Environmental Impact Assessment (EIA) for Harvesting and Management of Prosopis for pilot areas in the Orange-Fish River Basin: /Ai -/Ais National //Kharas Regions, Namibia

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Acronyms

ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act 2017 (Act No. 7 of 2007)
EMP	Environmental Management Plan
GEF	Global Environmental Facility
HA	Hectares
IWRMP	Integrated Water Resource Management
MAWLR	Ministry of Agriculture Water and Land Reform
MEFT	Ministry of Environment Forestry and Tourism
NAPs	National Action Plans
ORASECOM	Orange- Senqu River Commission
RDC	Red-Dune Consulting
SADC	Southern Africa Development Community
SAP	Strategic Action Programme
TDA	Transboundary Diagnostic Analysis
UNDP	United Nation Development Programme

Executive Summary

The Proponent

The Ministry of Environment Forestry and Tourism (MEFT) is the proponent through the support by the Orange- Senqu River Commission (ORASECOM) secretariat. ORASECOM was established by the governments of Botswana, Lesotho, Namibia, and South Africa to promote equitable and sustainable development and management of the resources of the Orange–Senqu River.

Background

ORASECOM is implementing a project titled, "Support to the Orange-Senqu River Strategic Action Programme (SAP) Implementation", the project is supported by United Nation Development Programme (UNDP) and funded by the Global Environmental Facility (GEF).

In Namibia, this project is supporting the Government through the Ministry of Environment Forestry and Tourism (MEFT) to tackle issues of land degradation through the sustainable management of alien invasive species, the Prosopis. This support is targeted to clearing Prosopis and revegetating cleared sites with indigenous species at four (4) demonstration areas of /Ai-/Ais National Park and Dreihuk in //Kharas region as well as at Gibeon and Mariental in Hardap Region in the Orange-Fish River Basin. *This report is made for the /Ai-/Ais National Park pilot area.*

Project approach

This project will be undertaken through a three (3) phase approach; (i) Clearing of Prosopis and, (ii) Revegetation of cleared pilot area with indigenous / local trees and, (iii) Managing the regrowth of Prosopis. The project will use a range of methods which includes.

- Mechanical methods – chopping and removing Prosopis (Mainly manual and semi-mechanised methods)
- Chemical methods – using approved and environmentally safe herbicides to control regrowth.
- Biological control – Introducing Prosopis beetles to control seed production.

- Integrated control - combinations of the above three approaches which is often required to prevent enormous impacts.

The project will result in creation of secondary industries such as wood chips, charcoal production, animal fodder and potential compost from leaves which is expected to create employment opportunities to the local communities.

Socio-Environmental Impacts Identified

Overall, the project aims at controlling and eradication of prosopis which is known to cause land degradation in the Orange Rive Basin. In terms of biodiversity, the project aims to restore local plant diversity whose space was evaded by Prosopis. The spill over effect is the creation of jobs through secondary industry.

Potential negative impacts such as habitat destruction of wildlife and cattle grazing were negligible. Other impacts such as potential oil spill from vehicle / machinery to be involved, soil disturbances / pollution were analysed and, with adequate implementation of the SEMP, their impacts were found to negligible.

Conclusions

The proposed clearing and harvesting of Prosopis is within the scope of the Namibian laws and efforts to preserve biodiversity and promotion of sustainable ecological processes. Article 95(l) of the country Constitution call for *"The State to actively promote and maintain the welfare of the people by adopting policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future"*… the NBSAP Strategic Initiative calls for *"the development of mechanisms and measures to prevent the establishment and introduction of alien invasive species and to control or eradicate existing alien invasive species*" the guidelines for complying with regulations governing bush thinning in Namibia and value 2017, recommends that "*all Prosopis Plant **MUST** be eradicated completely even in water course where it is NOT recommended to thin other encroacher species due to possible soil erosion and riverbank stability"*.

The strategic keyword in dealing with Prosopis is *"complete eradication".* The project does not pose major threat to the environment. In the end, the project in line with solving the challenge of Prosopis invasion, to restore land productivity, restore plant diversity, enhance ground water, and smooth river flows.

Recommendations

The following recommendations are made.

- Issuance of Environmental Clearance Certificate
- Develop a Clearing and Harvesting Manual / Guideline
- Undertake Feasibility Study For Secondary Industries
- Develop a ground water monitoring system
- Develop Prosopis Management Plan For Water Basins
- Create partnership with high energy consumers.

1. Introduction

1.1. The Proponent

The Orange- Senqu River Commission (ORASECOM) was established by the governments of Botswana, Lesotho, Namibia, and South Africa to promote equitable and sustainable development and management of the resources of the Orange–Senqu River. This joint commitment was sealed through an Agreement on the Establishment of the Orange–Senqu River Commission signed in November 2000 in Windhoek, which conforms with best international practices regarding the joint management of shared rivers.

The highest body of ORASECOM is the Council, consisting of delegations from each country, supported by various 'Task Teams' that manage projects, and a Secretariat. The Council serves as technical advisor to the member states on matters related to development, utilisation and conservation of water resources of the Orange–Senqu River system. The Secretariat, established by agreement with South Africa in 2006 and hosted there, coordinates ORASECOM activities, implements ORASECOM decisions and is the focal point of the institution (ORASECOM, 2014.)

1.2. The Orange River Basin

The Orange-Senqu River originates in the Lesotho Highlands from where it flows westwards about 2,300 km to its mouth at Oranjemund on the Atlantic West Coast (Fig 1). The river basin is the third largest in Southern Africa, after the Zambezi and the Congo, covering a total area of one million square kilometres of which almost 600,000 km^2 is inside the Republic of South Africa (ORASECOM 2007).

