of relevant development and natural resource sectors.

2.1 Dry-land crop farmers use climate-smart production techniques to increase crop yields

Conservation Agriculture (CA) 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 accepted 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, 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 are 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. 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 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.

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 proposed project also intends to facilitate the supply of farming inputs needed for the implementation of climate-smart crop production techniques. The principle is not to supply free inputs to farmers other than those operating demonstration plots used for farmer training, 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. Some 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 all 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.

2.2 Dry-land crop farmers improve soil health and fertility and contain soil erosion

Namibia's version of CA concentrates on breaking hardpans, 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 sandy soil, which loses nutrients and moisture rapidly to leaching, creating acidic and vastly eutric 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. These pasture grasses should be integrated into crop rotation, achieving a grass ley-based rotation. Since the grasses are perennial, 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. Perennial grasses will also stabilise the soil and protect it against extreme seasonal flooding during great “efundja” 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.

When the cropped part of a crop field is rotated to grow grasses, grasses no longer need to be grown from seed. 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 “old” part of the field, the tufts split into smaller tuftlets and the tuftlets transplanted into the “new” 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 3-year ley period.

The proposed project intends to protect the soils of crop fields on 100 crop farms in the Omusati and 30 in the Omaheke region further by promoting the planting of 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 soil is greatly exposed. To add another dimension to the windbreak, bushes used should be drought-tolerant fodder shrubs 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. 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 another development project intervention (Rothauge, 2017), especially with drought-tolerant fodder shrub species like *Atriplex nummularia* that are more easily grown from cuttings than from seed. There is a nursery owned by DAPP (Development Aid from People to People)/Humana at Outapi in the Omusati region that can be used for the multiplication of drought-tolerant fodder shrubs, as agreed to during negotiations during the project proposal preparatory phase.

The proposed project also intends to facilitate the supply of farming inputs needed for the implementation of climate-smart soil amelioration techniques. The principle is not to supply free inputs to farmers unnecessarily other than to those operating demonstration plots used for farmer training or when it is absolutely essential, but rather to stimulate and organise the local retail and SME sector to provide the required inputs as this is a business opportunity for them, or to subsidise certain inputs. Some 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, LEDA, Ministry of Urban and Rural Development, etc.

2.3 Dry-land crop farmers diversify crop and cultivar use

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.

New crop species are needed. One 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 fancy, expensive equipment, viz. pressing oil out of the shelled seeds to be used as cooking oil by people. 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 Section 2.7).

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 can be 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.

2.4 Cultivated, dry-land grass pastures established to support cattle production

The need for cultivated pastures of perennial, good grazing grasses was discussed exhaustively in Section 1.5. Its prime purpose is to augment the feed supply of livestock, add to the drought fodder bank and improve soil fertility of crop fields in the process, aiding farmers to adapt to climate change and strengthen their resilience. The purpose of including grass pastures under the component that enhances dry-land livestock production is to provide for the making of hay (used as a cash crop and drought reserve) and because cultivated pastures will be the foundation of the small-holder dairy industry that both regions' Governors want to establish. Building a fodder bank from hayed grass was also already discussed (Section 1.3) so that this discussion will focus on pastures for dairy ranching.

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 running 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 of South Africa, semi-extensive dairy ranching was practised successfully and profitably in regions of South Africa too marginal for more intensive production systems (Rothauge,1993) and is the system envisaged for the Omusati and Omaheke regions.

Currently, no milk is produced by a dairy for sale in Omusati region although many farmers produce fresh milk and sell it informally, as do a few farmers in Otjinene and Eiseb in the Omaheke region who produce fresh milk for sale. Their cows are beef cows that produce milk off the natural rangeland which exposes them greatly to adverse environmental impacts and climate change. 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 1.7 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.

In Omusati region, the need for additional forage is great. Local farmers drive their cattle across an unmarked international border with Angola because there is more grass on the Angolan than on the Namibian side. There, cattle pick up foot-and-mouth disease, lung sickness and other contagious diseases that restrict beef marketing of cattle from the NCA. Government plans to fence this land border for cattle soon, but this will aggravate the need for additional forage. The proposed project intends to demonstrate that cultivated grass pastures can supply the needed additional fodder, thus removing the temptation to drive Omusati cattle into southern Angola and avoiding the ripple effect of negative implications this has for the Namibian beef trade.

2.5 Livestock production is enhanced by climate-smart husbandry techniques

Improved grass fodder production by natural rangeland and cultivated pastures enhances the productivity and fertility of grazing livestock if it is not inhibited by other 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.), and inadequate nutrition (especially mineral and vitamin deficiencies). These husbandry factors will be addressed by the proposed project so that the 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 used to grow out 15,000 weaner cattle (in Omaheke region). Since nearly 30% of livestock-based households are headed by women, this activity will contribute to greater women empowerment and gender equity.

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).

In addition to this, limited alternative sustainable land use practices that are climate-smarter and lack of knowledge in rangeland management and animal production also hamper the capacity of livestock farmers to cope with the impacts 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 human 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.

This component includes the climate-smart management of wild game animals in communal conservancies, by righting the 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, expanding the tourism potential of conservancies, improving the management capacity of its staff, etc.

The proposed project also intends to facilitate the supply of farming inputs needed for the implementation of climate-smart livestock husbandry techniques. The principle here is not to supply free inputs to farmers unnecessarily but to stimulate and organise the local retail and 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), Ministry of Urban and Rural Development. Most probably in all 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.

2.6 Processing and marketing of produce to enhance offtake

This proposed project component 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 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,
- 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. 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. There are sufficient ecological and social project components that balance economic priorities, ensuring that project activities are balanced.

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) and offer communal farmers such a poor price for their non-standard produce that they prefer to not sell, 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 and reduces the resilience of social and environmental systems.

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, horticultural and forest products). This is also in accordance with the national "Growth at Home" strategy, Namibia's guiding document towards industrial development. A recent investigation into specifically the marketing of cattle and beef in the NCA of Namibia (Kruger, 2014) has 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. 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 10-20%.

2.7 Develop small-scale dairy ranching industry

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. 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 to provide the concentrate supplements to 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. 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 whole lot 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 might not have reached the areas of implementation.
- 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 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 proposed project will investigate how a pasture-based dairy-ranching system can be realised, drawing on the experience of the 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.

2.8 Investigate market development for goat meat

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 to 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. There seems to be a total disconnect between goat production, consumer demand for goat meat and its supply, to the detriment of goat producers.

The proposed project intends to investigate this apparent disconnect and what can be done about it, so that the consumer who demands goat meat can be satisfied by a producer who can market his/her goats profitably along formal channels. 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.

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 an adequate market to sell goat meat to.

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.

2.9 Optimise management of existing/new wildlife conservancy areas

It was described earlier that the optimisation of wildlife management in existing (Omusati) or newly-to-be-established (Omaheke) communal conservancies is one of the components of the proposed project. This is a valuable diversification strategy as wildlife production is a climate-smart adaptation. It is a quantifiable 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.

The proposed project will investigate the optimisation of wildlife and conservancy management in the Uukwaluudhi Core Conservancy in Omusati region, and its implementation. It will also investigate the potential of a communal conservancy in the Omaheke region, which consists primarily of camelthorn savanna. This impressive vegetation unit is not conserved at all in Namibia and it may be desirable to conserve it in parts of the Omaheke region that are not yet densely populated. A farmer with 2,500 ha in southern Gam indicated his willingness to create a joint venture with conservation and tourism stakeholders for such purpose during the proposal preparation phase. Another possibility is to create a regional game reserve (one step up from a communal conservancy on the ladder of legal protection) that crosses the regional boundary into the Ohakane (African Wild Dog) conservancy in neighbouring Otjozondjupa region to the west. The output will be a feasibility study of this possibility and if possible, the first steps towards the end goal.

3. Component 3: Enhance irrigated horticultural production

Omusati region 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.

3.1 Irrigating horticultural producers increase their yield by using climate-smart production techniques

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 crop yields 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 adopting the adaptation option for 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 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.
- Diversification into growing tropical and sub-tropical fruit 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.

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.

3.2 Processing and marketing of produce to enhance offtake

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 10-20%.

4. Component 4: Capacity building

The proposed project aims to facilitating 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.

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.

4.1 Improve capacity of benefitting farmers and communities to manage resources more sustainably

The proposed project focusses a lot of resources on training and learning of farmers and communities. The focus of 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.

Currently in the Omusati and Omaheke regions, the baseline for 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.

This has 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, the day will come that this project ends and then 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 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.

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 on-farm demonstration plots to assist with practical training and skill development.

4.2 Improve capacity of institutions serving regional farmers to fulfil their mandate effectively

One of the most important support functions to agricultural production is provided by downstream institutions that provide inputs required by producers, and upstream 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.

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 upstream 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 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.

It has been agreed that NUST's Pupkewitz School of Business could be intimately involved in institutional and business training since it is an acknowledge centre of expertise in these matters. 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 to manage their processes (including value addition) properly to adequately support producers, enhance offtake and improve livelihoods by making production more profitable.

4.3 Disseminate relevant production, marketing and climate risk information through appropriate media

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. 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. 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.

Despite various past initiatives, awareness about and technical capacity to implement adaptation measures such as resilient cropping and livestock rearing systems, adaptive management of degrading resources, soil fertility management and animal husbandry is still limited. Whereas farmers used to apply traditional knowledge to adapt to natural aridity, the

intensity, scope and extent of the changing weather conditions are such that they are unable to catch up speedily enough. In addition, human management impacts the ecological restoration in the project sites and landscapes.

Access to relevant climate information that enables farmers to timely prepare for climate change and reap benefits from adaptation measures is urgently required. To counter inherent natural variability and vulnerability factors, a few development initiatives have been applied in Namibia. However most of those focussed on small-scale pilots without much replication or upscaling to address regional scopes. Further, while some of the development assistance such as improved and diversified livelihood options and access to water resources has contributed to reducing the underlying vulnerability of poor farmers, the degree of their exposure to climate risks were not properly addressed, due to partial and incomplete climate risk information. With the recent completion of the Vulnerability and Adaptation Assessment under the Third National Communication on adaptation to climate change, adaptation options and actions have been better assessed giving better perspectives for adaptation intervention at specific sites. Hence this project will use the results of the Vulnerability and Adaptation Assessment and adjust them with in-depth localised and site-specific information to improve relevant and timely access to information for proactive decision making that will benefit farmers with specific focus on female-headed households.

Uncertainty surrounds future climate change impacts and future socio-economic development constraints to be addressed by specific identified optimal adaptation options. However, it is anticipated that uncertainties will decline over time as more climatic and socio-economic data becomes available. Adaptation measures currently outlined in Namibia's policy documents are designed in a flexible adaptive management manner so that suitable adaptation options that could be adjusted or reversed to micro-level actions as new information becomes available. This is particularly important for adaptation options that have long-term implications, or measures that need to be taken over longer lifespan, such as infrastructure and soil management practices that could easily alter the soil characteristics towards declining fertility. Another aspect that will be considered in this project relates to suitable management, interpretation and use of regional-national-local and micro data and assessments. It is important that such "background" information also be disseminated to cultivate better understanding for the problem amongst producers and support services.

4.4 Improve and expand cooperative marketing of processed products

The importance of adding value to farm products by processing them further towards the shape and form desired by end consumers has been emphasised countless times in this proposal. However, having a high-value, desirable product but no market is of little use. 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 and assist regional and local institutions and producers to access these opportunities.

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. The project will thus strengthen the role of producers' cooperatives for crop and livestock farmers in the two regions.

4.5 Establish a Farmers' Academy

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, in two ways:

- Firstly, it is a training institution – NUST - that offers and arranges this training. That alone should add a long-term quality to the planned project interventions in training and knowledge dissemination.
- The drawback to 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 implement the technical backstopping provided by NUST. The targeted regional counterpart is the 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 budgets as lack of human capacity is recognised as one of the main factors delaying Namibia's development. Also, 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.
- 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 RSc) are involved. It will be important to institute transparent and participatory processes and regular, publicised feedback to encourage involvement of other stakeholders.
- 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 should 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 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 a noticeable impact on infant survival, primary health, containment of contagious diseases etc. and have greatly improved the interaction of rural patients with government health services. CARPs can achieve the same in agriculture. The FA can offer them regular, seasonal up-date training (e.g. newest cultivars and cultivation methods to use in the upcoming crop growing season) to ensure that CARPs relay the latest information to farmers, in time for seasonal activities.

The proposed output of this activity is a regional FA that provides content and trainers and uses existing structures in the region to train farmers and institutions. This innovative approach has not been tried in Namibia before.

4.6 Train students

The proposed training activities will include student training, the first primary objective of NUST. 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. 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, 35 student excursions are planned. 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 student) or in sequence (e.g. the same group visiting in different years to assess progress).

4.7 Research and development

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 projects provide for nine (9) masters or doctoral students, their academic fees and in part for their expected research costs, including for the analysis of 360 samples of soil, water plant and animal tissue. 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. Since the analysis of samples is usually very expensive, this is budgeted for separately. 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 outcomes 4.6 and 4.7. 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.

4.8 Be visible, communicate and report

The project implementers intend to follow a communication plan and visibility strategy if the proposal is successful, to ensure that the donor and relevant stakeholders get acknowledged appropriately. Examples of visibility is branding of all reports, meeting and training outputs with the donor's logo or inscription and sign-posting of field trials and demonstration plots. The communication plan is linked with the knowledge management and results dissemination and will include activities described under the capacity building component (e.g. in Section 4.3 and Section G) to ensure that communication occurs within officially-approved institutional channels as required by NUST and with acceptable content. As before, the Project Services Unit of NUST will oversee these activities.

5. Component 5: Improve legal and policy 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 in different land use systems. It is the intention of this project component to identify such legal problems and correct them, for the benefit of Namibian society. 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. The policies will be translated appropriately for the communities for use. In this case, rigorous awareness and capacity building will be carried. In this project, we are not investigating the non-applied laws or attempting to change any, rather, we 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 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.

5.1 Evaluate the impact of existing policy and legal framework

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 (e.g. the revised Communal Land Reform Act) for their impact on society and whether they had the intended outcome. For instance, 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. Ideally, a legal or policy evaluation should follow within a year of the activation of such provisions, but in the Namibian context, this may be too soon, enabling the project to evaluate even those laws that were passed some time ago.

The output will be an advisory document to the legal profession and lawmakers that explains the situation and explains possible solutions.

5.2 Review policy and legal framework to update and harmonise

The conflicting laws that weaken the safeguarding of communal grazing areas explained in Section 1.2 is a perfect example of a few different but well-intended laws that target the same sector of society but prescribe different solutions, or different legal mechanisms; not one of which has the intended effect. It would help a great lot if one proven mechanism, tested for efficacy by trialling in practice (e.g. in the project regions) were prescribed by these various laws so that all achieve a common outcome and can co-exist harmoniously side-by-side.

As far as climate-smart law-making is concerned, it is of utmost importance to review, update and implement the Soil Conservation Act, 1969 (Act No.76 of 1969) to empower communities by enhancing their resilience to environmental shocks, including those caused by climate change and variability.

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.

5.3 Policy and legal advocacy

It is apparent from the two activities above that a lot of legal advocacy should be undertaken to convince law-makers and the legal profession of the suggested changes to Namibia's legal framework that applies to communal area farming and climate change. Many of the aspects that need to be investigated are outside the expertise of the implementing entity and additional resources will have to be sought. The expected outcome of advocacy is a legal framework that is better able to equip people with the means to adapt to climate change.

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.

Therefore, there is a need to deliver local-level and direct benefits to the vulnerable communities through the development and implementation of this climate change adaptation project. The distributional aspect of net benefits will be best addressed when the vulnerable groups such as women are targeted on the ground, giving weights to different adaptation costs and benefits according to who receives the benefits and who bears the costs. This will result in a potential multiplier effect of economic, social and environmental benefits. Omusati and Omaheke regions have a high number of female headed households, highlighting the need to beneficiate women through the project. The project does not present any risk of marginalization of minority groups or indigenous people. 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	• Increased income generation streams from grass, wood, value added meat products sales. • Reduction in income losses due to SRM and herd management.	• More adaptive management of open-access rangelands by resident communities	• Enhanced rangeland productivity. • More grass regrowth and increased carrying capacity.
		• Women will generate more income through the sale of crop produce. • Average yield per ha of cereals (maize, millet, sorghum etc) which are	• Improved food security (access to meat, milk and carbohydrate staples).	• Soil degradation will be reduced due to soil conservation methods applied. • There will be a reduction in bush

Project component	Present situation	Expected benefits		
		Economic	**Social**	**Environmental**
		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. • Increased income generation streams from grass, wood, value added meat products sales. • Reduction in income losses due to SRM and herd management.	• 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.	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
2. Enhance rain-fed and livestock production	• 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
3. Enhance irrigated Horticultural production	• 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	• More adaptive conservation management practices to improve resilience to climate change especially amongst women.

Project component	Present situation	Expected benefits		
		Economic	Social	Environmental
			production, marketing and processing.	
4. Capacity building	• 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.
5. Improve policy and legal framework	• Lack of awareness for technical and environmental standards especially amongst rural women. • No adequate framework to access climate change policy imperatives.	• 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	• Preservation of ecosystem through sustainable management or production practises.

Project component	Present situation	Expected benefits		
		Economic	Social	Environmental
	• Limited participation in policy formulation and review.		the targeted beneficiaries • More women and youth are exposed to their social rights and privileges for enhanced decision making.	

