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Strategic Environmental Assessment (SEA) of the Integrated Land-use Plan for the Oshana Region, Namibia

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One Step @ a time

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ABBREVIATIONS

ECC	Environmental Clearance Certificate
EMA	Environmental Management Act
GIS	Geographic Information System
IRLUP	Integrated Regional Land Use Plan
LDN	Land Degradation Neutrality
LUPA	Land Use Planning and Allocation
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
NDP	National Development Plan
PLUP	Participatory Land Use Planning
SEA	Strategic Environmental Assessment
SEMP	Strategic Environmental Management Plan
SCIRLUP	Steering Committee for Integrated Land-Use Planning
TA	Traditional Authority
TEC	Tortoise Environmental Consultants

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1. INTRODUCTION

1.1. Strategic Environmental Assessment (SEA)

1.1.1. What is an SEA?

A Strategic Environmental Assessment (SEA) is a process and a tool for evaluating the effects of proposed policies, plans and programmes (e.g IRLUP[1]) on the natural environment, social, cultural and economic conditions to guide decision-making (IAIA, 2022). EIAs and SEAs effectively promote sustainable development by mainstreaming the natural environment into socio-economic development and integrating environmental targets into strategic and project related decision-making (OECD, 2021).

SEA has the capacity to support the development of policy and planning exercises, with a stronger environmental component, and plays a fundamental role in promoting the principles of sustainable development. SEA helps achieve environmental protection and sustainable development by:

- Taking into consideration the environmental impacts of proposed strategic actions
- Identify the most appropriate and practicable environmental option
- Providing early warning of possible cumulative impacts and large-scale changes
- Integrating the environment into sector-specific decision-making by promoting environmentally sound and sustainable proposals (Partidário, 2014)

1.1.2. SEA Framework

Namibia has explicitly incorporated the protection of the environment in its constitution. Article 95 of Namibia's constitution mandates ***"the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for the benefit of the Namibians, both present and future".*** The constitution therefore places a duty on the Namibian Government to develop appropriate laws to protect the environment and to ensure that they are enforced.

The fifth National Development Plan (NDP5) sets out a roadmap for achieving inclusive and sustainable growth of Namibia by adhering to the following pillars of sustainable development:

- Economic Progression
- Social Transformation
- Environmental Sustainability
- Good Governance

[1] *Integrated Regional Land Use Plan (IRLUP) for the Oshana Region*

The national objective of the Environmental Sustainability Pillar is to ensure management and utilisation of natural resources on a sustainable basis.

Coordinated land management and development strategies, will therefore only achieve long lasting results if they adequately reflect environmental concerns and the sustainable use of natural resources (Nghitila et al., 2011).

1.1.3. SEA Principles and Performance criteria

The preparation of this SEA was guided by

- The 2006 Organisation for Economic Co-Operation and Development (OECD)'s Development Assistance Committee (DAC) Guidelines and Reference Series on Applying Strategic Environmental Assessments
- The SEA Performance Criteria developed by the International Association of Impact Assessment (IAIA), the and the procedures
- Guidelines for Strategic Environmental Assessment and Environmental Plan as provided by the Minister of Environment and Tourism in April 2008.

The purpose of the performance criteria is to provide general guidance on how to build effective new SEA processes and evaluate effectiveness of existing SEA processes (IAIA, 2002). The IAIA outlines the criteria that characterize a good-quality SEA process as being:

a) Integrated

- Ensures an appropriate environmental assessment of strategic decisions relevant for the achievement of sustainable development
- Address the interrelationships between biophysical, social and economic aspects
- Tiered to policies in relevant sectors and regions and where appropriate, to project EIA and decision-making

b) Sustainability-led

- Facilitates the identification of development options and alternative proposals that are more sustainable

c) Focused

- Provides sufficient, reliable and usable information for development planning and decision-making
- Concentrates on key issues of sustainable development.
- Is customized to the characteristics of the decision-making process.
- Is cost- and time-effective.

d) Accountable

- Is the responsibility of the leading agencies for the strategic decision to be taken.
- Is carried out with professionalism, rigor, fairness, impartiality and balance.
- Is subject to independent checks and verification
- Documents and justifies how sustainability issues were taken into account in decision making

e) Participative

- Informs and involves interested and affected public and government bodies throughout the decision-making process.
- Explicitly addresses their inputs and concerns in documentation and decision making.
- Has clear, easily understood information requirements and ensures sufficient access to all relevant information.

f) Iterative

- Ensures availability of the assessment results early enough to influence the decision-making process and inspire future planning.
- Provides sufficient information on the actual impacts of implementing a strategic decision, to judge whether this decision should be amended and to provide a basis for future decisions.

1.1.4. Assumptions and Limitations of the SEA

The SEA is primarily based on literature, stakeholder consultations and observations.

1.2. Land use planning

1.2.1. What is Land Use Planning?

Land is the means of production, socio-economic development and livelihoods. Therefore, as the population grows, so does the need for more land. Meaning, there is linear correlation between population growth and the demand for more land. However, land is finite and does not grow, and hence it is often subjected to conflicting interests and competing uses. Thus, we need to use land for the most suitable and viable land use option.

In addition to socio-economic development, land is the foundation for ecosystem services and life support systems, which are vital for community survival.

1.2.2. What is Participatory Land Use Planning?

Participatory land use planning refers to the interactive process governed by dialogue amongst all stakeholders and consensus decision making for sustainable land use.

1.2.3. Integrated Land Use Planning

Integrated Land Use Planning (IRLUP) refers to the coordination of various sectors in allocating the most suitable and sustainable land use, by evaluating different land use options for a specific piece of land, through a participatory land use planning process (SPC, 2020). An integrated Land Use Plan guides development within a region and should be reviewed over time (SEA – TOR, 2019.

1.2.4. SEA Objectives

a) To guide the IRLUP and ensure that the proposed land use scenarios are environmentally, socially, and economically sustainable
b) To integrate environmental and social aspects in the IRLUP
c) Identify and assess environmental and social impacts pertaining to developmental activities
d) Assess ecosystem services (life-support systems), and the inter-relation / inter-dependency of the inhabitant communities
e) To promote sustainable development agenda (environmental and socio-economic) and integration into the regional decision-making platforms
f) Identify opportunities for regional land use planning to contribute and enhance environmental sustainability, climate change adaptation and resilience, and promote low carbon development and transition towards green economy.

1.2.5. SEA Rational

Similar to other regions, developmental activities in the Oshana region are guided by the regional development strategy. However, if overlooked, some of the developmental activities / land use plans may have negative environmental and social impacts to the inhabitant communities. Thus, the objective of the SEA is to mitigate and minimise negative impacts, and develop viable alternatives.

1.2.6. SEA Process

The SEA process entails:

i. Conducting the SEA in accordance with the Terms of reference, SEA guidelines, and the applicable legal framework (e.g. the EMA, Act No. 7 of 2007 and the SEA Guidelines of 2008)

ii. Identify key environmental, social and economic aspects, pertaining to the IRLUP, with emphasis on sustainability.

2. METHODOLOGY

2.1. Overview of SEA Process

The diagram below is a summary of the SEA process that have thus far been carried during this consultancy (1-5) and the consecutive steps after submission of the scoping report.

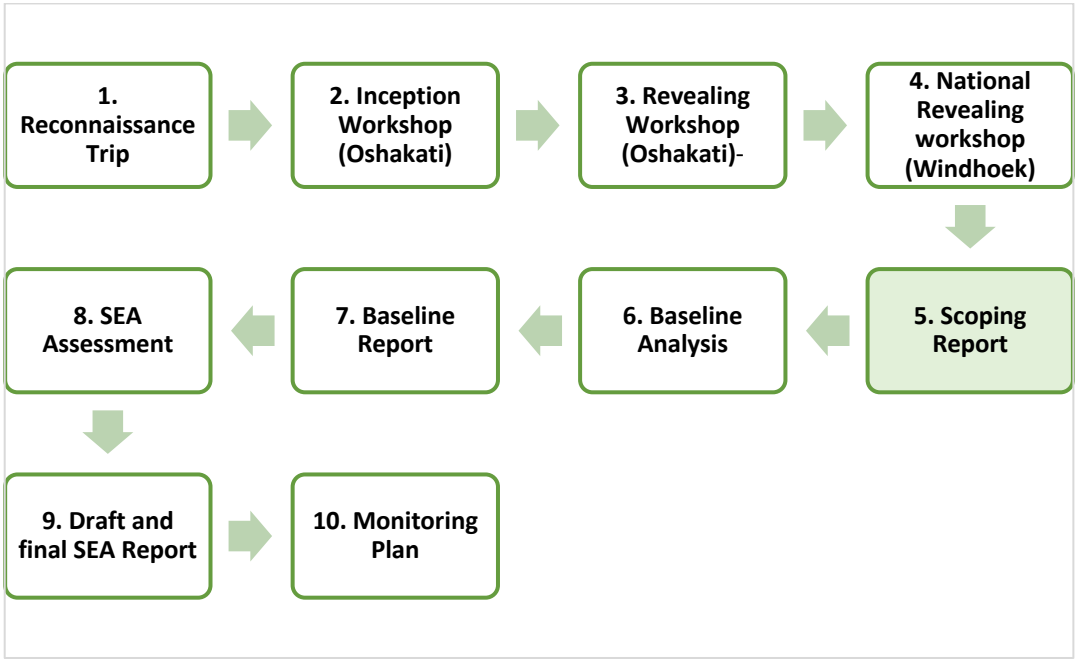

Figure 2.1. SEA Process

2.2. Scoping

After the inception phase, with guidance from the client (MAWLR), a reconnaissance trip was carried out jointly with the IRLUP team. Participatory scoping workshops were held with key stakeholders in all 11 constituencies to establish:

- The current land uses and projects (including potential land use conflicts or competing land use options)
- Current development plans and planned projects
- Other key land use planning and environmental issues in the region
- Preliminary inventory and description of ecosystem services (to be complemented with literature and other data)
- Visioning (where the region would want to be in the next 5 years)

2.3. Baseline analysis

All information gathered during the scoping workshops will contribute to the development of the baseline report. The baseline analysis describes the existing environmental, social and economic situation of the region. In-addition, it provides an overview of the current state of environment relevant to the SEA with a focus on the following:

a) Key environmental and social issues (present situation and future evolution)
b) Existing environmental protection measures, and objectives set out at national, regional, and international levels
c) Status and quantification of ecosystem services identified during scoping
d) Current situation of Oshana regarding planning (infrastructure, demographics, land ownership, legal status of protected and conservation areas etc.
e) Identifying gaps in the regional planning GIS

2.4. Ecosystem Services Assessment

2.4.1. Ecosystem Services Assessment Methodology

An initial inventory of ecosystem services was done through the review of existing literature and data. The information was complemented by inputs from stakeholders, during the SEA consultation process.

Table 2:1. Methodology – Ecosystem services assessment

	Step	Description	Explanation
1	Define boundaries of study area	Administrative regional boundaries	As illustrated in Figure 4.1, the boundaries of the Oshana region constituencies, conservancies, community forests and urban settlements (towns) are well defined.
2	Identify and map ecosystems in the study area	Can be natural, or semi-natural ecosystems or man-made landscapes, LDN variability.	The key ecosystems identified include the Cuvelai-Etosha drainage system and terrestrial ecosystems (tree and shrub savannah and mopane shrublands), Salt pans and Oponono Lakes. The LDN report of 2015 and other literature will be used to assess the changes in productivity and land degradation risk of the region.
3	Describe potential linkages with neighbouring regions	There may be interdependencies between different areas, for example linked to surface and groundwater flows, wildlife migration patterns, movements of cattle, or migration of people.	Interlinkages exist between people and the environment (land, plants, animals and water resources). Because of multiple land uses, conflicting land uses and HWC issues were identified.
4	For each ecosystem, identify and quantify ecosystem	Starting with expert inventory, verified with stakeholders. Quantification in terms of the service itself (e.g. amount of sustainably harvestable water for irrigation; surface	Identification of ecosystem services was done in consultation with stakeholders during the PLUPs and Reconnaissance field trips.

	services. Utilise the LDN data available for proper zoning.	area of wood production times productivity per ha., similar for grazing area, fish production in tonnes/year, wildlife species and numbers per species, etc.) Where possible, data should be disaggregated to explore the different usage of ecosystem services by males and females.	The benefits derived from ecosystem services are summarised in this report.
5	Identify (groups of) stakeholders of each ecosystem service	Stakeholders can be direct users (farmers, fishermen), or organisation speaking on behalf of users (user association), on behalf of a service (wildlife conservation), or having governmental responsibility for a service. Steps 4 & 5 are iterative until all agree that all relevant services are covered.	The users of key ecosystem services were also identified during the PLUPs and reconnaissance field trips, in consultation with stakeholders. A stakeholders list is annexed to this report.
6	Quantify value for each (group of) stakeholder(s)	Values of services can be expressed in social, monetary or ecological terms. Examples: market value of agricultural produce; number of households depending on fisheries; Since regional planning is a participatory process the definition of values can best be done in a participatory manner; for quantification expert input may be needed.	The valuation of ecosystem services will be done during the next phase of the SEA. The results will be presented in the assessment report.
7	Baseline situation and trends for ecosystem services	What is the present condition of an ecosystem service. Does an ecosystem service represent a development opportunity (underexploited) or a constraint (already over exploited). What is the past and expected future trend; what drivers of change are at work (at what scale do they work; at what scale can they be managed; what management option are available in the region).	Baseline data was collected during the field trips and complemented with information from literature to develop the baseline report.

2.5. Environmental Assessment

This is the core step of the SEA and will be carried out in close collaboration with the IRLUP team:

a) Identify impacts and cumulative environmental impacts of development initiatives (positive and negative impacts).
b) Apply relevant tools to the assessment such as matrices, overlay mapping, comparative risk assessment, cumulative impact assessment.
c) Identify and recommend mitigation or enhancement measures and alternatives where applicable for impacts identified.

3. LEGAL AND POLICY FRAMEWORK

The Namibian government has the duty to protect the environment as provided for in article 95 of the constitution. The table below provides a summary of the laws that are applicable to the SEA and IRLUP process.

Table 3:1: Namibian legislations applicable to SEA of Oshana Region

Legislation	Brief description	Applicability to Oshana SEA
The Namibian constitution (Article 95)	Article 95 states: "the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at ***maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of natural resources on a sustainable basis for the benefit of all Namibians both present and future"*** Article 101 further states that; "the principles embodied within the constitution "shall not of and by themselves be legally enforceable by any court, but shall nevertheless guide the Government in making and applying laws." The courts are entitled to have regard to the said principles in interpreting any laws based on them."	Maintenance of ecosystems and sustainable use of natural resources is key in land use planning.
Development Framework (Vision 2030 and National Development Plans)	Namibia's Vision 2030 was launched in 2004 with the rationale to provide long-term policy scenarios on the future course of development in the country until the target year of 2030. The objective of vision 2030 is to ensure that the *integrity of vital ecological processes, natural habitats and wild species throughout Namibia is maintained whilst significantly supporting national socio-economic development through sustainable low-impact, consumptive and non-consumptive uses, as well as providing diversity for rural and urban livelihoods.* Five Year National Development Plans (NDPs) are the main vehicle for achieving this long-term objective. NDP5 is the latest development plan for period 2017/18 to 2021/22	Regional development plans strive to align to the development vision of the country.

The Environmental Management Act – EMA (Act No. 7 of 2007)	The Environmental Management Act No 7 of 2007 aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities that may have significant effects on the environment and to provide for incidental matters. The acts provide a list of activities that may not be undertaken without an Environmental Clearance Certificate.	Section 23 and 24 of the EMA describe the requirement to prepare an Environmental Plan (EP). The Draft Regulations for SEAs and EIAs define an Environmental Plan to mean SEA. The Procedures and Guidelines for a SEA and EP were gazetted in 2008 and have been used as a guide during this SEA process
Environmental Investment Fund of Namibia Act No 13 of 2001	This Act makes provision for the establishment of the Environmental Investment Fund of Namibia. The Fund shall finance activities and projects aimed at promoting: - the sustainable use and management of environmental and natural resources. - the maintenance of the natural resource base and ecological processes - the maintenance of biological diversity and ecosystems for the benefit of all Namibians; and - Economic improvements in the use of natural resources for sustainable rural and urban areas EIF is the only accredited Green Climate Fund Master in Namibia to maximise climate change and mitigation projects. EIF is also an accredited implementing partner of Global Environment Facility (GEF) and positions the country to ensure it benefits from international funding opportunities for environmental projects.	EIF through various funds supports individuals, projects and communities that ensure the sustainable use of natural resources. The focal areas are cross-cutting environmental issues relevant to the SEA and IRLUP such as pollution, climate change, sustainable use of natural resources
Regional Councils Act 22 of 1992	This Act makes provision the establishment and functioning of regional councils. In addition to the powers conferred upon a regional council by Article 108 of the Namibian Constitution it shall, among other things, undertake planning functions and establish, manage and control settlement areas. Communal assets of a settlement area shall vest in the regional council who declared the area.	The mandate of Oshana Regional Council is to plan, administer and manage the socio-economic development of the region. The regional council is therefore instrumental in the process of land use planning

Urban and Regional Planning Act 5 of 2018	The Act consolidates the laws relating to urban and region planning: - To provide a legal framework, principles and standards for spatial planning - To provide for preparation, approval and review of the national special development framework, regional structure plans - To provide for the subdivision and consolidation of land	The IRLUP process takes all these provisions into consideration
The Communal Land Reform Act No. 5 of 2002	The Communal Land Reform Act provides for the allocation and administration of all communal land in the areas described in the first schedule to this Act or in any area declared to be communal land under Section 16(1)(a). The Act makes provision for the prevention of land degradation and for mitigating the impacts of mining, prospecting, road works and water provision. It provides for certain rights to communal farmers and traditional authorities and representation on Communal Land Boards.	To guide sustainable land use practices by traditional authority in allocation and administration of communal land in the region.
The Traditional Authorities Act 25 of 2000	Provides for the establishment of traditional authorities and the designation, election, appointment and recognition of traditional leaders. Defines powers, duties and functions of traditional authorities and traditional leaders	The Ondonga, Oukwanyama and Uukwambi traditional authorities have jurisdictions in the Oshana region and serve as advisors on communal land and customary right matters in the region
Water Resources Management Act 11 of 2013	Provides for the management, protection, development, use and conservation of water resources; for the regulation and monitoring of water services and for incidental matters.	Water management activities and development in the region should comply with the water act
Nature Conservation Ordinance No 4 of 1975	An Ordinance to consolidate and amend the Laws relating to the conservation of nature; the establishment of game parks and nature reserves; the control of problem animals and to provide for matters incidental thereto. The Act makes provision for the conservation and management of wildlife and regulates fishing in inland waters.	This act will apply to wildlife management in ENP and IYT conservancy