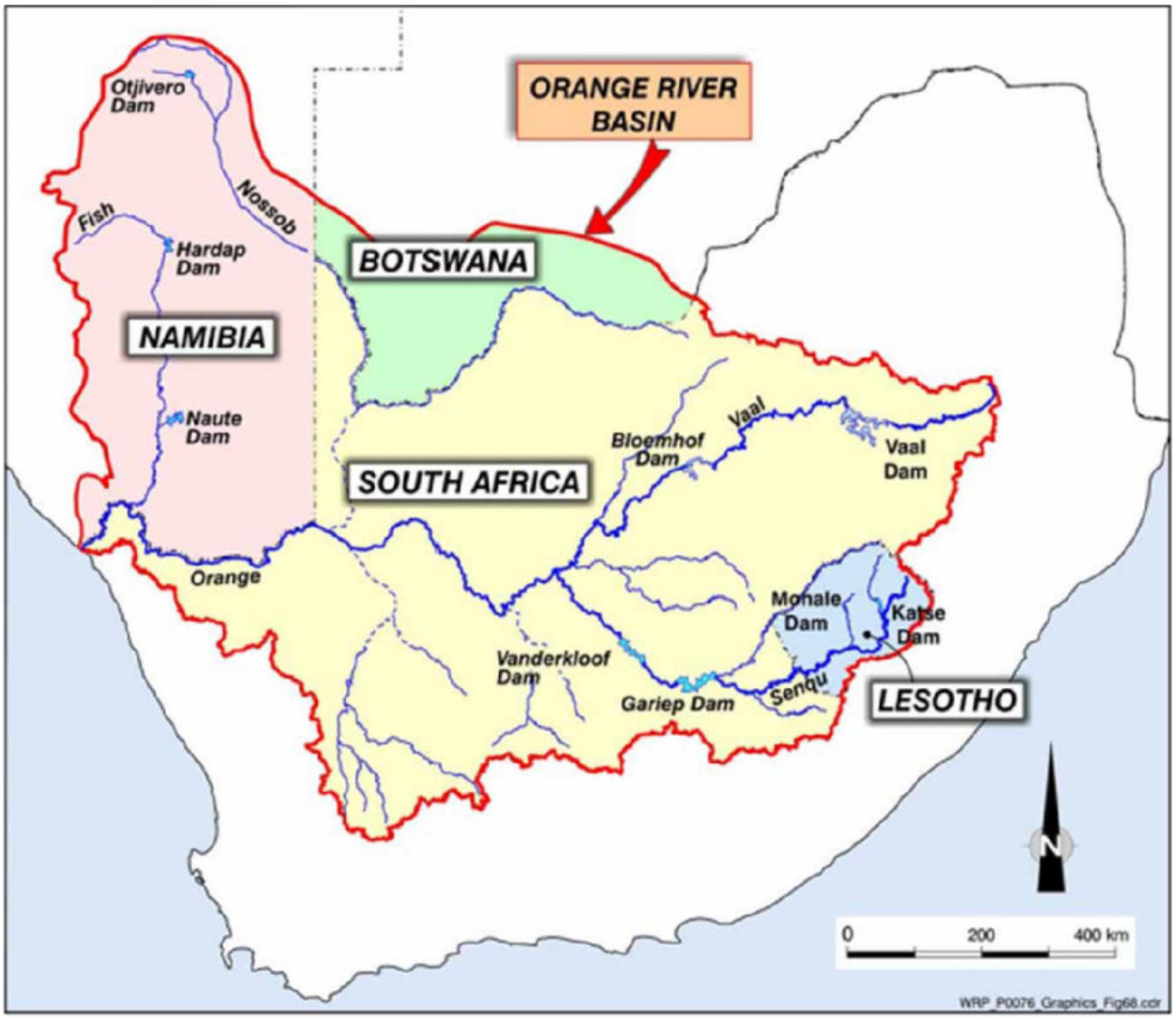

Figure 1. Orange River Basin (ORASECOM., 2007)

1.3. The Orange Fish River Basin

The Fish River in Namibia forms part of the Orange basin tributaries. The tributary has its headwaters on the Rehoboth Plateau south-central Namibia and flows several hundreds of kilometres to meet the Orange river about 30 km south-west of /Ai-/Ais National Park between Aussenkehr and Sendelingsdrift (Fig 2).

Figure 2. The Confluence area of Fish River and Orange River

The Orange Fish River Basin (OFRB) is amongst the defined basin management areas in Namibia, made up of tributaries that drain directly into it and those that drains into the Orange River and covers an area of 120,000 km^2 (Fig 3) (John Irish., 2008).

Figure 3. Orange-Fish River Basin (John Irish., 2008)

1.4. ORASECOM Project

ORASECOM is implementing a project titled, "Support to the Orange-Senqu River Strategic Action Programme (SAP) Implementation", the project is supported by United Nation Development Programme (UNDP) and funded by the Global Environmental Facility (GEF).

The overall objective of the SAP Implementation project is the strengthening of joint management capacity for implementation of the basin-wide Integrated Water Resource Management (IWRM) Plan and demonstrating environmental and socioeconomic benefits of ecosystem-based approach to water resources management through the implementation of SAP priority actions in the Orange-Senqu River basin.

1.4.1. Prosopis Management

In Namibia, ORASECOM through the above-mentioned project, is supporting the Government through the Ministry of Environment Forestry and Tourism (MEFT) to tackle issues of land degradation through the sustainable management of alien invasive species, the Prosopis. This support is targeted to clearing Prosopis and revegetating cleared sites with indigenous species at four (4) demonstration areas of /Ai-/Ais National Park and Dreihuk in //Kharas region as well as at Gibeon and Mariental in Hardap Region in the Orange-Fish River Basin. This report is made for the Ai -/Ais National Park pilot areas.

1.5. Statutory Requirements

1.5.1. Environmental Management Act 2007 (Act No. 7 of 2007)

Environmental Management Act 2007 (Act No. 7 of 2007) (EMA) has listed the clearing of forest areas, deforestation, aforestation, timber harvesting or any other related activity that requires authorisation in term of the Forest Act, 2001 (Act No. 12 of 2001) or any other law as listed activities that may not be undertaken without Environmental Clearance Certificate (ECC). Thus it is imperative for the project to obtain an ECC before its implementation.

The Ministry of Environment Forestry and Tourism is responsible for the implementation of EMA. The application of the ECC will be made to this Ministry through the Department of Environmental Affairs.

1.5.2. Forest Act, 2001 (Act No. 12 of 2001)

The Forest Act 2001 (Act No. 12 of 2001) regulates the clearing of forest areas, deforestation, aforestation, timber harvesting or any other related activity that requires authorisation in term of this act. This act obliges anyone to obtain a harvesting permit when harvesting of trees and wood or clearing and harvesting of trees at an area of 15 ha per annum. The act further stipulates that a person is not authorised to transport, sell, market, transit, and export forest produce without a valid licence or permit for transport, marketing, transit, export of harvested trees / forest produce. During the implementation phase of clearing of Prosopis, persons / company involved will thus be required to obtain all relevant permits.

Applications of these permits and licences will be made to the Department of Forestry under MEFT and it is also this department that will oversee the Revegetation / Reforestation component of the project.

To fulfil the above statutory requirements, Red-Dune Consulting cc (RDC) was appointed to undertake an Environmental Impact Assessment (EIA) and Develop Environmental Management Plan (EMP) for Harvesting and Management of Prosopis at two (2) pilot areas of /Ai -/Ais National Park and Dreihuk, in //Kharas Regions.

1.6. The Need and Desirability of The Project

The ORASECOM National Action Plan (NAP) for Namibia, through the Transboundary Diagnostic Analysis (TDA) process identified amongst others land degradation as priority problem leading to the decline in ecosystem health and functioning of aquatic ecosystems in the basin. Besides unsustainable agriculture practises, Prosopis trees are identified as major contributing factors leading to land degradation, biodiversity loss and high consumption of ground water (ORASECOM SAP 2014, ORASECOM Namibia NAPs 2014). The SAP objective for addressing the priority problem of land degradation amongst other is to develop and implement local-level monitoring systems for rangeland conditions including **eradication of Prosopis**. Thus, this project is desirable to address issues of land degradation, restoration of local/indigenous biodiversity and improvement of ground water resource in the basin.

1.7. Terms of Reference

The scope of this EIA is guided by the Terms of References as provided for by the EIA Regulation 2012, Section 9 (a-b) but, not limited to the following;

- Provide a comprehensive description of the proposed Project.
- Identify relevant legislation and guidelines for the project.
- Identify potential environmental (physical, biological, and social) conditions of the project location and conduct risk assessment.
- Inform Interested and Affected Parties (I&APs) and relevant authorities about the proposed project to enable their participation and contribution.
- Develop an Environmental Management (EMP) that would be a legal guideline for the environmental protection by the project.

1.8. Scope of the EIA

The Namibia EIA process is explained in the EIA regulation 2012, GRN Gazette No. 4878. The process is summarised in figure 4 below.