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 ESG principles have been integrated into which 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 More adaptive management of open-access rangelands by resident communities improves carrying capacity, increases biodiversity, reduces impact of climate change and improves drought resilience.	9, 10, 11, 15
	1.2 Legal provisions to empower communities to better control their natural resources (especially rangeland grazing) are exhausted, enhancing land and livestock productivity and improving livelihoods.	2, 3, 4, 5
	1.3 Improvement in rangeland condition improves production in summer (rainy season) and supplies for winter (dormant season). This improves peoples' livelihoods and ecosystem resilience.	11, 12, 14, 15
	1.4 Judicious bush and erosion control followed by re-introduction of locally extinct grasses rehabilitates rangeland condition and productivity, a prerequisite to adapt to climate change successfully	1, 6, 9, 10, 12, 15
	1.5 Dry-land grass pastures are widely accepted as intensification and drought adaptation method. Pastures take grazing pressure off natural rangelands, making it easier to rehabilitate them and strengthen resilience.	11, 12, 15
	1.6 Re-structuring of existing, barred and unsustainable charcoal enterprises to obtain regulatory approval. Improve efficiency (involve NUST engineering experts) to serve as a role model for other areas.	1, 3, 4, 5, 6, 12, 13
	1.7 More adaptive management of conservation areas (existing and new) improves resilience to climate change and creates employment	9, 10
2. Enhance rain-fed crop and livestock production	2.1 Production management and efficiency of dry-land crop farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	11, 12, 15
	2.2 Climate change resilience and sustainability is improved by grass ley crop rotation via improved soil health and fertility and reduced erosion	11, 12, 15
	2.3 Food security from dry-land cropping is improved by diversification into drought-tolerant cultivars and species	11, 12, 15
	2.4 Improved fodder production from pastures enhances beef production by better slaughter condition & balanced seasonal supply of slaughter cattle (Omusati) & retaining otherwise exported weaners for local processing (Omaheke). Fodder-banked hay increases resilience against droughts and climate shocks.	11, 12, 15

Project component	Component outcomes	Most important ESG principle integrated
	2.5 Improved livestock husbandry skills support increased livestock output due to improved fodder flow, which improves livelihoods. Emphasis is on beef cattle and goats.	5, 11, 12, 15
	2.6 Production of dry-land cropping and livestock systems will increase without increasing the pressure on natural resources only if improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	1, 2, 3, 4
	2.7 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 an obvious intensification and diversification strategy	11, 12, 15
	2.8 The poorest farmers who have only goats (no cattle) benefit from goat meat sold in retail outlets in urban areas in addition to the informal market, but this potential first needs to be tested for feasibility	2, 3, 5, 11, 12, 15
	2.9 Optimal management of wildlife conservancies demonstrates higher productivity than livestock ranching in climate-stressed environments, also by diversification into tourism (Omusati). Where it does not exist (Omaheke), potential for wildlife conservation is explored.	9, 10, 11, 12, 15
3. Enhance irrigated horticultural production	3.1 Production management and efficiency of irrigating horticultural farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	11, 12, 15
	3.2 Horticultural production will increase without increasing the pressure on natural resources only if improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	1, 2, 3, 4
4. Capacity building	4.1 Systematic training based on local experience and incorporating much practical and experiential learning (i.e. practical, hands-on skills development) builds the capacity of farmers, extension and institutional workers and other trainers especially women to adapt to climate change, which improves their livelihoods	2, 3, 4, 5, 7, 14
	4.2 Improved capacity to manage institutions and processes properly and realise long-term strategic interests provides quality support to producers, enhances offtake, value addition and profitability. NUST School of Business is involved in sectoral development activities.	1, 2, 3, 4, 12

Project component	Component outcomes	Most important ESG principle integrated
	4.3 Regular climate risk and production information dissemination supports training efforts, reaches a wider audience than training and creates awareness. Easily linked with advertising companies, media houses, and corporate responsibility programmes to expand scope.	11
	4.4 Improved marketing of agricultural produce acts as “pull” factor that encourages production but is often inadequate, unimaginative and downright inhibitive in Namibia’s communal areas. Strategies and the capacity to overcome these challenges are synchronised with national stakeholders to improve livelihoods and reduce rural poverty.	1, 2, 3, 4
	4.5 A permanent training capacity is established at regional level to ensure systematic, structured and relevant farmer training and maintain training and information dissemination beyond project end. A successful regional role model can easily be up-scaled to national level.	2, 3, 5, 13
	4.6 Field Facilitators, based in participating communities link project implementers with beneficiaries. They evolve into embedded “Community Agriculture Resource Persons”, associated with the FA, helping sustain capacity building beyond project end.	2, 7
	4.7 Students are exposed to practical project work and to farmers, learning how to apply knowledge (hard skills) and interact with farmers (soft skills) for a more rounded trainee	2, 4
	4.8 Capacity in applied research is built in the institution (NUST) and the post-graduate student. It also makes the institution relevant to communal agriculture by solving real-life problems and improving resilience.	2, 4
5. Improve legal and policy framework	5.1 Identify and address unintended consequences and strengthen desired impacts of the existing legal framework so that it provides a conducive framework to communal agriculture and for climate change adaptation	1, 2, 3, 4, 5, 7, 8, 13, 14, 15
	5.2 Update legal framework, simplify for ease of understanding and harmonise to reduce contradictions and confusion, making it easier for the communal producer to abide by the law	1, 2, 3, 4, 5, 7, 8, 13, 14, 15
	5.3 Interaction with lawmakers influences them to enact laws that make sense on the ground and help farmers cope with climate change	1, 2, 3, 4, 5, 7, 8, 13, 14, 15

As can be seen 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	• 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	• Integrated research and development • Provide extension services • Community Forestry management & conservancy • Rangeland rehabilitation	**1,378,537**	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.

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
2. Enhance rain-fed production	• 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	• Improved water use efficiency • Improved production and management of croplands • Increased farm income/profit • Increased resilience to climate change	• Introduce CA practices • Research • Post-harvest processing • Design efficient industrial-scale charcoal kiln.	**593,152**	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 range from 10% after one storage year

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
					to more than 30% over the longer storage period (Mallet and du Plessis, 2001).
3. Enhance irrigated horticultural production	• Increased raw and processed horticultural produce • Improved managerial ability and resilience of farmers and institutions • Enhanced post-harvest storage of horticultural products • Enhance the processing and marketing of horticultural	• 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.	• Engage horticultural specialist • Student research and feasibility studies • Field trips and excursions	**404,481**	• The drilling of operational boreholes and flood harvesting using bunds. • 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. • However, the costs of drilling and maintaining boreholes exceeds N$250,000 (per borehole) which is enormous and flood harvesting is not feasible due to

Project approach	Expected outputs/effects	Expected outcome/value-added unit of effects	Activities	Total cost (USD)	Alternative to project approach
					the sandy soils which are predominant in the project sites.
4. Capacity building	• 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	• 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	• 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	**1,701,958**	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
	• Improve and expand cooperative marketing of processed products • Regional FA established • Capacitate NUST Students through field trips to project sites • Post graduate students capacitated to undertake scientific research.	• Students are exposed to practical project work • Farmers learn how to apply knowledge gained • Applied research capacity is built among the candidate students	in Omusati and Omaheke regions • 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		
5. Improve policy and legal policy framework	• Policy and legal framework aligned to climate change adaptation in the communal areas • Acquaint producer with the existing acts, laws and policies	• Conducive conditions for climate change adaptation created • Strengthened resilience to climate change impacts (risks) • Unintended consequences of policy and legal frameworks identified and addressed	• improve the existing policy and legal framework applicable to climate change adaptation in the communal areas • Evaluate the impact of existing acts, laws and	**593,152**	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

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

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 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 vulnerable groups in the project area. Gender equity will be promoted mainly through education and rigorous involvement of women, especially considering training courses tailored to women needs. 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 income 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 the vulnerable from all societal groups in the project area.

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.

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 5);
- Sustainable development and ensuring environmental sustainability (Components 1,2,3 and 4);
- Stakeholder participation in climate change policy implementation (Component 5);
- Awareness generation, education, training and capacity building (Component 4);
- Human rights-based development (Component 5);

- Promote and address ‘adaptation’ and ‘mitigation’ as key approaches (Components 1,2,3 and 4);
- Promote and address ‘adaptation’ and ‘mitigation’ as key approaches (Components 1,2,3 and 4);
- Promote Public Private Partnerships to foster involvement of all sectors in sustainable development (Components 1,2,3,4 and 5).

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

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.	Directorate of Environmental Affairs, Division of Environmental Assessment, Waste Management and Pollution Control, and Inspections (EAWMPCI).

Sector	Compliance	Clearing Authority
	Clearance Certificate (can take up to 6-8) months (iv) EMP included in the EIA (v) Follow-up (Monitoring and auditing)	
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. • Ensure the continuous supply of potable water to communities, and particularly to their livestock • Minimise the degradation of the natural resource base during droughts;	Directorate Agricultural Production, Extension and Engineering Services

Sector	Compliance	Clearing Authority
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 3 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)	National Planning Commission provides a planning framework in which government agencies operates

Sector	Compliance	Clearing Authority
	(iv) Promote Good Governance through Effective Institutions (Component 4-5)	
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 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.	Office of the Prime Minister, Directorate of Disaster Risk Management

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 4 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.

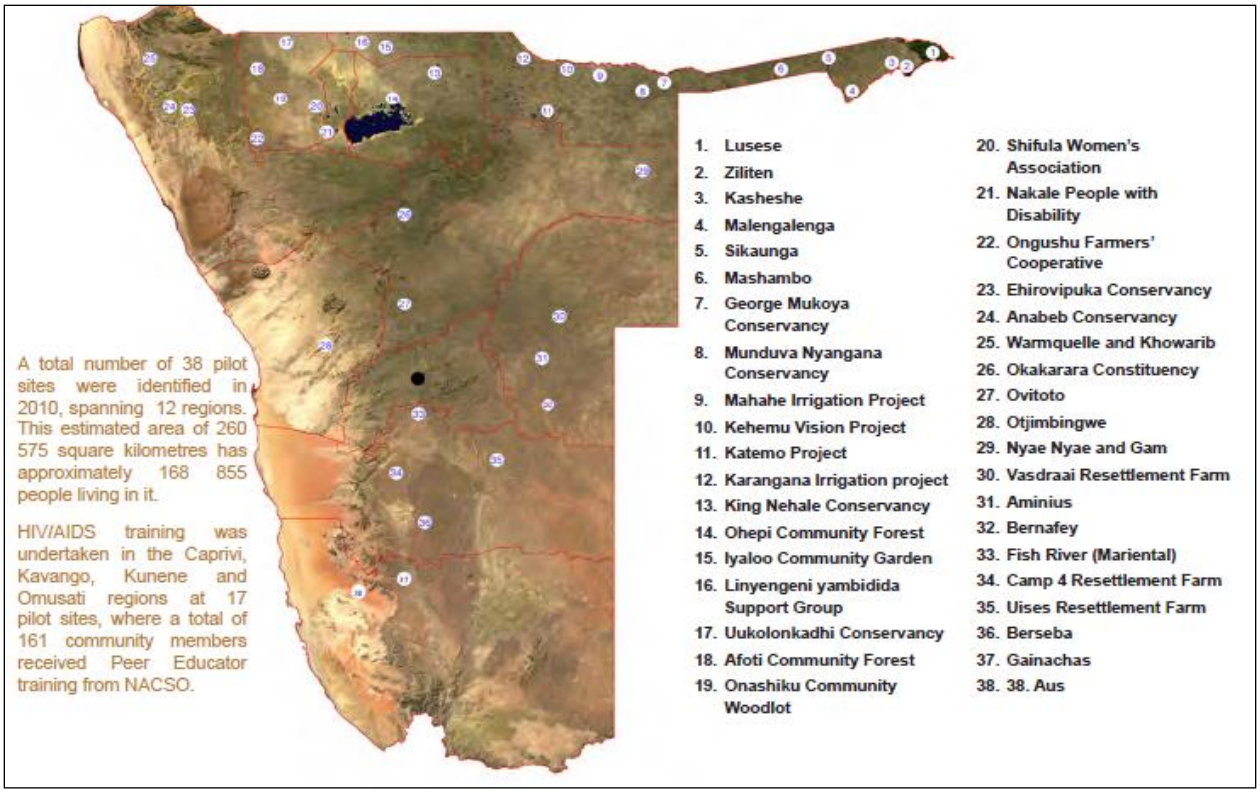

Figure 4: Similar CPP-ISLM project in Namibia (MET, 2010)

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 4. 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 4: Capacity Development, although it is recognised that all components have elements of knowledge management which will be managed and collated under component 4. 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).

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H. Consultative process

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

Following 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 13).

Table 13: 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

Name and affiliation	Gender	Institution	Contacts
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
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	

Name and affiliation	Gender	Institution	Contacts
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

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 diversification and value addition? Rangeland rehabilitation?
- Where are these projects/ programmes being implemented?

These consultations assisted in finding the most suitable interventions needed to address community needs and identification of beneficiaries. During the screening process, no environmental and social risks that required an assessment and management plan were identified, however should this materialise during the project implementation, an environmental and social assessment and management plan will be compiled in compliance with the Environmental and Social Policy of the AF.

It has to be emphasised that the project team used a novel approach to engage with communities and to improve the sustainability of project interventions. Previous 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". A full list of stakeholders consulted is provided in table 13. These stakeholders are organically connected to their communities but are no longer at grassroots level, but 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 consultations. For this reason, we did not have "community consultations" but rather, "stakeholder consultations". For example, we consulted the horticultural producers' associations rather than their communities of origin. The communities will applaud any suggestions, but the producers' associations have already had their own experiences and will be much more focussed and specific. Consulting this level of a community promises better returns and cost-effectiveness of the project than continually consulting the grassroots level, i.e. the whole community itself thus ensuring ownership by the community and sustainability of project interventions post-project.

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 Annex 1) during these consultations form the basis of the project. A final round of consultations took place after the final draft of this proposal was produced to obtain blessing from the governors, regional / constituency councillors and farmers cooperatives before submission to the NIE in July 2017. The letters of support from some of the consulted persons and institutions are enclosed in Annex 2.

I. Justification for funding requested

The proposal is costed at USD 4,999,386 of which 97% will be spent on applying adaptation reasoning. The proposal does not contain direct co-funding although there will be many indirect contributions of the executing entity, NUST, as indicated under the Monitoring and Evaluation section in Part III. For example, direct contribution from NUST includes the salaries of the lecturing and technical staff participating in implementing. Similarly, when students are taken on field excursions, NUST contributes busses for transport at institutional rates.

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: Enhance rain-fed crop and livestock production

he 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.

Component 3: Enhance irrigated horticultural production

The current baseline is that communal producers are little able to implement the basics of irrigating horticultural crops for efficient production, but unlike in Component 2, 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 4: Capacity building

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.

Component 5: Review policy and legal framework

Namibia’s well-intended and extensive policy and legal framework sometimes does not address 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

The proposed project will be carried out on sites determined during project formulation stage. Project sites were determined in close consultations with various regional and national governance structures such as regional governors, constituency councillors, representatives of farmers association, community forests, conservancies, cooperatives and local horticultural associations. Majority of the environmental, social impacts and risks within the project are minimal and does not require further assessment. 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 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	No initiatives are identified with orientation or execution that could generate a negative impact on	Include clauses that the development of the initiatives will not generate adverse impacts on vulnerable groups.

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: 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)	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 design and development of the agricultural activities.	Priority should be to target poverty pockets, women, vulnerable groups and ensure the benefit of vulnerable groups living in the project areas.
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	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

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
	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.	and economic) with no adverse impacts on them.
Core Labour Rights **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	Payments to labour under the project area will be made as per Government approved norms duly following minimum wage rate and hence 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.	Labour law compliance for worker safety, health and rights supervised by the national, international human rights orgs and ILO - 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.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
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 the 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 biodiversity, as for example the massive introduction of alien species?)	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 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.	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. Project interventions will enable improved management of natural habitats, thereby supporting the conservation of biological diversity.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
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. The project will adopt an inclusive approach, and

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		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 14.

Components 1-5 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 1-5 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 no 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 in Namibia. This science/policy interface is strengthened through the envisaged partnership with the involved line Ministry and local level governance structures.

The project implementation takes place at three levels, namely, nationally, institutionally and locally (technically) as is depicted in Figure 5.

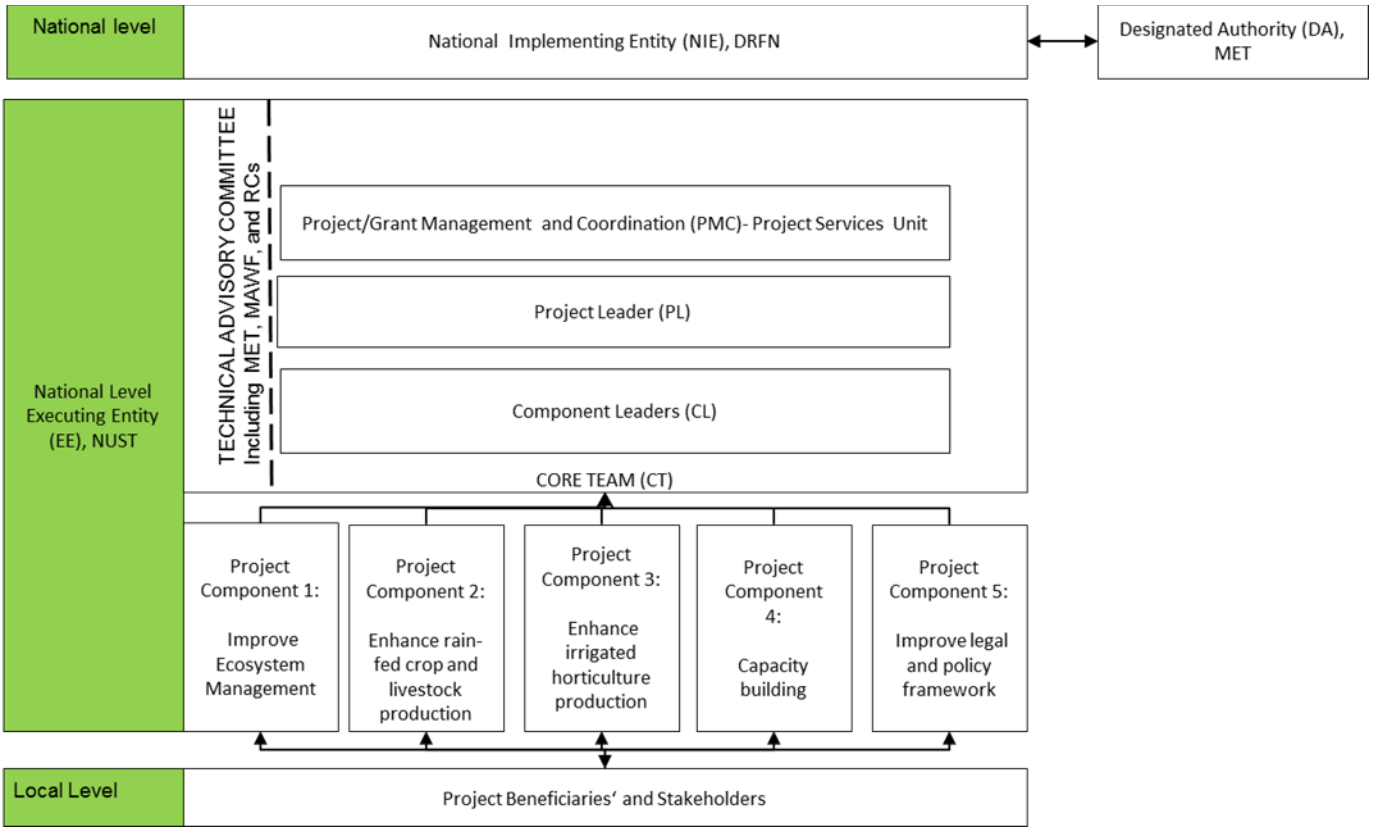

Figure 5:Detailed national and institutional project implementation design

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. In this role, the NIE plays several roles which include overall project monitoring and evaluation as well as administration of the funds received through the AF. Furthermore, 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.