Nature Conservation Amendment Act, 1996 (Act No.5 of 1996)	Amended the Nature Conservation Ordinance of 1975 as to provide for an economically based system of sustainable management and utilisation of game in communal areas; to delete references to representative authorities; and to provide matter incidental thereto.	This act will apply to wildlife management in ENP and IYT conservancy
Forest Act 12 of 2001	Consolidates the laws relating to the use and management of forests and forest produce; it provides for the control of forest fires. The Act enables the registration of classified forests, namely state forest reserves, regional forest reserves, community forests and forest management areas.	Community forest activities in the Otshikutshiithilonde community forest in Oshana are governed by this act.
Soil Conservation Act 6 of 1969	This Act covers the prevention and combating of soil erosion; the conservation, improvement and manner of use of the soil and vegetation; and the protection of water sources.	There is a need to address land use activities that contribute to soil erosion
Inland Fisheries Resources Act No. 1 of 2003	Deals with the conservation and utilisation of inland fisheries resources and allows for the updating and development of new policies for the conservation and sustainable utilisation of Namibia's inland fisheries.	This act guides development of aquaculture activities in the region at the Ongwediva Inland Aquaculture Centre and Inspectorate
National Heritage Act No. 27 of 2004	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. 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 such as	Heritage is one of the key components for assessment of the SEA process

Table 3:2. Namibian Policies and plans relevant to the Oshana IRLUP and SEA

Policy/Plan	Description	Relevance to Oshana IRLUP and SEA
National Land Policy	The policy calls for the establishment and proclamation of urban areas, and strives to promote decentralisation and community involvement.	Policy guides the development of urban areas in the region
National Land Use Planning Policy	It provides a framework for the implementation of regionally integrated land use plans.	Framework under which the IRLUP is being developed
National Land Tenure Policy	Covers all land tenure systems in urban, communal, commercial (freehold) and resettlement areas, and is intended to guide all land tenure rights in Namibia. The policy promotes the sustainable utilisation of land and other resources	The IRLUP and SEA process is guided by the principles of sustainable use of natural resources in the region
National Agricultural Policy	The policy's objectives is to promote national and household food security, while recognising the limitations imposed by the country's climate and soils. The policy seeks to promote sustainable utilisation of the land and other natural resources within the context of a vulnerable ecosystem	The IRLUP and SEA process is guided by the principles of sustainable use of natural resources in the region
Regional Planning and Development Policy	The policy acknowledges the trend of the increasing degradation of pastures, rangelands and woodland, with special attention to soil, water and forest management as development tools.	Framework under which the IRLUP is being developed and hence take the objectives of this policy into consideration
Namibia's Drought Policy and Strategy	Is concerned with developing an efficient, even-handed and sustainable approach to drought management.	With drought being a common occurrence in Namibia, the SEA considers the impacts of climate change on the region and possible ways to reduce vulnerability to climate change impacts such as drought
Water and Sanitation Policy	It aims to improve sustainable food self-sufficiency and security and provides a foundation for the equitable and efficient development of water supply in Namibia. The policy promotes the supply of water, and improved sanitation at an affordable cost to all Namibians.	The SEA considers the availability of water and issues of public health in Oshana

Forestry Policy	Aims to reconcile rural development with biodiversity conservation by empowering farmers and local communities to manage forest resources on a sustainable basis. The policy identifies effective property rights; a supportive regulatory framework; good extension services; community forestry; and forest research, education and training as instruments essential to the successful implementation of sustainable forestry management in Namibia. The policy also paves the way for the establishment of community forests and their custodianship by the people most dependent on such resources	The framework that guides the establishment and management of community forests such as the Otshikutshiithilonde Community Forest
National Tourism Policy	Aims to secure and develop important tourism areas so that their value is not undermined by other, unsustainable land use options.	Promotes development of tourism and maximising benefits of tourism to the people and natural resources of the region
Community-based Tourism Policy	Under the terms of the policy, the Ministry of Environment and Tourism is obliged to ensure that development of the community-based tourism sector is environmentally sustainable, and that no development takes place without the participation of the people affected. This objective is geared to emphasise environmental sustainability, biodiversity conservation and community participation in tourism.	Promotes the involvement of local people in tourism. The IYT conservancy has a high tourism potential to ensure that conservancy members benefit from tourism while conserving the environment.
Revised Draft Tourism Policy	This policy stresses that no tourist development should be at the cost of biodiversity and requires that some of the income derived has to be reinvested into natural resource conservation.	Promotes development of tourism and maximising benefits of tourism to the people and natural resources of the region
National Policy on Climate Change	The policy seeks to outline a coherent, transparent and inclusive framework on climate risk management in accordance with Namibia's national development agenda, and the relevant legal framework. The general aim of the Policy is to contribute to the attainment of sustainable development in line with	The SEA incorporates issues of climate change and how the region can build resilience against climate change impacts.

	Namibia's Vision 2030 through strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks.	
Revised Policy of Human Wildlife Conflict Management	To provide measures and approaches to management of human wildlife conflict in a way that recognizes the rights and development needs of local communities, recognizes the need to promote biodiversity conservation, promotes self-reliance and ensures that decision-making is quick, efficient and based on the best available information. In order to achieve this, the Government will devolve decision-making to the lowest appropriate institutional levels, develop appropriate mitigation and monitoring methods and develop the capacity of all stakeholders to manage human wildlife conflict.	Parts of ENP falls in the Oshana region. Issues of HWC associated with neighbouring a wildlife core area are guided by this policy
National Policy on Protected Areas neighbours and Resident communities, 2013	The aim of the Policy is to contribute to the improvement of conservation efforts of Namibia's protected areas, provide greater social equity in accessing benefits from protected areas and stimulate local economic development through creating business opportunities linked to protected areas. Appropriate economic opportunities and benefits will be provided to protected area residents and neighbours in accordance with the Government's Policy on Tourism and Wildlife Concessions on State Land	A framework under which conservancies operate to ensure communities neighbouring parks receive social and economic benefits from parks
National Policy on Community Based Natural Resource Management, 2013	To provide a framework that promotes the wise and sustainable use of natural resources on State Land outside Protected Areas, as well as the promotion of integrated land and natural resources planning and decision making that considers the most appropriate land uses based on land capability, optimum economic return, environmental and human needs.	A framework under which conservancies and community forests operate to ensure communities receive social and economic benefits from managing natural resources

4. BASELINE – OVERVIEW OF THE OSHANA REGION

4.1. Socio-economic Aspects

4.1.1. Regional Demographic information

Oshana region is situated in North-central Namibia and covers an area of 8,647km^2 (Namibia Statistics Agency, 2017). The region covers approximately 1.05% of the country's land mass, making it the smallest region in Namibia. Oshana is named after the most prominent landscape features locally referred to as *'iishana'* which are shallow, seasonally inundated depressions of water that underpin the local ecological system.

Oshana region has eleven constituencies namely, Okaku, Okatana, Okatyali, Ompundja, Ondagwa Rural, Ondangwa Urban, Ongwediva, Oshakati East, Oshakati West, Uukwiyu Uushona and Uuvudhiya. Oshakati is the capital city of the region. The Oshakati-Ongwediva-Ondangwa complex is the urban centre and has the largest population concentration in the region. The table below provides a summary of demographic information contained in the Namibia Inter-censal Demographic Survey Report of 2016.

Table 4:1. Summary of key demographic information of Oshana Region (Namibia Statistics Agency, 2017)

Statistic	Value
Regional Area	8,647km^2
Population size	189,237
Population Density	22/km^2
Human Development Index (HDI)-2017[2]	0.669
Percent male population	38
Percent female population	52
Unemployment rate	37%
Annual population growth rate	1.4%
Percent in Urban	46
Percent in rural	54
Literacy rate	94.1

With an average population density of 22 people per km^2, Oshana is the second-most densely populated region after the Ohangwena region with a population density of 24 people per km^2.

[2] The Human Development Index (HDI) is a metric compiled by the United Nations to quantify a country's average achievement in three basic dimensions of human development: Health, Knowledge and Standard of Living. The index is expressed as a value between 0 and 1, with 1 being the highest and 0 the lowest (WHO, 2022).

Although English is the official language, Oshiwambo is the most spoken language with over 94% of households having Oshiwambo as the main language spoken at home. More than half of the region's population lives in rural areas. Figure 4.1 below is a map of the region indicating the constituencies and the main land use features.

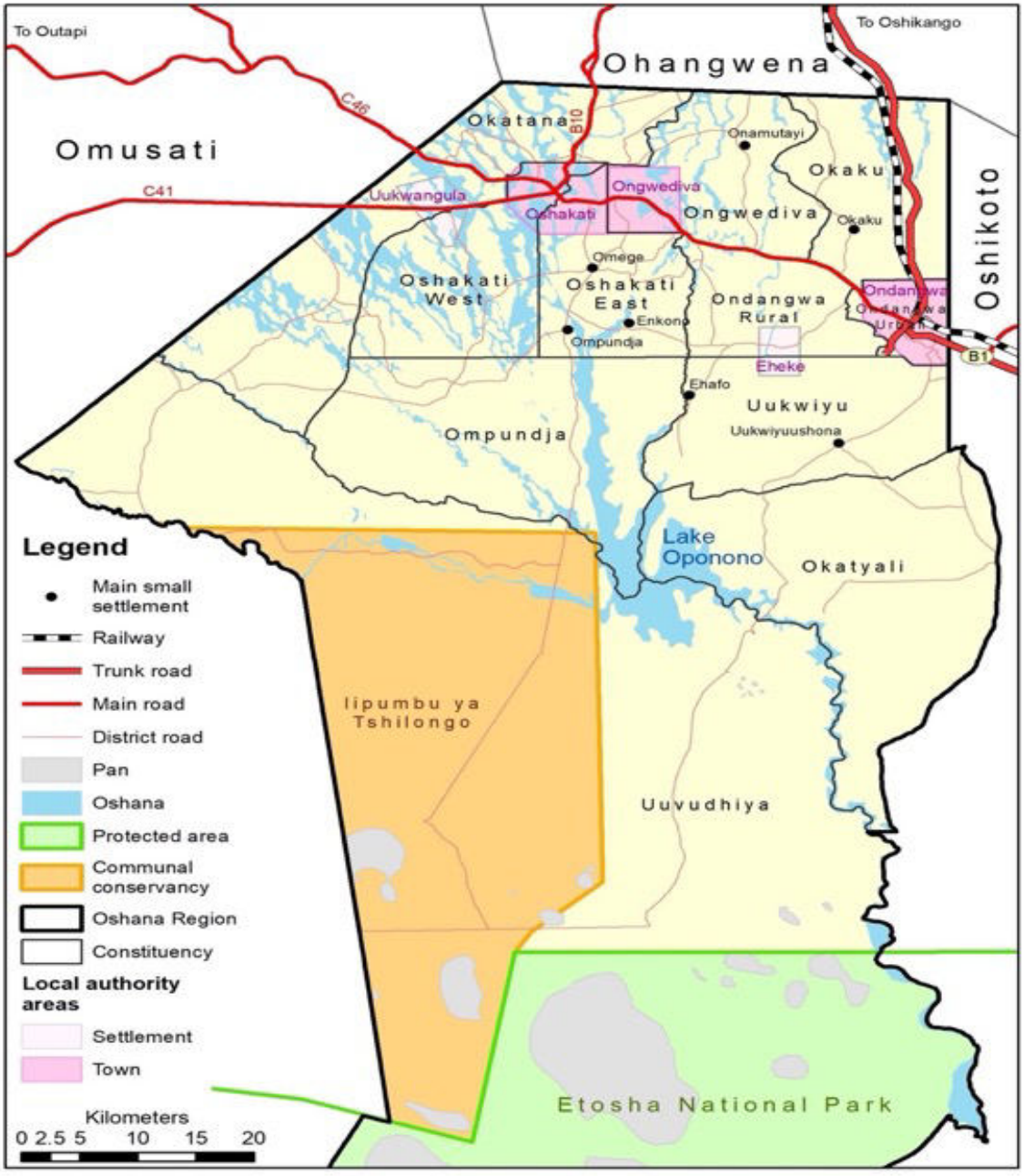

Figure 4.1: Oshana Region – Constituencies and main land use features (Urban Dynamics, 2021)

4.1.2. Housing and social welfare

The graphs below provide a summary of the materials used to construct roofs, walls and floors of housing units in the region. Although this information provides important indicators for housing condition and welfare of households, it also highlights how much the population is dependent on natural resources within the region. The distribution is based on 44,544 households (Namibia Statistics Agency, 2017).

According to the State of Environment Report of 2020, Oshana was one of the regions with an oversupply of housing and no significant housing deficits (MEFT, 2021).

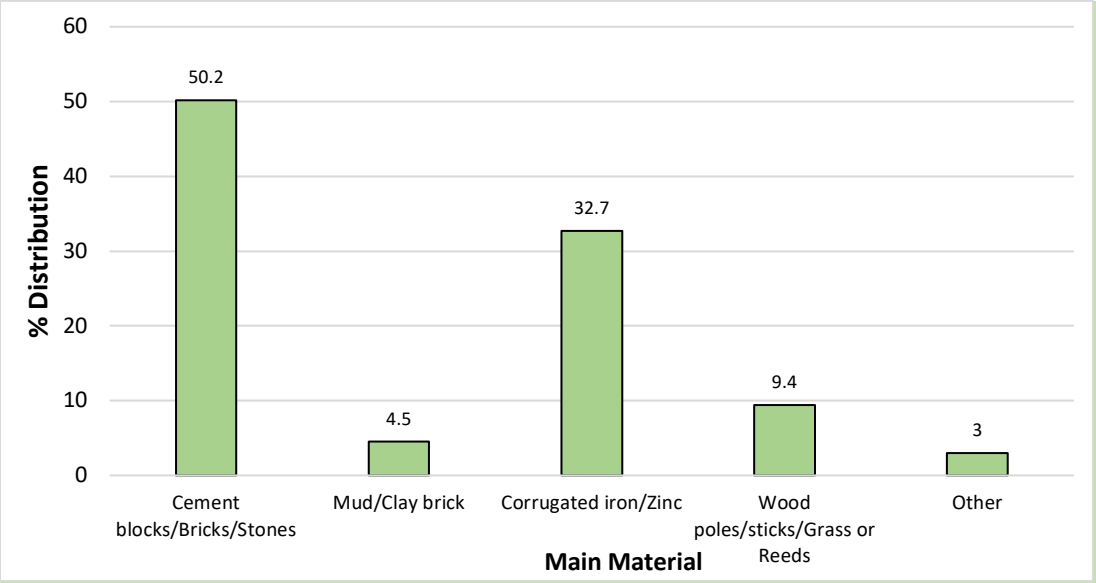

Figure 4.2. Distribution of household by main material used for construction of housing units (outer wall) (Namibia Statistics Agency, 2017)

About 13% of the population uses some form of natural resources for building of the outer wall areas of households. This includes the use of natural resources such as wood, poles, sticks, grass or reeds and mud or clay bricks.
Other refers to: prefabricated, burnt bricks; tin, wood/board/plastic.

In addition, statistics show that at least 18% of the region's population uses grass or thatch for roofing purposes. Most of these are in the rural areas (villages) where traditional building methods are used for homesteads.

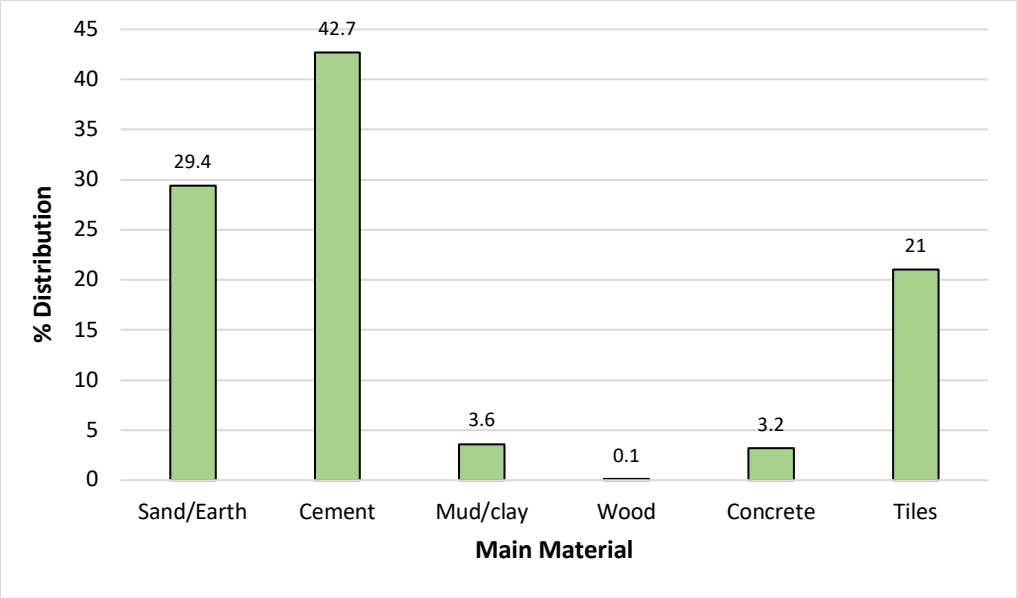

Figure 4.3. Distribution of household by main material used for construction of housing units (floor) (Namibia Statistics Agency, 2017)

Approximately 33% of the population uses sand or clay for constructing floor areas in households. In the case of sand, this may not necessarily imply harvesting of sand but rather that the floor areas is kept as sand and not constructed. This is common in the traditional homesteads of the Aawambo people.

According to the Namibia Statistics Agency **(**2017), at least 46.6% of the region's population relies on wood/firewood as the main energy source for cooking.

The results above indicate that the inhabitants of the Oshana region are still reliant on the use of natural resources in households.

4.1.3. Water supply and sanitation

By 2016, at least 98.4% of households in the Oshana region had access to safe water. This is the highest percent access to safe water in Namibia after the Khomas region.