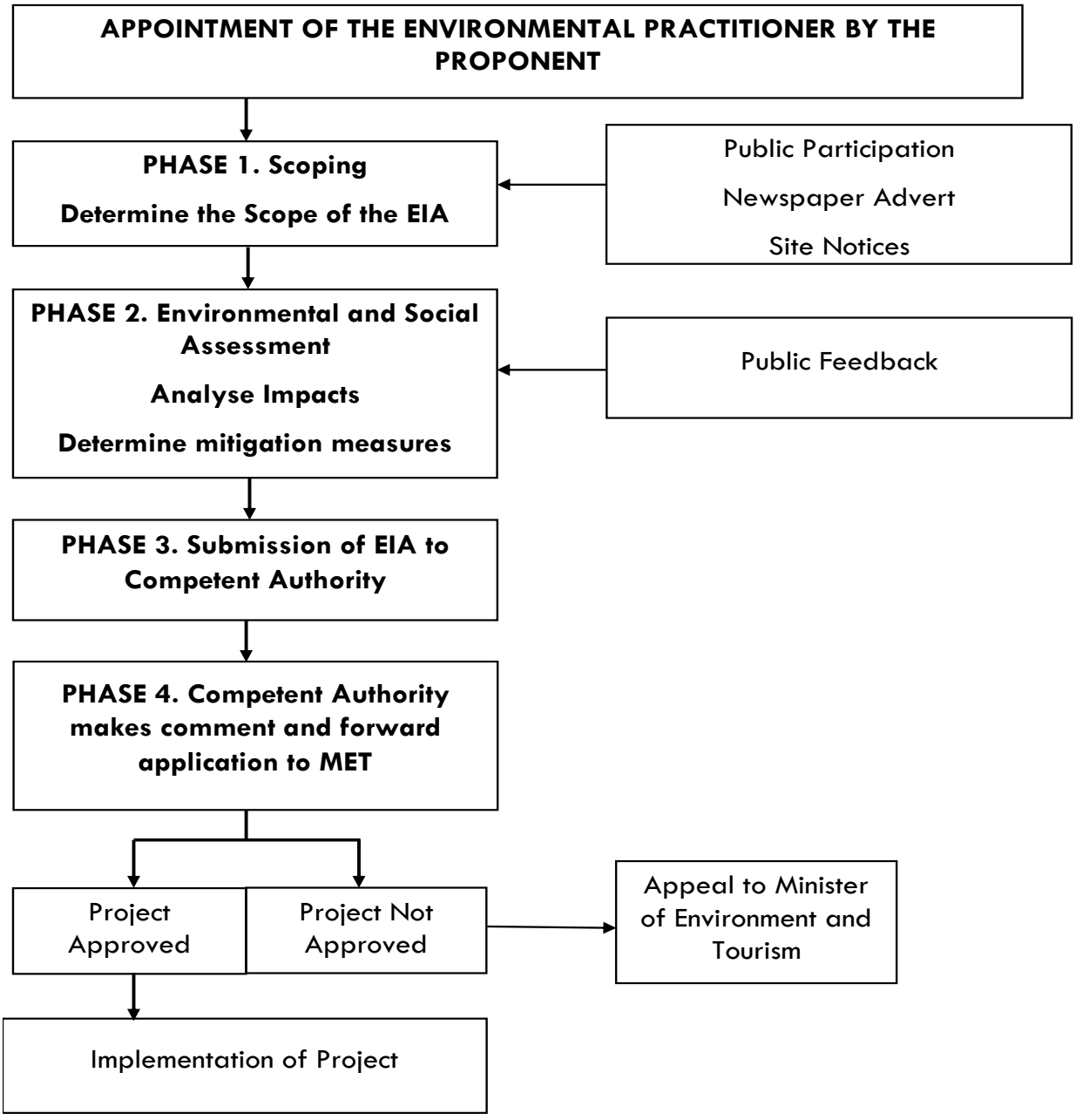

Figure 4. The EIA process in Namibia

2. Project Description and Approach

2.1. Location

The pilot area for this study is located at /Ai -/Ais Hot Spring Game Park, (-28.284851, 17.375342) (Fig 2). The pilot site is approximately 73 km of Orange River frontage from the Gamkab River confluence (and eastern border of the /Ai-/Ais Park) to Sendlingsdrift (western border of the park (Fig 5).

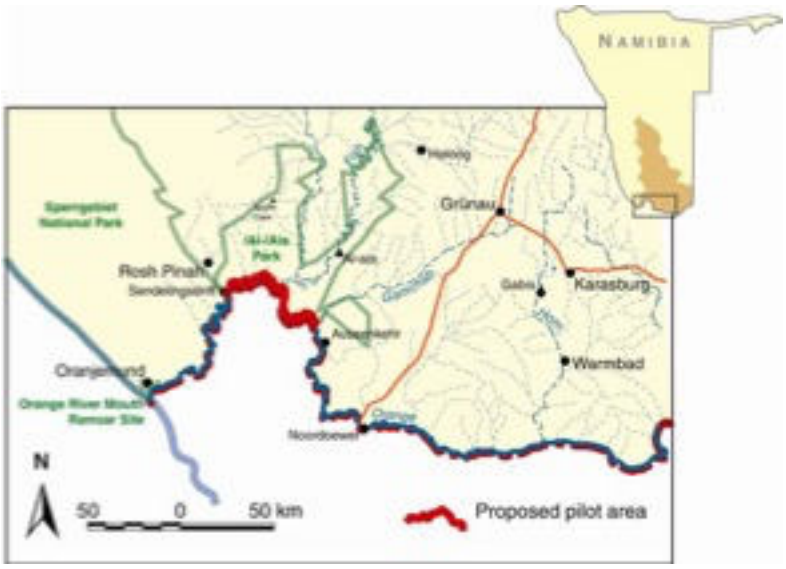

Figure 5. Pilot area for Proposis clearing (Source: ORASECOM)

The park derived its name from a local Nama language which means “burning” water referring to the hot springs in the park (MEFT, 2013). Proclaimed in 1968, it has a size of 4,611km^2 and dominated by the Fish River Canyon, the second largest in the world. It borders directly the Richtersveld National Park in South Africa whereby in 2003, a treaty was signed between Namibia and South Africa, creating the /Ai-/Ais-Richtersveld Transfrontier Park (ARTFP). The park contains some hidden treasures such as the Apollo 11 rock shelter / cave which is known to be the oldest rock painting in southern Africa estimated to be around 26 000 BP (MEFT, Lewis-Williams 1997, 7; Thackeray 2005, 27).

2.2. Background of Prosopis Invasion

Prosopis is an alien and highly an invasive plant that was introduced to Southern Africa as animal fodder in the 1930s (Le Maitre, 1999; Poynton, 2009; Wise *et al,* 2012). While in Namibia, it was introduced in the 1970s (Smit., 2002). It originated form areas of Mexico in South America (Gomes, 1961; Silva, 1986). There are three species of Prosopis in Namibia, *Prosopis chilensis, Prosopis glandulosa* (with two subspecies, *P. glandulosa* subsp. *glandulosa a*nd *P. glandulosa* subsp *torreyana*) (Brown *et al* 1985, Visser 1998, Simon 2005, Strohbach *et al* 2015). For this report, all species will be referred to as "Prosopis". Some of its common names includes, Honey Mesquite in English, ǂkhòǹhai.s (Khoekheogowab) |nàra.s in Damara or !khàa.s in Nama language (Curtis, B and Mannheimer, C, 2005) MATHENGE in Kenya (Julius & Mohamed 2020).

2.3. Management of Prosopis

Various studies have been undertaken to seek solution for the invasion problem of Prosopis in Southern Africa all of which recommended the total eradication of Prosopis (Klein., 2002, Smit., 2002, Strohbach *et al* 2015). Biological control "Natural enemies" of Prosopis were regarded as the most effective methods of controlling the plant, consequently two beetle species, *Algarobius prosopis* and *Neltumius arizonensis* was released in South Africa in 1987 and 1993 respectively. A comprehensive literature review on management of Prosopis is provided below.