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. In

this regard, NUST will serve as the primary interface point with the NIE. 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 oversees all administrative and coordinative tasks.

The structure of the indicated project team (Figure 6) 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 Project Management and Coordination Unit (PM) including the Project Leader is responsible for the overall project management and coordination including all administrative and financial issues as well as the scientific project management. The PM 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 finance Unit offers additional administrative support to carry out all required bookkeeping and financial reporting tasks.

For every Project Component (PC) a responsible Leader (PCL) will be nominated. The PCLs will be nominated from within the Implementing Entity. The competitive advantage of having an Higher Education Institution as the Implementing Entity is the wide variety of experts that can be used based on demand. PCLs will thus be selected from various Faculties within the University depending on the nature and the expertise required per project component. The PCL will be responsible for all issues related to the management, the conceptual development and progress and the integration of evidence elaborated within their respective PCs. The PCL will, furthermore, be responsible for the work package reports, the communication of execution and financial problems to the Project Leader (PL) and the interaction with all relevant persons in the project. The PCL will organise the work at PC level and monitor the work on a high professional level. The PCL will have to supervise the compliance of deadlines for outputs, milestones and the interim and final reports.

The Core Team (CT) will meet regularly and discuss the project progress and, if necessary, adaptations in the action plan. The CT will be formed by the PSU (including PL) and the PCL. A further crucial duty of the CT will be to decide on the adaptation of specific expected results per PC including the related action plan to the entire target region. A Technical Advisory Committee (TAC) will be established to offer professional advice and support to the CT and contributes to guiding, qualifying and optimising the project design and implementation facilitated and coordinated through the PSU. On a higher level, the TAC's responsibility will be to foster the creation and institutionalisation/sustainability of the project outputs. The TAC meets on a bi-annual basis.

Finally, at local/technical level implementation, 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 issues are needs based (Figure 6). The project is strategically designed to have field facilitators employed on the project budget per project component, to ensure that there is project ownership and smooth implementation. The

selection for fieldworkers 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 15. For example, in component 1, they are actively involved in cultivating dry-land grass pasture, Improving drought resilience, Community forest & 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. These issues are then filtered/translated and researched in a participatory manner through the EE (since they work closely with grass roots levels) to take up research in collaboration with academics to address the issues. In this sense, the EE plays a vital role (funnel) to facilitate the process of presenting the issues from the people to the government as well as translating research outputs from academics (since it is protested that decision makers do not understand the language of academics). NUST would also play an advisory role to government in the way of policy advocacy and informing/raising awareness to policy makers. Similarly, the role of regional/local government is often forgotten due to the believe of lack of capacity- however through this model their role will be strengthened to ensure that the issues from grass roots are well-represented and support evidence-based decisions.

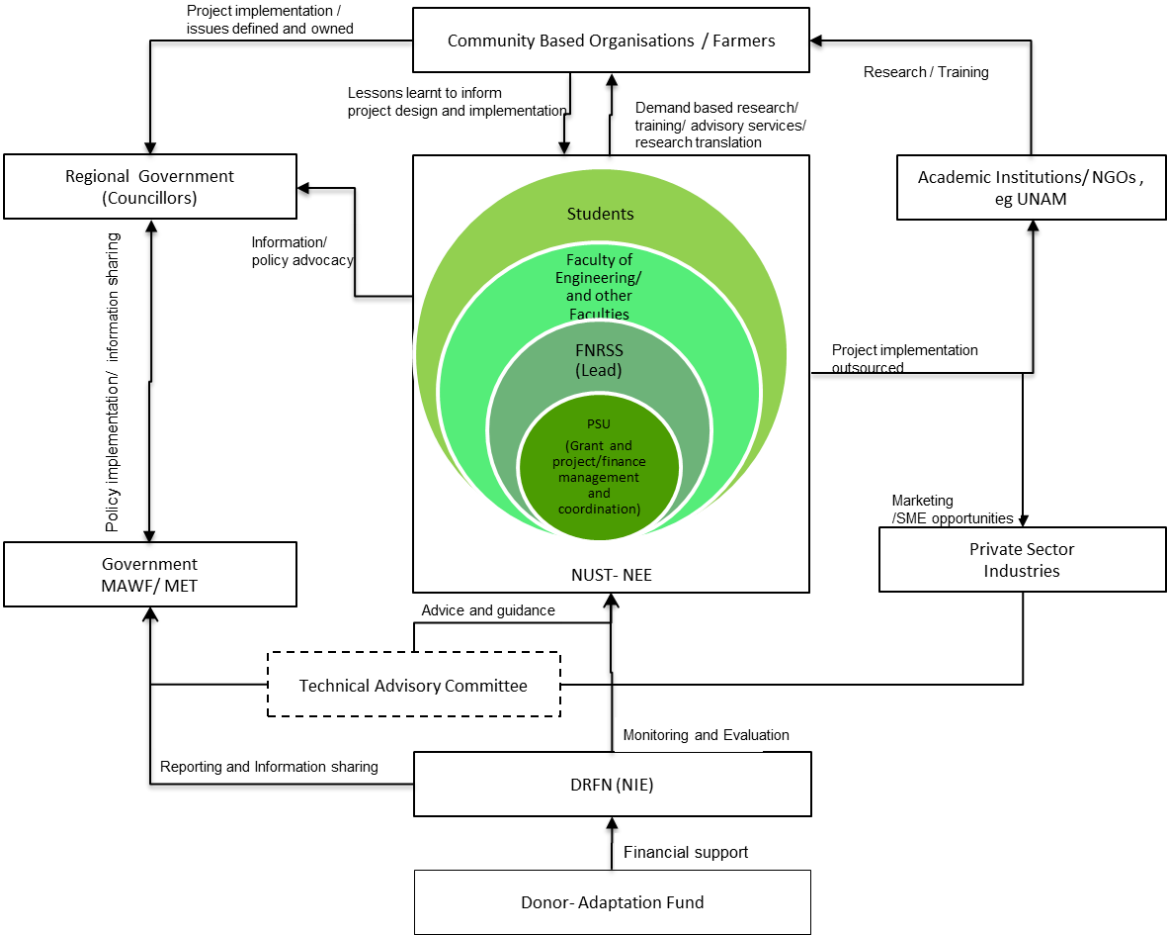

Figure 6: Detailed local level implementation design

Furthermore, donors 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. The model suggests that technical assistance and aid from donors should be in line with the needs as identified by the government, which in turn addresses grassroots level issues through the local government, NGOs and any research recommendations from the academia. 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: 1.4-1.11; 2.4-2.10; 3.4-3.8; 4.2-4.6, 4.9, 4.13; 5.2-5.4
Community Based Organisations/ Producer Cooperatives (eg horticulture, bush harvesting and livestock)	Community development, Increased local production	Coordinating development Projects, representing locals Specific Activities: 1.5, 1.8-1.11; 2.6-2.10; 3.5-3.8; 4.2, 4.5, 4.6, 4.9;
Political representatives (village/constituency development committees, councillors, regional governors)	Bringing community issues to the attention of decision makers	Politically representing the community Specific Activities: 4.2, 4.4, 4.5, 4.9; 5.2-5.4, 4.13
Non-Governmental Organisations	Empowering community members	Capacity building, advocating for the community Specific Activities: 4.2, 4.4, 4.5, 4.9; 5.2-5.4, 4.13
Academia and Students	Inter-disciplinary research with community and related	Research and capacity building Specific Activities:

Stakeholder	Interest	Roles and Responsibilities
	management practices and impacts, using data to empower community	1.4-1.8, 1.12-1.13; 2.4, 2.6, 2.9, 2.11, 2.12; 3.4-3.6, 3.8-3.10; 4.1-4.9; 4.13; 5.1-5.6
Extension workers (line ministries based in area)	Promoting sector programs at community level	Supporting community to adapt sector initiatives Specific Activities: 4.2, 4.4, 4.5, 4.9; 5.2-5.4, 4.13
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: 1.4-1.8; 2.5-2.8; 3.3-3.6; 4.5, 4.13
Project Management team	Project management and coordination, Donor reporting and accounting	Overall project implementation, facilitation, research, Monitoring and evaluation Specific activities: 1.1-1.14; 2.1-2.12; 3.1-3.10; 4.1-4.13; 5.1-5.6; 7.1

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 5.
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.

No.	Risk types	Main risk factors	Classification	Mitigation measures
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 funding beyond initial phase	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 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.

No.	Risk types	Main risk factors	Classification	Mitigation measures
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 Environmental and Social Policy of the Adaptation Fund is consistent with Namibia's environmental and social policies and laws, in aspects which ensure that project interventions/activities do not cause environmental or social harm. The objective of the project is to implement activities that increase the resilience of the most marginalized and vulnerable communities of society, and the landscape they reside in by a) enhancing/diversifying their livelihoods source , thus reducing poverty while reducing their dependence on single resources only, b) by building functional and robust community institutions for collective decision making, strengthening the role of women and vulnerable groups and c) to improve their functionality maintaining a healthy ecosystem base to act as a natural buffer to the impacts of climate variability and climate change.

The focus of the project lies in creating a conducive environment that on one hand improves the resilience of the local community through developing their ability to take informed and collective actions, and enhancing their income through development/diversification of livelihoods on the other hand. It adopts an integrated approach to landscape level conservation that promotes sustainable agriculture management and at the same time strengthening the biodiversity and local communities' livelihoods. By adopting this approach, the project aims to directly benefit 130 dry-land crop farmers, 10 pastoral communities and 100 small-scale horticultural producers, and to train more than 5,000 farmers in SRM, of whom at least 30% will be women.

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.

It is anticipated that the proposed project activities will not result in causing any adverse environmental or social impacts. However, should any adverse social or environmental impact occur, it is likely to be restricted at a village level, be small in scale, and reversible and the project is thus classified as a category B project.

The implementation mechanism is designed to take care of social and environmental risks. The principles of the Environmental and Social Policy of the AF have been included in each of the project activities. All project activities will be screened for risks by the implementing partners at the village level, and will focus on addressing the risks detection of environmental and / or social risks. If such risks are detected, plans will be made to address or mitigate for the specific risk.

Over and above the mitigation measures, the EE, the NIE and the project implementation teams will be sensitized on these aspects and would specifically review issues related to social and

environmental risk during its periodic meetings and shall be responsible for identifying specific risks that may arise during implementation based on the monitoring of project and built in mitigation and reporting mechanism for the same. Also, social audit would be put in place that would also help in mitigation of some of risk enlisted under Environmental and Social Policy of the Fund.

Due to the project objective and design it is important to note that with mitigation measures extending into project intervention implementation, the EE will ensure that environmental and social risks, if any, will be adequately and timely addressed through a management plan or changes in project design. The existing system of annual project performance reports and the mid-term and terminal evaluation reports will be designed to track any required environmental and social risk management plan or changes in project design.

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:

- Internal project evaluation;
- Reports and documentation coupled to reporting period and internal verification process;
- Feedback loops;
- Quality management plan;
- Evaluation of the key-deliverables and the implementation modalities;
- External project evaluation for quality assurance and control will be done primarily by the NIE
- Elaboration of the evaluation report, including recommendations and
- 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 15) 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.

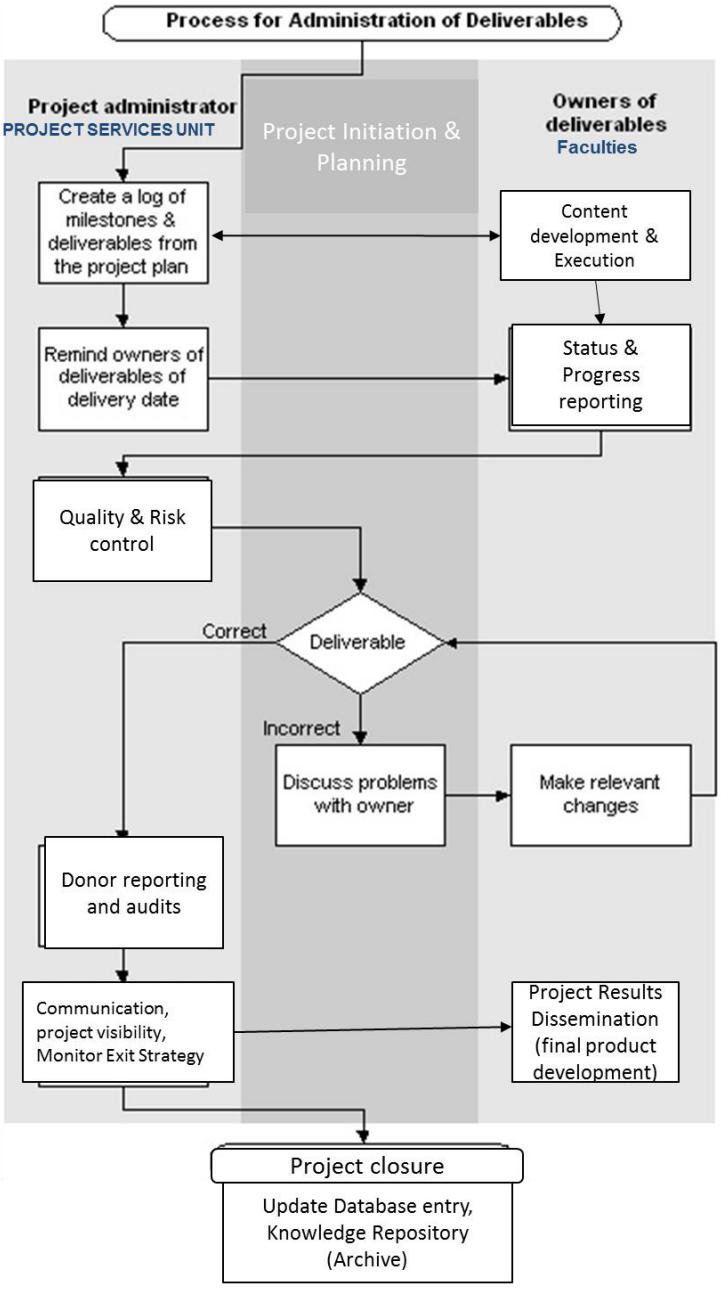

Figure 7: NUST Monitoring and Evaluation Framework to be used for the project

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 7).

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 open-access rangelands by resident communities improves carrying capacity, increases biodiversity, reduces impact of climate change and improves drought resilience.	Number of communities implementing SRM	No adaptive rangeland management plans in place	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)	Project reports: annual reports, mid-term review and final evaluation report
1.2 Legal provisions to empower communities to better control their natural resources (especially rangeland grazing) are exhausted, enhancing land and livestock productivity and improving livelihoods.	Number of legal provisions amended to enhance grazing management at community levels, thus preventing pasture “poaching”.	No legal provisions in place for community-level grazing management except for forest resources and game	Apply policy instruments to ward off poaching of community rangeland and forest resources in Omaheke and Omusati regions	Project reports: annual reports, mid-term review and final evaluation report
1.3 Improvement in rangeland condition improves production in summer (rainy season) and supplies for winter (dormant season). This improves peoples’ livelihoods and ecosystem resilience.	Area in hectare of rangeland under improved forage production	Only one village in southern Omusati region with rotational grazing applied at village level; limited planned rotational grazing in Omaheke	Increase the provision of baled and standing hay (foggage, by +20%) for the dry season (winter) so that communities can survive a drought with more livestock intact and producing.	Project reports: technical reports, annual reports, mid-term review and final evaluation report
1.4 Judicious bush and erosion control followed by re-introduction of locally extinct grasses rehabilitates rangeland condition and productivity, a	Area in hectare of land with selective debushing and re-seeded with locally adapted grasses	Debushing is currently prohibited on communal lands; Re-seeding attempts in Otjombinde	Selectively thin encroacher bush on 20,000 ha of degraded rangeland in Omaheke and 2,000 ha in Omusati,	Project reports: technical reports, annual reports, mid-term review and

Component outcomes	Indicator	Baseline	Target	Sources of verification
prerequisite to adapt to climate change successfully		constituencies (Lister farm) failed	control soil erosion and over-seed with desirable indigenous, perennial grass species	final evaluation report
1.5 Dry-land grass pastures are widely accepted as intensification and drought adaptation method. Pastures take grazing pressure off natural rangelands, making it easier to rehabilitate them and strengthen resilience.	Hectares of land under dry-land cultivated pasture of mix climax grazing grasses	Zero dry-land pasture production in place	Establish 1,000 ha of pastures in Omusati (in crop fields, integrated into crop rotation) to support cattle destined for slaughter and 5,000 ha in Omaheke (on-farm) to grow out weaners to slaughter	Project reports: technical reports, annual reports, mid-term review and final evaluation report
1.6 Restructuring of existing, barred and unsustainable charcoal enterprises to obtain regulatory approval. Improve efficiency (involve NUST engineering experts) to serve as a role model for other areas.	Number of charcoal enterprises with regulatory approval;	Zero charcoal enterprises	Re-structure charcoal operation at Lister and establish another in Otjinene (Omaheke) by demonstrating sustainable model approved by the regulator (Directorate of Forestry, Forest Stewardship Council). Design efficient, industrial-scale charcoal kiln.	Project reports: technical reports, annual reports, mid-term review and final evaluation report
1.7 More adaptive management of conservation areas (existing and new) improves resilience to climate change and creates employment	Number of conservancies with adaptive management plans	Two conservancies have management plans, two do not have, and those having management plans need to incorporate elements of climate change adaptation	Compile management plans for communal conservancies and community forests (where these do not exist, or need updating/revising) and assist communities to implement them successfully	Project reports: technical reports, annual reports, mid-term review and final evaluation report