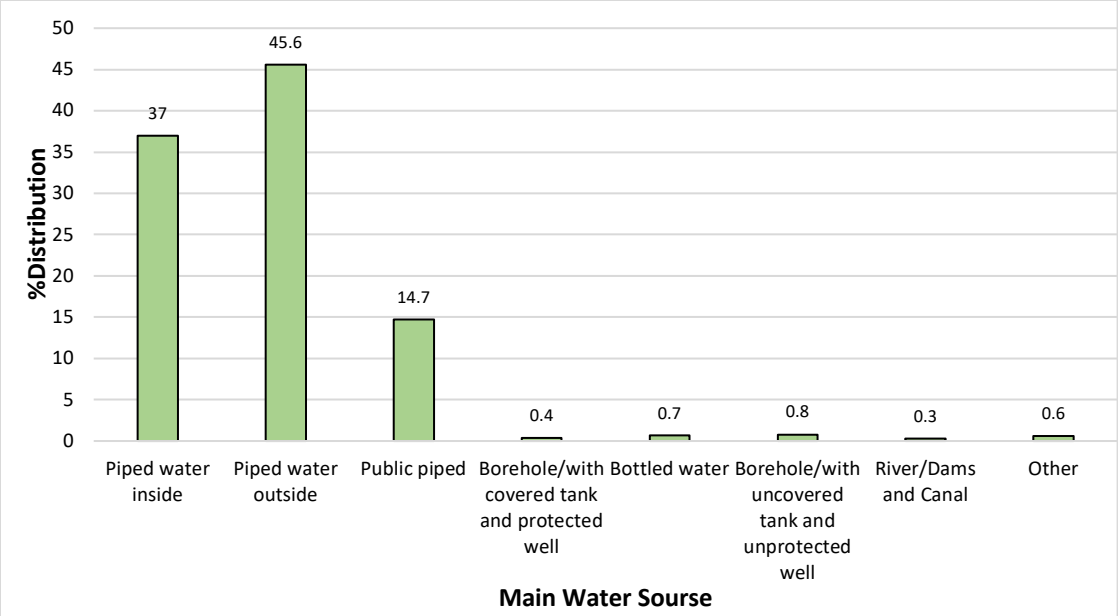

Figure 4.4. Percent distribution of households by main source of drinking water

There has been notable improvement in access to safe water in the region as compared to 2011 when the last census was held. In 2011, the distribution of households with access to safe drinking water in the region was 84% (Namibia Statistics Agency, 2017).

The graph in **Figure 4.5** below presents the percentage distribution of households by the main type of toilet facilities.

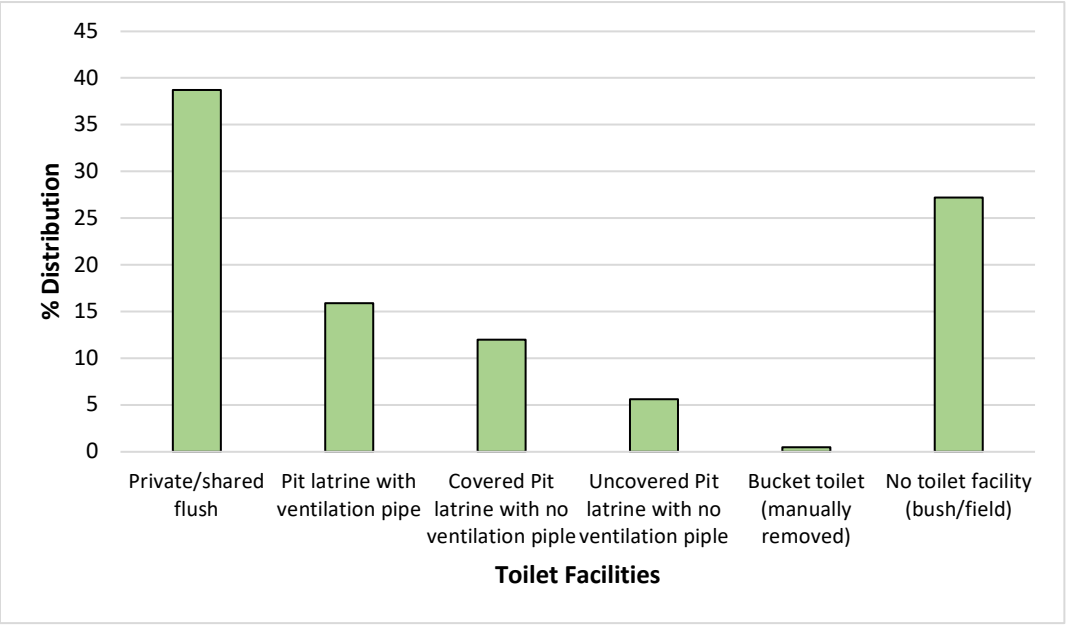

Figure 4.5. Distribution of households by main toilet facilities

The distribution of households with no access to toilet facilities were also significantly reduced from 46% in 2011 to 27% in 2016 (Namibia Statistics Agency, 2017). This implies that at least 73% of households have access to some form of toilet facilities. There is still a need to further improve sanitation in the region for 27% of the population.

4.1.4. Solid Waste Management at household level

The graph below presents the percentage distribution of households by means of solid waste disposal.

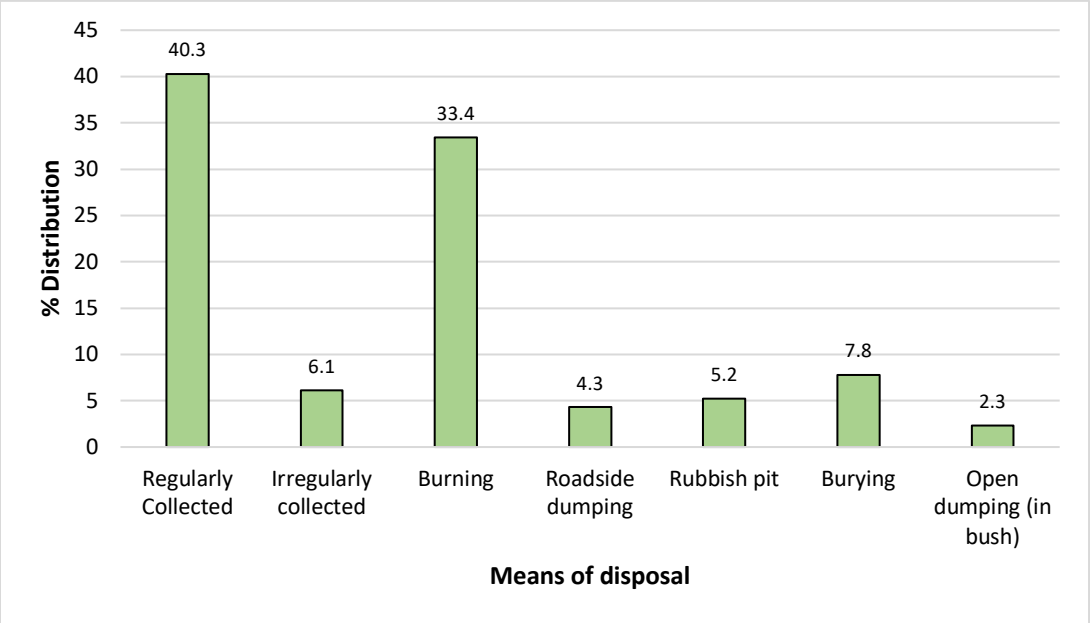

Figure 4.6. Distribution of households by means of waste disposal (Namibia Statistics Agency, 2017)

About 46% of households in the Oshana region get their waste collected by service providers. Regular waste collection stood at 40.3% and is mostly common in urban areas. Burning was the second most practiced method of waste disposal at 33.4%, followed by burying (7.8%). Open dumping in the form of roadside dumping (4.3%), rubbish pits (5.2%) and open dumping in the bush (2.3%) is still practiced in the region.

4.2. Economic Aspects

4.2.1. Agriculture

Rainfed agriculture in the form of dry crop production is the main source of livelihood for most people. Livelihoods in this context is not only in monetary terms but also refers to the main products produced for consumption or sale. The main crops grown are mahangu (pearl millet), sorghum, maize, groundnuts, beans, pumpkins and melons (Oshana Regional Council, 2018). Subsistence farming accounts for 11.9% of household income sources in the region (Namibia Statistics Agency, 2017).

Other income sources in households are from the government through pension grants (pensioners) and social grants (orphans and vulnerable children) and the majority of the youth who are employed outside the constituency.

There are currently no green schemes in the region. Plans are however underway to construct 44 earth dams to harvest flood waters, and establish 44 green schemes in the 11 constituencies to boost food security in the region (Shigwedha, 2021). The authorization from the Ministry of Agriculture, Water and Land Reform (MAWLR) and the National Planning Commission (NPC) has already been granted. The proposed sites have been identified in consultation with the community.

Although there are no green schemes in the region, the Agro-Marketing Agency (AMTA)'s fresh produce hub is housed in the Oshana region in the Ongwediva Constituency. This hub helps farmers to market the fresh produce and its use would be enhanced should the proposed green scheme projects be implemented.

In 2013, it was estimated that the region was home to 149,585 large stock, 74,567 small stock, 11,891 donkeys, 6,800 pigs and 75,593 poultry (Directorate of Veterinary Services). The current livestock population is not known, however it is assumed that the numbers may have decreased after the 2013/14 and 2018/19 droughts. Livestock farmers sell their cattle to Meatco, informal slaughterhouses or individual sales. The off-take to these markets are however quiet low compared to other regions.

4.2.2. Value addition to Non-timber Forest products

The use of natural products, particularly non timber forest products are a source of livelihoods for most women in Oshana region.

Marula Trees

Marula trees (*Sclerocarya birrea*) are dominant is several constituencies in the region. Marula is the most important tree for rural communities because it yields so many products (Marula juice-1, Marula juice-2, Marula oil-1 (food), Marula oil-2 (lotion / cosmetic, fruit peel and leaves = livestock fodder). Other fruit trees produce just fruit and perhaps have a few other uses. With marula anything and everything can be used. As a result, the Marula tree is very important to the local communities, not only as a food source, but it also carries a cultural symbolic value.

Table 4:2. Marula components and its uses

Marula component	Uses / Value
Seed – kernel (endocarp)	Marula Oil (Odjove) – food
	Marual Oil – Pharmaceutical (e.g. sun-block)
Fruit pulp (mesocarp)	Beverage 1 (Omagongo)
	Beverage 2 (Oshinwa)
	Beverage 3 (Amarula liqour)
	Marula jam
Fruit Skin (epicarp)	Livestock fodder
Leaves	Fodder + fertilizer (compost)
Roots and Bark	Medicinal uses

Figure 4.7. Marula jam (left) and the making of Omagongo (right)

The Eudafano Women Manufacturing (owned by Eudafano Women's Cooperative) is a local company that produces marula and melon seed oil for cosmetics. They buy marula kernels and melon seeds from women associations in different villages in northern Namibia. The factory is situated in Ondangwa and produces on average over 10 tons of oil annually to local and international markets in USA, Europe and Africa (NANCI, 2022).

Figure 4.8. Eudafano Marula oil processing facility (Ondangwa) (TEC, 2019)

Value from other indigenous Trees

Plant	Uses/Value
Ziziphus mucronate, Grewia species and Makalani fruits (*ondunga*)	Traditional gin (*ombike*)
Jackalberry (*eenyandi*)	Fruits for household consumption and sale
Bird plum (*eembe*)	Fruits for household consumption and sale

Income Generation Potential from crops and other non-timber products

Oshana is endowed with natural resources that show high potential for value addition and increased income generating opportunities, particularly for the rural women.

The surplus crops produced are often sold at a selling point at Opoto. Mahangu grains sell at a price of N$85 per 20L bucket. The constituency is dominated by *Sclerocarya birrea* (Marula trees). The locals harvest its fruits and add value by making traditional wine (omagongo), marula jam and marula oil (odjove). Women also produce traditional gin (ombike) from the indigenous fruits such as the makalani.

Value addition to indigenous natural products such as non-timber products from plants need to be enhanced. This would improve household income, food security and help to alleviate poverty through the sustainable use of natural resources.

4.2.3. Tourism and Wildlife

The region's landscapes and cultures give it a high tourism potential. A section of the of Etosha National Park (ENP) falls in the southern part of the Oshana region.

ENP is a gazetted protected area in Namibia with an array of wildlife. The Okaukuejo resort in ENP lies within the Oshana region and is one of the popular tourist attraction sites for both local and international tourists. According to the Oshana Region's Development Profile, the main tourist attraction sites identified in the region include:

- Etosha National Park (ENP)
- Otjivalunda Salt pan (Ekango Lyomongwa) and
- Lake Oponono.

Other accommodation facilities exist within the major town centres of Oshakati, Ondangwa and Ongwediva to cater to visitors. Opportunities for cultural tourism exist but are however not well explored.

The Iipumbu ya Tshilongo Conservancy (IYC) is the only conservancy in the Oshana region. Communal conservancies are self-governing, democratic entities, run by their members, with established boundaries that are agreed with adjacent conservancies, communities or land owners (NACSO, 2020).

The conservancy was officially registered in May 2012 and covers an area of 1,548km^2. The conservancy was established to improve livelihoods of communities through wildlife conservation and tourism. Wild animals move freely between ENP and the conservancy giving it a high tourism potential.

4.2.4. Mining

There is limited mining potential in the region. The salt pans at Otjovarunda in Uuvudhiya constituency has a potential for salt mining particularly of minerals such as trona, burkete and sodium suphate (Enviro Dyanmics, 2013).

A proposal for salt mining of salts and subsequent soap production at Otjivalunda was submitted by Gecko Mining in 2013. An EIA was conducted with public consultations. The proposal was however rejected by the community resulting in an Environmental Clearance Certificate not being issued by MEFT.

The other mining potential in the region is that of clay for production of ceramic products. A large renewable deposit of clay is found at Ekulo lya Nanzi (Oshana Regional Council, 2018).

4.2.5. Fisheries and Aquaculture

The region lies within the drainage channel of the Cuvelai-Etosha Basin watercourse system. The basin is part of a transboundary catchment shared by Angola and Namibia. During the rainy seasons, water flowing into the region from Angola brings in various types of fish, the most common being catfish (*Clarias gariepinus*). Fish is harvested by local people for economic benefits as well as for own consumption. Monitoring and surveillance activities are regularly performed

on the various inland water bodies to curb harmful fishing practices and protect inland water.

The Ongwediva Inland Aquaculture Centre and Inspectorate office provides an opportunity for the development of an aquaculture industry for interested farmers. The aquaculture centre can facilitate access to information pertaining to fish farming and provide fingerlings for start-up projects (Oshana Regional Council, 2018).

The Oshana Development profile highlights the demand for freshwater fish as an area that warrants urgent investment for the establishment of fish farming, processing and storage facilities for sustainable supply of fish in the region. Water bodies such as Lake Oponono, Yinakulu Yomathiya and Uulili were identified as potentials that could be transformed into income-generating opportunities for the region through fish farming activities.

4.3. Administration and Governance

There are 3 levels of governance under which Oshana is governed, the political structure under the Oshikoto Regional Council, the local authorities' structure and Traditional Authorities. The eleven (11) political constituencies are each represented by a regional councillor. A chairperson of the regional council is elected from the 11 councillors. The region has three (3) local authorities: Ondangwa, Ongwediva and Oshakati. The local authorities are represented by the local authority councillors, who elect a mayor of each town amongst themselves. There are three (3) traditional authorities namely Uukwambi, Ondonga and Oukwanyama that serve as advisors on communal land and customary matters (Oshana Regional Council, 2022a).

The Governor is the political head of the region and his role is to provide strategic political leadership within the framework of the law, acting as a link between central government and the regional council. Oshana region is headed by the Regional Governor, Hon. Elia Irimari (at present), who is appointed by the President of the Republic of Namibia.

4.4. Infrastructure Development

Development of reliable infrastructure is vital for enhancing socio-economic development. Development and upgrading of infrastructure is an important component for assessment during the SEA. The following are key infrastructure developments in the region that would be relevant to the SEA and as identified in the 2022 State of the Region Address (SORA):

- Transport infrastructure
- Water Infrastructure
- Energy Infrastructure
- Education infrastructure
- Sports infrastructure
- Telecommunication Infrastructure

4.4.1. Transport infrastructure

Transport infrastructure in the Oshana region include

- Roads (tarred, gravel and two-track)
- Railway line and train stations
- Airport

The table below summarises major transport infrastructure development in the region.

Table 4:3. Major transport infrastructure development activities in Oshana region for 2021/22 financial year (Oshana Regional Council, 2022b)

No.	Description	Value (NAD)	Status
1.	Expansion of the railway line from Ondangwa to Oshakati	Not known	
2.	Upgrading of Okatana-Ongwediva Road to bitumen standards	24.1 million	Completed
3.	Upgrading of Andimba Toivo ya Toivo Airport Intersection Road	6.3 million	Completed
4.	Rehabilitation of Burrow pits (phase 1)	11 million	Ongoing
5.	Upgrading of the DR3607 from Oshakati to Ekango	Not known	Planned for 2022/23
6.	Rehabilitation of road between Oshana Mall and David Shikomba Complex	2.2 million	Planned for 2022/23

4.4.2. Water infrastructure

Water is the source of live for all living organisms. Effective water infrastructure systems ensure sufficient and clean water supply to safeguard the public from waterborne diseases. Effective water management is essential for socio-economic development. Oshana region has the following infrastructure for water resources management:

- Calueque-Oshakati Water Canal
- Water purification plants
- Dams
- Pipelines

A description of water resources and associated water infrastructure is outlined in section 4.5.3.