2.3.1. Working for Water initiative in South Africa

South Africa recognized the adverse impact of Alien Invasive Plants which hinders the growth of natural vegetation, destabilize the ecological balance, while thickets of alien plants have converted valuable agricultural land into unproductive wasteland. They use excessive water resulting in reduced ground water levels, and dried-up rivers and streams (https://www.dws.gov.za/wfw/default.aspx., accessed 07 Feb 2023).

In 1995, the South African Government launched Working for Water (WfW) program to tackle the problem of invading alien plants while at the same time addressing unemployment.

The South African government has spent over US$ 100 million on this programme between its inception in 1995 and April 2000 (B.W. van Wilgen *et al.,* 2001). The program is hailed as huge environmental conservation initiatives success globally. Since its inception, it has cleared more than one million hectares of invasive alien plants, providing jobs and training to approximately 20 000 people (https://www.dws.gov.za/wfw/default.aspx., accessed 07 Feb 2023) through the creation Secondary Industries based on the cleared wood such as charcoal, wood chips and organic fertilizer (KPMG *et al.,* 2003).

The program use a range of methods to control invasive alien plants which includes;

- Mechanical methods - chopping, removing, or burning invading alien plants.
- Chemical methods - using environmentally safe herbicides.
- Biological control - using species-specific insects and diseases from the alien plant's country of origin.
- Integrated control - combinations of the above three approaches which is often required to prevent enormous impacts.

2.4. Project Approach

This pilot project will be undertaken through a three (3) phase approach; (i) Clearing of Prosopis and, (ii) Revegetation of cleared pilot area with indigenous / local trees and, (iii) Managing the regrowth of Prosopis.

2.4.1. Clearing of Prosopis

After many years of invasion, Prosopis has become part of the ecosystem with various ecological and social benefits such as animal food, habitat for wildlife animals, soil stability for the riverbank and firewood for the people. Nonetheless, the guidelines for complying with regulations governing bush thinning in Namibia and value 2017, recommends that all Prosopis Plant **MUST** be eradicated completely even in water course where it is NOT recommended to thin other encroacher species due to possible soil erosion and riverbank stability. Thus, for the /Ai-//Ais pilot areas, the impacts of clearing Prosopis were identified as follows;

- Habitat destruction for wildlife (Birds, Snakes and Reptiles, Baboons etc)

- Riverbank stability (Not profound as majority of the riverbanks is rocky)

Consequently, clearing of Prosopis at /Ai-//Ais will adopt an indiscriminate harvesting method where all Prosopis Trees will be removed. The above impacts are comprehensively assessed under Section 7 below.

An integrated approach using Mechanical, Chemical and Biological methods will be used for clearing. A list of herbicides exists (U. K. Shanwad. *et al*., 2015) but requires adequate screening to determine their cost effectives and environmental threats. While biological method such as re-introduction (having been used in /Ai-Ais area already) of seed-feeding bruchid Beetles could be explored.

2.4.1.1. Mechanical Methods

Mechanical methods involve chopping / cutting down the trees with mechanical tools / instruments. The level of mechanization (tools / machinery such as bulldozers, excavators etc) is determined by the extend of the area, type of plant / tree to be cleared. Furthermore, highly mechanised clearing method using heavy machinery may pose environmental threat such as soil disturbance. Using a bulldozer for example may not be selective as everything in its path is cleared including desired local / indigenous vegetation. Another disadvantage is that, the aim to support community livelihood is compromised as machinery will replace manpower and consequently reduce employment opportunities. For the pilot areas, a combination of manual such as use of axes, handsaws, pruning shears and semi-mechanised such as using chainsaws, bush cutters will be ideal (D. Oberhauser., 2017).

Mechanical method is not effective when solely applied due to potential of regrowth. Thus, it is used in combination with chemical method where after cutting down the tree at stem level, the stem is further wounded with an axe and a chemical agent is applied. The chemical agent is then translocated into the roots and kills them, thus avoiding regrowth (De Klerk., 2004, Handley., Int, U. K. Shanwad. *et al*., 2015). The

combination of mechanical and Chemical methods is labour intensive thus ideal for employment creation.

2.4.1.2. Chemical Methods

Chemical methods for bush control includes applying the chemical agent to roots or leaves or to the stem of the plant. When applying to the roots, it is expected that the agent will be absorbed by the roots after it rained, however this is not selective as other plant roots may absorb it as well. Leaves application is on thickets either aerial or using manual spray methods. Aerial sprays could be effective, but they are not selective and will end up killing non targeted species hence it is only desirable for large areas with high densities of targets plants (De Klerk., 2004). Stem application is known to be desired as explained above.

Previous attempt to control Prosopis at Sendelingsdrif, *used Garlon 480 EC (Triclopyr).* This chemical agent required to be diluted with diesel oil before application. Although it was found effective, the dilution with diesel pose environmental threat of water pollution. The WfW program in South Africa used *Kaput 100 Gel (Picloram, Triclopyr)* a water-based chemical agent which was found to be effective and environmentally friendly. Other herbicides that are currently prescribed for targeting Prosopis are *Teburhioron, Bromacil, Triclopyr and Clopyralid* (Int. Izaaks). While in India, individual chemical of combination of Mera – 71 (Glyphosate), Paraquat, 2, 4-D amine and ester, Diuron, Keroscene and Coaltar have been tried (U. K. Shanwad. *et al*., 2015).

For this report, it is pre-mature to recommend a specific herbicide in the abscess of cost and it ecological threats. The risk assessment recommends that, herbicides to be used must be within the confines of Namibian law and environmentally friendly. It will thus be critical to develop a guideline for clearing (Fig 6).

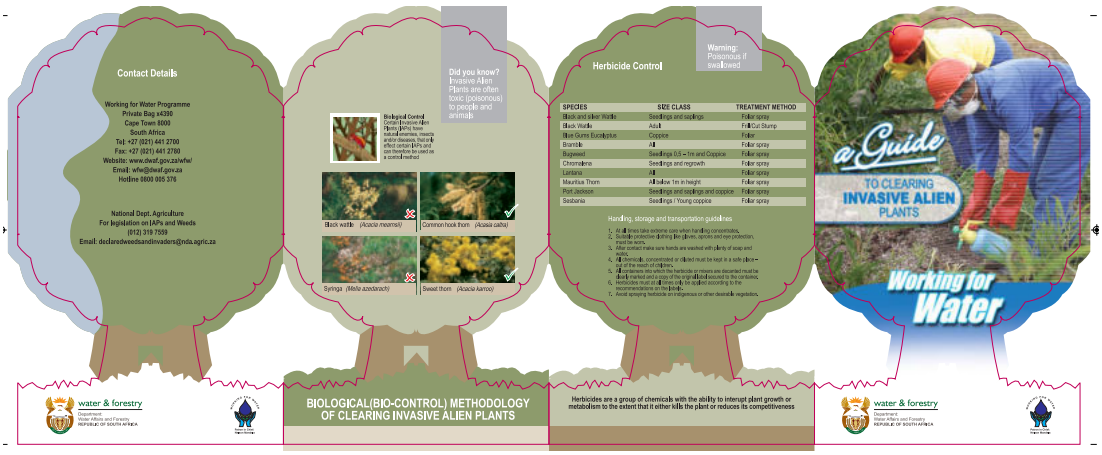

Figure 6. A guide to clearing invasive alien plant (Source: WfW, 2022)

2.4.1.3. Biological Methods

Biological control agents are introduced to attack specific plant organs such as the vegetative parts (leaves, stems or roots) or reproductive parts (flowers, fruits or seeds) (Klein 2002). In 1987 and 1993, the beetles, *Algarobius prosopis and Neltumius arizonensis* were introduced to South Africa respectively from Arizona, United State of America to control Prosopis (Impson F.A.C *et al.,* 1999, Klien., 2002).