Component outcomes	Indicator	Baseline	Target	Sources of verification
Project Component Outcome 2: Enhance rain-fed crop and livestock production				
2.1 Production management and efficiency of dry-land crop farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	Area in hectare under climate-smart and water-wise cultivation techniques	Farmers in Omusati apply traditional dry-land cropping, and a limited number of farmers in Omaheke do dry-land cropping	130 dry-land crop farmers (100 in Omusati, 30 in Omaheke) use soil improvement, grass ley crop rotation, rainwater harvesting, fertilisation, conservation agronomy, IPM, etc. to increase crop yields. Arrange for the supplies of inputs.	Project reports: technical reports, annual reports, mid-term review and final evaluation report
2.2 Climate change resilience and sustainability is improved by grass ley crop rotation via improved soil health and fertility and reduced erosion	Number of farmers using grass ley leading to improved soil fertility and moisture retention.	One farmer in Omaheke using grass ley under dry-land cropping (Erindi Ozombaka village); limited use in Omusati	Soil organic matter content is increased by incorporating grass leys into crop rotation, thus improving soil condition and crop yield, on 130 crop farms (100 in Omusati, 30 in Omaheke)	Project reports: technical reports, annual reports, mid-term review and final evaluation report
2.3 Food security from dry-land cropping is improved by diversification into drought-tolerant cultivars and species	Number of farmers using drought-tolerant cultivars and species	Cultivars used are not necessarily adapted to climate change and climate variability	130 dry-land crop farmers (100 in Omusati, 30 in Omaheke) use more adapted, drought-tolerant cultivars of existing crops and diversify into new, better adapted crops (e.g. sunflower)	Project reports: technical reports, annual reports, mid-term review and final evaluation report
2.4 Improved fodder production from pastures enhances beef production by better slaughter condition & balanced seasonal supply of slaughter cattle (Omusati) & retaining otherwise	Area in hectare under pasture production, and kilogrammes of grass hay baled and	Currently no such practice in place in both Omusati and Omaheke regions. Limited number of oxen currently	In Omusati, about 1,000 ha of grass pastures are used to maintain cattle destined for slaughter. In Omaheke, about 15,000 weaner cattle (10% of	Project reports: technical reports, annual reports, mid-term review and

Component outcomes	Indicator	Baseline	Target	Sources of verification
exported weaners for local processing (Omaheke). Fodder-banked hay increases resilience against droughts and climate shocks.	stored for dry season use; A balanced number of slaughter cattle for summer and winter in Omusati; Number of weaners retained under the scheme	produced are grown on the range, none from fodder production	exports) are grown out to slaughter on about 5,000 ha of grass pasture.	final evaluation report
2.5 Improved livestock husbandry skills support increased livestock output due to improved fodder flow, which improves livelihoods. Emphasis is on beef cattle and goats.	Number of farmers in Omusati applying improved livestock husbandry skills;	Zero cattle grown to slaughter markets in Omusati and weaners in Omaheke exported to South African feedlots	In 10 pastoral communities supplying slaughter cattle (Omusati) or growing weaners out on pasture (Omaheke), livestock productivity is increased by improved breeding management and selection, feeding (esp. mineral and vitamin supplementation). Arrange for the supplies of inputs.	Project reports: technical reports, annual reports, mid-term review and final evaluation report
2.6 Production of dry-land cropping and livestock systems will increase without increasing the pressure on natural resources only if improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	Number of diversified marketing options and increase in offtake as a result.	No value addition to crops and livestock is taking place in the communities of the two regions; Marketing is facilitated by AMTA and livestock auctioneers external to the communities. Postharvest storage is non-existent in Omaheke, but	130 dry-land crop farmers apply better post-harvest storage of crops. Their produce and that of 10 pastoral communities is processed to add value. Cooperative marketing of produce is developed and promoted in these beneficiaries and new markets are developed to increase offtake by 10-20%.	Project reports: technical reports, annual reports, mid-term review and final evaluation report

Component outcomes	Indicator	Baseline	Target	Sources of verification
		rudimentary (no cooling facilities) in Omusati.		
2.7 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 an obvious intensification and diversification strategy	Number of farmers involved dairy-ranching; Volumes of milk produced by mixed breed cows	Only 3 farmers produce milk for markets at small-scale in Omaheke and none in Omusati.	Investigate and support the establishment of a small-scale dairy-ranching industry in both regions, based on grass pastures, by launching pilot projects and expanding existing initiatives that demonstrate feasibility and enable learning and optimisation	Project reports: technical reports, annual reports, mid-term review and final evaluation report; incorporating interviews with producers
2.8 The poorest farmers who have only goats (no cattle) benefit from goat meat sold in retail outlets in urban areas in addition to the informal market, but this potential first needs to be tested for feasibility	Investigate market development for goat meat	No goat meat market exists in both regions, although a need exists in Omusati region.	Investigate the potential to formalise informal goat meat marketing (in Omusati) by feasibility study	Feasibility study report
2.9 Optimal management of wildlife conservancies demonstrates higher productivity than livestock ranching in climate-stressed environments, also by diversification into tourism (Omusati and Omaheke/ Otjozondjupa bi-regional wildlife conservation area).	Number of conservancies with participatory management plans; Number of tourism diversification options including public-private partnership enterprises, e.g. game lodge in wildlife conservancy areas	2 joint-ventures: one in each region; 5 participatory management plans for conservancies	Compile participatory management plans for Uukwaluudhi Core Conservancy (Omusati) and Ondjou Conservancy (Omaheke/Otjozondjupa bi-regional conservancy) and support its implementation. Investigate the potential of establishing mutually beneficial joint-venture with private entrepreneur	Project reports: annual reports, mid-term review and final evaluation report

Component outcomes	Indicator	Baseline	Target	Sources of verification
			in Omaheke's southern Gam area.	
Project Component Outcome 3: Enhance irrigated horticultural production				
3.1 Production management and efficiency of irrigating horticultural farmers in Omusati and Omaheke is strengthened by applying adapted, climate-smart and water-wise cultivation techniques	Irrigating horticultural producers increase their yield by using climate-smart production techniques	Some farmers in Omusati use drip irrigation and but no water-wise techniques used in Omaheke	75 small-scale horticultural producers in Omusati and 25 in Omaheke use adapted cultivars, plant new crops, apply water-wise irrigation techniques, use shading and composting etc. to increase yields. Arrange for the supplies of inputs.	Project reports: technical reports, annual reports, mid-term review and final evaluation report
3.2 Horticultural production will increase without increasing the pressure on natural resources only if improved marketing techniques and exploitation of new markets increases offtake. Value added to raw produce by better storage and processing improves livelihoods and creates employment.	Processing and marketing of horticultural produce enhances offtake to improve livelihoods and decrease pressure on the land	Transport in Omusati hampers marketing of produce to AMTA; Marketing of produce is poorly developed – only selling to other farmers who might want to consume directly.	100 small-scale horticultural producers apply better post-harvest storage of crops. Their produce is processed to add value. Cooperative marketing of produce is developed and promoted in these beneficiaries and new markets are developed to increase offtake by 10-20%.	Project reports: technical reports, annual reports, mid-term review and final evaluation report
Project Component Outcome 4. Capacity building				
4.1 Systematic training based on local experience and incorporating much practical and experiential learning (i.e. practical, hands-on skills development) builds the capacity	Improve capacity of benefitting farmers and communities to manage resources more sustainably	Farmers training is a continuous process requiring reinforcement and incorporating new	Train more than 5,000 farmers from benefitting communities (at least 30% women, 10% marginalised and vulnerable, 5% training-of-trainers) in	Project reports: technical reports, annual reports, mid-term review and final evaluation

Component outcomes	Indicator	Baseline	Target	Sources of verification
of farmers, extension and institutional workers and other trainers to adapt to climate change, which improves their livelihoods		knowledge and skills.	sustainable resource management and surplus-oriented farming over 600 meeting-days. All training materials compiled in a training kit and distributed to stakeholders.	report, reflecting interviews with beneficiaries
4.2 Improved capacity to manage institutions and processes properly and realise long-term strategic interests provides quality support to producers, enhances offtake, value addition and profitability. NUST School of Business is involved in sectoral development activities.	4.2 Improve capacity of institutions serving regional farmers to fulfil their mandate effectively	No such capacity building exercise has ever been carried out.	Train at least 20 regional and national institutions that serve farmers in Omusati and Omaheke in operational, strategic and business management (e.g. abattoirs, AMTA, charcoal and producers' associations, farmers' organisations, forest management committees)	Project reports: annual reports, mid-term review and final evaluation report
4.3 Regular climate risk and production information dissemination supports training efforts, reaches a wider audience than training and creates awareness. Easily linked with advertising companies, media houses and corporate responsibility programmes to expand scope.	Number of relevant production, marketing and climate risk information disseminated through appropriate media	Appropriately packaged information targeted to producers of crops and livestock production in the context of climate change adaptation has not been done.	Disseminate relevant production, marketing and climate risk information weekly, using popular, accessible print, verbal, visual and electronic media. All information to be compiled into info packs and distributed to stakeholders	Project reports: annual reports, mid-term review and final evaluation report; information tools (e.g. pamphlets) and dissemination reports
4.4 Improved marketing of agricultural produce acts as "pull" factor that encourages production but is often inadequate, unimaginative and	Improve and expand cooperative marketing of processed products	No cooperative marketing of slaughter animals in Omaheke; weaners are marketed	Arrange processing, value addition and cooperative marketing at regional level and involve authorities like RCs, Ministry of	Project reports: annual reports, mid-term review and final

Component outcomes	Indicator	Baseline	Target	Sources of verification
downright inhibitive in Namibia's communal areas. Strategies and the capacity to overcome these challenges are synchronised with national stakeholders to improve livelihoods and reduce rural poverty.		through farmers unions; no crop marketing in Omaheke, but cooperative marketing exists in Omusati albeit needing market expansion	Industrialisation, Trade and SME Development, etc. Explore and penetrate new markets with relevant crop, horticultural, livestock, rangeland and forestry products. Devise innovative strategies to overcome marketing and offtake bottlenecks.	evaluation report
4.5 A permanent training capacity is established at regional level to ensure systematic, structured and relevant farmer training and maintain training and information dissemination beyond project end. A successful regional role model can easily be up-scaled to national level.	Establish a (regional) FA	FAs do not exist in the regions.	Establish a farmers' training institution (also training-the-trainers) at regional level (Omusati and Omaheke) within the RC, concentrating on content and delivery while using Council and existing infrastructure. Obtain NTA accreditation and secure demonstration plots.	Project reports: annual reports, mid-term review and final evaluation report
4.6 Field Facilitators, based in participating communities link project implementers with beneficiaries. They evolve into embedded "Community Agriculture Resource Persons", associated with the FA, helping sustain capacity building beyond project end.	Number of field facilitators recruited to work within the farming communities	No specified field facilitators in place, but local community development NGOs or individuals will be recruited.	Appoint 9 Field Facilitators full-time to assist with project implementation. Train, empower and re-train occasionally.	Field facilitators reports; Project reports: annual reports, mid-term review and final evaluation report
4.7 Students are exposed to practical project work and to farmers, learning how to apply knowledge (hard skills) and	Number of students working in the targeted communities	None on climate change adaptation for specified	Take NUST agriculture and natural resource students on 35 practical excursions (7/year) to	Project reports: annual reports, mid-term review and final

Component outcomes	Indicator	Baseline	Target	Sources of verification
interact with farmers (soft skills) for a more rounded trainee		interventions and targeted regions.	Omusati and Omaheke projects	evaluation report
4.8 Capacity in applied research is built in the institution (NUST) and the post-graduate student. It also makes the institution relevant to communal agriculture by solving real-life problems and improving resilience.	Research and develop applied solutions to local situations	No post-graduate students researching on climate change adaptation regarding the specified adaptation interventions and targeted regions	Grant 9 post-graduate research opportunities to MSc and PhD candidates, researching local problems and developing applied solutions. Includes analysis of 360 samples of soil water, plant and animal tissue.	Project reports: annual reports, mid-term review and final evaluation report
Project Component Outcome 5. Improve policy and legal framework				
5.1 Identify and address unintended consequences and strengthen desired impacts of the existing legal framework so that it provides a conducive framework to communal agriculture and for climate change adaptation	Evaluate the impact of existing policy and legal framework	Synergistic impacts of unintended policy and legal framework, and climate change and variability are not assessed.	Evaluate the impact of existing acts, laws and policies relevant to climate change adaptation in communal areas to evaluate if intended outcomes were achieved, identify flaws and propose corrections	Laws and policy evaluation reports
5.2 Update legal framework, simplify for ease of understanding and harmonise to reduce contradictions and confusion, making it easier for the communal producer to abide by the law	Reviews of policy and legal framework, updated and harmonised	No updated review and suggested harmonisation in place.	Review and evaluate existing acts, laws and policies relevant to climate change adaptation in communal areas and suggest updates, corrections and harmonise different components	Laws and policy evaluation reports
5.3 Interaction with lawmakers influences them to enact laws that make sense on the ground	Number of interactions with lawmakers to	No being done currently.	Advocate for changes required and advise lawmakers on intended	Laws and policy evaluation reports

Component outcomes	Indicator	Baseline	Target	Sources of verification
and help farmers cope with climate change	harmonise policy and laws in the face of climate change and impacts on producers.		changes and processes to strengthen resilience and adaptation of communal farmers to climate change and associated risks	

F. Alignment with the Results Framework of the Adaptation Fund

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

Project Objective(s)[1]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Objective 1: Vulnerable communities implement climate-smart SRM to improve the resilience rangeland-based ecosystem and other agricultural resources to climate variability and change	Size of land placed under SRM and improved resilience and biodiversity	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	Indicator 5: Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress	1,378,537
Objective 2: Vulnerable communities implement climate-smart production and management techniques to enhance the adaptive capacity of dry-land (i.e. rain-fed) crop and livestock production systems to climate variability and change	Number of vulnerable communities enhancing their adaptive capacities by implementing climate-smart production and management techniques in the crop and livestock natural resource sectors.	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	593,152
Objective 3: Vulnerable communities implement climate-smart production and management	Number of vulnerable communities enhancing their adaptive capacities by implementing climate-smart	Outcome 4: Increased adaptive capacity within relevant development	Indicator 4.1: Development sector's services responsive to evolving needs from	404,481

Project Objective(s)[1]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
techniques to enhance the adaptive capacity of irrigated horticultural production system to climate variability and change	production and management techniques in the irrigated horticultural production system	and natural resource sectors	changing and variable climate	
Objective 4: Strengthen the knowledge and skills of vulnerable communities to adapt and become more resilient to climate change and variability	Number of vulnerable communities/ persons whose knowledge and skills are strengthened to become more resilient to climate variability and change	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	Indicator 3.1: Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	1,701,958
Objective 5: Review and improve the legal framework relevant to climate change adaptation in communal areas so that resilience measures are promoted and the adaptive capacity of vulnerable communities is improved	Number of policies / laws reviewed and for which aspects of adaptation to climate variability and change are mainstreamed.	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	Indicator7: Climate change priorities are integrated into national development strategy	91,867

G. Detailed budget

Table 20: Detailed budget for Project Activity Cost (A)

Item no.	Component/item	Year 1 cost	Year 2 cost	Year 3 cost	Year 4 cost	Year 5 cost	Total cost
1	***Improve ecosystem management***	***230 719***	***267 959***	***259 235***	***349 823***	***270 802***	***1 378 537***
1.1	Travel (trip @ 2,000 km: 1/month)	12 000	12 720	10 112	10 719	15 436	60 987
1.2	Per diems (10 pax@20d, 3 pax@40d)	12 000	16 960	17 978	19 056	20 581	86 575
1.3	Consumables (fertilizer, seed etc.)	8 462	13 454	14 261	10 078	10 884	57 138
1.4	Sample analyses (soil, plant)	1 725	3 048	1 938	2 055	1 479	10 244
1.5	Equipment (hay- & charcoal-making, cultivation, solar-electric fencing etc.)	32 000	33 920	17 978	28 584	10 290	122 772
1.6	Cultivate dry-land grass pasture	60 000	127 200	134 832	214 383	154 356	690 771
1.7	Develop efficient kiln	2 308	7 338	7 779	8 245	8 905	34 576
1.8	Improve drought resilience	3 846	6 115	6 482	9 161	9 894	35 499
1.9	Community forest & conservancy intervention	5 769	6 115	8 643	11 452	9 894	41 873
1.10	Rangeland rehabilitation actions	4 615	9 785	10 372	5 497	5 937	36 205
1.11	Field facilitator (wage, transport)	6 456	6 843	7 254	7 689	8 304	36 547
1.12	Student field excursion costs	3 846	8 154	8 643	9 161	9 894	39 698
1.13	Post-graduate student & research costs	3 846	16 307	12 964	13 742	4 947	51 806
1.14	Project implementation mobility	73 846	0	0	0	0	73 846
2	***Enhance rain-fed production***	***71 769***	***110 974***	***127 658***	***151 351***	***131 400***	***593 152***
2.1	Travel (trip @ 2,000 km: 1/month)	12 000	12 720	10 112	10 719	11 577	57 128
2.2	Per diems (8 pax@20d, 2 pax@40d)	12 000	12 720	13 483	14 292	15 436	67 931
2.3	Consumables (fertilizer, seed, pest control, lick, etc.)	4 615	7 338	10 372	10 994	8 905	42 225

Item no.	Component/item	Year 1 cost	Year 2 cost	Year 3 cost	Year 4 cost	Year 5 cost	Total cost
2.4	Sample analyses (soil, plant, blood, etc.)	2 308	4 892	3 889	4 123	2 968	18 181
2.5	Equipment (shade, cultivation, husbandry, etc.)	6 923	11 008	15 558	20 614	17 810	71 912
2.6	Post-harvest processing assistance	3 846	4 077	6 482	6 871	7 421	28 698
2.7	Abattoir assistance	7 692	8 154	12 965	18 323	19 789	66 923
2.8	Development of dairy ranching	5 538	11 742	18 669	19 789	7 124	62 862
2.9	Feasibility studies (goats, wildlife)	3 077	9 785	10 372	18 323	19 789	61 346
2.10	Field facilitator (wage, transport)	6 462	5 708	5 445	5 772	6 234	29 620
2.11	Student field excursion costs	3 846	8 154	8 643	9 162	9 895	39 699
2.12	Post-graduate student & research costs	3 462	14 677	11 668	12 368	4 453	46 627
	Sub-total: Rain-fed production	71 769	110 974	127 658	151 351	131 400	593 152
3	***Enhance irrigated production***	***68 000***	***77 584***	***87 770***	***92 762***	***78 365***	***404 481***
3.1	Travel (trip @ 2,000 km: 1/month)	12 000	12 720	10 112	10 719	11 577	57 128
3.2	Per diems (3 pax@20d, 1 pax@40d)	5 000	5 300	5 618	5 955	6 431	28 305
3.3	Consumables (fertilizer, seed, pest control, etc.)	18 462	9 785	10 372	10 994	5 937	55 549
3.4	Sample analyses (soil, plant, water, etc.)	2 885	3 058	3 241	3 436	2 226	14 845
3.5	Equipment (irrigation, shade, pumps, cultivation etc.)	13 077	20 792	29 386	31 150	25 231	119 637
3.6	Post-harvest processing assistance	2 769	4 403	6 223	8 245	7 124	28 765
3.7	Field facilitator (wage, transport)	3 231	6 849	7 260	5 772	6 234	29 346
3.8	Horticultural specialist	3 269	6 931	7 347	7 787	4 205	29 539
3.9	Student field excursion costs	3 846	4 077	4 322	4 581	4 947	21 773
3.10	Post-graduate student & research costs	3 462	3 669	3 889	4 123	4 453	19 595