Table 4:4. Major water infrastructure development projects in the Oshana region since 2021 (Sources: (Oshana Regional Council, 2022b) and (MAWF & AfDB, 2019)

No.	Description	Value (NAD)	Status
1.	Upgrading of the Oshakati water purification plant	8.96 million	Completed

2.	Rehabilitation of the Calueque-Oshakati canal	Not known	Planned for 2022/23
3.	Rehabilitation of the Ogongo-Oshakati water supply scheme	Not known	Planned for 2022/23
4.	Construction of Water Treatment Plant at Oshakati	50 million	Planned for 2022/23
5.	Upgrading of water pipeline from Okapya to Oshuunga (4.7km)	173,551.55	Completed
6.	Rain and Floodwater harvesting infrastructure (excavation of 44 earth dams)	Not known	Planning underway

4.4.3. Energy infrastructure

Economic development is associated with increasing demand for energy. The Oshana Regional Council emphasises the importance of diversifying its energy sources to meet the high demand for energy in the region. The following energy infrastructure development projects are planned for the region:

Table 4:5. Energy infrastructure projects in Oshana region (Oshana Regional Council, 2022b)

No.	Description	Value	Status
1.	Upgrading of the Omatando sub-station from 10MVA to 20 MVA	12 million	Planned for 2022/23
2.	Installation of LED street Lighting in Ondangwa	640,000.00	Planned for 2022/23
3.	Electrification of Omahenene and Onanyoka growth points (for 153 households and 32 SMEs)	3.2 million	Planned for 2022/23

4.4.4. Education Infrastructure

Oshana region has 137 schools, catering to 50,740 learners (Oshana Regional Council, 2022a). These are complemented by tertiary institutions such as the University of Namibia (UNAM), International University of Management (IUM), Vocational Training Centres and several hospitality training institutions.
The following infrastructure development projects are planned for schools:

Table 4:6. Current and planned education infrastructure development projects in Oshana region (Oshana Regional Council, 2022b)

No.	Description	Value (NAD)	Status
1.	The construction and refurbishment of Andimba Toivo ya Toivo SS	154 million	77% completed
2.	Construction of 2 blocks of classrooms at Ondjadjo SSS	11.8 million	95% completed
3.	Construction of Community Hostel at Ondjadjo SSS	11.8 million	98% completed

4.	Construction of Intellectual Impairment section and hostel at Eluwa Special School	8.6 million	
5.	Construction of Oshana School of Computing (funded by RANI Traders)	3.9 million	99% completed
6.	Construction of 1 x2 block of classrooms at Ompadakani CS	722,495	75% completed
7.	Construction of 16 classrooms at Ekuku and Ondiiyala JPS	35 million	Planned for 2022/23
8.	Construction of 6 classrooms, ablution and administrative block at Ondjadjo SS	3.95 million	Planned for 2022/23

4.4.5. Urban Development Projects

In addition to the infrastructure development project mentioned above, local authorities availed funding for development of urban areas as outlined below.

Table 4:7. Regional Capital Projects- Oshana region (Oshana Regional Council, 2022b)

No.	Description	Status
1.	Construction of a State-of-the-ArtSport Stadium at Ondangwa	Planned for 2023-2027
2.	Construction of a sports stadium at Ongwediva	Planned for 2022/23
3.	Construction of Sewer reticulation services infrastructure in Ongwediva	Planned for 2022/23
4.	Construction of storm water channels in Ongwediva	Planned for 2022/23
5.	Construction of a fire station at Oshakati	Ongoing

4.5. Biophysical Aspects

4.5.1. Landscape and Soils

Oshana is one of the only three (3) regions in Namibia that do not have a coastline or bordered with a neighbouring country. Oshana is bordered by Omusati to the west, Oshikoto to the East, Ohangwena to the north and Kunene to the south. It is also the smallest region in the country covering and area of 8,647km^2.

The region is relatively flat with no mountain ranges or canyons. The soil type is of the Kalahari Group made up of deposits of sands, clays and calcretes (Mendelsohn et al., 2003b). Such soil type has low soil fertility due to its low nutrient content retaining capacity and therefore has low potential for crop growth. To improve soil fertility, fertilizer or manure is often used to enhance crop production.

4.5.2. Climate and Climate Change

Oshana is one of the warmest regions in Namibia with average daily maximum temperatures of 33°C. The region falls within the zone of the highest solar radiation in the country with total radiation between 6.2-6.4 kWh/m^3/day (REEEI & HRDC, 2008). This is because the elevation of the sun is higher in north central Namibia compared to other parts of the country.

The region is classified as semi-arid, with average annual rainfall in the range of 300 to 450mm. Rainfall in the region is variable and both floods and drought episodes have been frequent in recent years. The worst drought over the past decade that had devastating impacts on food security was between 2013 to 2016. The unpredictable frequent floods and droughts in the region calls for a need to improve flood and drought monitoring and early warning systems in the country.

Oshana is one of the regions that is most vulnerable to climate change and climate variability. Combined with the effects of environmental degradation, social vulnerability to poverty inequalities and changing climate will compromise subsistence farming in the region. In addition, sociodemographic characteristics of the region characterized by high levels of unemployment, high elderly population and high dependency on traditional agricultural livelihoods are an indication of the vulnerability of most households to climate change (Angula & Kaundjua, 2014).

Climate change projections indicate that Namibia is expected to get hotter with reduced precipitation. This will therefore result in increased droughts and more prevalent fires in most parts of the country.

Increased drought conditions may also exacerbate Human Wildlife Conflict in the region, particularly with elephants. Because of limited water availability, there will be a 'competition' for water between humans (for consumption and for livestock) and wildlife.

4.5.3. Water resources

Oshana lies in the heart of the Cuvelai-Etosha Basin. The Cuvelai-Etosha Basin is a transboundary wetland area shared by Angola and Namibia. It consists of hundreds of drainage channels called *iishana* (singular-oshana) that flow southerly from the highlands of southern Angola towards the Etosha pan (Mendelsohn et al., 2013). *Iishana* are shallow, seasonally inundated depressions of water that underpin the local ecological system. *Iishana* are the most prominent landscape features in the region, and hence the name 'Oshana region'.

The Kunene River is also an importance source of headwater for the *iishana* system. Part of the river water is diverted from Angola to the Namibian part of the Iishana-System by the 155km Calueque-Oshakati Canal (Arendt et al., 2021).

The Calueque-Oshakati Water Scheme is the only bulk transfer scheme out of the Kunene River basin. This scheme consists of an open channel of a pipe network of more than 2000km to supply four water purification plants in northern Namibia. Of the purification plants, two (2) are found in Oshana at Olushandja and Oshakati.

These treatment plants have water production capacities of 100m^3/h and 2,000m^3/h respectively (NamWater, 2021).

4.5.3.1. Surface Water

There are no perennial rivers in Oshana. Iishana are the main surface water sources. They are dry most of the year but are prone to major flooding (efundja) during the rainy season because of the flat topography of the region. Flooding is not only because of local rainfall, but also due to extensive rainfall in high rainfall zones upstream in Angola.

Although floodwaters cause widespread damage and displacement of people, it is also a source of livelihood for inhabitants. Fish and frogs during rainy seasons are a source of income and food for most households in rural areas. In addition, these episodic surface waters support crops growth and provide grazing for livestock.

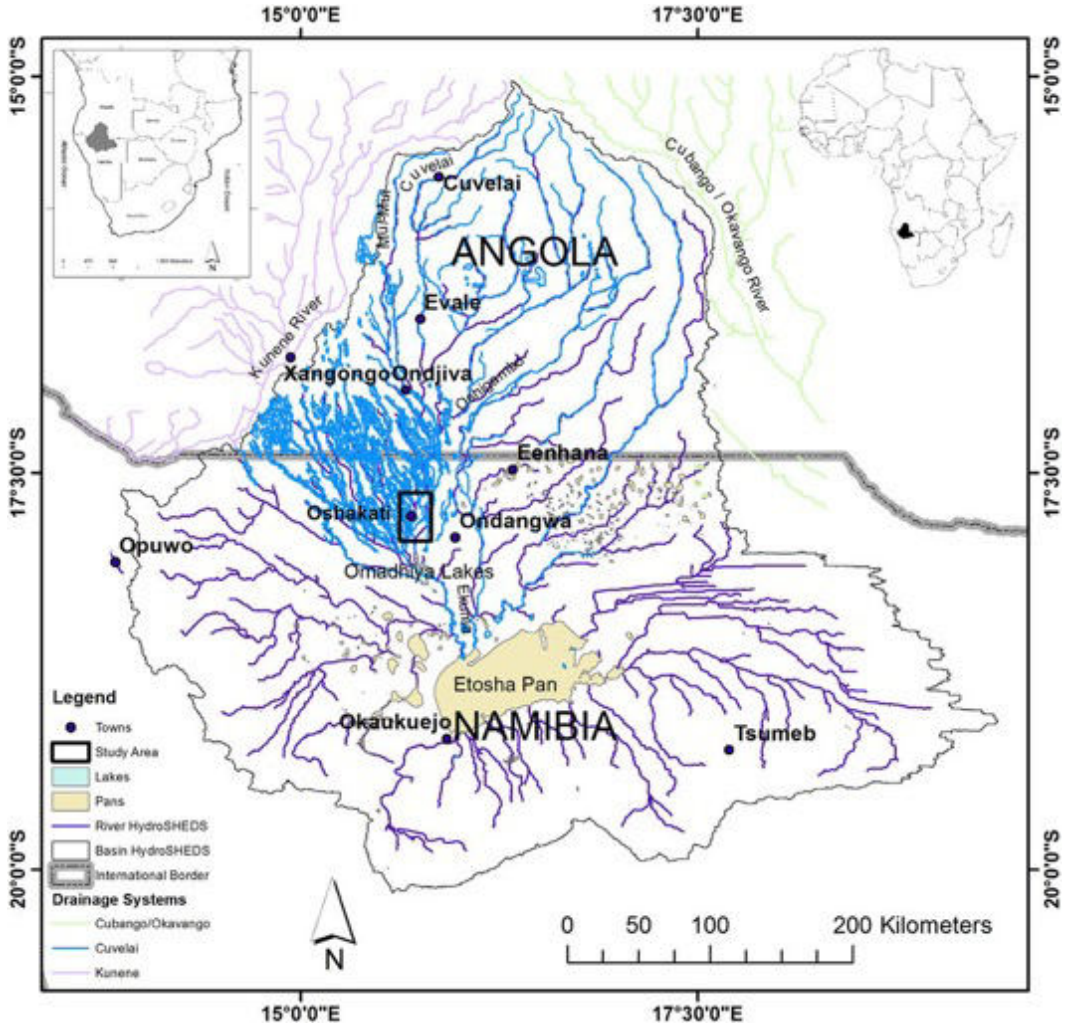

Figure 4.9. The catchment area of the Cuvelai-Etosha Basin. Source: (Persendt & Gomez, 2016)

Iishana are a rich source of protein from catfish and frogs during the rainy season. This drainage basin is dominated by five species of fish that migrate towards the Etosha Pan. The fish die off when the water dries up and re-appears again during the next rainy season. A reconnaissance fish survey conducted in 2017 revealed that that this basin is a major migratory route for three (3) fish genera namely the *Entoromius, Oreochromis* and *Clarias* (Hipondoka et al., 2018). These are all eurytopic species that are known to undertake upstream, lateral, and downstream migrations in flood plains.

A series of extensive grassy pans that merge into large water bodies (known as the Omadhiya Lake Complex) during flooding periods are common source of surface water in the region (Mendelsohn et al., 2013). The Omadhiya Lake comprises of Oshituntu, Uulindi, Onamangwena and Oponono lakes with the latter being the largest.

4.5.3.2. Groundwater

A major part of Oshana falls within the zone of 'Little to no groundwater reserves. The characteristics of the aquifer system in Oshana is summarized below.

Table 4:8. Characteristics of the Oshana aquifer system (Mendelsohn et al., 2013)

Aquifer System	Oshana multi-layered aquifer
Main rock type	Sand, calcrete/limestone
Depth below surface (m)	10-80
Water Quality	Saline to hyper saline
Borehole yield (m^3/h)	1-30

Shallow groundwater sources of small freshwater ponds known as *eendobe* and shallow hand-dug wells called *omithima* are some sources of groundwater. These were the main sources of water for years before the introduction of pipe or pump water (Mendelsohn et al., 2013).

4.5.4. Vegetation and Biomes

Vegetation type is influenced by the type of soil, geology and rainfall pattern in the region. The vegetation biome in Oshana is the Tree-and-shrub Savannah, made up of the Cuvelai drainage and Mopane shrubland.

The mopane shrubland is dominated by the *Colophospermum mopane (locally referred to as "omusati')* and other woody species such as *Acacia fleckii, Boscia albitrunca*, *Commpiphora Africana*, *Grewia flavescens* and *Dichrostachys cinerea* (Curtis & Mannheimer, 2005). Makalani palm trees (*Hyphaene petersiana*) are prominent in Oshana, and most dominantly places with slightly saline soils.

In terms of plant productivity, areas in the northern part of Oshana produce very little plant biomass. The vegetation in this area is also degraded because this is where majority of the population lives, and where subsistence farming take place. Several species of plants occurring in Oshana are categorised as Protected Plant species of Namibia. Amongst these include

- *Colophospermum mopane* (Omusati)
- *Berchemia discolor (*Bird plum, Eembe*)*
- *Acacia erioloba (*Camethorn, Omuthiya*)*
- *Ziziphus mucronate (*Omusheshete*)*
- *Diospyros mespiliformis (*Jackalberry, Eenyandi*)*
- *Sclerocarya birrea (*Marula, Omugongo*)*
- *Hyphaene petersiana (*Makalani palm, Omulunga*)*
- *Commpiphora Africana (*Hairy corkwood*)*
- *Devil's claw (*omalyata*)*

Protection of forests is key to addressing the impacts of climate change. In the latest Nationally Determined Contributions (NDC) (updated in 2021), Namibia has set an ambitious target of reducing its carbon emissions by 91% by 2030. One of the commitments towards achieving this target is to reduce the rate of deforestation by 75% which ensures that woodland areas remain as carbon sinks.

5. ECOSYSTEM SERVICES

5.1. Definition

Ecosystem services are the direct and indirect benefits that the natural environment provide that make life possible for humans. These benefits include, but not limited to food, water, energy, building materials, flood protection and spiritual values. The concept of ecosystem services has been developed to describe the value of nature to people (NWF, 2020). Ecosystem services are divided into four (4) main categories:

- Provisioning services
- Regulating services
- Cultural services
- Supporting services

Ecosystem services assessments can help to describe the impacts of policy and program decisions on the well-being of communities and economies that depend on ecosystems. Studies indicate that it is important to integrate ecosystem services into strategic decision-making, so that the impacts of development activities on the ecosystems and the services they provide, can be considered at the earliest appropriate stage (Geneletti, 2016).

The SEA is well positioned to mainstream environmental sustainability across the full range of development policies and programs. It is applied to safeguard critical resources and ecological functions in conditions of uncertainty or limited understanding of the potential impacts of development activities (OECD, 2010).

5.2. Objective of Ecosystem Services Assessment

The objective of ecosystem assessment is to identify the development opportunities and constraints for the region.

5.3. Overview of Ecosystem Services of Oshana region

Oshana lies within the Cuvelai Wetlands system which is characterised by the Cuvelai drainage vegetation. The Cuvelai drainage vegetation consist of five (5) vegetation units (ecosystems) namely:

- Mopane shrubland
- Oponono Saline Grasslands (*Ombuga* grassland)
- Oshanas (*iishana*)
- Oshana-Kalahari Mosaic
- Pans and lakes

The sixth ecosystem in Oshana is the *Etosha grass and dwarf shrubland* which does not fall within the Cuvelai Drainage vegetation. The map below outlines the vegetation

biomes (habitats) that make up the Oshana region and represent the 6 main ecosystems in the region.

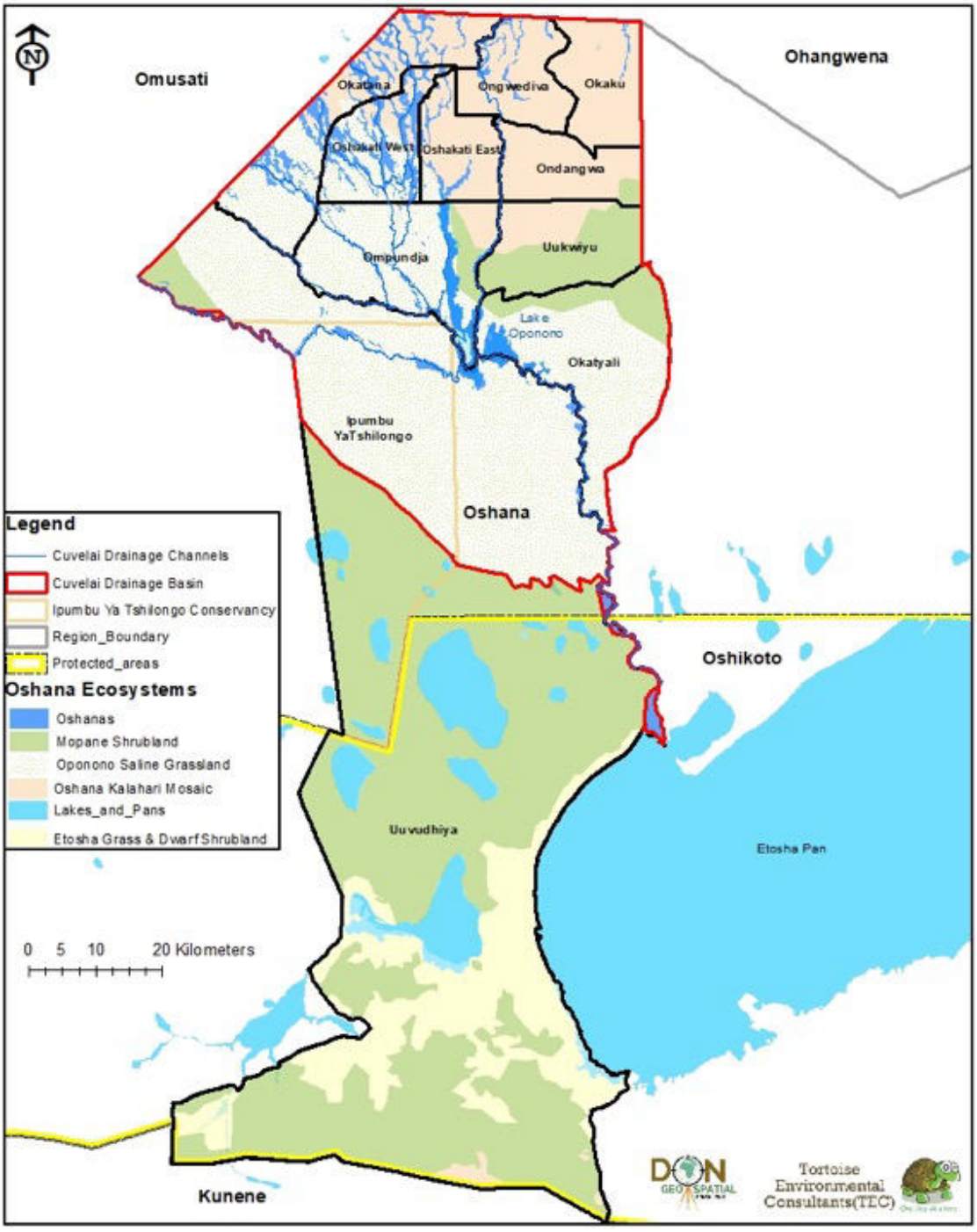

Figure 5.1. Ecosystems in Oshana region (TEC,2022)

The table below provides a brief description of each of the ecosystems above.