Figure 7. Adult specimen of *Algarobius prosopis & Neltumius arizonensis* (Source: Klein., 2002)

These beetles lay their eggs on Proposis pods, and their larvae feeds on ripe seed which inhibit germination (Fig 7). These beetles are already introduced to Namibia (Smit 2002). It will be necessary to determine population dynamics of the these beetles and explore ways of increasing their population and introduction in infested drainage systems.

Figure 8. Undamaged Prosopis pods (bottom) and pods with escape holes, indicating where adult beetles have emerged (top) (Source: Klein., 2002)

2.4.1.4. Fire

Fire has traditionally been used to control thicket or dense vegetation to enhance grazing areas. This method is not selective, and destructive to non-target species as well as wild animals such as birds, snakes, and other small animals. The use fire will not complement the social objective of the project and restoration of biological diversity. Furthermore, due to the sensitivity of the Karoo biome, the use of fire will not be an option.

2.4.2. Revegetation with Indigenous / local trees

/Ai-//Ais Hot Spring Game Park is made up of Succulent Karoo and Nama Karoo Biomen (Strohbach et al., 2015, Driver et al., 2011). Its vegetation include Desert/Dwarf Shrub Transition, Succulent Steppe, Dwarf Shrub Savannah, Karas Dwarf Shrubland, Riverine Woodland. Quiver tree *(Aloe dichotoma*) maiden's quiver tree *(Aloe ramosissima),* giant quiver tree *(Aloe pillansii*) and halfmens *(Pachypodium namaquanum).* The plants in the Karoo biomes are normally characterized by succulent plant species that can grow in arid environments (MEFT).

Majority of the pilot area of /Ai-//Ais will not support revegetation since Prosopis is growing in the water at the riverbanks which will be impossible to revegetate in the water (Fig 8)

Figure 9. Prosopis along the Riverbanks at /Ai-Ais

However, there are scattered trees of Acacia which could increase after the clearing of Prosopis.

3. Description of the Affected Environment

3.1. Geology and Topography

The /Ai-/Ais area consist of a diversity of landscapes, topographic features and habitats. The area geology is made up of rock formations of the Karoo and Nama Groups. It has high mountainous to foothills topography which has in-between, arrays of rocky and sandy plains, rocky hillsides, plateaus, drainage lines, incised valleys, and the ephemeral river courses which drains southwards into the Orange River. Its key topographic features include includes the Fish River Canyon, the Konkiep valley, the Orange River valley, the Huns Mountains and the Klein Karas Mountains (Ministry of Mines and Energy).

In relation to clearing of Prosopis, the natural environment setting of the banks of Orange River is mostly made up of arrays of rocky areas and few sandy plains and instant steep topography. Thus the project objective of planting indigenous vegetation will not be easy to achieve. Furthermore, the riverbank's topography will also be challenging during clearing and harvesting, as most of its part is eroded and steep.

The Fish River Canyon, /Ai-/Ais Hot Spring and the Apollo 11 curve are amongst the tourist attraction in the park. These topographic features are not close to the riverbanks where the project is confined.

3.2. Climate

Namibia is one of the driest countries in sub-Saharan Africa. The country's climate is characterized by high climatic variability in the form of persistent droughts, unpredictable and variable rainfall patterns, variability in temperatures and scarcity of water. Rainfall decreases from east to west, with Zambezi Region receiving the highest rainfall of 600ml/year to less than 25 ml in the Southwest and West of the country.

With reference to the study site, /Ai-/Ais, the Lesotho Highlands where the Orange River originates receives an average annual rainfall is between 1,800 mm and 2,000 mm which decreases westward in the basin to 25 - 50 mm per annum at /Ai-/Ais in the lower basin (Nicci

D. et al., 2005,.). The /Ais-/Ais climatic condition is that of hot and dry climate with temperature ranging between 18 to 20 °C and average rainfall of 25mm.

The lowest temperatures occurs during the dry season months of June to August. Mean monthly minimum temperatures do not, on average, fall below 0°C. High solar radiation, low humidity and high temperature lead to very high evaporation rates, which vary between 3 800 mm per annum in the south to 2600 mm per annum in the north. Surface water sources such as dams are subject to high evaporation rates. Potential evaporation is at least five times greater than rainfall. Lack of water is one of the key limitation factor to Namibia's development.

The country's aridity coupled with climate change effects and socio-economic factors such as poverty, lack of income, employment opportunities will further limit the adaptive capacity of local communities. Thus, water conservation through the intervention such as the clearing or Prosopis trees, is high priority as outlined in the 5th National Development Plan's (NDP5) Water strategies and Desired outcomes for the period 2017-2022.

3.2.1. Flora

As mentioned above, the park is made of Succulent Karoo and Nama Karoo Biome. Vegetation type includes Desert/Dwarf Shrub Transition, Succulent Steppe, Dwarf Shrub Savannah, Karas Dwarf Shrubland, Riverine Woodland. Quiver tree *(Aloe dichotoma)* maiden's quiver tree (*Aloe ramosissima),* giant quiver tree *(Aloe pillansii)* and halfmens (*Pachypodium namaquanum)* (MEFT)

The vegetation on the banks of the river does not necessarily resemble that of the Succulent Karoo and Nama Karoo Biome. The riverbank is heavily infested with Prosopis while patch areas has tall acacia trees which are not part the two biome. The vegetation in these two biomes are arid type and will not be suitable to revegetate on the riverbanks.

3.2.2. Fauna

There are no domestic animals in park. The park management plan prohibits domestic animals and recommends for destroy if any domestic animal is spotted in the park.

The wild animals in the park include the Hartmann's mountain zebra, klipspringer, kudu, leopard, brown hyaena, grey rhebok (rare). There are 202 bird species recorded in the park which include Little Bittern, Black Stork, Black Harrier, Malachite Sunbird and African Pied Wagtail (MEFT). Poaching is prohibited in Namibia, and the park management plans calls for ZERO tolerance to poaching and using of any other natural resource in the park without permission.

3.3. Socio-Economic

There are not communities in the park. Tourism, lodging, swimming / canoeing, and mining are the main economic activities in the park. The Fish River Canyon and the Apollo 11 cave are main tourist attraction in the park.

3.4. Heritage and Archaeology

The Fish River Canyon and the Apollo 11 cave are declared world heritage sites. As mentioned above, these sites are not within the project areas thus impact of heritage resources is expected to be negligible. A chance find is developed for the project operation.

4. Project Alternative

The EMA requires an EIA to explore various project alternatives which aims to ensure that a chosen project component does not have significant impact to the environment. Project alternatives ranges from not implementing the project (no go alternative), when the environmental impacts are severe, or there is high degree of uncertainty. Other alternative considers the project site, technology, and equipment to be used. The description of alternatives is given in table 4 below.