Item no.	Component/item	Year 1 cost	Year 2 cost	Year 3 cost	Year 4 cost	Year 5 cost	Total cost
4	***Capacity-building***	***236 577***	***309 968***	***320 420***	***367 406***	***467 586***	***1 701 958***
4.1	Travel (trip @ 2,000 km: 2/month)	16 000	29 680	25 281	26 798	36 016	133 775
4.2	Per diems (10 pax@20d, 5 pax@40d)	12 000	25 175	26 686	28 287	30 550	122 697
4.3	Training material	3 846	6 115	8 643	9 162	7 421	35 187
4.4	Training courses (@30 participants)	16 500	32 065	43 259	65 506	106 120	263 449
4.5	Marketing assistance & development	5 769	12 231	19 447	27 485	14 842	79 774
4.6	Establish regional training facilities	1 923	4 077	6 482	9 162	9 895	31 539
4.7	Student field excursion costs	3 846	8 154	8 643	9 162	9 895	39 699
4,8	Post-graduate student & research costs	3 462	3 669	3 889	4 123	4 453	19 595
4.9	Workshops, meetings (20 part.)	11 538	21 404	29 170	34 356	40 815	137 284
4.10	Project leader	64 000	59 360	62 922	57 169	82 323	325 773
4.11	Implementation assistant	50 769	53 815	38 030	40 311	54 420	237 346
4.12	Administrative/financial assistant	38 462	40 769	43 215	45 808	49 473	217 727
4.13	Communication, visibility, reporting	8 462	13 454	4 754	10 078	21 365	58 112
5	***Review legal & policy framework***	***17 346***	***10 641***	***23 228***	***13 788***	***26 864***	***91 867***
5.1	Travel (trip @ 2,000 km: 2/year)	2 000	2 120	2 247	2 382	2 573	11 322
5.2	Per diems (3 pax@20d)	3 000	1 590	1 685	1 787	1 929	9 991
5.3	Advocacy activities	1 538	3 262	5 186	5 497	3 958	19 441
5.4	Workshops, meetings (10 participants)	3 500	0	5 899	0	9 004	18 403
5.5	Student field excursion costs	3 846	0	4 322	0	4 947	13 115
5.6	Post-graduate student & research costs	3 462	3 669	3 889	4 123	4 453	19 595
6	**Project activity cost (A)**	**624 411**	**777 126**	**818 312**	**975 129**	**975 017**	**4 169 995**

Table 21: Budget notes for Project Activity Cost (A)

No.	Component/item	Amount (USD)	Budget note
1	**Improve ecosystem management**		
1.1	Travel (trip @ 2,000 km: 1/month)	60 987	Av. trip=2,000 km (1,750km Outapi; 1,250 km Eiseb; plus 500 km local)
1.2	Per diems (10 pax@20d, 3 pax@40d)	86 575	Per diem rate based on internal NUST guidelines
1.3	Consumables (fertilizer, seed etc.)	57 138	Consumables procured for pastures, bush control, rehabilitation
1.4	Sample analyses (soil, plant)	10 244	Soil analyses before pasture establishment, fodder analyses
1.5	Equipment (hay- & charcoal-making, cultivation, solar-electric fencing etc.)	122 772	Equipment procured to cultivate pastures, make hay and charcoal, fence and graze pastures, count game, etc.
1.6	Cultivate dry-land grass pasture	690 771	5,000 ha of dry-land grass pasture established
1.7	Develop efficient kiln	34 576	Large- efficient kiln developed for communal charcoal industry
1.8	Improve drought resilience	35 499	Various measures aimed at resilience, including fodder banking
1.9	Community forest & conservancy intervention	41 873	Assisting communities to design and/or implement management plans
1.10	Rangeland rehabilitation actions	36 205	Erosion structures, re-seeding and other rehabilitation measures
1.11	Field facilitator (wage, transport)	36 547	4 field facilitators to work in project areas full-time
1.12	Student field excursion costs	39 698	9 field excursions by NUST students to project areas
1.13	Post-graduate student & research costs	51 806	Academic fees, research equipment of 6 post-graduate students
1.14	Project implementation mobility	73 846	double cabin 4x4 LDV fully equipped acquired for project implementation
2	**Enhance rain-fed production**		
2.1	Travel (trip @ 2,000 km: 1/month)	57 128	Av. trip=2,000 km (1,750 km Outapi; 1,250 km Eiseb; plus 500 km local)

No.	Component/item	Amount (USD)	Budget note
2.2	Per diems (8 pax@20d, 2 pax@40d)	67 931	Per diem rate based on internal NUST guidelines
2.3	Consumables (fertilizer, seed, pest control, lick, etc.)	42 225	Consumables procured for crop (fertilizer, diesel, seed, pest control etc.) and livestock production (lick, vaccines etc.)
2.4	Sample analyses (soil, plant, blood etc)	18 181	Analysis of various soil and plant matter from crop; animal tissue
2.5	Equipment (shade, cultivation, husbandry, etc.)	71 912	Equipment procured to cultivate crops (ploughs, rippers, sprayers and spreaders, etc.) and livestock (burdizzo, AI flask, etc .)
2.6	Post-harvest processing assistance	28 698	Improved storage of grains, processing of livestock prod (e.g. skins)
2.7	Abattoir assistance	66 923	Abattoir equipment to make better products, less waste
2.8	Development of dairy ranching	62 862	Study to investigate and start-up pasture-based dairy ranching
2.9	Feasibility studies (goats, wildlife)	61 346	Studies to investigate value-addition to goat & wildlife enterprises
2.10	Field facilitator (wage, transport)	29 620	3 field facilitators to work in project areas full-time
2.11	Student field excursion costs	39 699	9 field excursions by NUST students to project areas
2.12	Post-graduate student & research costs	46 627	Academic fees, research equipment of 6 post-graduate students
3	**Enhance irrigated production**		
3.1	Travel (trip @ 2,000 km: 1/month)	57 128	Av. trip=2,000 km (1,750 km Outapi; 1,250 km Eiseb; plus 500 km local)
3.2	Per diems (3 pax@20d, 1 pax@40d)	28 305	Per diem rate based on internal NUST guidelines
3.3	Consumables (fertilizer, seed, pest control, etc.)	55 549	Consumables procured for horticulture (fertilizer, diesel, seed, pest control etc.)
3.4	Sample analyses (soil, plant, water etc.)	14 845	Analysis of various soil and plant matter from horticulture crops
3.5	Equipment (irrigation, shade, pumps, cultivation etc.)	119 637	Equipment procured to cultivate horticulture crops (ploughs, rippers, sprayers and spreaders, planters, etc.)

No.	Component/item	Amount (USD)	Budget note
3.6	Post-harvest processing assistance	28 765	Processing of produce: tomato paste, fruit juices, soup powder etc.
3.7	Field facilitator (wage, transport)	29 346	2 field facilitators to work in project areas full-time
3.8	Horticultural specialist	29 539	Outside expert flown in to complement NUST capacity
3.9	Student field excursion costs	21 773	5 field excursions by NUST students to project areas
3.10	Post-graduate student & research costs	19 595	Academic fees, research equipment of 1 post-graduate student
4	**Capacity-building**		
4.1	Travel (trip @ 2,000 km: 2/month)	133 775	Av. trip=2,000 km (1,750 km Outapi; 1,250 km Eiseb; plus 500 km local)
4.2	Per diems (10 pax@20d, 5 pax@40d)	122 697	Per diem rate based on internal NUST guidelines
4.3	Training material	35 187	Training material includes videos, hand-outs, tapes, etc.
4.4	Training courses (@30 participants)	263 449	Cost of training events (venue, meals, transport of participants, etc)
4.5	Marketing assistance & development	79 774	For marketing cooperatives & to explore new markets
4.6	Establish regional training facilities	31 539	Provide contents and trainers, furnish infrastructure, etc.
4.7	Student field excursion costs	39 699	9 field excursions by NUST students to project areas
4,8	Post-graduate student & research costs	19 595	Academic fees, research equipment of 1 post-graduate student
4.9	Workshops, meetings (20 part.)	137 284	Mostly management events, some training events not covered elsewhere
4.10	Project leader	325 773	Dedicated project leader to implement project timeously
4.11	Implementation assistant	237 346	Implementation assistant to assist timetable-bound staff
4.12	Administrative/financial assistant	217 727	To assist with financial and admin duties of a huge project
4.13	Communication, visibility, reporting	58 112	Sign-posting, branding, report-writing assistance, communication strategy
5	**Review legal & policy framework**		

No.	Component/item	Amount (USD)	Budget note
5.1	Travel (trip @ 2,000 km: 2/year)	11 322	Av. trip=2,000 km (1,750 km Outapi; 1,250 km Eiseb; plus 500 km local)
5.2	Per diems (3 pax@20d)	9 991	Per diem rate based on internal NUST guidelines
5.3	Advocacy activities	19 441	Material and actions to inform and influence law-makers
5.4	Workshops, meetings (10 participants)	18 403	Cost of meetings with stakeholders
5.5	Student field excursion costs	13 115	3 field excursions by NUST students to project areas
5.6	Post-graduate student & research costs	19 595	Academic fees, research equipment of 1 post-graduate student
Project Activity Cost (A)		**4 169 995**	

Table 22: Detailed budget for Project Execution Cost (B)

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

Item	Execution Intervals	Unit	No. of Unit	Unit Rate	Total (USD)
Planning Support tools, Development and monitoring					
Contractual Familiarisation and template development (Memorandum of Understanding with local partners) and change management	Quarterly	Months	10	5 600.00	56 000.00
Project Operational Framework	Quarterly	Months	10	5 600.00	56 000.00
Quality Management Plan	Quarterly	Months	15	4 500.00	67 500.00
Sustainability and Exit Plan	Quarterly	Months	15	4 500.00	67 500.00
Communication Plan	Quarterly	Months	25	4 500.00	112 500.00
Knowledge Management Plan and database maintenance	Half-yearly	Months	30	3 700.00	111 000.00
Reporting					

Item	Execution Intervals	Unit	No. of Unit	Unit Rate	Total (USD)
Internal quarterly report	Quarterly		20	4 500.00	90 000.00
Annual Report	Annually		5	4 500.00	22 500.00
Periodic field Survey report	Quarterly		20	4 500.00	90 000.00
Mid-term Assessment Report	Once-off		1	5 600.00	5 600.00
Final Report	Once-off		1	4 500.00	4 500.00
Planning Meetings					
Project Planning meetings (Core team)	5 times a year	Number	25	5 500.00	137 500.00
TAC meetings	Bi-annually	Number	10	5 600.00	56 000.00
Catering, venue, material		Number	525	200.00	105 000.00
Financials					
Financial/ Accounting supervision	Bi-annually	Months	10	7 000.00	70 000.00
Internal Verification and Audit preparation	Annually	lumpsum	1	30 000.00	30 000.0
Bank charges	Monthly	Months	60	30.77	1 846.15
Office related expenses					
Office space and local travel (within Windhoek)	Monthly	Months	60	1 153.85	69 230.77
Internet access	Monthly	Months	60	807.69	48 461.54
Consumables (telephone, stationery, etc.)	Monthly	Months	60	153.85	9 230.77
Total project execution cost					**1 210 369.23**
NUST indirect contribution					**772 635.23**
Executing Entity Fee (B)					**437 734.00**

Table 23: 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	62 308	4
5. Knowledge dissemination	Information distribution Reporting	18 462	5
Total budget	**Project management**	**391 657**	

Table 24: 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

Budget notes
• 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 • 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 25: List of project milestones

Milestones	Expected dates
Signature of agreement between AF and NIE	March 2018
Start of project (Inception workshop)	April 2018
Inception report (1 month after inception workshop)	May 2018
End of execution Year 1	March 2019
Annual Performance Report 1 - PPR 1 (within 2 months of end Year 1)	May 2019
End of execution Year 2	March 2020
Annual Performance Report 2 – PPR 2 (within 2 months of end Year 2)	May 2020
Mid-point of project implementation	October 2020
Mid-term evaluation report (within 6 months of mid-point)	April 2021
End of execution Year 3	March 2021
Annual Performance Report 3 – PPR 3 (within 2 months of end Year 3)	May 2021
End of execution Year 4	March 2022
Annual Performance Report 4 - PPR 4 (within 2 months of end Year 4)	May 2022
End of execution Year 5	March 2023
Project implementation completion	March 2023
Annual Performance Report 5 - PPR 5 (within 2 months of end Year 4)	May 2023
Project completion report (within 6 months of project completion)	September 2023
Project closing (6 months after project and disbursement completed)	September 2023
Terminal evaluation report (within 9 months after project completion)	December 2023
Final audited financial statements (within 6 months of end of NIE FY)	June 2024

Table 26: Disbursement schedule

Milestone	Scheduled date	Project funds	NIE fee	Total disbursement
Signature of agreement	March 2018	689,957	74,331	**764,288**
Submission of PPR 1	May 2019	858,702	74,331	**933,033**
Submission of PPR 2	May 2020	858,702	83,562	**987,774**
Submission of PPR 3	May 2021	1,077,491	83,562	**1,151,822**
Submission of PPR 4	May 2022	1,077,367	85,102	**1,162,469**
Total project		**4,607,729**	**391,657**	**4,999,386**

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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:** *14 July 2017* ***Signature:***

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2017 -07- 14
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: 7 July 2017	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)

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

Tel: (00 26461) 284 2111
Fax: (00 26461) 229 936

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

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

12 July 2017

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

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

Dear Sir/Madam

SUBJECT: ENDORSEMENT OF THE FULLY DEVELOPED PROPOSAL 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 am pleased to endorse the project **"Community-based integrated farming systems for climate change adaptation"** having a total funding requirement of USD 4 999 386.

The Namibia University of Science and Technology has developed the project proposal as Executing Entity under the management and guidance of the Desert Research Foundation of Namibia (DRFN) as the accredited NIE for Namibia.

Sincerely Yours,

P/Bag 13306 Windhoek, Namibia
2017 -07- 14
Office of the Environmental Commissioner

Mr. Teofilus Nghitila
Environmental Commissioner

"Stop the poaching of our rhinos"

All official correspondence must be addressed to the Permanent Secretary

Annexures

Annexure 1: Meeting at Eiseb 10

Annexure 2: Meeting at Okarui Horticulture

Annexure 3: Meeting at Outapi DVS Office

Annexure 4: Meeting with Mr Endjala, Governor Omusati Region

Annexure 5: Meeting with Ms N Kanime, Omusati Regional Council

Annexure 6: Meeting with Olushandja Horticulture Producers Association

Annexure 7: Meeting with Omahenene DARD staff

Annexure 8: Meeting with Omusati Livestock Marketing Cooperative

Annexure 9: Meeting with Otjinene Community Forest

Annexure 10: Meeting with Otjinene Farmers Association

Annexure 11: Meeting with Otjozondjupa Conservancy

Annexure 12: Meeting RWS Chief Control Officer

Annexure 13: Meeting with Vizahemi Crop Farmers' Cooperative

Annexure 14: Meeting with Ministry of Youth

Annexure 15: Meeting with NAFOLA

Annexure 16: Endorsement letters Omaheke

Annexure 17: Endorsement letters Omusati

Annexure 18: Endorsement letter Epukiro Constituency Office

Annexure 19: Key informant interviews

Annexure 1: Meeting at Eiseb 10

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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·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:·¶

Next·meeting:·→¶

Annexure 2: Meeting at Okarui Horticulture

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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·peppers·and· onions¤	• → Pest·control¶ • → To·be·improved·with·drip·irrigation·¤	¤
• → Dryland·¤	• → Production·of·Maize·and·Cow·peace¤	• → Capacity·building·¤	¤
¤	¤	¤	¤

Meeting·adjourned:·¶

Next·meeting:·→¶

Annexure 3: Meeting at Outapi DVS Office

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PREPARATION·GRANT·FUND¶

ADAPTATION·FUND·PROPOSAL·DEVELOPMENT·PROCESS·¶

PROJECT·MEETING·MINUTES¶

Present:··¶

1.→ Dr·Axel·Rothauge·(AF·Team)¶

2.→ Prof·Katjiua·Mutjinde·(AF·Team)¶

3.→ Mr·Josephat·Peter·(MAWF-DVS)¶

4.→ Ms·Laina·K·Hango·(MAWF-–·DVS)¶

5.→ 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·Operators)¶ • → Omutambomaue·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:·→¶

Annexure 4: Meeting with Mr Endjala, Governor Omusati Region

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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.→ Mr·E·Endjala·(Governor·of·Omusati·Regional)¶

2.→ Prof·Katjiua·Mutjinde¶

3.→ Dr·Axel·Rothauge→ ¶

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:·→¶

Annexure 5: Meeting with Ms N Kanime, Omusati Regional Council

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.→ Ms·N·Kanime·(Acting·Director:·Planning·of·Omusati·Regional·Council)¶

2.→ Prof·Katjiua·Mutjinde¶

3.→ Dr·Axel·Rothauge→ ¶

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·advice¤
•→ 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:·¶

Annexure 6: Meeting with Olushandja Horticulture Producers Association

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.→ Dr·Axel·Rothauge·(AF·Team)¶

2.→ Prof·Katjiua·Mutjinde·(AF·Team)¶

3.→ 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:·→¶

Annexure 7: Meeting with Omahenene DARD staff

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.→ Dr·Axel·Rothauge·(AF·Team)¶

2.→ Prof·Katjiua·Mutjinde·(AF·Team)¶

3.→ Ms·Ndinelao·Weyulu·(Staff·member)¶

4.→ Ms·Irene·Mundjele·(Staff·Member)¶

5.→ Ms·Emilia·Thomas·(Staff·Member)¶

Venue·and·Date:·Omahenene·DARD·Board·Room,·27/04/2017¶

Agenda·point¤	Discussion/Action·points¤	Applicability·¤
• → Challenges·of·station·¤	• → Plant·breeding,¶ • → Pest·and·weed¶ • → Soil·health¶ • → Fodder·production·¶ • → Crop·storage¤	• → In·line·with·project·objectives·to·be·addressed·¤
• → Challenges·of·farmers·¤	• → Crop·and·fodder·production·issues,·¶ • → Knowledge·and·skills·transfer·¶ • → Institutional·capacity¤	• → In·line·with·project·objectives·to·be·delivered·¶ • → ¤
• → Slow·update·of·information·¤	• → Farmers·not·reached·by·ow·slow·to·respond·to·new·information,·storage·and·processing·post-harvest.·¤	• → Proposed·Farmer·Training·Academy·to·provide·backstopping,·value·addition·¤

• → 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:·→¶

Annexure 8: Meeting with Omusati Livestock Marketing Cooperative

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

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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.→ Dr·Axel·Rothauge·(AF·Team)¶