Table 5:1. Description of ecosystem services of Oshana region

Ecosystem	Description
Mopane shrubland	The mopane shrubland is dominated by the *Colophospermum mopane (locally referred to as "omusati')* and other woody species such as *Acacia fleckii, Boscia albitrunca*, *Commpiphora Africana*, *Grewia flavescens* and *Dichrostachys cinerea* (Curtis & Mannheimer, 2005). In

	the mopane savanna *Schmidtia kalihariensis, Pogonarthria fleckii* and *Stipagrostis uniplumis* are the most common grasses. The landscape of the mopane shrubland is a mix of alluvial clays and aeolian sands which are generally salty. The roots of woody species are therefore unable to reach nutrients and water beneath these layers resulting in vegetation of stunted nature of less than 2.5m (Mendelsohn et al., 2013)
Oponono Saline Grasslands (*Ombuga* grassland)	This saline grassland area is a flat plain covering an area of approximately 3,000km^2 making it the most dominant terrestrial ecosystem in the region. Because of soil salinity and shallow depth of the soil, there is no growth of woody species. The most common grasses in Ombuga grassland are *Odyssea paucinervis*, *Aristida stipioides* and *Schmidtia kalihariensis* (Klintenberg, 2007). Ombuga is one of the important grazing areas in the region. Makalani palm trees (*Hyphaene petersiana*) are prominent in Oshana, and most dominantly places with slightly saline soils.
Oshana-Kalahari mosaic	This ecosystem consists of deep infertile sands which hold little water. The sands are not suitable for crop production however tall woodlands grow on these sands. Most important fruit trees such as Bird plum (*eembe*), Jackalberry (*eenyandi*) and Murula trees occur in this ecosystem.
Oshanas (iishana) as part of the cuvelai drainage system	The cuvelai drainage system is made up of hendreds of drainage channels (*iishana*) that flow southwards towards the etosha pan. *Ishana* are shallow, seasonally inundated depressions of water that underpin the local ecological system and are the main source of surface water. Most parts of the Cuvelai Drainage system are ephemeral and only hold water sporadically, particularly during good rainy seasons. Because of the ephemeral nature of the *iishana* system, several adaptation measures were developed to increase water retention and ensure water supply during the dry seasons, reducing vulnerability to drought. Examples include hand dug wells (*omithima*), earth dams and burrow pits
Pans and lakes	A series of extensive grassy pans that merge into large water bodies (known as the Omadhiya Lake Complex) during flooding periods are common source of surface water in the region (Mendelsohn et al., 2013). The Omadhiya Lake comprises of Oshituntu, Uulindi, Onamangwena and Oponono lakes with the latter being the largest.
Etosha grass and dwarf shrubland	This is made up of the grass and dwarf shrubs in the plains surrounding the Etosha pan. The soil type is predominantly saline and therefore limits the growth of trees. These plains are however favoured by grazing antelopes (Mendelsohn et al., 2003a)

5.4. Inventory of Ecosystem goods and services

The main goods and services provided by these ecosystems are outlined below:

5.4.1. Provisioning services

Provisioning services, or goods, are the benefits that can be obtained directly from nature such as food, water and building materials. These can be used directly or converted into other forms for human benefit. Provision services in Oshana include:

- **Provision of water for:** human consumption, agriculture, construction, and other social and economic activities. Water provision is key to sustaining livelihoods and economic development. Water supply in the region is predominantly surface water from the Cuvelai-Etosha basin system. Areas around Oshakati receive water from the Kunene basin through the Calueque-Oshakati Water scheme.

Shallow groundwater sources of small freshwater ponds known as *eendobe* and shallow hand-dug wells called *omithima* are some sources of groundwater. These were the main sources of water for years before the introduction of pipe or pump water (Mendelsohn et al., 2013).

- **Provision of plants and related products:** this includes food plants and forest products such as wood and grass for energy, construction and craft-making. Plant products are also a source of income and livelihoods because they act as a safety net for people.

  In Otshikutshiithilonde community forest, the harvesting of devil's claw, an indigenous plant product is a source of revenue if sustainable harvesting methods continue to be practised.

Figure 5.2. Household utensils made from palm leaves and clay (Studio7, 2021)

Figure 5.2 above depicts the use of plant products by women. Woven baskets are a common source of income for most rural women in the region. Most of these baskets are used for storage, as eating utensils and for gifting during ceremonies such as weddings.

Figure 5.3. Forest resources provide food and materials for constructing homesteads (photo: Son of Media Photography, 2021)

About 13% of the population uses some form of natural resources for building of the outer wall areas of households. This includes timber, wood, poles, grass and mud / clay bricks (Namibia Statistics Agency, 2017).

Figure 5.4. Deforestation & firewood business, Okaku constituency (TEC, 2022)

In addition, statistics also indicate that at least 46.6% of the region's population relies on wood/firewood as the main energy source for cooking.

The table below provides a summary of key resources in the region and benefits derived from each.

Table 5:2. Summary- provision services in the Oshana region

Resource	Benefits derived
Plants (trees, shrubs and grasslands)	• Provision of fruits such as bird plum (*eembe*), makalani fruits (, marula fruits, Jackalberry (*eenyandi*) and figs and the fruit juices made from them. • Income from selling fruits and marula juice and liqour • Provision of shade, firewood • Livestock fodder • Droppers and poles for construction and fencing • Traditional medicine • Browsing and grazing for livestock and wildlife • Income from sale of plant products (e.g. firewood, tropples, furniture, wooden crafts, woven baskets etc.)
Water from Pans, Oshanas, wells and lakes	• Water for human, livestock and wildlife • Fish, frogs, water lily tubers • Sand for construction
Salt Pan	• Salt for domestic and livestock consumption • Agricultural produce (cultivation)
Devil's claw	• Income from sale of devil's claw
Land/soils and rangeland	• Cultivating land for food from crops/vegetables such as sorghum, millet, ground beans, pumpkins, watermelons etc. • Income from the sale of surplus harvest • Livelihood (building of home, kraals for livestock, chicken pens) • Construction (e.g. brick-making and traditional huts)
Wildlife	• Income through conservation hunting • Game meat • Income from photographic tourism

5.4.2. Regulating services

Ecosystems provide the basic services that support productivity and stability of the environment. These include nutrient cycling into the soil, infiltration of water into the soil to recharge groundwater and carbon sequestration by plants. Other regulatory services include water purification, flood control, climate regulation and pollination of plants.

- **Wetlands and Flood control**- *lishana* and the several water bodies of the cuvelai system helps to regulate floods in the region. Overgrazing leads to sedimentation which overtime makes the water streams shallower and thereby reducing the water storage potential of the *iishana* system and increase the risk of flooding.

- **Sediment retention:** The vegetation helps to reduce soil erosion by retaining sediments and protecting topsoil. Sedimentation plays an important role in delivering nutrients to flood plains thereby reducing land degradation, loss of topsoil. delivery of excess sediment into water ways however increase flooding, and siltation of dams resulting in high cost of water treatment or limited water availability in earth dams.

- **Improve Water quality:** The vegetation in terrestrial ecosystems and wetlands facilitate filtration of nutrients and other chemicals to improve water quality in the natural streams and lakes in the region

- **Groundwater recharge:** Obstruction caused by vegetation cover slows down surface run-off, increases water retention and subsequently increase infiltration to recharge groundwater systems.

- **Climate regulation:** Vegetation contributes to global climate regulation through the storage and sequestration of carbon. Deforestation in the region is however a huge threat because it reduces Namibia's carbon sequestration potential.

5.4.3. Cultural services

Interaction with nature comes in different forms. Ecosystems of Oshana are important to humans for cultural aspects such as:

- **Scientific and educational value** - evident from the numerous studies done on the ecosystems of the region,
- **Serenity, spiritual and psychological value** – the natural fresh air, sunsets beauty of the region creates a sense of peace and serenity. This is particularly popular amongst the locals, and tourist who capture magnificent sunsets silhouetted by the vegetation of the region.

- **Traditional and cultural practices:** traditionally, salt harvesting from salt pans (Ekango lyo mongwa) forms part of an initiation ritual of the Aawambo people. This marked the transition from boy into manhood.

- **Cultural services** are provided by the inhabitants of the region through cultural practices, dances and crafts. Most of the arts and crafts is made from locally available resources. Festivities such as weddings are a becoming an attraction to most Namibians from other parts of the country. Such events display an array of cultures of the Aawambo people that have been preserved and continue to be practised to date.

Figure 5.6. Donation of traditionally hand-made household utensils at a wedding ceremony (Studio 7, 2021)

The gifting of traditional kitchenware such as woven baskets and clay pots has been part of the culture of the Aawambo people for decades. Such items are generally gifted to a bride on her wedding day, as a contribution to her first kitchen (*epata*).

- **Tourism and recreation:** Etosha National Park is Namibia's most popular tourist destination, attracting tourists from all over the world. Most people visit the park to view its wildlife, particularly high value species such as lion, elephant, leopard and the endangered black rhino. Tourism and recreational facilities have been constructed in the region to cater to the needs of local and international travellers in the form of lodges, guest houses and hotels.

5.4.4. Supporting / habitat services

Supporting services are essential for the production of all other ecosystem services. These services include biomass production, production of oxygen, formation of soil, water cycling and habitats (Green Facts, 2022).

Plants are habitats to a diverse group of animals. The mopane worm, an edible caterpillar and popular delicacy in Namibia feeds on the leaves of the mopane trees which are a dominant ecosystem in the region.

The *iishana* of the Cuvelai drainage system is home to between 61-90 species of mammals, 12-15 species of frogs, 111-200 species of birds and 61-70 species of reptiles and about 17 species of fish in (Mendelsohn et al., 2003b).

Because of proximity to ENP and existence of the Iipumbu ya Tshilongo conservancy adjacent to the park, wildlife movement in the southern parts of the region is common. Wild animals including predators move between the park and

the conservancy. The most common wildlife species include springbok, oryx, wildebeest, kudu, steenbok, elephant, jackal and lion.

Elephants in Namibia were almost hunted to extinction for their ivory in the 19th century (Namibia Biodiversity Database, 2022). The elephant is now listed as an endangered species on the IUCN conservation status and is a specially protected game in Namibia. Conservation efforts such as establishment of national parks and conservation areas such as conservancies are part of the government's strategy to conserve wildlife and ensure it benefits the local population.

5.5. Threats and Opportunities to ecosystems

The following have been identified as key threats and opportunities to ecosystems of Oshana that could be further emphasised during the planning process:

- **Population growth:** population density and demand for resources such as energy, food and building material results in increasing pressure on resources and is contributing to land degradation. If not well monitored and control measures put in place to avoid over-exploitation, the environment may in future not be able to support the steady growth of the region.

- **Deforestation:** it is evident from the current dependency on woody species that loss of vegetation is a threat to maintaining ecosystems in the region.

- **Overgrazing:** Overstocking and limited grazing areas contribute to overgrazing and land degradation. There are areas in the region designated for grazing. The use of these areas should be well managed to avoid over-exploitation and further degradation of the undisturbed grassland. Based on the erosion hazard index, rainfall index, livestock density index and population pressure index, Oshana region is rated as having the highest land degradation risk in Namibia (Klintenberg & Seely, 2004).

- **Sedimentation:** Loss of vegetation cover subsequently leads to loss of top soil. This results in soil being washed away into water streams and contributing to siltation of dams and other natural water bodies. This exacerbates the risk of flooding and reduced water availability.

- **Enhancement of cultural tourism:** In addition to wildlife viewing in the ENP, the rich cultures of the people of Oshana present an opportunity to diversify tourism activities in the region. This can involve setting up of traditional villages that display the different cultures (dances, clothing, handcrafts, cuisine etc) as is currently the practise in areas such as the Zambezi and Kunene regions. This would give tourists opportunity to experience the local traditions outside of the norm. The salt pans also present a rare opportunity to provide indigenous and traditional knowledge on its cultural values to the people. This would attract even the local youth who may be interested in learning about the cultures of the Aawambo people and the initiation of boys into manhood.

6. OSHANA INTEGRATED REGIONAL LAND USE PLAN

The Oshana IRLUP proposes the following land use strategies to achieve sustainable land use in the region.

- Environmental Sustainability
- Sustainable Grazing
- Infrastructure Development
- Controlled settlement
- Careful Urban Expansion
- Economic Opportunities

The figure below outlines the objective of each of the strategies above.

Figure 6.1. Proposed land use strategies for Oshana region (Urban Dynamics, 2022)

These strategies and their associated objectives are in line with the five (5) pillars of NDP5 and are therefore an important tool to achieve sustainable development.

These strategies guided the development of appropriate land use zones for Oshana region, presented in Figure 6.2 below.

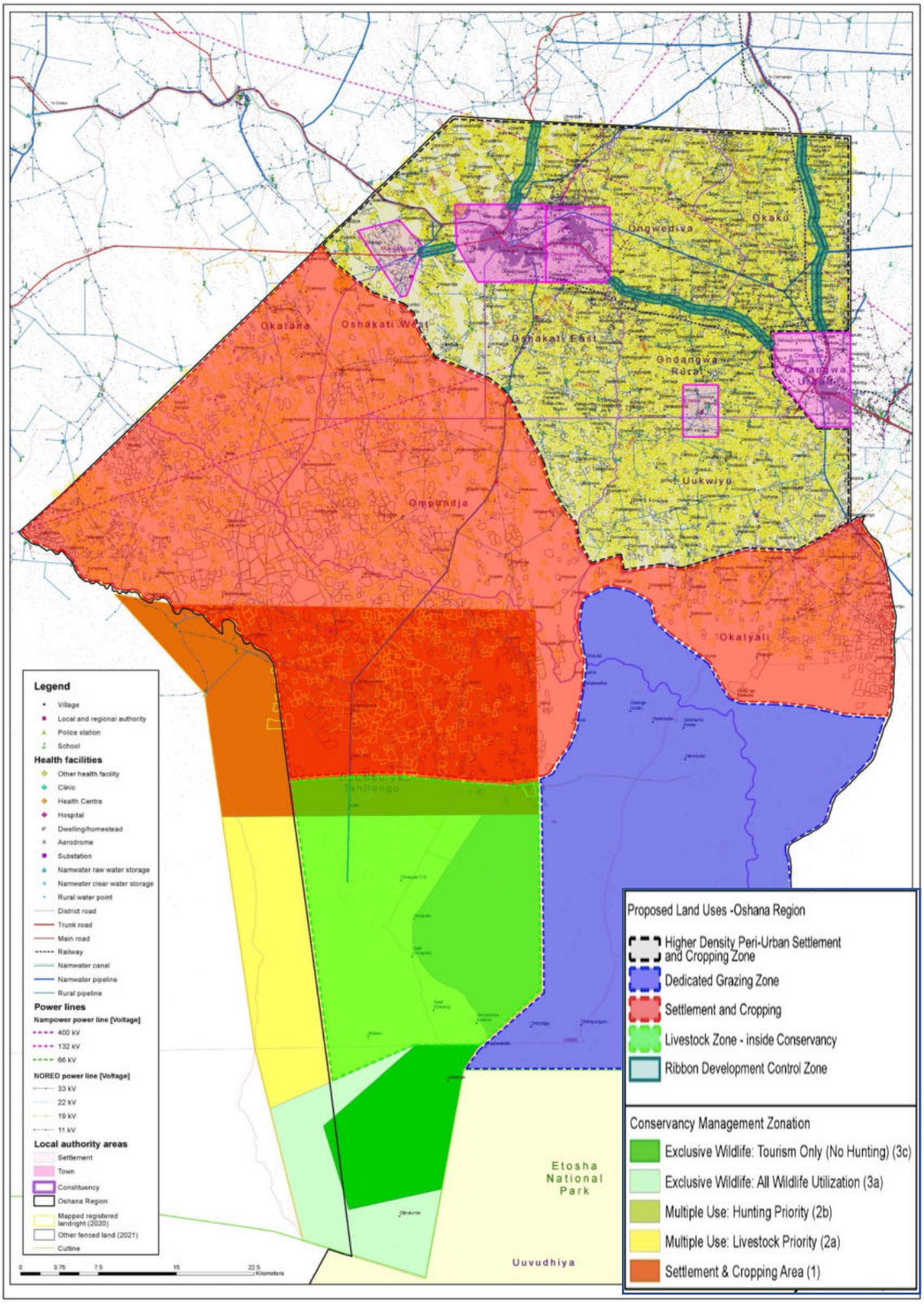

Figure 6.2. Proposed land use zones for Oshana region (Urban Dynamics, 2022)

7. KEY ENVIRONMENTAL AND SOCIAL ISSUES

7.1. Environmental Assessment Criteria

The assessment entails identification and evaluation of environmental components to determine potential impacts applicable to the IRLUP. The assessment entails an analysis of the environmental, social and economic impacts of the spatial development projects and other initiatives, as well as the land-use scenarios defined in the IRLUP process.

The assessment entails:

d) Identification of environmental and social impacts (both positive and negative)
e) Evaluation of impact significance, using the selected impact assessment criteria and impact assessment risk matrix,
f) Assessment of cumulative impacts
g) Identification and recommendation of mitigation / enhancement measures, and alternatives (where applicable)

7.2. Assessment of Cumulative Impacts

The Environmental Assessment Policy in Namibia requires that, cumulative impacts should be considered in all environmental assessment processes. However, EIAs have traditionally failed to account for cumulative impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements.

- Environmental assessments are typically carried out on specific developments, whereas cumulative impacts result from broader biophysical, social and economic considerations, which may not always be practical to address at the project level.

7.3. Mitigation Measures

For each impact / potential impact assessed, mitigation measures have been recommended to reduce and/ or reduce negative impacts. Where applicable, enhancement measures were also identified to increase positive impacts. The mitigation measures are further expanded and presented in the Strategic Environmental Management Plan (SEMP). The SEMP serves as the implementation and monitoring tool for the SEA, including stakeholder roles and responsibilities.

The SEMP is attached to the SEA as Appendix 1.

7.4. Quantifying impacts

7.4.1. Impact Assessment Criteria

For each impact, the **EXTENT** (spatial scale), **SEVERITY** and **DURATION** will be described. These criteria would be used to ascertain the **SIGNIFICANCE** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure/s in place.

- The magnitude of impacts is obtained by combining extent, severity, and duration **(Magnitude= Extent + Severity +duration).**
- The significance of impacts is obtained by combining the consequence of an impact and the Probability of occurrence **(Significance= Consequence x probability)**

In addition to these criteria, evaluating the significance of an impact is also influenced by expert judgement of the consultants, literature review and the views of stakeholders. Impacts can be ecological, social, economic, or both and hence may not always be numerically quantifiable.