Table 1. Project alternatives

Project Alternative	Description	Advantages	Disadvantages	Alternative adoption
No project	Do not implement the project	• Animal fodders (Not applicable in /Ai-Ais areas) • Habitat for wildlife	• Land Degradation • Ecological degradation • Depletion of ground water resources • Reduced rives flow stream	No
Implement the project	Implement the project	• Restoration of degraded land • Restoration of local biodiversity • Improved ground water resources • Enhanced rives flow stream • Increase water flow into the estuary	• Short term habitat destruction	Yes
Mechanical Control	The use of manual and semi-mechanized methods to clear the Prosopis plants	• Labour intensive resulting in high employment potential • Negligible threat to the environment • Selective and highly effective • High quality plant with potential to create secondary industries	Tedious during implementation	Yes
Chemical Control	The use of chemical agent (Manual / Aerial	• Limit potential of regrowth	• Aerial spray is expensive and unselective • Manual use of chemical agent is selective and highly effective	Manual Application of Chemical agent (Yes)
Biological Control	The use of "Natural enemies of Prosopis"	• Natural enemies has been used for the control of Prosopis since 1987. • The control plant seed banks and reduce regrowth	• They do not eradicate but control population	Yes (For long term control of Prosopis

5. Policy and Legal Framework

5.1. National Regulatory Framework

Table 2. National Regulatory framework applicable to the project

Legislation	Relevant authority	Objective	Applicability
The Namibia Constitution	**Government Republic of Namibia**	The Namibian constitution is the supreme law of the country and makes provision for environmental protection and sustainable development. Article 95(1) of the Constitution of Namibia states that:- "The State shall actively promote and maintain the welfare of the people by adopting policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future".	The project aims to promote maintenance of ecosystems, essential ecological processes and biological diversity and utilization of living natural resources for the benefit of all Namibians
Environmental Management Act No. 7 of 2007	**Ministry of Environment Forestry and Tourism (MEFT)**	The environmental management act No.7 of 2007 (EMA) aims to promote the sustainable use of natural resources and provides the framework for the environmental and social impact assessment, demands precaution and mitigation of activities that may have negative impacts on the environment and provision for incidental matters. Furthermore, the act	Harvesting and Clearing of Prosopis is a listed activity that requires an EIA and get approved through issuance of the ECC to ensure sustainable Socio and Environmental management

Legislation	Relevant authority	Objective	Applicability
		provides a list of activities that may not be undertaken without an environmental clearance certificate.	
Pollution Control and Waste Management Bill (in preparation)	**MEFT, Ministry of Health and Social Service**	The Pollution Control and Waste Management Bill, intents to regulate and prevent the discharge of pollutants into the air and water as well as providing for general waste management	The herbicides to be used for the control of regrowth of Prosopis will be done in accordance to this bill to prevent pollution in the water course
Public Health Act (Act No. 36 of 1919)	**Ministry of Health and Social Services**	The Public Health Act aims to protect the public from nuisance and states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.	The project should ensure that the workers are provided with protective gear to safeguard their wellbeing. The activities should also be conducted in a manner that does not pose any danger to the general public.
Integrated Water Resources Management Act (Act No. 11 of 2013)	**Ministry of Agriculture, Water and Land Reform (MAWLR)**	This Act provides a framework for managing water resources based on the principles of integrated water resources management. It provides for the management, development, protection, conservation, and use of water resources.	One of the projects main objectives is the restoration / improvement of ground water quality and enhance of smooth river flows. These objectives are in line with this Act.
Water Act No, 54 of 1956	**Ministry of Agriculture, Water and Land Reform (MAWLR)**	This act prevents pollution and promotes the sustainable utilization of the water resource.	One of the projects main objectives is the restoration / improvement of ground water quality and enhance of smooth river flows. These objectives are in line with this Act.

Legislation	Relevant authority	Objective	Applicability
The Occupational Safety and Health Act No. 11 of 2007	**Ministry of Labour**	A safety risk is a statistical concept representing the potential of an accident occurring, owing to unsafe operation and/or environment. In the working context "SAFETY" is regarded as "free from danger" to the health injury and to properties.	Project implementation should explore measures to ensure that safety and health at work place are maintained.
Soil Conservation Act No. 76 of 1969	**Ministry of Agriculture, Water and Land Reform (MAWLR)**	This act promotes the conservation of soil, prevention of soil erosion.	The above ground harvesting of Prosopis is aimed towards maintaining the stability of the riverbank thereby preventing soil erosion.
National Heritage Act No. 27 of 2004	**Ministry of Urban and Rural Development**	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or remains, while Section 48 sets out the procedure for application and granting of permits.	A chance found was developed in accordance to this act.
Regional Councils Act, 1992 (Act No. 22 of 1992)	**Ministry of Urban and Rural Development**	The Regional Councils Act legislates the establishment of Regional Councils that are responsible for the planning and coordination of regional policies and development. The main objective of this Act is to initiate, supervise, manage and evaluate regional development.	The Regional Councils will spearhead to participate in the implementation of this project and its long-term management

5.2. Regional and International Legal Framework

Table 3. Regional and international legal framework applicable to the project

Legal Instrument	Relevant authority	Objective	Applicability
Revised SADC Protocol on Shared Watercourses	**MEFT & MAWLR**	The objective of this Protocol is to foster closer cooperation for judicious, sustainable and co-ordinated management, protection and utilisation of shared watercourses and advance the SADC agenda of regional integration and poverty alleviation.	The Orange River is a shared river resource which call for its co-management
ORASECOM Agreement	**MAWLR**	Article 1 of the ORASECOM agreement provides to establish and undertake to maintain the Orange-Senqu River Commission (hereinafter referred to as the "Commission") in accordance with the provisions of this Agreement.	ORASECOM is actively involved in the adequate utilization of the Orange-Senqu River Commission, through its council for sustainable management of the Orange-Senqu River
Permanent Water Commission for the Orange River (between Namibia and South Africa)	**MAWLR**	The Permanent Water Commission (PWC) established in September 1992 between South Africa and Namibia advises the two Governments on matters pertaining to the development of the Lower Orange River where it forms the border between South Africa and Namibia.	This body advises the two Governments on matters pertaining to the development of the Lower Orange River where it forms the border between South Africa and Namibia which is the location of the project
UN Convention to Combat Desertification	**MEFT**	The overarching objective of the UNCCD is for people living in areas affected by desertification, land degradation and drought to create a resilient livelihood base	The initiative of clearing Prosopis is amongst other to prevent land degradation and to maintain ecosystem of the Orange-Fish River Basin.

Legal Instrument	Relevant authority	Objective	Applicability
		and secure long-term benefits while enhancing the healthy functioning of ecosystems.	
UN Framework Convention on Climate Change	**MEFT**	The objective of all three agreements under the UNFCCC is to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system, in a time frame which allows ecosystems to adapt naturally and enables sustainable development.	The NDC for Namibia under Paris agreement aims to reduce Carbon Dioxide from fossil fuel and convert to biomass production. The harvested Prosopis will be utilised as clean energy.
UN Convention on Biological Diversity	**MEFT**	The Convention on Biological Diversity (CBD) is an international legally-binding treaty with three main goals: conservation of biodiversity; sustainable use of biodiversity; and the fair and equitable sharing of the benefits arising from the use of genetic resources. Its overall objective is to encourage actions which will lead to a sustainable future.	The clearing of Prosopis is aimed to restore ecological diversity
Cartagena Protocol on Biosafety to the Convention on Biological Diversity Convention on Wetlands of International Importance (Ramsar Convention)	**MEFT**	The Cartagena Protocol is an international agreement managing the movement of living modified organisms from one country to another. It aims to protect nature from the potential risks posed by such organisms by establishing procedures	The project will adopt existing strategy for controlling of Prosopis with "Natural enemies"

Legal Instrument	Relevant authority	Objective	Applicability
		countries can use to make informed decisions on the import of such organisms.	