2.→ Prof·Katjiua·Mutjinde·(AF·Team)¶

3.→ Mr·Albertus·Jason·(FSP/CLDP·Mentor·and·Chairperson·Omusati·Livestock·Marketing·Cooperative)¶

4.→ 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:·→¶

Annexure 9: Meeting with Otjinene Community Forest

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.→Mr·Ewald·Kaihiva¶

3.→Abednego·Mbazuvara·(Vice·Chairperson)¶

4.→Nelson·Kangootui·(Secretary)¶

5.→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·aftercare·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·have·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:·¶

Annexure 10: Meeting with Otjinene Farmers Association

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

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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.→ Mr·Tjandeka·Putuaota·(Otjiinene·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:·→ ¶

Annexure 11: Meeting with Otjozondjupa Conservancy

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

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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.→ Mr·Aron·Nangolo·(Treasure)¶

3.→ 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:·→¶

Annexure 12: Meeting RWS Chief Control Officer

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

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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.→ Dr·Axel·Rothauge·(AF·Team)¶

2.→ Prof·Katjiua·Mutjinde·(AF·Team)¶

3.→ 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·CuveWaters·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:·→¶

Annexure 13: Meeting with Vizahemi Crop Farmers' Cooperative

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.→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:·¶

Annexure 14: Meeting with Ministry of Youth

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:·→¶

Annexure 15: Meeting with NAFOLA

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.→ 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 16: Endorsement letters Omaheke

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)

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: 10 May 2017 TIME: 09h00 VENUE: Otjinene OFA office

Name	Surname	Affiliation/Institution	Position	Email	Telephone
Mutjinde	KATJIUA	NUST		mkatjiua@gmail.com	0810328248
Ewald	Kaihiva	Community Forestry	-	-	0816685343
Tjandana	PUTUAOTA	OFA	Chairperson		0816575934
ABEDNEGO	MBAZUVARA	Comm forestry	Vice Chair	0813591048	—
Nelson	Kangootui	Otjinene Comm. forestry	Secretary	Kangootuinelson@gmail.com ~~0813193880~~	0813193880

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: 11-05-2017 TIME: 1600h 1700 VENUE: Conservancy Office

Name	Surname	Affiliation/Institution	Position	Email	Telephone
STEFANUS	MARENGA	OTJOMBINDE CONSERVANCY	SENIOR GAME GUARD		081 227 1618
AARON	NANGOLO	OTJOMBINDE CONSERVANCY	TREASURER	OTJOCONSERVANCY@YAHOO.CO.UK	0816967722

Annexure 17: Endorsement letters Omusati

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,

OFFICE OF THE GOVERNOR
OMUSATI REGION
27 APR 2017
Private Bag 523, Outapi
TEL: 065-251019
FAX: 065-251078

Erginus Endjala
Regional Governor

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
LEA

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 18: Endorsement letter Epukiro Constituency Office

Omaheke Regional Council
EPUKIRO CONSTITUENCY OFFICE

Enquiries: Hon. C.V. Kanguatjivi (MP)
Tel: (062) 567224
Fax: (062) 567225
E-mail: c.kanguatjivi@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

Annexure 19: Key informant interviews

Check list of key informant interviews

1. Gender of respondent

2. How would you define the state of play in your community with regard to adaptation? (circle as appropriate)
   - We have an adaptation strategy and have implemented measures
   - We implemented some isolated adaptation measures but no process is underway.
   - We conducted a vulnerability assessment but haven't implemented measures
   - We have initial discussions ongoing on adaptation but no plan
   - Other

3. Do you have *de facto* adaptation activities on your territory that are not yet labelled as climate change adaptation? If yes, please specify
4. What adaptation practices are currently in place to reduce the vulnerability to climate change
5. Has the rangeland condition deteriorated in the past 5 years?
6. What are the rangeland management methods that you have previously used and how effective were they?
7. What should be done differently to increase the productivity of the rangelands?
8. To the best of your knowledge, are climate change awareness campaigns carried out in your community
9. How is climate change information disseminated in your community
10. Have you utilised any kind of advisory or extension service that provides technical farm or livestock input
11. In terms of cropping, how much, in tonnes have you harvested in the previous 5 years – per crop

Minutes for the key informant meetings, 1 September 2017-09-04

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

<u>Ms Elise Haimbondi, Administrative Officer – Omusati Livestock Marketing Cooperative - Female</u>
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.

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

Tel: (00 26461) 284 2111
Fax: (00 26461) 229 936

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

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

12 July 2017

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

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

Dear Sir/Madam

SUBJECT: ENDORSEMENT OF THE FULLY DEVELOPED PROPOSAL 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 am pleased to endorse the project **"Community-based integrated farming systems for climate change adaptation"** having a total funding requirement of USD 4 999 386.

The Namibia University of Science and Technology has developed the project proposal as Executing Entity under the management and guidance of the Desert Research Foundation of Namibia (DRFN) as the accredited NIE for Namibia.

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2017 -07- 14
Office of the
Environmental Commissioner

Sincerely Yours,

Mr. Teofilus Nghitila
Environmental Commissioner

"Stop the poaching of our rhinos"

All official correspondence must be addressed to the Permanent Secretary

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:** *14 July 2017* ***Signature:***

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
2017 -07- 14
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: 7 July 2017	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)

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

#50

REPUBLIEK VAN SUID-AFRIKA

VERDRAGREEKS

No. 1/1969

Ooreenkoms tussen die Regering van die Republiek van Suid-Afrika en die Regering van Portugal met betrekking tot die eerste fase van die ontwikkeling van die waterhulpbronne van die Kunenerivierbekken

Plek en datum van notawisseling: Lissabon, 21 *Januarie* 1969

Datum van inwerkingtreding: 21 *Januarie* 1969

Prys: R7,45 Oorsee: R9,30 Posvry

DIE STAATSDRUKKER, PRETORIA

REPUBLIC OF SOUTH AFRICA

TREATY SERIES

No. 1/1969

Agreement between the Government of the Republic of South Africa and the Government of Portugal in regard to the first phase development of the water resources of the Kunene River Basin

Place and date of exchange of notes: Lisbon, 21 *January* 1969

Date of entry into force: 21 *January* 1969

Price: R7,45 Overseas: R9,30 Post Free

THE GOVERNMENT PRINTER, PRETORIA

LISSABON.

21 Januarie 1969.

U Eksellensie,

Ek het die eer om na U Eksellensie se Nota van vandag te verwys, waarvan die Afrikaanse vertaling soos volg lui:

"Ek het die eer om U Eksellensie daarvan te verwittig dat die Portugese Regering akkoord gaan met die bepalings van die hieronder aangehaalde dokument wat deur die Suid-Afrikaanse en Portugese afvaardigings opgestel is in die loop van die onderhandelings wat van 7 tot 10 Oktober 1968 in Lissabon plaasgevind het.

'OOREENKOMS TUSSEN DIE REGERING VAN DIE REPUBLIEK VAN SUID-AFRIKA EN DIE REGERING VAN PORTUGAL MET BETREKKING TOT DIE EERSTE FASE VAN DIE ONTWIKKELING VAN DIE WATERHULPBRONNE VAN DIE KUNENERIVIERBEKKEN

1. Hierdie Ooreenkoms word aangegaan na aanleiding van–

1.1 die Ooreenkoms tussen die Regering van die Republiek van Suid-Afrika en die Regering van Portugal met betrekking tot riviere van gemeenskaplike belang en die Kunenerivierskema wat in Lissabon onderteken is op 13 Oktober 1964;

1.2 omvattende studies wat uitgevoer is in opdrag van beide Regerings, ooreenkomstig artikel I van genoemde Ooreenkoms van 13 Oktober 1964, asook verskeie samesprekings en onderhandelings op tegniese en diplomatieke vlak betreffende die bes moontlike gesamentlike benutting van die waterhulpbronne van die Kunenerivierbekken kragtens voornoemde artikel;

en die volgende voordele word beoog naamlik–

(a) die regulering van die vloei van die Kunenerivier;

(b) verbeterings in die opwekking van hidro-elektriese krag te Matala;

(c) aanvanklike besproeiing en die voorsiening van water vir die menslike en dierlike verbruik in die Middel-Kunene;

LISBON.

21st January, 1969.

Your Excellency,

I have the honour to refer to Your Excellency's Note of today's date which, when translated into English, reads as follows:

"I have the honour to inform Your Excellency that the Portuguese Government agree with the provisions contained in the document quoted hereunder, as drafted by the South African and Portuguese delegations during the negotiations which took place in Lisbon from the 7th to the 10th October, 1968.

'AGREEMENT BETWEEN THE GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA AND THE GOVERNMENT OF PORTUGAL IN REGARD TO THE FIRST PHASE DEVELOPMENT OF THE WATER RESOURCES OF THE CUNENE RIVER BASIN

1. This Agreement is in pursuance of

1.1 the Agreement between the Government of the Republic of South Africa and the Government of Portugal in regard to rivers of mutual interest and the Cunene River Scheme signed in Lisbon on 13th October, 1964;

1.2 comprehensive studies carried out at the direction of both Governments in accordance with Section I of the said Agreement of 13th October, 1964, as well as various discussions and negotiations at technical and diplomatic levels on the best joint utilisation of the water resources of the Cunene River basin in terms of the said Section;

and is aimed at achieving the following benefits:

(a) the regulation of the flow of the Cunene River;

(b) the improvement of generation of hydro-electric power at Matala;

(c) initial irrigation and the supply of water for human and animal requirements in the middle-Cunene;

(d) die voorsiening van water vir die menslike en dierlike verbruik in Suidwes-Afrika en vir aanvanklike besproeiing in Ovamboland;

(e) die opwekking van hidro-elektriese krag te Ruacana.

2. ALGEMENE ASPEKTE

Die twee Regerings kom soos volg ooreen, naamlik–

2.1 dat die deelstudies wat deur die Suid-Afrikaanse en die Portugese Studiegroepe uitgevoer word, saamgevoeg word om as rigsnoer te dien vir die ontwikkeling van die waterhulpbronne van die Kunenerivierbekken, en dat die optimum posisie, aard, afmetings en doelstellings van iedere komponent, asook die program en die prioriteite wat by die uitvoering daarvan in ag geneem moet word, bepaal word op grond van die tegniese, ekonomiese, sosiologiese en ander belangrike oorwegings wat ter sake blyk te wees wanneer tot 'n beslissing geraak word;

2.2 dat 'n Permanente Gesamentlike Tegniese Kommissie in die lewe geroep word, wat uitsluitlik in 'n raadgewende hoedanigheid optree, om sake betreffende die huidige ooreenkoms te bestudeer en daaroor verslag te doen. Die Kommissie moet bestaan uit 'n gelyke getal lede uit elke land, wat deur hul onderskeie regerings aangestel word. Die regulasies ingevolge waarvan die Kommissie sal funksioneer, is aan albei Regerings se goedkeuring onderworpe.

3. WERKE WAT IN DIE LOOP VAN DIE EERSTE FASE UITGEVOER MOET WORD

Hierby word ooreengekom dat die volgende werke in die loop van die eerste fase van die ontwikkeling van die waterhulpbronne van die Kunenerivierbekken uitgevoer moet word, naamlik–

3.1 om by Gove 'n dam 1590 meter bo die gemiddelde seespieël (Portugese gegewe) te bou om die volle toevoer op te vang, ten einde die Kunenerivier te regularineer;

3.2 om by Calueque 'n dam 1098 meter bo die gemiddelde seespieël (Suid-Afrikaanse gegewe) te bou om die volle toevoer op te vang, ten einde die vloei van die Kunenerivier verder te reguleer ooreenkomstig die behoeftes van die kragsentrale wat te Ruacana gebou gaan word;

(d) the supply of water for human and animal requirements in South West Africa and for initial irrigation in Ovamboland;

(e) the generation of hydro-electric power at Ruacana.

2. GENERAL ASPECTS

The two Governments agree:

2.1 That the part studies carried out by the South African and Portuguese Study Groups taken in conjunction shall serve as a guide for the development of the water resources of the Cunene River basin and that the optimum position, character, dimensions and objectives of each component, as well as the programme and priorities to be observed in their execution, be established on the basis of technical, economic, sociological and other important considerations that shall prove to be relevant at the time a decision is to be made.

2.2 That a Permanent Joint Technical Commission be established, which shall act solely in an advisory capacity, to study and report on matters relating to the present Agreement.

The Commission shall consist of an equal number of members from each country, appointed by the respective Governments. The regulations under which the Commission will operate shall be subject to approval by both Governments.

3. WORKS TO BE EXECUTED IN THE FIRST PHASE

It is herein agreed that the works to be executed in the first phase of the development of the water resources of the Cunene River basin shall be:

3.1 A dam at Gove built to full supply level of 1590 metres above mean sea level (Portuguese datum), for the purpose of regulation of the Cunene River.

3.2 A dam at Calueque built to a full supply level of 1098 metres above mean sea level (South African datum), for the purpose of the further regulation of the flow of the Cunene River in accordance with the requirements of the power station to be built at Ruacana.

3.3 'n skema te Calueque om water uit die Kunenerivier te pomp ten einde water te voorsien vir menslike en dierlike verbruik in Suidwes-Afrika en vir aanvanklike besproeiing in Ovamboland;

3.4 om by Ruacana 'n hidro-elektriese kragsentrale en verwante uitkeringswerke op te rig vir die voorsiening van elektriese krag, vernaamlik aan Suidwes-Afrika.

4. BEPALINGS BETREFFENDE DIE WERKE VAN DIE EERSTE FASE

4.1 Gove-dam

4.1.1 Die volle verantwoordelikheid vir die ontwerp, planne, spesifikasies, tenders, tenderbeoordeling, konstruksie, toesig oor en oorname van die werke, berus by die Portugese owerheid en val binne sy regsbevoegdheid.

4.1.1.1 Die dam moet gebou word ooreenkomstig die planne, tenderdokumente en voorstelle wat reeds aan die Suid-Afrikaanse owerheid voorgelê is.

4.1.1.2 Die finale tenderdokumente en aanbevelings in verband met die tendertoekenning moet aan die Suid-Afrikaanse owerheid voorgelê word, en laasgenoemde onderneem om binne 30 dae ná ontvangs van die betrokke dokumente sy kommentaar daaroor in te dien.

4.1.2 Aangesien dit vir Portugal gebiedend noodsaaklik is om die kragopwekking by Matala te verbeter en om in die Middel-Kunene te begin met besproeiing en watervoorsiening vir menslike en dierlike verbruik, stem die Regering van die Republiek van Suid-Afrika tot die onmiddellike bou van die Gove-dam in.

4.1.3 Die Republiek van Suid-Afrika moet tot die finansiëring van die Gove-dam bydra en wel ten opsigte van komponente wat deel uitmaak van die opgaarreguleringsfunksie; koste wat aangegaan word in verband met die beoogde opwekking van hidro-elektriese krag uitsluitlik in belang van die Portugese Regering, word egter spesifiek uitgesluit. Suid-Afrika se geldelike verpligting ten opsigte hiervan sal hoogstens R8,125,000 bedra. Die helfte hiervan is 'n regstreekse (nie-terugbetaalbare) skenking; die res geld as 'n lening wat oor 'n tydperk van 20 jaar terugbetaal moet word, saam met rente teen 5% per jaar op die uitstaande saldo, jaarliks agternabetaalbaar.

3.3 A scheme at Calueque for pumping water from the Cunene River to supply water for human and animal requirements in South West Africa and initial irrigation in Ovamboland.

3.4 A hydro-electric power station at Ruacana and associated diversion works for the supply of power mainly to South West Africa.

4. PROVISIONS REGARDING THE FIRST PHASE WORKS

4.1 Gove Dam

4.1.1 The design, plans, specifications, tenders, tender adjudication, construction, supervision and taking over of the works, shall be the entire responsibility and within the competence of the Portuguese Authorities.

4.1.1.1 The dam shall be built according to the plans, tender documents and proposals already presented to the South African Authorities.

4.1.1.2 The final tender documents and recommendation for award shall be presented to the South African Authorities, who undertake to furnish their comments within 30 days after receipt of these documents.

4.1.2 On account of the urgent need of Portugal to improve power production at Matala and to initiate irrigation and supply of water for human and animal requirements in the middel-Cunene, the Government of the Republic of South Africa agrees to the immediate construction of Gove dam.

4.1.3 The Republic of South Africa shall participate in the financing of Gove dam in respect of components forming part of the storage regulation function, but specifically excluding costs incurred for intended hydro-power generation purely in the interest of the Portuguese Government. South Africa's financial obligation in terms hereof shall be limited to R8,125,000 one half of which shall be a direct (non-reimbursible) grant, and the balance shall be in the form of a 20-year loan bearing interest at the rate of 5% per annum on the outstanding balance, payable annually in arrear.

4.1.4 Betalings ten opsigte van die Republiek van Suid-Afrika se aandeel in die finansiëring van die komponente wat deel uitmaak van die opgaarregulering, moet geskied ooreenkomstig die bepalings van die kontrakdokumente met betrekking tot die verrigting van die werk, en dié bedrae moet beskikbaar gestel word aan 'n Portugese instansie wat spesiaal vir dié doel deur die Portugese Regering in die lewe geroep word.

4.1.5 Die Portugese owerheid moet te alle tye toegang tot die persele en werke verleen aan 'n spesiaal aangestelde Suid-Afrikaanse waarnemer wat die Suid-Afrikaanse owerheid op hoogte moet hou betreffende die vordering van die werk, sodat die tydsverloop tussen versoeke om betalings deur die Portugese owerheid en Suid-Afrika se tenuitvoerlegging van sodanige versoeke tot 'n minimum beperk kan word.

4.1.6 Met betrekking tot betalings wat ingevolge artikel 4.1.4 deur Suid-Afrika gedoen moet word, word 50% ten opsigte van Suid-Afrika se regstreekse skenking, en 50% ten opsigte van die lening self geag te wees.

4.1.7 Rente op die bedrae wat ooreenkomstig Suid-Afrika se lening voorgeskiet word, word bereken vanaf die datum waarop dié bedrae aan die Portugese instansie in artikel 4.1.4 hierbo vermeld, betaal word. Rente wat oploop voordat die terugbetalings ingevolge artikel 4.1.8 'n aanvang neem, moet gekapitaliseer word.

4.1.8 Die Lening moet afbetaal word in twintig gelyke jaarlikse paaiemente met ingang van die einde van die eerste jaar ná die datum waarop die Portugese owerheid die dam voorwaardelik van die kontrakteur in ontvangs neem. Die datum van voorwaardelike oorhandiging is dié waarop die dam wesentlik voltooi geag kan word. Die datum waarop hierdie paaiemente betaal moet word, kan op versoek van die Portugese owerheid aangepas word by die einde van die Portugese boekjaar wat volg op die einde van die boekjaar waarin die dam voorwaardelik oorgeneem is.