The criteria used to evaluate the impacts and the method of determining the significance of the impacts are outlined in the tables below.

Table 7:1: Assessment criteria for the evaluation of impacts (SLR, 2019)

Criteria	Rating	Description
Extent (spatial scale) The spatial extent of the impact, i.e., affected area: • Which area is affected? • How big is the affected area? • Who is affected?	High (H)	**Regional or National:** affecting the Oshana region and may extend beyond the region (i.e. extending to several constituencies)
	Medium (M)	**Local:** within a constituency (affecting several settlements)
	Low (L)	**Site specific:** e.g., at village/settlement level
Magnitude (Severity/intensity) The degree of change an impact has on the receiving environment (takes into account the extent, severity and duration)	Substantial Improvement (H+)	Results in a substantial degree of improvement to affected environment (ecological or social)
	Substantial deterioration (H-)	Results in a substantial degree of disturbance or deterioration to affected environment (ecological or social). Change not easily reversible.

- What area is affected, and how - What is the extent (size) of area affected - Degree of reversibility (temporary, permanent)	Moderate improvement (M+)	Moderate improvements to affected environment
	Moderate deterioration (M-)	Moderate disturbance or deterioration to affected environment
	Minor improvement (+)	Minor improvement to environment. Change is negligible/ not measurable
	Minor disturbance (L-)	Minor deterioration to environment. Disturbance is negligible/ not measurable
Duration (temporal scale) The significance of the impact at various time scales as an indication of the duration of the impact: • For how long? e.g. days, months, years • What are the potential long-term effects? • What are the long-term benefits?	Low (L)	Short term- up to 18 months (Impacts are quickly reversible)
	Medium (M)	Medium term- between 0-5 years (Impacts are temporary and reversible over time)
	High (H)	Long-term- between 5-10 years (often Permanent, and/or irreversible)
Probability The likelihood that an impact would occur as a result of proposed plan	Definite	Estimated greater than 95 % chance of the impact occurring.
	Very likely	Estimated 50 to 95% chance of the impact occurring
	Fairly likely	Estimated 5 to 50 % chance of the impact occurring
	Unlikely	Estimated less than 5 % chance of the impact occurring
	Very unlikely	Definitely no chance of occurrence

7.4.2. Rating significance of impacts (Magnitude)

The magnitude (severity) of negative and positive impacts is obtained using as outlined in the table below.

Table 7:2. Determining the Magnitude Ratings (Adopted from SLR, 2019)

DETERMINING MAGNITUDE					
Severity = L					
DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**
Severity = M					
DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**
Severity = H					
DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
Severity= Very High					
DURATION	Long term	H	**Medium**	**Very high**	**Very high**
	Medium term	M	**Medium**	**Very High**	**Very high**
	Short term	L	**Medium**	**High**	**Very high**
			L	**M**	**H**
			Site specific (e.g. at village/level)	Local- Fairly widespread (within a constituency)	Regional/National- Widespread beyond constituency boundary
			SPATIAL SCALE		

Once the ratings are applied to the criteria above, the impact matrix below is used to establish the significance of impact.

Table 7:3. Determining significance

	Magnitude (Severity of Impact)			
Likelihood	**Low**	**Medium**	**High**	**Very high**
Definite	Medium	High	Very high	Very High
Very Likely	Medium	High	High	Very high
Fairly likely	Low	Medium	High	Very high
Unlikely	Low	Low	Medium	Medium
Very unlikely	Low	Low	Low	Medium

Table 7:4. Interpretating Impact significance

Significance rating	**Description** *Impacts may result in either positive or negative, medium to short term effects, on the social and/or natural environment.*
Low	Acceptable impact for which mitigation is desirable but not essential. (Has little to no influence on the decision)
Moderate	Important impacts which require mitigation. Such impacts maybe insignificant by themselves, but in conjunction with other impacts, it may influence the decision/s.
High	Serious impacts which constitute major short / long-term changes to the natural / social environment and will result in severe effects or beneficial results. (Has influence on the decision/s)
Very High	Very serious impact, constitute major short / long-term changes to the natural / social environment and will result in severe effects or beneficial results. (Has influence on the decision/s). Such impacts may result in severe effects, or very beneficial results.

The overall significance of the assessed land use activities is either positive (+), negative (-) or neutral (0) and will further be rated as low, moderate, high or very high depending on the severity of the impact. The significance rating would flags / signal how much management attention is required for specific impacts, as well as the extent of control measures to be employed in-order to mitigate risks.

7.5. Assessed Components

The following environmental and socio-economic components were identified for assessment.

a) Forest resources
b) Water Resources
c) Wildlife and Nature Conservation (Protected Areas management)
d) Infrastructure Development

e) Economic development
f) Employment opportunities and livelihoods
g) Food security
h) Youth Development/Youth Empowerment

From the components assessed, mitigation / enhancement measures and alternatives (where applicable), were proposed for impacts with medium or high significance ratings. Current management strategies being implemented in the region were also incorporated.

7.6. Components Scoped-out

It was assumed that the IRLUP would not have significant impacts on the following components, and were hence scoped out of the assessment:

- Air quality
- Cultural heritage
- Landscape alteration

7.7. EIA framework

It should however be noted that the strategic environmental assessment is done at a high-level (regional level) and did not explicitly assess the impacts of specific activities. Project-specific EIAs would still be required for Listed Activities as stipulated in the EMA of 2007.

8. Strategic Environmental Assessment (SEA)

8.1. Impact on Forest Resources

8.1.1. Timber

<table>
<tr><td>Environmental/National Objective/Target</td><td colspan="4">Protection of forests is key to addressing the impacts of climate change. In the latest Nationally Determined Contributions (NDC) to the UNFCCC (MEFT, 2021), Namibia has set targets of reducing its carbon emissions by 91% by 2030. To achieve this, Namibia has committed to reduce the rate of deforestation by 75%.</td></tr>
<tr><td>Description of impact</td><td colspan="4">Cutting trees:
- To construct homesteads
- Land clearing for crop fields
- Fencing of crop fields and livestock kraals
- Crafts and other utensils</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td colspan="2">- Building materials (homesteads, huts, crafts)
- Land clearing to establish crop fields
- Fencing of crop fields, kraals, etc</td><td colspan="2">- Deforestation= no soil protection = soil erosion = leaching of nutrients (loss of topsoil) = loss of primary productivity = desertification
- Sedimentation and silting of river streams = increased risk of flooding
- Reduced carbon sink capacity to absorb CO_2 & oxygen production
- Loss of natural habitats, biodiversity, ecosystem functioning, etc</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="3">Overall Rating (Impact significance – Negative Impacts)</td></tr>
<tr><td>Extent</td><td>Regional</td><td colspan="2">Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td colspan="2" rowspan="3">Very High</td><td rowspan="3">Moderate</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation Measures (short – term)
- Alternative construction materials for huts and homesteads such as Bricks (clay or cement), Corrugated iron, Artificial timber poles (from timber plantations), etc</td><td colspan="3">Mitigation Measures (long – term)
- Awareness raising on the value and importance of trees
- Reforestation (tree planting initiatives)
- Sustainable harvesting practices (e.g. harvesting branches to allow regeneration as compared to cutting the entire tree)</td></tr>
</table>

8.1.2. Firewood

<table>
<tr><td>Environmental/National Objective/Target</td><td colspan="4">The main goal of the National Electrification Policy is to increase access to electricity and innovative technology through public and private sector mechanisms, with specific emphasis on rural electrification. According to the Ministry of Mines and Energy (MME, 2022), there are 235,884 rural households, of which 35,855 (15%) are connected to the grid, while 18,324 (8%) have access to solar energy, which equates to about 23%.</td></tr>
<tr><td>Description of impact</td><td colspan="4">Approximately 80% of the region’s population depends on firewood as the main energy source for cooking. Firewood is also sold for income, which stimulates unsustainable harvesting (even cutting live trees for firewood). Rural electrification is very low, but at times, even those with electricity still use firewood for cooking (to reduce their electricity bills). In-terms of gender, firewood collection is predominantly women and children-oriented activity.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td colspan="2">- Energy source for cooking and lighting</td><td colspan="2">- Deforestation= no soil protection = soil erosion = leaching of nutrients (loss of topsoil) = loss of primary productivity (grass and trees) = desertification
- Sedimentation and silting of river streams = increased risk of flooding
- Excessive smoke exposure (inhalation), can become a health risk
- Becoming increasingly scarce = women and children walk long distances and spend more time searching for firewood</td></tr>
<tr><td>Impact Assessment Criteria</td><td colspan="2">Rating score</td><td colspan="2">Overall Rating (Impact significance – Negative Impacts)</td></tr>
<tr><td>Extent</td><td colspan="2">Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td colspan="2">Long term</td><td rowspan="3">Very High</td><td rowspan="3">Moderate</td></tr>
<tr><td>Magnitude</td><td colspan="2">High</td></tr>
<tr><td>Probability</td><td colspan="2">Definite</td></tr>
<tr><td colspan="2">Mitigation Measures (short – term)
- Alternative sources of energy for cooking and lighting (e.g solar cookers, energy efficient stoves that use less wood, gas cookers, bush blocks, biochar wood,)</td><td colspan="3">Mitigation Measures (long – term)
- Alternative sources of energy for cooking and lighting
- Rural electrification programs
- Reforestation (tree planting initiatives)</td></tr>
</table>

8.1.3. Non-timber forest products (NTFP)

<table>
<tr><td>Environmental/National Objective/Target</td><td colspan="3">To protect/preserve valuable plant species, particularly those with significant and direct livelihood benefits to locals through provision of shade, fruits, drinks, crafts, medicine, etc.</td></tr>
<tr><td>Description of impact</td><td colspan="3">Cutting down of important trees that provide Non-timber Forest Products (NTFP) for:
- Land clearing for crop fields
- Crafts and other utensils</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">Important trees (NTFP), provides:
- Fruits (e.g Berchemia (eembe), Diospyros (eenyandi), Hyphaene/Palm (eendunga), Adansonia/Baobab (omakwa), Grewia (eeshe), etc)
- Juice (e.g Sclerocarya/Marula-juice (omagongo), Palm-wine (omalunga), etc)
- Cooking oil (e.g Marula oil – Odjove)
- Medicinal (e.g Harpagophytum/Devil’s claw, Eucalyptus (omungaalipi), etc)
- Body lotion (e.g Manketi oil – Omanghete)
- Income (through sale of products)
- Cultural heritage (e.g. Omagongo festivals)</td><td>- Cutting down of valuable trees to create space for crop fields</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Low[3]</td><td rowspan="3">n/a</td></tr>
<tr><td>Magnitude</td><td>Low</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Enhancement Measures (short – term)
- Continue awareness raising on the value and importance of valuable trees (NTFP) – particularly to the use</td><td colspan="2">Enhancement measures (long – term)
- Consider inclusion into school and university curriculum</td></tr>
</table>

[3] *Low rating because, over the years, communities appreciate the importance and protect trees such as Sclerocarya/Marula (Omoongo), Berchemia (Omuve), Diospyros (Omwandi), Adansonia/Baobab (Omukwa), Eucalyptus (Omungaalipi), and minimal changes are likely to occur with the proposed land use zones.*

8.1.4. Grazing

<table>
<tr><td>Environmental/National Objective/Target</td><td colspan="3">The Ombuga grasslands are an important grazing area for livestock in the Oshana region. The environmental objective is to safeguard grasslands and mitigate land degradation through overgrazing.</td></tr>
<tr><td>Description of impact</td><td colspan="3">Due to high population density, at present only Uuvudhiya and Okatyali constituencies still have grazing land. However, with limited grazing in other constituencies, the grasslands in Uuvudhiya and Okatyali are at high risk of degradation due to increasing livestock numbers (overstocking). Although water availability is a positive impact, the establishment of a permanent water source (pipeline) has contributed to a significant increase in cattle posts and livestock numbers.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Grazing for livestock
- Livestock is very important for community livelihoods (ploughing, trading (income), meat markets (supply chain), weddings and funerals)
- Grass cover mitigates soil erosion</td><td>- Overstocking = Overgrazing = soil erosion = leaching of nutrients (loss of topsoil) = loss of primary productivity = desertification
- Poor grass productivity = poor livestock production
- Overstocking (high number of livestock kept for pride, as a tradition)
- Tragedy of the commons
- Lack of markets and limited incentives to reduce livestock numbers
- Grassland proximity to Etosha = increase risk of livestock predation</td></tr>
<tr><td>Impact Assessment Criteria</td><td colspan="2">Rating score</td><td>Overall Rating (Impact significance – Negative Impacts)</td></tr>
<tr><td>Extent</td><td colspan="2">Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td colspan="2">Long term</td><td rowspan="3">High</td><td rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td colspan="2">High</td></tr>
<tr><td>Probability</td><td colspan="2">Definite</td></tr>
<tr><td colspan="3">Mitigation Measures (short – term)
- Determine livestock carrying capacity (MAWLR – Extension)
- Limit livestock numbers in accordance with the legal framework (e.g CLRA, 2002)
- Create viable markets and develop incentives to reduce livestock numbers, to prevent overgrazing</td><td colspan="2">Mitigation measures (long – term)
- Maintain stocking rate at carrying capacity
- Develop and implement an integrated rangeland management system to guard against overstocking and overgrazing?</td></tr>
</table>

8.1.5. Thatching Grass

<table>
<tr><td>Environmental/National Objective/Target</td><td colspan="3">The environmental objective is to safeguard natural resources and mitigate land degradation through sustainable harvesting of natural resources, including thatching grass</td></tr>
<tr><td>Description of impact</td><td colspan="3">Overharvesting of thatching grass</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td>Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td>- Thatching grass is an important building material for construction of huts</td><td colspan="2">- Tall grass suitable for thatching grows in waterlogged areas (e.g natural ponds), and overharvesting, soil erosion and sedimentation of natural ponds presents a risk to the resource</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance – Negative Impacts)</td></tr>
<tr><td>Extent</td><td>Local</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">High</td><td rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>Low</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation Measures (short – term)
- Provide awareness on the value and importance of thatching grass</td><td colspan="2">Mitigation measures (long – term)
- Preservation of thatching grass habitat (natural ponds – where it grows)</td></tr>
</table>

8.1.6. Veld Fire (Grasslands)

<table>
<tr><td>Environmental/National Objective/Target</td><td colspan="3">The Ombuga grasslands are an important grazing area for livestock in the Oshana region. Develop and implement a fire management plan, in accordance with the fire National Guideline on Forest Fire Management in Namibia (Forestry, 2017)</td></tr>
<tr><td>Description of impact</td><td colspan="3">Lack of a fire management Strategy for particularly Constituencies with fuel load (e.g Uuvudhiya and Okatjali)</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts e impacts</td></tr>
<tr><td colspan="2">Fire can be used a management tool
- To reduce the fuel load (moribund material)
- To convert moribund into nutrients and stimulate new growth and improve grazing</td><td>- High fuel load = high fire intensity (uncontrollable)
- Lack of fire belts to limit fire spread and protect entire grazing area from burning at once
- Loss of valuable grazing
- Moribund material = Poor grazing quality</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Local</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Very High</td><td rowspan="3">Medium</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation Measures (short – term)
- Develop Fire Management Strategy and Monitoring Program for grasslands (Uuvudhiya and Okatyali Constituencies)
- Construct / maintain fire cut lines to limit fire spread from one grazing block to another and enable firefighting during fire outbreaks</td><td colspan="2">Mitigation measures (long – term)
- Demarcate fire management blocks and apply rotational early burning to reduce fuel load and stimulate new growth
- Adjust fire management strategy as guided by the fire monitoring program</td></tr>
</table>

8.2. Impact on water resources

8.2.1. Water supply

<table>
<tr><td>National Objective/Target</td><td colspan="3">Namibia's 9th Desired Outcome (DO9) of NDP5 is that 'by 2022, Namibia has a sustainable production and consumption of water resources resulting in improved access to safe drinking water for human consumption and for industrial use MAWLR (NPC, NDP5). According to the 2011 Population and Housing Census report, access to clean drinking water stood at about 98% in urban areas and 59% in rural areas, where 16% rely on unsafe water from rivers or streams, whilst 13% rely on unprotected wells.</td></tr>
<tr><td>Description of impact</td><td colspan="3">The demand for water increases with the growing population and food production (irrigation). Access to water is a major issue in the Oshana region and some communities (including livestock) walk long distances to the nearest water point.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Foundation for community livelihoods (drinking, food, bathing, cleaning, etc)
- Water provision for livestock (e.g earthdams)
- Ecological functioning (fresh water systems (Oshanas), forest resources and wildlife)</td><td>- Increasing water demand can lead to over abstraction</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">High</td><td rowspan="3">Medium</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation/Enhancement Measures (short – term)
- Strengthen ongoing water infrastructure projects to reach 100% target of safe water supply in the region (national pipeline)
- Rainwater harvesting (rehabilitation and construction of earth-dams)
- Regular rehabilitation and removal surface of mud and sediments from water bodies (earth-dams, canals, river streams, etc)</td><td colspan="2">Mitigation measures (long – term)
- Explore alternative water supply sources to reduce dependency on the Calueque – Oshakati canal and pipeline, such as:
⇒ Rainwater harvesting
⇒ Groundwater (boreholes) and Desalination
⇒ Ohangwena aquifer[4]</td></tr>
</table>

[4] *The Ohangwena aquifer resource is estimated @ 5 billion cubic meters. The rate of recharge would determine the sustainability of the water resource. without recharge, the aquifer could supply the Namibian northern population (about 800,000 people) for about 400 years.*

8.2.1.1 Water Supply – Additional Information

As guided by NDP5, To achieve the desired outcome on water supply, the following water infrastructure projects / activities has been recommended for the region:

1. Upgrading of the Calueque-Oshakati and Etaka Canal Water supply schemes.

2. Rain Water harvesting through construction of 44 earth dams (2 x earth dams per constituency) for rain water harvesting and potential development of other economic activities (e.g irrigation schemes, aquaculture, brick-making, etc)

Oshana to set up earth dams, green schemes

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by Absalom Shigwedha

THE Oshana Regional Council says it plans to build 44 earth dams and set up 44 green schemes to boost food security in the region.

3. Construction of the 4.7km pipeline from Okapya to Oshuunga to improve water supply in the region.

4. Construction of a new Water Treatment Facility at Oshakati

5. Enhance transboundary water cooperation**:** Oshana falls within the Etosha-Cuvelai basin, a transboundary drainage basin originating from Angola and thus there is a shared water basin committee to ensure integrated water resources management and use by the two countries (Angola and Namibia).