6. Public Consultations

Section 21 of the EIA Regulation requires the undertaking of an Environmental Impact Assessment (EIA) to follows a robust and comprehensive public consultation. This is an important process, because it gives members of the public, especially the Interested and Affected Parties to comment or raise concerns that may affect their socio-economic or general environment because of the project. Further, it solicits crucial local knowledge that the Environmental Assessment Practitioner may not have. The process was undertaken as follows;

6.1. Notice board

In accordance with Section 21 (a) a notice board should be placed at the project site and other public place to inform and create public awareness about the project and the application of ECC. A notice board was placed at ROSHKOR offices inviting the public to the meeting.

6.2. Written notices

In accordance with Section 21 (b) written notices will be given to the public. There are not people residing in the /Ai-/Ais National park.

6.3. Newspaper advertisement

In accordance with Section 21 (c), this project was advertised once a week for two consecutive weeks in the New-Era and Confident newspapers that are widely circulated in Namibia on 20th & 27th January 2023.

6.4. Public Meeting

In accordance with Section 21 (5,6) a public meeting was held at the town of Rosh Pinah on 30th January. The Meeting was only attended by two officials from the Ministry of Environmental Forestry and Tourism responsible for the /Ai-/Ais National Park.

I. After presentation by Red-Dune Consulting, the MEFT park Warden Mr. Wayne remarked that, public consultation of this nature do not attract high attendance because community are mostly interested in meetings that relates to job opportunities. Furthermore, he indicated that the meeting was also not in the community's interested as the park is secluded from public.

II. Mr. Wayne cautioned against project failure because similar project funded by GIZ failed because it could not establish market for the harvested timber / wood which resulted in the rotting of harvested wood since Prosopis wood has a short lifespan of about four (4) – six (6) months. Learning from this failure, he cautioned the project to appointed competent companies that can create a market and can take the products to the market.

III. Mr. Wayne proposed for the project to explore partnership with Nampower, for the project to supply wood chips for its biomass project.

7. Impact Identification and Risk Assessment

The risk assessment for this study focuses on the impact resulting from the clearing or harvesting of Prosopis and revegetation of cleared areas with indigenous / local trees. The criteria to be used for assessing impacts and the method of determining their significance is outlined in Table 2 below. This process conforms with the Environmental Impact Assessment Regulations of Environmental Management Act, 2007 (Government Gazette No. 4878) EIA regulations. The approach will adopt a two phases (i) identification and (ii) analysing of impacts.

- **Impact identification**; during this step, the impact is assessed based on severity, spatial scale and its duration.
- **Impact Significance**: various rating will be used to determine the overall rating of the impact

Impact significance is determined under two mitigation scenarios; **without mitigation** and **with mitigation**. The confidence of impact mitigation depends on the level of certainty based on available information to assess the impact.

Table 4. Risk assessment criteria

Risk Event	**Rating**	**Description of the risk that may lead to an Impact**
Impact type	**0**	No Impact
	+VE	Positive
	-VE	Negative
Probability	The probability that an impact may occur under the following analysis	
	1	Improbable (Low likelihood)
	2	Low probability
	3	Probable (Likely to occur)
	4	Highly Probable (Most likely)
	5	Definite (Impact will occur irrespective of the applied mitigation measure)
Confidence level	The confidence level of occurrence in the prediction, based on available knowledge	

	L	Low
	M	Medium
	H	High
Significance (Without Mitigation)	0	None (Based on the available information, the potential impact is found to not have a significant impact)
	L	Low (The presence of the impact's magnitude is expected to be temporal or localized, that may not require alteration to the operation of the project
	M	Medium (This is when the impact is expected to be of short term moderate and normally regionally. In most cases, such impacts require that the projects is altered to mitigate the impact or alternative method of mitigation is implemented
	H	High (The impact is definite, can be regional or national and in long term. The impact could have a no go implication unless the project is re-designed or proper mitigation can practically be applied
Mitigation	The applied measure / alternative to reduce / avoid an impact	
Significance (With Mitigation)	0	None (Based on the available information, the potential impact is found to not have a significant impact)
	L	Low (The presence of the impact's magnitude is expected to be temporal or localised, that may not require alteration to the operation of the project
	M	Medium (This is when the impact is expected to be of short term moderate and normally regionally. In most cases, such impacts require that the projects is altered to mitigate the impact or alternative method of mitigation is implemented
	H	High (The impact is definite, can be regional or national and in long term. The impact could have a no go implication unless the project is re-designed or proper mitigation can practically be applied
Duration	Time duration of the impacts	
	1	Immediate
	2	Short-term (0-5 years)
	3	Medium-term (5-15 years)
	4	Long-term (more than 15 years
	5	Permanent
Scale	The geographical scale of the impact	
	1	Site specific
	2	Local

	3	Regional
	4	National
	5	International

7.1. Project Planning

This project is guided by the TDA-SAP for ORASECOM. However proper planning for the project implementation is required to ensure it yield the intent outcomes. The implementation plan is recommended to be guided by the table below.

No.	Impact	Planning question	Desired Outcome
1.	Project acceptance	Is the project accepted by relevant authority and communities	Yes, the project is accepted
2.	Human displacement	Will the project require displacement of people	No, there will be no displacement of people
3.	Project beneficial	Is the project relevant and beneficial to the country and local communities	Yes
4.	Project Objection	Has the project been objected by relevant authority / local communities	No

7.2. Project Implementation / Operation

7.2.1. Socio-Economic Consideration

Potential Social Impact	Mitigation Measures	Significance of the Impact	
Employment / Socio-Economic advancement	1. Ensure that all general work is reserved for local people unless in circumstances where specialized skills are required. 2. Fair compensation and labour practice as per Namibian Labour Laws must be followed 3. Ensure skill transfer to the locals 4. Use local supplier for good and service where possible	**Impact type**	**+VE**
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Permanent
		Scale	Local
Health and Safety	1. All drivers must be in possession of appropriated driver's licenses 2. All heavy vehicles must have a rotating flushing light installed for visibility 3. Ensure construction / operation starts from 6am-5pm only and no night operation / construction / 4. Adequate safety signs must be put at designated places.	**Impact type**	**-VE**
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation	Medium
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Local

Potential Social Impact	Mitigation Measures	Significance of the Impact	
	5. Provide safe wears such as, overalls, safety boots, safety eyeglasses, Hand gloves and hard hat etc to employees 6. Train employees on health and safety 7. Provide first aid kit with adequate anti-snake venoms and insect bites. 8. Develop a user manual for handling snakes 9. Provide training on the use of hand tools and semi-mechanised tools 10. Apply caution when clearing Prosopis in the water		
Tourist disturbance	1. Do not stop tourist / visitors in the park 2. Do not beg tourist for money/food etc in the park 3. Do not block roads during operation	**Significance (With)**	Low
HIV and AIDS, Alcohol and Drug abuse	1. Provide awareness to the employees on danger of alcohol and drug abuse 2. All employees must be screen with the breathalyser to avoid intoxicated personnel on site	**Significance (Without Mitigation)**	Low
		Significance (Without Mitigation)	Low

Potential Social Impact	Mitigation Measures	Significance of the Impact
	3. Adopt a disciplinary system to discipline staff for non-compliance 4. Provide Condoms to employees	

7.2.2. Biodiversity

Potential Impact on Biodiversity	Mitigation Measures	Significance of the Impact	
Destruction of habitat for wildlife **(**The /Ai-/Ais pilot area does not have domestic animals. Impact on grazing is negligible)	1. Do not kill wild animal during clearing unless it possesses eminent danger to people (i.e. Snakes) 2. Wild animal will relocate for Prosopis Bushes 3. Relocate bird nests to indigenous tree 4. Develop a user manual on relocation bird nests 5. Apply Zero tolerance to poaching 6. No snare or weapon are allowed on site 7. Do not take any natural resource in the park	**Impact type**	**-VE**
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Project lifecycle
		Scale	Local
Flora	1. Clear all Prosopis plants in the pilot area 2. Cut all plants stems above ground, do not disturb soils in sand areas 3. Prosopis in the water should be cut above the water mark. This will ensure that the herbicides to be applied is absorbed by the plant stem to its root thereby killing the plant	**Impact type**	+VE
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Permanent
		Scale	Site specific