4.1.9 Ondanks Suid-Afrika se geldelike aandeel, berus die eiendomsreg van die werke geheel en al by die Portugese Regering.

4.1.4 Payments in respect of the Republic of South Africa's participation, in the financing of the components forming part of the storage regulation, shall be made in conformity with the requirements of the contract documents covering the execution of the work, and the amounts shall be placed at the disposal of a Portuguese Authority specially set up by the Portuguese Government for that purpose.

4.1.5 The Portuguese Authorities shall grant access at all times to the sites and works to a South African observer specially appointed who shall keep the South African Authorities informed on the progress of the works so that the interval between the request for payments made by the Portuguese Authorities and the implementation by South Africa of such requests may be reduced to a minimum.

4.1.6 With regard to payments to be made by South Africa in terms of Article 4.1.4, 50% shall be regarded as being in respect of South Africa's direct grant and 50% in respect of the loan.

4.1.7 Interest on the amounts advanced in terms of South Africa's loan shall commence to run from the date on which such amounts are paid over to the Portuguese Authority referred to in Article 4.1.4 above.

Interest accruing prior to the commencement of redemption payments in terms of Article 4.1.8 shall be capitalized.

4.1.8 The loan shall be paid off by means of twenty equal annual instalments commencing at the end of the first year after the date on which the Portuguese Authorities shall have taken provisional delivery of the dam from the contractor. The date of provisional delivery shall be the date on which the dam may for all practical purposes be regarded as completed. The date for payment of these instalments may, at the request of the Portuguese Authorities, be adjusted to the end of the Portuguese financial year, following upon the end of the financial year in which the dam shall have been provisionally taken over.

4.1.9 Notwithstanding South Africa's financial participation, ownership of the entire works shall vest in the Portuguese Government.

4.1.10 Die Portugese Owerheid aanvaar volle verantwoordelikheid vir die eksploitasie en onderhoud van die werke, wat binne sy uitsluitlike bevoegdheid val. Alle verpligtings in verband met bogenoemde berus by die Portugese owerheid.

4.1.11 Met die oog op Suid-Afrika se bydrae ter bestryding van die koste van die Gove-dam ooreenkomstig artikel 4.1.3, verbind Portugal hom om nie meer as 50% van die gevolglike gereguleerde vloei van die rivier te onttrek nie; en vir die toepassing van hierdie Ooreenkoms word dit bereken op 80 kubieke meter per sekonde te Ruacana: Met dien verstande dat die grootheid gewysig kan word wanneer die hidrologiese analises waartoe besluit is en waarvan in artikel 5.3 sprake is, beskikbaar raak.

4.1.12 Die Gove-dam moet op so 'n wyse benut word dat 'n gereguleerde vloei ontstaan op 'n berekende basis binne die hidrologie van die Kunenerivier, so ná as moontlik aan die gereguleerde vloei in artikel 4.1.11 vermeld as die hoeveelheid water wat in die dam opgegaar word toelaat. Hierdie benuttingsprosedure moet deur albei partye in hersiening geneem word sodra nog 'n regulerende dam stroom op van Calueque gebou moet word. Vir die toepassing van hierdie artikel kan die Permanente Gesamentlike Tegniese Kommissie geraadpleeg word oor die tegniese prosedures wat gevolg moet word.

4.1.13 Vir die opwekking van elektriese krag mag Portugal vrye gebruik maak van die volle vloei van die rivier stroom op van die stroomopperk van die kom van die Ruacana-uitkeringstuwal.

4.2 Werke te Calueque

4.2.1 Vanweë die humanitêre aard van die skema willig die Regering van die Republiek Portugal in dat daar onmiddellik 'n aanvang gemaak word met die bou en eksploitasie van die uitkeringsprojek, naamlik om water uit die Kunenerivier te pomp vir menslike en dierlike verbruik in Suidwes-Afrika, en vir aanvanklike besproeiing in Ovamboland.

4.2.2 Die hoeveelheid water wat gedurende enige bepaalde week deur middel van die pompskema onttrek mag word, moet beperk bly tot die helfte van die rivier se natuurlike vloei by die onttrekkingspunt gedurende daardie week; met dien verstande dat daar hoogstens 6 kubieke meter per sekonde gepomp mag word.

4.1.10 The operation and maintenance of the works shall be the entire responsibility and within the full competence of the Portuguese Authorities. All charges in connection herewith, shall be for the account of the Portuguese Authorities.

4.1.11 By virtue of South Africa's contribution towards the cost of the Gove dam, in terms of Article 4.1.3, Portugal agrees not to abstract more than 50% of the resulting regulated flow of the river which, for the purpose of this Agreement, shall be taken as 80 cubic metres per second at Ruacana, subject to adjustment when the agreed hydrological analyses referred to in Article 5.3 become available.

4.1.12 Gove dam shall be operated so as to provide a regulated flow on a calculated basis within the hydrology of the Cunene River as close as possible to the regulated flow referred to in Article 4.1.11 as may be compatible with the quantity of water stored in the dam. This operation procedure shall be reviewed by both parties as soon as a further regulating dam is to be constructed upstream of Calueque. For the purpose of this Article, the Permanent Joint Technical Commission may be consulted regarding the technical procedures to be followed.

4.1.13 Portugal may utilize freely, for power production the full flow of the river upstream of the upstream limit of the Ruacana diversion weir basin.

4.2 Works at Calueque

4.2.1 On account of the humanitarian nature of the scheme, the Government of the Republic of Portugal agrees to the immediate construction and operation of the project for the diversion by means of pumping of water from the Cunene River for human and animal requirements in South West Africa and for initial irrigation in Ovamboland.

4.2.2 The quantity of water to be abstracted by means of the pumping scheme during any one week, shall be limited to one half of the natural flow of the river at the point of abstraction during that week, subject to a maximum pumping rate of 6 cubic metres per second.

4.2.3 Die twee Regerings moet later verdere onderhandelings voer aangaande 'n vermeerdering van die hoeveelheid water wat onttrek mag word; dit sal gebeur wanneer die regulering van die rivier so 'n stap regverdig, met inagname van die gunstige gesamentlike benutting van die rivier soos onderling ooreengekom.

4.2.4 Die onttrekking van water moet geskied deur middel van werke soos uiteengesit in dokumente wat reeds deur die Portugese Regering goedgekeur is.

4.2.5 Die pompskema mag alleenlik benut word om water te voorsien vir menslike en dierlike verbruik in Suidwes-Afrika en vir aanvanklike besproeiing in Ovamboland; in dié omstandighede word geen gelde gevorder ten opsigte van die maksimum van 6 Kubieke meter per sekonde vermeld in artikel 4.2.2 nie.

4.2.6 Die bou van die pompskema ooreenkomstig die reeds goedgekeurde planne kan enige ander projek in hierdie Ooreenkoms genoem voorafgaan, dog die volgende algemene bepalings is, indien tersaaklik, op sowel die Calueque-pompskema as die Calueque-dam van toepassing:—

4.2.6.1 Die verantwoordelikheid vir die opstel van die ontwerpe en planne in verband met die projekte, en die bevoegdheid ten opsigte daarvan, berus geheel en al by die Suid-Afrikaanse owerheid. Die planne moet ter oorweging en goedkeuring aan die Portugese owerheid voorgelê word.

4.2.6.2 Die Suid-Afrikaanse owerheid is verantwoordelik vir die opstel van die tenderdokumente.

4.2.6.3 Die tenderdokumente en die kontrakte wat aan die tenderaars toegeken word, is onderworpe aan die Suid-Afrikaanse reg vir sover dit die betrekkinge tussen die Suid-Afrikaanse owerheid en die kontrakteur aanbetref, dog onderwyl die bouwerksaamhede aan die gang is, is die kontrakteurs self onderworpe aan die Portugese reg, sowel siviel as krimineel. Alle geskille wat in verband met die uitvoering van die werk en die verskillende kontrakte tussen die Suid-Afrikaanse owerheid en die kontrakteurs mag ontstaan, moet in die geval van 'n regsgeding in die Suid-Afrikaanse howe besleg word.

4.2.6.4 Die tenderdokumente betreffende werke wat in Angola gebou sal word, moet aan die Portugese owerheid voorgelê word vir goedkeuring en aanpassing by die Portugese reg.

4.2.3 An increase in the quantity of water to be abstracted shall be the subject of further negotiations between the two Governments when the regulation of the river justifies this, and in keeping with the mutually agreed best joint utilization of the river.

4.2.4 The abstraction of water shall be effected by means of works detailed in documents already approved by the Portuguese Government.

4.2.5 The pumping scheme shall be operated solely for the supply of water for human and animal requirements in South West Africa and initial irrigation in Ovamboland, under which conditions no charge shall be raised in respect of the maximum of 6 cubic metres per second, referred to in Article 4.2.2.

4.2.6 Construction of the pumping scheme according to the plans already approved may procede any other project referred to in this Agreement, but the following general provisions shall apply to both the Calueque pumping scheme and the Calueque dam, where applicable.

4.2.6.1 The preparation of the designs and plans for the projects shall be the entire responsibility and within the full competence of the South African Authorities. The plans shall be submitted to the Portuguese Authorities for consideration and approval.

4.2.6.2 The South African Authorities shall be responsible for the preparation of the tender documents.

4.2.6.3 The tender documents, and the contracts awarded to tenderers, shall be subject to South African law insofar as the relationship between the South African Authorities and the contractors is concerned, but Portuguese law, both civil or criminal, shall apply during the course of construction to the contractors themselves. All disputes relating to the execution of the works and respective contracts arising between the South African Authorities and the contractors, shall, in the event of litigation, be resolved in the South African courts.

4.2.6.4 The tender documents in respect of works to be constructed in Angola, shall be sent to the Portuguese Authorities for approval and adaptation to Portuguese law.

4.2.6.5 Die dokumente vermeld in artikel 4.2.6.4 moet, na goedkeuring, aan die Suid-Afrikaanse owerheid teruggestuur word; laasgenoemde moet dan sorg vir die advertensie om namens die Portugese en Suid-Afrikaanse owerhede tenders te vra op 'n internasionale grondslag. Hierdie tenderdokumente moet gelyktydig in Portugal, Suid-Afrika en Suidwes-Afrika in Portugees en Engels uitgegee word.

4.2.6.6 Afskrifte van alle tenders wat ontvang word moet aan die Portugese en Suid-Afrikaanse owerhede afsonderlik voorgelê word.

4.2.6.7 Die twee owerhede moet die dokumente afsonderlik bestudeer, en Suid-Afrika moet sy aanbevelings aan die Portugese owerheid voorlê, wat hom verbind om binne 30 dae na ontvangs van hierdie aanbevelings kommentaar daarop te lewer.

4.2.6.8 Die verantwoordelikheid vir die toekenning van kontrakte berus geheel en al by die Republiek van Suid-Afrika, nadat oorweging geskenk is aan die kommentaar van die Portugese owerheid.

4.2.6.9 Die volle verantwoordelikheid vir die bou berus by die Republiek van Suid-Afrika, wat die totale koste daarvan moet dra.

4.2.6.10 Die werkverrigting kan te alle tye geïnspekteer word deur 'n Portugese verteenwoordiger of verteenwoordigers wat spesiaal vir dié doel deur die Portugese owerheid angestel moet word.

4.2.6.11 Die werke word finaal van die kontrakteur oorgeneem na mededeling deur die Permanente Gesamentlike Tegniese Kommissie dat die werk ooreenkomstig die kontrakdokumente voltooi is.

4.2.6.12 Die Republiek van Suid-Afrika aanvaar volle verantwoordelikheid daarvoor om voorsiening te maak vir skadevergoeding ooreenkomstig die Portugese reg ten opsigte van eise wat in die loop van die oprigting van die werke ontstaan en daaruit voortspruit.

4.2.7 Die Republiek van Suid-Afrika het eiendomsreg slegs op roerende goedere wat deel uitmaak van die werke, met inbegrip van alle masjinerie en ander uitrusting wat verwyder kan word sonder om die vaste eiendom te ruïneer. Alle vaste eiendom, met inbegrip van die oor- en uitlooptoerusting van die Calueque-dam, bly Portugese eiendom.

4.2.6.5 The documents referred to in Article 4.2.6.4 shall, after approval, be returned to the South African Authorities, who shall arrange for the advertisement inviting tenders on an international basis, in the names of the Portuguese and South African Authorities; these tender documents shall be issued simultaneously in the Portuguese and English languages in Portugal, South Africa and South West Africa.

4.2.6.6 Copies of all tenders received shall be submitted separately to the Portuguese Authorities and to the South African Authorities.

4.2.6.7 The two Authorities shall study the documents separately and South Africa shall submit her recommendations to the Portuguese Authorities, who undertake to furnish their comments within 30 days, after receipt of these recommendations.

4.2.6.8 The award of contracts shall be the sole responsibility of the Republic of South Africa, after consideration of the comments of the Portuguese Authorities.

4.2.6.9 The construction shall be the entire responsibility of the Republic of South Africa, who shall bear the entire cost thereof.

4.2.6.10 The execution of the works shall be subject to inspection at all times by a Portuguese representative(s) specially appointed for this purpose by the Portuguese Authorities.

4.2.6.11 The final taking over of the works from the contractor shall be effected after advice from the Permanent Joint Technical Commission that the works have been completed in terms of the contract documents.

4.2.6.12 It shall be the entire responsibility of the Republic of South Africa to provide indemnity in accordance with Portuguese law against claims arising during and due to the construction of the works.

4.2.7 The Republic of South Africa shall have the right to ownership only over moveables incorporated in the works, including all machinery and other equipment which can be removed without destroying the immovable property. All the immovable property including spillway and outlet equipment of the Calueque dam shall remain Portuguese property.

4.2.8 Die Portugese owerheid dra die verantwoordelikheid vir en besit bevoegdheid oor die eksploitasie van die werke, ooreenkomstig die bepalings van artikels 4.2.8.1 tot en met 4.2.8.8. Vir dié doel moet 'n toepaslike instansie in die lewe geroep word, later hierin die "Eksploitasie-owerheid" (Exploracão) genoem.

4.2.8.1 Die Direkteur van die Eksploitasie-owerheid word deur die Portugese Regering aangestel.

4.2.8.2 Ten einde te verseker dat onttrekkings uit die Calueque-dam gekoördineer word met die Ruacana-kragsentrale se aanvraag ten opsigte van kragontwikkeling, word die Calueque-dam deur middel van 'n afstandsbeheerstelsel gekontroleer, wat deur Suid-Afrika vanuit die Ruacana-kragsentrale in werking gestel word. Hierdie afstandsbeheerstelsel dek ook die Calueque-pompskema.

4.2.8.3 'n Duplikaat-kontrolepaneel vir die eksploitasie van die Calueque-werke moet te Calueque ingerig word, ten einde–

(a) dit moontlik te maak om beheer te Calueque uit te oefen na ontvangs van telefoniese opdragte vanaf Ruacana, indien die afstandsbeheerstelsel onklaar sou raak; en

(b) die Eksploitasie-owerheid in staat te stel om oorheersende kontrole uit te oefen indien so 'n stap ingevolge artikel 4.2.8.4 geregverdig sou blyk.

4.2.8.4 Die Eksploitasie-owerheid mag hom nie met die afstandsbeheerstelsel inmeng nie, tensy dit duidelik blyk dat die wyse waarop dit gebruik word strydig is met die uitdruklike voorwaardes in hierdie Ooreenkoms vervat; en in so 'n geval moet die Suid-Afrikaanse owerheid te Ruacana onmiddellik daarvan verwittig word. Die Suid-Afrikaanse owerheid het dan die reg om hom op die "Governador-Geral de Angola" te beroep.

4.2.8.5 Indien die Eksploitasie-owerheid ontevrede is oor die wyse waarop beheer vanuit Ruacana uitgeoefen word, het hy nie die reg om hom in te meng met die stellings wat vir Calueque bepaal is sonder voorafgaande oorlegpleging met en opdrag van die "Governador-Geral de Angola" nie, en laasgenoemde moet binne 'n tydperk van 20 dae 'n beslissing doen.

4.2.8 The operation of the works shall be the responsibility and within the competence of the Portuguese Authorities, in accordance with the provisions of Articles 4.2.8.1 to 4.2.8.8, inclusive.

For this purpose a suitable entity shall be created, hereinafter referred to as "the Operating Authority" (Exploracão).

4.2.8.1 The Director of the Operating Authority shall be appointed by the Portuguese Government.

4.2.8.2 In order to ensure that releases from Calueque dam are coordinated with the call on power demand from Ruacana power station, the operation of the Calueque dam shall be by a remote control system effected by South Africa from the Ruacana power station. This remote control system shall also be extended to the Calueque pumping scheme.

4.2.8.3 A duplicate control panel for the operation of the Calueque works shall be provided at Calueque to enable:

(a) control to be effected at Calueque upon telephonic instructions from Ruacana in the event of failure of the remote control system; and

(b) the Operating Authority to exercise overriding control when justified in terms of Article 4.2.8.4.

4.2.8.4 The Operating Authority shall not interfere with the remote control system, except when this is operated clearly in conflict with the express conditions of this Agreement, in which event the South African Authorities at Ruacana shall be informed immediately. The South African Authorities shall thereupon have the right to appeal to the "Governador-Geral de Angola".

4.2.8.5 If the Operating Authority should be dissatisfied with the manner in which control is exercised from Ruacana, it shall not be entitled to interfere with the settings arranged for Calueque without prior reference to and instruction from the "Governador-Geral de Angola" who shall make a decision within a period of 20 days.

4.2.8.6 Die Republiek van Suid-Afrika moet 'n permanente verteenwoordiger aanstel, wat bekend sal staan as die "Skakelbeampte", en op wie die volgende bepalings van toepassing is:–

(i) Die Skakelbeampte kan òf 'n Portugese òf 'n Suid-Afrikaanse burger wees, en sy aanstelling is onderworpe aan die goedkeuring van die Portugese owerheid.

(ii) Die Skakelbeampte moet self te alle tye toegang tot alle dele van die skema hê. Om hom in staat te stel om sy pligte uit te voer, moet toegang ook verleen word aan sy agente, en ten opsigte van uitrusting, voertuie en materiaal; slegs met dien verstande dat die Eksploitasie-owerheid vooraf in kennis gestel word. Ten einde die perke van die skema vir die doel van toegangverlening te bepaal, is die volgende grensbepalings van toepassing:–

(a) Die oppervlakte van die opgaardam en werksone langs die oewer, asook redelike toegang daartoe vanaf die land;

(b) 'n omheinde of andersins afgebakende gebied waarbinne die dam en oorloopbouwerk, die meetseksie, uitkeringswerke, pompstasie, stygleiding, kanaal tot by die grens tussen Angola en Suidwes-Afrika, toegangspad/paaie, krag- en kommunikasielyne na genoemde grens, wonings, kantore en ander geboue geleë is.