8.2.2. Water Pollution

<table>
<tr><td>National Objective/Target</td><td colspan="4">Article 95 of the Namibian constitution stipulates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at the maintenance of the ecosystems, essential ecological processes and biological diversity and utilization of natural resources on a sustainable basis for the benefit both present and future generations</td></tr>
<tr><td>Description of impact</td><td colspan="4">Poor solid waste disposal in the region presents a serious risk for water pollution (both surface and ground water sources), through:
- Dumping of solid waste into water streams (oshanas)
- Poor sanitation and wastewater discharge into water bodies (pit latrines and poorly constructed oxidation ponds)
- Bathing and washing in the river streams, both locally and upstream (Kunene River and the Oshanas)</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td colspan="2">- None</td><td colspan="2">- Water contamination = deteriorating water quality
- Bioaccumulation[5] and feeding on contaminated fish and frogs
- Irrigation return-flows (chemicals – pesticides, herbicides, etc)
- Risk of waterborne diseases (e.g. Cholera[6], Hepatitis E)[7]</td></tr>
<tr><td>Impact Assessment Criteria</td><td colspan="2">Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td colspan="2">Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td colspan="2">Long term</td><td rowspan="3">High</td><td rowspan="3">Medium</td></tr>
<tr><td>Magnitude</td><td colspan="2">High</td></tr>
<tr><td>Probability</td><td colspan="2">Definite</td></tr>
<tr><td colspan="3">Mitigation Measures (short – term)
- Prohibit waste dumping into river streams (Oshanas), or any other water body
- Regular monitoring of point sources of water pollution and implement the polluter pays principle as punishment</td><td colspan="2">Mitigation measures (long – term)
- Implement Solid Waste Management and recycling facilities
- Develop wastewater treatment infrastructure (other than use of oxidation ponds)
- Manage irrigation return flows (EIAs, EMPs and Audits)
- Education and awareness on impacts of water pollution</td></tr>
</table>

[5] *Accumulation of substances, such as pesticides, heavy metals or other chemicals, in organisms and passed on along the food chain*
[6] *Acute diarrheal illness caused by infection of the intestine caused by ingestion of food or water contaminated with cholera bacteria*
[7] *Hepatitis E is a liver disease spread through drinking water that has been contaminated by fecal waste*

8.2.1.2 Dead Fish

Although the actual cause was not investigated, in 2017, dead fish were observed in the water bodies (Oshanas and earth-dams / ponds), it is most likely that the mass fish mortality was caused by pollutants in the water (Figure 8.1).

Figure 8.1: Dead fish observed in water bodies in the Oshana region (The Namibian, 2017)

Figure 8.2. Dumping of waste in the Okatana stream, Ekuku village, Okatana constituency (TEC, 2022)

8.2.3. Floods

<table>
<tr><td>National Objective/Target</td><td colspan="3">The goal of the National Disaster Risk Management (NDRM) Policy of Namibia is to contribute to the attainment of sustainable development in line with Namibia's Vision 2030 through strengthening national capacities to significantly reduce disaster risk and build community resilience to disasters</td></tr>
<tr><td>Description of impact</td><td colspan="3">According to Cuvecom (2022), the Oshana region is considered to be at high risk of flooding because it is located within Cuvelai drainage basin. The 2008 and 2011 floods are notable flood examples and affected urban settlements like Oshakati, Ongwediva and Ondangwa</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td>Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td>- Flood water carries fish and frogs (important source of protein)
- Water availability for people and livestock (for few months)
- Ecological and ecosystem functioning</td><td colspan="2">- Displacement of people and destruction of homes.
- Loss of crops, livestock and in severe cases, human lives
- Poor water flow and increased flooding owing to siltation and sedimentation of water flow channels
- Restricted movements and limited access to essential services such as hospitals, schools and supermarkets (to buy food)
- Risk of drowning</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Very high</td><td rowspan="3">Medium</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td colspan="2">Mitigation Measures (short term)
- Excavation of earth dams to harvest flood water
- Improve town planning and prevent township establishment in flood-prone areas
- Revive / strengthen the flood early warning system (EWS)</td><td colspan="2">Mitigation measures (long term)
- Development of infrastructure (e.g. bridges and culverts) to enable smooth passage of water (e.g Expansion and deepening of the Kandjengedi bridge in 2013)[8]
- Development of infrastructure (e.g dykes) protect flood prone areas and redirect flood water (e.g the Oshakati dyke)
- Undertake vulnerability mapping of communities that are most at risk of flooding and devise strategies to enhance their adaptive capacity and resilience</td></tr>
</table>

[8] *In 2013, the Okandjengedi and Ongwediva bridges were reconstructed and expanded to ensure the smooth flow of water to prevent flooding, and widened to dual carriageways with pedestrian walkways, to eliminate vehicle congestion between Ongwediva and Oshakati (especially during peak hours), and to improve pedestrian safety.*

8.2.1.3 Flooding Impact

Figure 8.3: Flooded homestead (OPM, 2011)

Figure 8.4: Children wading through water to School (OPM, 2011)

8.2.3.1 Flood Risk – Cuvelai Drainage

The Hydrological Services of Namibia (HSN) in the Ministry of Agriculture, Water and Forestry (MAWF) reports indicates that, heavy rain in the Cuvelai River Basin in Angola, combined with local rainfall in the Oshana, Oshikoto, Ohangwena, Omusati leads to flooding (MAWF, 2013).

The north-central area of Namibia is prone to flooding. The seasonal flooding is caused by a combination of rainfall and inundation from southern Angola. The catchment area for the Cuvelai Delta extends from Southern Angola (upstream) to northern Namibia (downstream). From upstream (southern Angola) to downstream (northern Namibia), the topography flattens creating a complex network of shallow, poorly defined ephemeral watercourses known as “Oshanas”, fanning out into a 70 to 130 km wide delta known as the “Cuvelai Delta” (Marsh and Seely, 1992).

The floods of 2008 and 2011 caused widespread damage to the natural resource based production and thereby destroying livelihoods in both rural and urban areas of the affected regions (OPM, 2011).

The 2008 floods displaced many people who were relocated to rescue camps, many health facilities and schools were either flooded or inaccessible and caused sewage ponds to overflow and thereby polluting the Oshanas, from where people and livestock drink and thereby posing a threat for diarrhoea and cholera (OPM, 2008). More than 50 per cent of the roads in the affected areas were damaged, and the agricultural harvest were reduced by more than 63 percent. As a result, 67 percent of the poor households experienced food shortages of about 20 - 30 % (OPM, 2008)

According Niipare, et.al (2020), the extent of floods determines the degree of impact. Floods can cause extensive economic losses, consequently affecting livelihoods, businesses, infrastructures and basic services.

Loss of field crops, destruction of houses, destruction of roads and other infrastructure, and to a lesser extent, loss of human lives are some of the notable flood impacts in the Cuvelai drainage, including Oshana region. The study by Niipare et.al (2020) revealed that vulnerability to floods is mainly due to lack of resources, poverty, poor infrastructure, limited budget, inactive disaster risk management structures in the region, rapid population change, non-existing Early Warning System (EWS), lack of awareness of the flood impacts. In-addition, the vulnerability of communities in the Oshana Region resulted in reduced household resilience to flood disasters.

The study by Niipare et.al (2020) recommended the following:

- ⇒ Availing of information on coping strategies in flood prone communities
- ⇒ Flood hazards awareness,
- ⇒ Developing and implementing mitigation measures for flood disasters
- ⇒ Prevention of constructing houses in flood prone areas (both rural and urban)
- ⇒ Development of information communication channels for EWS.

8.2.3.2 National Disaster Risk Management Policy

To National Disaster Risk Management (NDRM) policy, advocates for the following (OPM, 2009):

- Integration of disaster risk reduction into sustainable development policies and planning at all levels.
- Strengthening of disaster risk management structures, mechanisms and capacities to build resilience to hazards at national, regional, constituency and community levels.
- Systematic incorporation of risk reduction approaches into the implementation of emergency preparedness, response and recovery programmes.
- Building of multi-stakeholder partnerships at all levels to contribute to the implementation of total disaster risk management.

8.2.3.3 Flood Preparedness and Mitigation

To date, response to floods and droughts were primarily focused on the aftermath and relief provision for flood and drought victims, and very little on preparedness and impact mitigation (OPM & UN-Namibia, 2016) .

The impacts of the flood are aggravated by poor planning such as uncontrolled urban developments, informal settlements built in the flood prone areas, poorly maintained infrastructure (blocked culverts and storm drains), poor risk mapping and lack of integrated early warning system (Marsh and Seely, 1992).

8.2.4. Drought *(Meteorological, Agricultural and Hydrological)*

<table>
<tr><td>National Objective/Target</td><td colspan="3">Aridity and variable rainfall are a common phenomenon in Namibia. The drought policy aims to shift the responsibility of drought risk management from government to the farmer. Financial assistance and food relief interventions from government would only be considered in the event of extreme drought and declaration of a state of emergency (National Drought Policy and Strategy, 2017). The National Disaster Risk Management Policy (2009) aims to strengthen national capacity to significantly reduce disaster risk and build community capacity and resilience to disasters</td></tr>
<tr><td>Description of impact</td><td colspan="3">Similar to other parts of the country, the Oshana region is vulnerable to increased frequency of droughts, poor agricultural production (crop & livestock), food insecurities and poor livelihoods.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- None</td><td>- Poor crop yield (food insecurity)
- High cost of food imports
- Livestock losses owing to lack of grazing and water
- Water scarcity (domestic and livestock)
- Increased levels of poverty and poor livelihoods (survival)</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Very high</td><td rowspan="3">Medium</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td colspan="2">Mitigation Measures (short term)
- Construction of earth dams to harvest flood water for use during the dry season
- Revive / strengthen the drought early warning system (EWS)
- Implementation of National Disaster Risk Management Plan (NDRMP, 2011)</td><td colspan="2">Mitigation measures (long term)
- Mainstream climate change adaptation (CCA), into all strategies at regional levels
- Implementation of drought-adapted farming practices (e.g. drought-resistant crops, irrigated agriculture that uses water sustainably (drip-irrigation and hydroponics)
- Undertake vulnerability mapping of communities that are most at risk of drought and devise strategies to enhance their adaptive capacity and resilience</td></tr>
</table>

8.2.4.1 Drought Definition

Drought is a complex phenomenon which is difficult to monitor and define. The basic definition of drought is the absence of water. It can be defined as a meteorological anomaly characterized by a prolonged and abnormal moisture deficiency. Drought severity is dependent on the duration and magnitude of the abnormal moisture deficiency.

8.2.4.2 Drought Types

All droughts originate from a deficiency of precipitation or meteorological drought, but other drought types (i.e agricultural and hydrological) cascade from rainfall deficiency (Palmer, 1965).

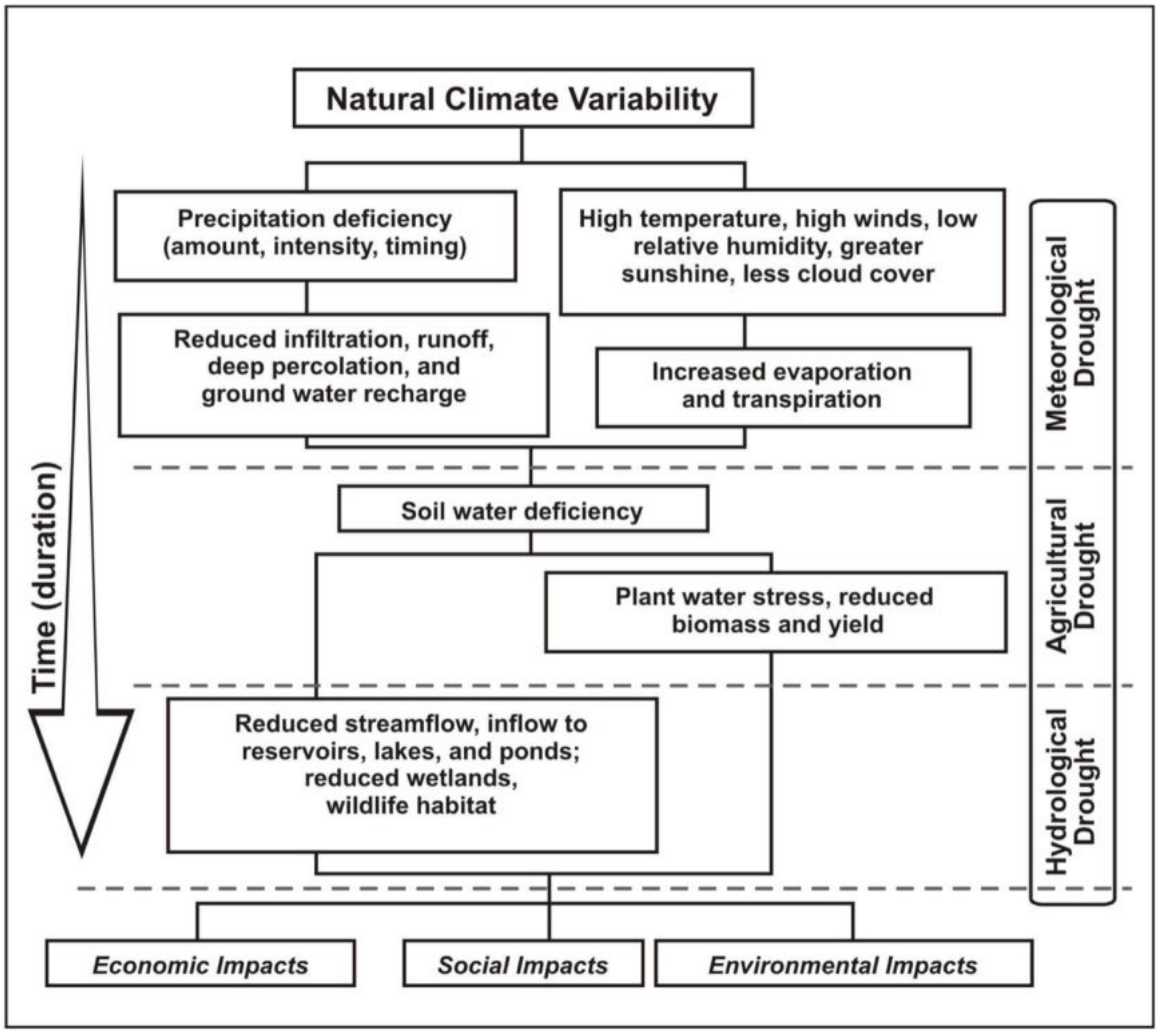


Figure 8.5: Differentiation between Meteorological, Agricultural and Hydrological droughts (Palmer, 1965)

8.2.4.2.1 Meteorological drought

Meteorological drought is defined by the degree of dryness and the duration of the dry period, in comparison to the normal or average rainfall for the area. Because atmospheric conditions and rainfall deficiencies are highly variable from one area to another, meteorological drought can be defined over a specific area or region (Palmer, 1965).

8.2.4.2.2 Agricultural drought

Agricultural drought happens when crops are affected by lack of water / moisture. It refers to the availability of water for optimum plant growth and agricultural produce, with primary focus on the deficits between actual and potential evapotranspiration, soil water deficits and reduced groundwater. Agricultural drought depicts poor crop production at different stages of crop growth, from germination to maturity (Marsh and Seely, 1992).

8.2.4.2.3 Hydrological drought

Although all droughts originate with rainfall deficiency, hydrological drought refers to how such water deficiency plays out in the hydrological system. It takes longer for rainfall deficiencies to become evident / reflect in the hydrological system such as streams, reservoirs and groundwater levels, which only becomes evident after many months of meteorological drought (Mendelsohn et al., 2003b). The frequency and severity of hydrological drought is often defined on a river basin scale (e.g the Cuvelai drainage basin).

8.2.4.3 Drought frequency and Cumulative Impacts

Similar to other parts of the country, the Oshana region is vulnerable to increased frequency of droughts, poor agricultural production (crop & livestock), food insecurities and poor livelihoods. The 2013 and 2014 droughts resulted in significant reduction in crop and livestock productivity and pushed rural communities into poverty (OPM, 2015). The cumulative effects of consecutive droughts for 2013 and 2014 affected agricultural productivity significantly (OPM, 2015).

8.2.4.4 Impact on Crop productivity

Drought leads to poor agricultural productivity and increases the country's dependency on food imports. The reliance on imported food expose communities to frequent price changes and food insecurity (OPM, 2015). Namibia relies on cereal imports from South Africa and the ever increasing transport costs has significant implications on local food prices (OPM, 2015).

Impact on Livestock and other Natural Resources

In addition to the poor crop production prospects, poor rainfall season leads to severe shortage of water and grazing for livestock, low milk production and poor livestock conditions (OPM, 2015). Drought has further implications on the livelihoods of communities (particularly poor households), who depend on income from natural resource products such as thatching grass, crafts and mopane worms (OPM, 2015).

8.2.4.5 Increasing Food Imports and Prices

According to the MAWF (2015), from 2008 to 2014, Namibia's food production averaged 125,000MT, which equates to about 41% of the national cereal demand (OPM, 2015). The crop assessment conducted by the Ministry of Agriculture, Water and Forestry (MAWF) in 2015, local cereal production only yielded 88,900MT, which is about 33% below average (MAWF, 2015).