Potential Impact on Biodiversity	Mitigation Measures	Significance of the Impact	
	4. Do not cut down any other vegetation that is NOT Proposis 5. Develop a revegetation strategy and its guidelines in consultation with MEFT, Forestry department 6. Develop a re-growth management strategy for Proposis		

7.2.3. Physical Environment

Potential Physical Impacts	Mitigation Measures	Significance of the Impact	
Land degradation The uncontrolled movement of heavy machinery at the project site as well as on access loads may cause land degradation.	1. Movement of vehicles / trucks must be well coordinated to ensure minimal soil disturbance 2. Tracks / footprints of vehicle must be rehabilitated immediately after clearing and loading of woods 3. Wood processing site must be well prepared with minimal footprint and in accordance with the park management plant	**Impact type**	**-VE**
		Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Project life span
		Scale	Site Specific
Water pollution Heavy vehicle and machinery may pollute water sources from leakages of oils, hydraulic fluids, lubricants, and greases.	1. Fuelling of heavy vehicle on site must be well coordinated at designated places 2. Stationary vehicles must be provided with drip tray to capture oil, lubricants and hydraulic fluids leakages 3. All vehicle and machinery must be well service to avoid leakages 4. Provide and train on oil spill emergency	**Impact type**	**-VE**
		Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Site Specific

Potential Physical Impacts	Mitigation Measures	Significance of the Impact	
	response 5. Servicing of vehicles and machinery must take place at designated sites 6. Soils contaminated with grease, oils and hydrocarbons must be collected and disposed of at approved site; 7. Provide and train on oil spill emergency response		
Secondary industry processing site (Nuisance and Aesthetic value) Designated are for processing of wood	1. Identify wood processing site in consultation with MEFT, Department of Parks for approval 2. Develop a processing strategy / guideline 3. Seek appropriate approval for project activities from MEFT to be executed in the park	**Impact type**	**-VE**
		Probability	Possible
		Confidence level	High
		Significance (Without Mitigation)	Moderate
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Site Specific

7.2.4. Pollution and Waste Generation

Potential Physical Impacts	Mitigation Measures	Significance of the Impact	
Waste Generation General household and other waste	1. Provide skip bins to collect waste and be disposed of at an approved disposal site 2. Do not burry waste on site 3. Used oil, grease and lubricants cans must be collected in appropriate drums and disposed of at an approved site. 4. Provide mobile toilet for employees 5. Do not allow single use plastic in the park 6. Abide by the Park Management Plan	**Impact type**	**-VE**
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation	Low
		Duration	Project Life Span
		Scale	Site Specific
Air Pollution	1. Prevent dust pollution by maintaining low speed (40km/h) of all vehicles 2. Charcoal processing must be approved by MEFT	**Impact type**	**-VE**
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Site Specific
Chemical Pollution (Use of Herbicides)	1. Use only approved herbicides that are environmentally friendly	**Impact type**	**-VE**
		Probability	Possible
		Confidence level	High
		Significance (Without Mitigation)	Medium

Potential Physical Impacts	Mitigation Measures	Significance of the Impact	
		Significance (With Mitigation	Low
		Duration	Project Life Span
		Scale	Site Specific
Noise Pollution	1. Maintain low speed (40km/h) to prevent noise pollution 2. All vehicles must be well serviced to prevent excessive noise 3. Do not hoot unnecessary 4. Do not rev the vehicle engines 5. Do not play loud music / radio in the park	**Impact type**	**-VE**
		Probability	Possible
		Confidence level	High
		Significance (Without Mitigation)	Moderate
		Significance (With Mitigation	Low
		Duration	Project Life Span
		Scale	Site Specific

7.2.5. Heritage Resources

Potential Physical Impacts	Mitigation Measures	Significance of the Impact	
Heritage Resources	1. Employee must be trained on the possible find of heritage and archaeological material in the area; 2. Implement a chance find and steps to be taken for heritage and archaeological material finding (Heritage (rock painting and drawings), human remains or artefacts) are unearthed by; i. Stopping the activity immediately ii. Informing the operational manager or supervisor iii. Cordoned of the area with a danger tape and manager to take appropriated pictures. iv. Manager/supervisor must report the finding to the following competent authorities, National Heritage Council of Namibia (061 244 375) National Museum (+264 61 276800) or the	**Impact type**	**-VE**
		Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Temporal
		Scale	Site specific

Potential Physical Impacts	Mitigation Measures	Significance of the Impact
	National Forensic Laboratory (+264 61 240461).	

8. Decommissioning and Rehabilitation

8.1. Clearing and harvesting

- During clearing, track / footprints of vehicle should be rehabilitated and levelled
- All plant branches must be taken to the fodder processing site.

8.2. Secondary Industry processing units

The EIA recommends the feasibility study of secondary industries that will be undertaken to add value to the harvested woods. The potential secondary industry includes Charcoal, Wood Chips, and Animal Fodder. Setting up processing areas and machinery for these secondary industries requires different machinery and site preparations. The feasibility study will be able to highlight the processes to be undertaken during operation and decommissioning.

9. Conclusion and Recommendations

9.1. Conclusions

The proposed clearing and harvesting is within the scope of the Namibian laws and efforts to preserved biodiversity and promotion of sustainable ecological processes. The project does not pose major threat to the environment. In the end, the project in line with solving the challenge of Prosopis invasion, to restore land productivity, enhance ground water and smooth river flows.

9.2. Recommendations

9.2.1. Issuance of Environmental Clearance Certificate

It is recommended to the approving Authority for the project to be issued with the Environmental clearance certificate.

9.2.2. Develop a Clearing and Harvesting Manual / Guideline

Learning from WfW project in South Africa, this manual will set out guideline on harvesting and clearing using different control methods. Each control methods should be logically explained to be understood by the layman. Furthermore, this manual should incorporate health and safety measure and a training plan.

9.2.3. Undertake Feasibility Study For Secondary Industries

The harvested / cleared wood has various potential for value addition. A feasibility study to determine the most effective secondary industry is required to ensure the project bears return on investment.

9.2.4. Develop a ground water monitoring system

This study is limited to obtain an ECC for project implementation. Monitoring of ground water to assess the response to the clearing of Prosopis will not be achieved within three years of remainder of the project. ORASECOM could assist in setting up ground water monitoring

which is to be handed over to MAWLF for continuous monitoring. The available data of ground water level from MAWLF and NAMWATER should be used as baseline before project implementation.

9.2.5. Develop Prosopis Management Plan For Water Basins

This project is supporting the Namibia Government through MEFT to eradicate Prosopis which is found over large areas of central and southern Namibia as well as on west drainage systems. Furthermore, the trees have also invaded areas outside the drainage systems. Thus, for sustainable implementation of eradication Prosopis, there is a need to develop a Management Plan for each basin and to adopt similar approach of the WfW program in South Africa.

9.2.6. Create partnership with higher energy consumer

One of the challenges experienced in previous project was access to market of wood product. It is important for ORASECOM to create partnership in the form of Memorandum of Understand / Agreement with cement industries and NAMPOWER to be the consumer of the harvested trees.

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