(iii) Die Skakelbeampte moet die Eksploitasie-owerheid periodiek skriftelik, op stelselmatige wyse, en minstens een week vooruit, kennis gee van die hoeveelheid water wat na verwagting aan die Calueque- werke onttrek sal word.

(iv) Die Skakelbeampte moet die werke inspekteer, en hy is daarvoor verantwoordelik om alle nodige stappe te doen in verband met onderhouds- en herstelwerk, vervangings en verbeterings, met die oog op die doeltreffende en ekonomiese eksploitasie van die skema. Die Eksploitasie-owerheid moet vooraf kennis gegee word van die voorneme om sodanige werk uit te voer, en indien sodanige werk enige modifikasie meebring van die skema soos beplan en goedgekeur, moet die Skakelbeampte vooraf die goedkeuring van die Eksploitasie-owerheid verkry.

4.2.8.6 The Republic of South Africa shall appoint a permanent representative, to be known as "the Liaison Officer", to whom the following provisions shall apply–

(i) The Liaison officer shall be either of Portuguese or South African nationality and his appointment shall be subject to the Portuguese Authorities' approval.

(ii) The Liaison Officer himself shall at all times have free access to all parts of the scheme. In order to enable him to carry out his duties, access shall also be granted to his agents and for equipment, vehicles and materials subject only to prior notice being given to the Operating Authority.

For determining the limits of the scheme for the purpose of access, the following boundaries shall apply

(a) The surface of the reservoir and a working zone along the shoreline as well as reasonable access thereto by land.

(b) A fenced-off or otherwise demarcated area in which the dam and spillway structure, gauging section, diversion works, pumping station, rising main, canal to the border between Angola and South West Africa, access road(s), power and communication lines to the said border, housing, offices and other buildings are situated.

(iii) The Liaison Officer shall advise the Operating Authority in writing in a systematic manner, from time to time, and at least one week in advance, of the anticipated water requirements to be drawn from the Calueque works.

(iv) The Liaison Officer shall inspect the works and shall be responsible for and take all necessary steps to effect maintenance, repairs, renewals and betterments with a view to the efficient and economic operation of the scheme. The Operating Authority shall be given previous notice of the intention to carry out such work, and in the event of the latter involving any modification to the scheme as planned and approved, the Liaison Officer shall obtain the Operating Authority's prior approval.

(v) Die Skakelbeampte moet rekenings sertifiseer alvorens hulle deur die Eksploitasie owerheid vereffen word.

4.2.8.7 Die Eksploitasie-owerheid moet meteraflesings en metings doen en aantekening hou van die riviervloei en gelewerde water.

4.2.8.8 Die werklike eksploitasiekoste en die koste in verband met die pligte wat ingevolge artikel 4.2.8.6 (iv) verrig word, moet deur die Suid-Afrikaanse owerheid gedra word. Die Eksploitasie-owerheid moet sy personeel- en bykomstige behoeftes aangee en 'n jaarlikse uitgawebegroting opstel, wat aan die Suid-Afrikaanse owerheid om goedkeuring voorgelê moet word nadat dit deur die Skakelbeampte oorweeg is. Die Eksploitasie-owerheid moet ook kwartaalstate van werklike uitgawes deur bemiddelling van die Skakelbeampte indien.

4.2.9 Die oorloopsluise van die Calueque-dam moet so ontwerp wees dat oorskryding van die 1098-meterpeil vermeld in artikel 3.2 by die damwal tydens normale vloeitoestande voorkom kan word.

4.2.10 Na ondertekening van die kontrak vir die bou van die Calueque-dam, moet die Regering van die Republiek van Suid-Afrika aan die Regering van Portugal 'n bedrag van R220,000 betaal as vergoeding vir die grond wat deur die werke beslaan word en vir die oorstroming van ongeveer 18,000 hektare grond as gevolg van die bou van die dam om die volle toevoer tot 1098 meter op te vang. Die Portugese Regering verbind hom om na ontvangs van hierdie vergoeding aan die Suid-Afrikaanse owerheid die reg te verleen om met die bouwerk te begin, sonder dat die vordering daarvan vertraag word omrede daar nie besit geneem kan word nie, soos hierbo uiteengesit.

4.3 Hidro-elektriese kragsentrale en uitkeringswerke te Ruacana

4.3.1 Die kragsentrale en die verskillende uitkeringswerke is geheel en al Suid-Afrikaanse ondernemings, behoudens—ten opsigte van werke op Portugese grondgebied—die bepalings van artikels 4.2.6.1, 4.2.6.10, 4.2.6.12 en 4.2.7 van hierdie Ooreenkoms.

(v) The Liaison Officer shall be responsible for certifying accounts before payment is effected by the Operating Authority.

4.2.8.7 The Operating Authority shall take meter reading and gaugings and shall keep records of river flow and of the water delivered.

4.2.8.8 The actual cost of operating and of the duties performed in terms of Article 4.2.8.6 (iv) shall be borne by the South African Authorities. The Operating Authority shall indicate its personnel and ancillary requirements and prepare an annual budget of its expenses which shall be submitted for approval by the South African authorities after consideration by the Liaison Officer. The Operating Authority shall also submit quarterly statements of actual expenditure through the Liaison Officer.

4.2.9 The spillway gates of the Calueque dam shall be so designed as to prevent the 1098 metre level mentioned in Article 3.2 being exceeded at the dam wall under normal flood conditions.

4.2.10 After the signing of the contract for the construction of Calueque dam the Government of the Republic of South Africa shall pay to the Government of Portugal an amount of R220,000 as compensation for the ground occupied by the works and for the flooding of approximately 18,000 hectares of ground resulting from the construction of the dam to a full supply level of 1098 metres.

The Portuguese Government undertakes that on receipt of the compensation, the South African Authorities shall be entitled to commence construction operations without its progress being delayed as a result of not being able to obtain occupation as aforementioned.

4.3 Ruacana hydro-electric power station and diversion works

4.3.1 The Ruacana power station and respective diversion works shall be entirely South African undertakings, subject—in respect of works on Portuguese territory—to the provisions of Articles 4.2.6.1, 4.2.6.10, 4.2.6.12 and 4.2.7 of this Agreement.

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4.3.2 Die Suid-Afrikaanse owerheid aanvaar volle verantwoordelikheid vir die bou, eksploitasie en onderhoud van die werke. Alle koste in verband daarmee kom die Suid-Afrikaanse owerheid ten laste.

4.3.3 Ten einde die perke van die skema te bepaal met die oog op toegang tot Portugese gebied vir eksploitasie- en onderhoudswerk, is die volgende grensbepalings van toepassing:—

(a) Die oppervlakte van die uitkeringsreservoir en 'n werksone langs die oewer, asook redelike toegang daartoe van die land af.

(b) 'n Omheinde of andersins afgebakende gebied waarbinne die uitkeringstuwal, die oorloop- en toevoerbouwerke, die kragkanaal en/of -tonnels, die toegangspad/paaie en krag- en kommunikasielyne na die grens tussen Angola en Suidwes-Afrika geleë is.

4.3.4 Vir die doel van kragopwekking het die Suid-Afrikaanse owerheid die uitsluitlike gebruik *in perpetuum* van die vloei van die rivier soos gereguleer deur die damme van die eerste fase, vanaf die stroomopperk van die kom van die Ruacana-uitkeringstuwal tot onderkant die Ruacana-kragwaterval.

4.3.5 Die Suid-Afrikaanse owerheid geniet die kostelose gebruik van dié grond op Portugese gebied te Ruacana wat nodig is vir die bou van die uitkeringswerke en reguleringskom en wat daardeur in beslag geneem gaan word.

5. SPESIALE BEPALINGS

5.1 Die bepalings van die Ooreenkoms van 13 Oktober 1964 met betrekking tot die aanlê van die kraglyne van Matala tot by die grens tussen Angola en Suidwes-Afrika en die aanbring van 'n derde turbo-generator te Matala, word herroep; met dien verstande dat dit nie toekomstige onderhandelings belet nie indien beide partye daarvoor te vinde is.

5.2 Die Republiek van Suid-Afrika moet aan Portugal vrugreg betaal ten opsigte van krag wat te Ruacana opgewek word. Die bedrag van die vrugreg en die toepassing daarvan is aan ondervermelde voorwaardes onderworpe:—

4.3.2 The South African Authorities shall be entirely responsible for the construction, operation and maintenance of the works. All costs in connection therewith shall be borne by the South African Authorities.

4.3.3 For determining the limits of the scheme for the purpose of access to Portuguese territory for operation and maintenance, the following boundaries shall apply:

(a) the surface of the diversion reservoir and a working zone along the shoreline as well as reasonable access thereto by land.

(b) a fenced-off or otherwise demarcated area in which the diversion weir, the spillway and intake structures, the power canal and/or tunnels, the access road(s) and power and communication lines leading to the border between Angola and South West Africa are situated.

4.3.4 The South African Authorities, shall for the production of power, have the exclusive use in perpetuity of the flow of the river regulated by the dams of the first phase, from the upstream limit of the Ruacana diversion weir basin to below the Ruacana power fall.

4.3.5 The South African Authority may use, free of charge, the ground on Portuguese territory at Ruacana to be occupied by and required for the construction of the diversion works and regulating basin.

5. SPECIAL PROVISIONS

5.1 The provisions of the Agreement of 13th October, 1964, referring to the construction of the power lines from Matala to the border between Angola and South West Africa and to the installation of a third turbo-generator at Matala, are revoked, provided that this shall not preclude future negotiations, should both parties be interested therein.

5.2 The Republic of South Africa shall pay a royalty to Portugal in respect of power generated at Ruacana. The royalty rate and its application shall be in accordance with the conditions stated below:

5.2.1 Die bedrag van die vrugreg word gebaseer op 'n vooruitberekening van die kragopwekking by Ruacana, volgens ramings van die Suid-Afrikaanse owerheid, wat daarop gemik is om oor 'n tydperk van twintig jaar 'n totale inkomste te verskaf, gelyk aan die twintig gelyke jaarlikse betalings ten opsigte van delging en rente wat deur Portugal gedoen moet word met betrekking tot die lening aan laasgenoemde vir die Gove-dam.

Hierdie berekening word gebaseer op die helfte van die vloei te Ruacana soos deur Gove gereguleer, asof geen water aan hierdie vloei stroom op van Ruacana deur die Portugese Owerheid onttrek was nie. Die vrugreg moet met tussenpose van vyf jaar hersien word, en vir die toepassing van hierdie Ooreenkoms word die aanvanklike tarief wat toegepas moet word ten opsigte van die eerste vyf jaar nadat die kommersiële eksploitasie van die Ruacana- kragsentrale 'n aanvang geneem het, geag 0.11 sent van 'n rand te wees vir elke kilowattuur wat opgewek word.

5.2.2 Die vrugreg is van toepassing op dié gedeelte van die krag wat te Ruacana opgewek word en gelykstaande is met die verhouding tussen die helfte van die vloei, deur die Gove-dam gereguleer en te Ruacana gewaarborg, en die vloei te Ruacana, deur die Gove- en die Calueque-dam gesamentlik gereguleer. Hierdie verhouding moet periodiek aangepas word, nadat rekening gehou is met onttrekkings van water vir verbruik deur albei lande. Vir die toepassing van hierdie Ooreenkoms word 'n aanvanklike verhouding van 40:100 aanvaar. Hierdie verhouding moet ook gewysig word wanneer daar ooreengekom word oor die resultate van die hidrologiese studies in artikel 5.3 vermeld.

5.2.3 Nadat die lening ten opsigte van die Gove-dam ten volle afbetaal is, moet die vrugreg vasgepen word op 0.05c van 'n rand per kilowattuur wat te Ruacana opgewek word, en moet dié verhouding toegepas word wat dan ingevolge artikel 5.2.2 geld.

5.3 Wanneer die eksploitasie van die werke 'n aanvang neem, en daarna met dié tussenpose waaroor ooreengekom word, moet die Permanente Gesamentlike Tegniese Kommissie die hidrologiese studies wat deur albei lande onderneem is vir dié doeleindes soos in artikels 4.1.11, 4.1.12 en 5.2.2 hiervan uiteengesit, in hersiening neem.

5.4 Die Portugese Regering moet die nodige stappe doen om te verseker dat vrystelling van doeane- en soortgelyke regte verleen word ten opsigte van alle goedere bestem vir die bou, eksploitasie en onderhoud van die werke wat te Ruacana en Calueque kragtens hierdie Ooreenkoms op Portugese gebied gebou sal word.

5.2.1 The royalty rate shall be based on a forecast of power generation at Ruacana, estimated by the South African Authorities, calculated to provide a total income over a period of twenty years equal to the sum of the twenty equal annual payments for redemption and interest to be made by Portugal in respect of the loan to Portugal for Gove dam.

This calculation shall be based on one half of the flow at Ruacana regulated by Gove, as if no abstraction of water shall have been made from this flow upstream of Ruacana by the Portuguese Authorities. The royalty rate shall be revised at intervals of five years and for purposes of this Agreement, the initial rate to be used for the first five years after the start of commercial operation of Ruacana power station shall be assumed to be 0.11 cents of a Rand per kilowatt-hour generated.

5.2.2 The royalty rate shall be applied to that part of the power generated at Ruacana which corresponds to the ratio between one half of the flow, regulated by Gove dam and guaranteed at Ruacana, and the flow at Ruacana regulated by Gove and Calueque dams combined: This ratio shall be adjusted, from time to time, after allowance shall have been made for abstractions of water for consumptive use by both countries. For the purpose of this Agreement an initial ratio of 40:100 shall be accepted. This ratio shall also be adjusted when agreement is reached on the results of the hydrological studies referred to in Article 5.3.

5.2.3 After the loan in respect of Gove shall have been fully redeemed, the royalty rate shall be fixed at 0.05c of a Rand per kilowatthour generated at Ruacana, applying the ratio then applicable in terms of Article 5.2.2.

5.3 At the commencement of the operation of the works, and thereafter at such intervals as may be agreed upon, the Permanent Joint Technical Commission shall revise the hydrological studies carried out by both countries for the purposes set out in Articles 4.1.11, 4.1.12 and 5.2.2 hereof.

5.4 The Portuguese Government shall take the necessary steps to ensure the granting of exemption from the payment of customs duties and similar dues in respect of all goods intended for the construction, operation and maintenance of the works to be constructed in Portuguese territory at Ruacana and Calueque in pursuance of this Agreement.

AGREEMENT BETWEEN THE GOVERNMENT OF THE REPUBLIC OF NAMIBIA

AND THE GOVERNMENT OF THE PEOPLE'S REPUBLIC OF ANGOLA

IN REGARD TO THE DEVELOPMENT AND UTILIZATION OF THE WATER

POTENTIAL OF THE KUNENE RIVER

RECOGNISING that the Governments of Portugal and the Republic of South Africa at various times since 1926 entered into agreements for the development of Rivers of Mutual Interest, specifically the AGREEMENT BETWEEN THE GOVERNMENT OF THE UNION OF SOUTH AFRICA AND THE GOVERNMENT OF THE REPUBLIC PORTUGAL REGULATING THE USE OF THE WATER OF KUNENE RIVER FOR THE PURPOSES OF GENERATING POWER AND INUNDATION AND IRRIGATION IN THE MANDATED TERRITORY OF SOUTH WEST AFRICA " of 1 July 1926, and the AGREEMENT BETWEEN THE GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA, AND THE GOVERNMENT OF THE REPUBLIC OF PORTUGAL IN REGARD TO RIVERS OF MUTUAL INTEREST AND THE CUNENE RIVER SCHEME" of 13 October 1964;

RECALLING also the " AGREEMENT BETWEEN THE GOVERNMENT OF THE REPUBLIC SOUTH AFRICA AND THE GOVERNMENT OF THE REPUBLIC OF THE PORTUGAL IN REGARD TO THE FIRST PHASE DEVELOPMENT OF THE WATER RESOURCES OF THE CUNENE RIVER BASIN" executed on 21 January 1969; and

CONSCIOUS that Angola and Namibia have since become sovereign states.

NOW THEREFORE:

The Governments of the Republic of Namibia and the People's Republic of Angola, recognising the need, for the mutual .benefit of the peoples of Angola and Namibia to consolidate by means of a new agreement the arrangements for the -development and utilization of the waters of the Cunene River, as envisaged in the Agreement between the Government of the Republic of Portugal dated 21 January 1969, hereby affirm and endorse the terms of the Agreements between the Governments of Portugal and the Republic (formerly the Union) of South Africa of 1 July 1926, 13 October 1964 and 21 January 1969, (herein after collectivelly referred to as " this said agreement")

- Conscious that the first phase of the developments as envisaged in the Agreement of 21 January 1969 has already been partially completed;

Recognising that the works so completed could not as yet be utilized to its best economic potential;

- Noting that neither party has to date been able to derive its equitable economic benefit;

- Mindful of the fact that both parties are anxious to promote the development of the region and encourage a spirit of good neighbourliness between their peoples;

- Conscious of the changed circumstances which necessitated amplification and amendment of, and additions to certain articles of the said Agreement, which are no longer appropriate or applicable in their original form, in particular Article 4.2.8 of the Agreement of 21 January 1969 in respect of the Operating Authority therein defined; and

- Realising that Namibia will become increasingly dependent upon the Republic of South Africa for its power requirements at continuously increasing costs;

The Parties hereto agree:

1. To establish a Joint Operating Authority (as referred to in Article 4.2.8 of the said 1969 Agreement) to ensure:

a) The maximum beneficial regulation of water flow at Gove required for optimum power generation at Ruacana and to control the abstraction of water along the middle Kunene and

b) To ensure the continuous operation and adequate maintenance of the water pumping works at Calueque and the diversion weir at Ruacana.

2. To allow the Permanent Joint Technical Commission (established in terms of Article 2.2 of the said 1969 Agreement) to evaluate the development of further schemes on the Kunene River in order to accommodate the present and the future needs for electricity in both countries.

3. This Agreement shall take effect on the date of execution thereof by representatives of the two Governments.

Thus done and signed at Lubango, People´s Republic of Angola, on this eighteenth day of September nineteen hundred and ninety, in two original copies in English and Portuguese languages, both texts being equally authentic.

FOR THE GOVERNMENT OF THE REPUBLIC OF NAMIBIA

HON. H. HAMUTENYA
MINISTER OF INFORMATION
AND BROADCASTING

FOR THE GOVERNMENT OF THE PEOPLE´S REPUBLIC OF ANGOLA

ANTONIO PAULO CASSOMA
MINISTRO DOS TRANSPORTES
E COMUNICACOES