8.3. Environmental Pollution

8.3.1. Solid-waste and Waste-water disposal / Management

<table>
<tr><td>National Objective/Target</td><td colspan="3">Implementation of the National Solid Waste Management Strategy (MEFT, 2018): Strategy objectives:
- To strengthen institutional, organisation, and legal framework, for waste management
- To implement formalised solid waste collection and management systems
- To enforce improvements in the municipal waste disposal standards</td></tr>
<tr><td>Description of impact</td><td colspan="3">- Excessive littering (throw-away-culture)
- Poor solid waste disposal and dumping of waste in the environment, including water streams (Oshanas)</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td>Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td>- None</td><td colspan="2">- Safety risks to people at dumping sites (exposure to dangerous objects such as broken glass, used syringes, used tissues, etc)
- Overflowing oxidation ponds
- Bio-accumulation (feeding on fish / frogs from contaminated water)
- Unpleasant and unhygienic sights (eyesore)</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Very high</td><td rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td colspan="2">Mitigation Measures (short term)
- Enhancement of solid waste collection and disposal systems and construction of recycling facilities (circular economy)
- Enforcement of the EMA (Act. No7 of 2007) and EIA regulations
- Implement the Polluter-pays-principle through punishment / Fines</td><td colspan="2">Mitigation Measures (Long term term)
- Enforcement of the EMA (Act. No7 of 2007 and EIA regulations
- Continuous environmental awareness on the dangers of poor waste management</td></tr>
</table>

8.3.1.1 Poor solid waste disposal – Illustrations

Figure 8.6: Dumpsites are common in the Oshana region (TEC, 2022)

Figure 8.7: Children exposed to dangerous waste (TEC, 2022)

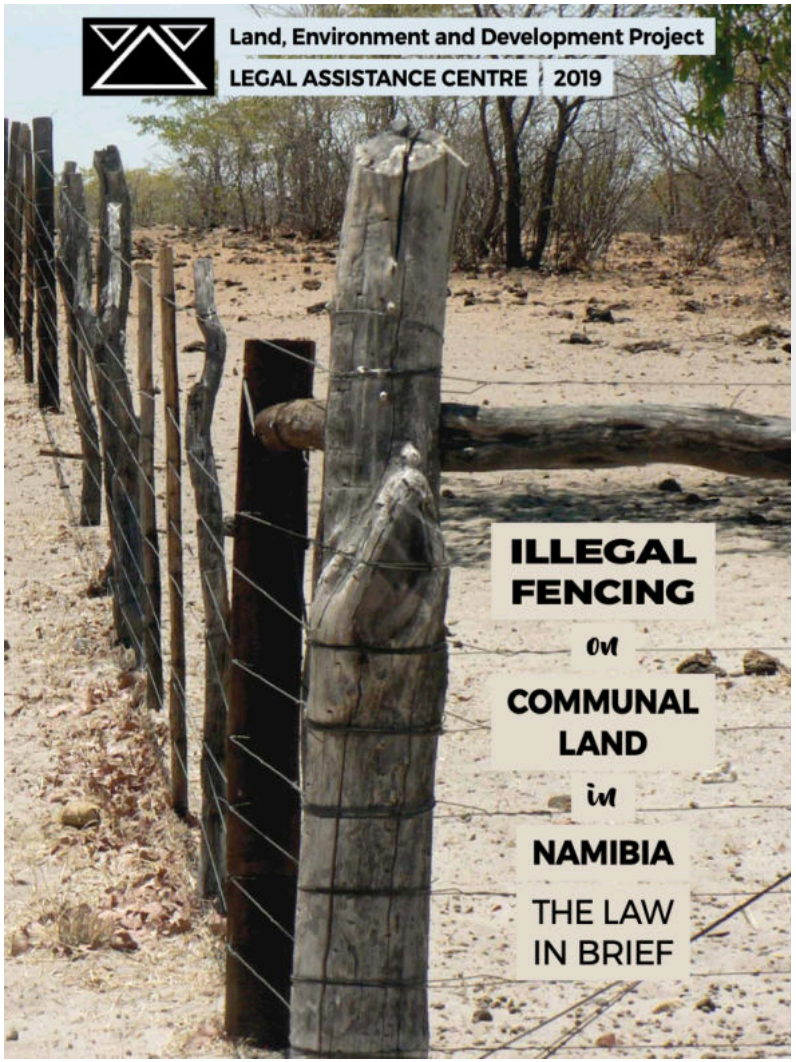
Figure 8.8: Mitigation – Conceptual waste collection & recycling (Google images, 2022)

8.4. Land Tenure

8.4.1. Land Allocation, Illegal Fencing, Enforcement (CLRA)

<table>
<tr><td>National Objective/Target</td><td colspan="3">To implement the Resolutions of the 2nd Land Conference (2018), specifically Thematic Area: Communal Land Reform Programs and related matters (Resolutions number: 10 to 18). The land conference resolutions are complimented by the 16th strategic element of achieving vision 2030, which commits Namibia to ensures fair access to the means of production, by all inhabitants.</td></tr>
<tr><td>Description of impact</td><td colspan="3">Poor land allocation, illegal land occupation and poor enforcement of the Communal Land Reform Act (Act No.5 of 2002). Some individuals occupy large tracks of land at the expense of poor communities who solely depend on land for their livelihoods (blocked access to water points, grazing, firewood, etc).</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Land tenure protection through registration of land rights (particularly for women and children)
- Optimum and sustainable land use through protection of commonage (e.g grasslands and water points) for all community members, regardless of their social status</td><td>- Illegal fencing (rampant and un-controlled e.g Blocking access to water points, grazing, firewood, etc)
- Illegal land occupation (new homesteads without Land Board Approval)
- Poor consultations on land allocation
- Unclear jurisdictions and TA boundaries leading to double land allocations
- Un-fair allocation of land (huge tracks of land allocated to one person at the expense of others (mostly poor community members))
- Poor land administration (maladministration)</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Medium</td><td rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td colspan="2">Mitigation Measures (short term)
- Awareness on boundaries of TA jurisdiction to reduce boundary conflicts
- Enforcement of the CLRA Act No.5 of 2002 by the regional council and TA</td><td colspan="2">Mitigation Measures (long term)
- Enforcement of the CLRA Act No.5 of 2002 (Traditional Authorities, Namibian Police, Regional council, Civil Society, etc)</td></tr>
</table>

8.3.1.1 Reference Articles – Land disputes in Namibia



Land and grazing disputes and overlapping authorities in Namibia

Paul Hebinck

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ABSTRACT

Illegal grazing and the fencing of land by livestock owners, elites and non-elites alike is endemic in Namibia. Fencing violates the Communal Land Reform Act of 2002. Court cases are held to stop the illegal use of land. The institutions that according to the Act have the authority to stop these practices do not perform accordingly and their authorities frequently overlap. The legal battle to remove fences or stop illegal grazing evolves as more than a struggle for justice. The case unfolds as an ontological struggle between actors, their institutions and respective policies and discourses, pivoting on conflicting visions of modernities and interpretations of the meaning of land.

8.3.1.2 Land Tenure – Additional Information

Land tenure security is a key component of land use planning. Land use planning should be focused on improving or ensuring tenure security. Land use planning decisions include defining land uses, allocating and reallocating land uses, and so on. Although land use planning and tenure security are typically distinct concepts, they can be combined to benefit both people and the environment.

8.3.1.1.1 Lessons Learned

Lessons learned highlights that, there is a need to further capacitate the traditional authorities, to enable them to effectively carry out their functions. It is important to re-emphasis the Tas roles and responsibilities and the corresponding roles and responsibilities of the CLBs, as stipulated in Communal Land Reform Act, CLRA (Act No.5 of 2002) and, the Traditional Authorities Act (Act No.25 of 2000).

8.3.1.1.2 TA Functions

Section 20 of the Communal Land Reform Act, gives Traditional Authorities the authority to allocate land rights (CLRA, Act No.5 of 2002). The Chief has the primary authority to allocate land and such authority can be delegated to members of the council of the Traditional Authority concerned. (MAWLR, 2010).

8.3.1.1.3 Functions of Communal Land Boards

The Communal Land Reform Act – CLRA (Act. No.5 of 2002) sets out the functions of Communal Land Boards as follows:

1. Control the allocation and cancellation of customary land rights by Chiefs or Traditional Authorities.
2. Decide on applications for rights of leasehold.
3. Create and maintain registers for the allocation, transfer and cancellation of customary land rights and rights of leasehold.
4. Advise the Minister on regulations to be made to meet the objectives of the Act.
5. Give effect to the provisions of this Act.

8.5. Infrastructure Development

8.5.1. Sand Mining

<table>
<tr><td>National Objective/Target</td><td colspan="3">The goal of the Economic Progression pillar of NDP5 is to achieve inclusive, sustainable and equitable socio-economic growth for the society. NDP5 aims to promote expansion and modernisation of physical infrastructure and create an enabling environment for economic growth, trade and innovation. Infrastructure development activities, such as sand mining should be carried out in line with the Environmental Management Act (Act No.7 of 2007 and EIA regulations of 2012)</td></tr>
<tr><td>Description of impact</td><td colspan="3">- Uncontrolled and illegal sand mining activities
- Poor enforcement and lack of accountability (e.g Lack rehabilitation for Road Construction borrow pits)
- Poor coordination among government institutions (national and regional levels), Land Boards, Traditional Authorities
- Adoc sand mining activities (mostly done by small scale builders), making it difficult to regulate</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Supply of sand and gravel for infrastructure development (e.g roads, railway, hospitals, schools, housing, bricks, etc)
- If properly planned and rehabilitated, sand mining borrow pits can fulfil 2 x objectives (Synergy):
⇒ Extraction of sand and gravel for developmental activities (roads, housing, hospitals, schools, etc)
⇒ Rain water harvesting to supply water people and livestock</td><td>- Uncontrolled and illegal sand mining activities
- Un-rehabilitated sand mining and gravel borrow pits, with steep edges and tipping point (serious safety risk to people and livestock)
- High risk for drowning (particularly children and the elderly)
- Gully erosion and sedimentation</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional</td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term</td><td rowspan="3">Medium</td><td rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td colspan="2">Mitigation Measures (short term)
- Enforcement of the EMA (Act. No7 of 2007 and EIA regulations</td><td colspan="2">Mitigation Measures (long term)
- Regular monitoring of sand mining activities by MEFT to identify and halt unregulated sand mining activities?</td></tr>
</table>

8.5.1.1 Sand Mining – Illustration

Figure 8.9: Un-rehabilitated, Sand mining borrow can be very dangerous to people and livestock, Okaku constituency (TEC, 2022)

Figure 8.10: If rehabilitated, Sand mining borrow pits can serve as an earth-dam for rainwater harvesting, Ondangwa urban constituency (TEC, 2022)

8.4.1.1 Sand Mining – Environment vs Economic Development

Economic activities such as construction of roads, railway, housing, schools, hospitals and supermarkets are vital for development, and hence, activities such as sand mining are inevitable (cannot be avoided).

However, such developmental activities should be conducted in a thoughtful and forward-looking manner. In other words, such developmental activities should consider the future land use after such activity has come to an end. Therefore, to ensure that the land remains valuable for other land uses in the future, rehabilitation should be part and parcel of such developmental activity right from the beginning and throughout the project lifespan.

Namibia's economy is highly dependent on a healthy environment and striking a balance between economic development (e.g sand mining) and environmental integrity can be a challenge. Therefore, environment and development sectors should work together and identify synergies.

Development takes place on land (in the environment) and hence the quest for economic development requires a trade-off with certain parts of the environment in-order for the development to be realized. Meaning, for development to take place, some part of the environment will be affected. However, such impacts should be mitigated / minimised.

The aim of environmental assessments is to guide the sustainable utilization of natural resources and to mitigate negative impacts that would otherwise compromise the environmental integrity and future ecosystem benefits.

8.4.1.2 Compliance *to the Environmental Management Act*

Section 27 of the Environmental Management Act (Act No. 7 of 2007), also known as the EMA, and EIA regulations (Government Notice: 30 of 2012), provide a list of activities that may not be undertaken without an Environmental Clearance Certificate (ECC), known as Listed Activities.

To obtain an ECC, and Environmental Impact Assessment (EIA) should be conducted and an Environmental Management Plan (EMP) should be developed.

8.4.1.3 Listed Activities

Listed Activities are activities that have potential to cause significant environmental and social harm, and thus may not be undertaken without an Environmental Clearance Certificate (ECC). This implies that for all listed activities, an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) are required.

8.5.2. Displacement of people

<table>
<tr><td>National Objective/Target</td><td colspan="4">Vision 2030 is geared towards making Namibia an urbanised country with at least 75% of the population residing in designated urban areas, with access to basic social services. Increasing investment in infrastructure development is also one of the NDP5’s strategies towards a high performing economy</td></tr>
<tr><td>Description of impact</td><td colspan="4">Infrastructure development is associated with increased rural-urban migration.
- More urban land required for the construction of townships (housing), transport systems (roads and rail), health facilities, education facilities, shopping malls and recreational facilities
- Urban expansion into communal land and displacement of people who have to make way for urban developments (e.g Ondagwa, Ongwediva, Oshakati, Uukwangula and Eheke)</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td colspan="2">- Improved access to energy, clean water and transport
- Employment opportunities (servicing and construction)
- Enhances economic productivity of the region
- Improved household income and livelihoods</td><td colspan="2">- Displacement of people from their traditional homes
- Disputed compensation rates for displacement</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="3">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional (High)</td><td>Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">High</td><td colspan="2" rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation Measures (short term)
- Timely communication of affected residents on potential displacement to allow them ample time to plan and search for new residential areas
- Revise / consult affected communities regarding compensation</td><td colspan="3">Mitigation Measures (Long term term)
- Formalization of existing informal settlement through the Implementation of the flexible land tenure system (in accordance with the Resolutions of the 2nd Land Conference, 2018)</td></tr>
</table>

8.6. Socio-economic development

8.6.1. Employment Creation

<table>
<tr><td>National Objective/Target</td><td colspan="3">NDP5 pillar on Social Transformation aims to build a capable and healthy human resource and reduce poverty through: (a) Human Capital Development (social protection, good health and education) and (b) Social Development (Sanitation, gender equality, land and housing). The desired outcome for rural economic development is that by 2022, the rural quality of life and socio-economic wellbeing has improved with rural poverty declining from 37% to 25%</td></tr>
<tr><td>Description of impact</td><td colspan="3">According to the 2018 labour force survey, Namibia's unemployment rate stood at 33.4%.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Social development and Economic activities can create much needed employment opportunities, reduce poverty, reduce crime, reduce alcohol and drug abuse</td><td>High unemployment breeds:
- Crime
- Teenage pregnancies, drugs and alcohol abuse</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional (High)</td><td>Without enhancement</td><td>With enhancement</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">Medium positive</td><td rowspan="3">High positive</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation/Enhancement Measures (short term)
- Initiate Youth employment and empowerment programs
- Employment opportunities within the region should prioritise residents of Oshana, with exception of jobs requiring specialised skills (if not available in the region)</td><td colspan="2">Mitigation/Enhancement Measures (Long term)
- Industrialization
- Long-term paradigm-shift from consumers to producers
- Enhance capacity to create own employment</td></tr>
</table>

8.6.2. Youth Development

<table>
<tr><td>National Objective/Target</td><td colspan="3">The Social Transformation pillar of NDP5 highlights Youth Empowerment as one of the key strategies to achieve social development and build a capable and healthy human resource. The desired outcome is that by 2022, youth are empowered and have adequate opportunities to actively participate in the economy and the youth development index has increased from 0.49 to 0.58 and reduce the unemployment rate from 39.2% to 33%</td></tr>
<tr><td>Description of impact</td><td colspan="3">According to the 2018 labour force survey, Namibia's youth unemployment rate of 46.1%.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Youth presents a potential workforce
- With specific youth employed and capacity development programs, the youth will become productive, reduce poverty, reduce crime, reduce alcohol and drug abuse</td><td>High unemployment breeds:
- Crime
- Teenage pregnancies, drugs and alcohol abuse</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional (High)</td><td>Without enhancement</td><td>With enhancement</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">Low positive</td><td rowspan="3">Moderate positive</td></tr>
<tr><td>Magnitude</td><td>High</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td colspan="2">Mitigation/Enhancement Measures (short term)
- Initiate Youth employment and empowerment programs</td><td colspan="2">Mitigation/Enhancement Measures (Long term)
- Initiate Youth employment and empowerment programs</td></tr>
</table>

8.6.3. Trading (access to markets)

<table>
<tr><td>National Objective/Target</td><td colspan="4">The NDP5's Economic Transformation Pillar includes Structural Transformation through Value Added Industrialisation as one of the structures to help Namibia achieve inclusive, sustainable and equitable growth</td></tr>
<tr><td>Description of impact</td><td colspan="4">In-addition to livestock, Oshana is endowed with a variety of forest products with potential for value addition. Given adequate funding for processing and capacity development, the region has potential to be a supplier of various local products made from naturally available resources in the region, such as Marula, Ximenia and Devil's claw.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td colspan="2">- Employment opportunities and increased household income
- Enhances economic productivity in the region
- Value addition and supply chains
- Reduces export of raw materials</td><td colspan="2">- Lack of viable Livestock markets
- Lack of markets for home-made products
- Poor supply chains</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="3">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Regional (High)</td><td>Without enhancement</td><td colspan="2">With enhancement</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">Low positive</td><td colspan="2" rowspan="3">Moderate positive</td></tr>
<tr><td>Magnitude</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td colspan="2">Mitigation/Enhancement Measures (short term)
- Assist community to access markets and enhance trading opportunities
- Improve access to markets (local and international) for enhanced trading opportunities and increase in revenues</td><td colspan="3">Mitigation/Enhancement Measures (Long term)
- Long-term supply chains and value addition to local products (e.g setting of a Marula oil processing plant for export to pharmaceutical companies across the world)</td></tr>
</table>

8.6.4. Food security

<table>
<tr><td>National Objective/Target</td><td colspan="3">The desired outcome of the agriculture sector and food security of NDP5 is that by 2022, the proportion of food insecure individuals has decreased from 25% to 12 and food production has increased by 30% of the NDP5 period</td></tr>
<tr><td>Description of impact</td><td colspan="3">Planned green schemes in all 11 constituencies through excavation of earth dams to harvest rainwater for irrigation Implementation of the green scheme projects could enhance food production, enhance food security and reduce poverty and hunger in the region.</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Employment opportunities and increased household income
- Food security and food diversification
- Enhances economic productivity of the region</td><td>- Poor agricultural produce (both crops and animal husbandry)
- Food shortage and reliance on food imports</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Local (Medium)</td><td>Without enhancement</td><td>With enhancement</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">Low positive</td><td rowspan="3">Moderate positive</td></tr>
<tr><td>Magnitude</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Fairly Likely</td></tr>
<tr><td colspan="2">Mitigation/Enhancement Measures (short term)
- Improve food production</td><td colspan="2">Mitigation/Enhancement Measures (Long term)
- Diversify farm produce and adopt new farming techniques (irrigated crops = drip irrigation, hydroponics, aquaculture, etc)</td></tr>
</table>

8.7. Wildlife

8.7.1. Human Wildlife Conflict (HWC)

<table>
<tr><td>National Objective/Target</td><td colspan="4">The Environmental Sustainability Pillar of NDP5 highlights Conservation and Sustainable use of Natural Resources as one of the strategies to achieve Environmental Sustainability and Resilience. This can be done by implementing measures to combat poaching, illegal trade of natural resources and lessen Human Wildlife Conflict (HWC). This includes improved management of protected areas and upgrading of infrastructure.</td></tr>
<tr><td>Description of impact</td><td colspan="4">Land use zones in proximity to ENP or the wildlife Core Areas of the Iipumbu ya Tshilongo conservancy may increase the risk of HWC and poaching. Wild animals move from the park into the conservancy. Expansion of human activities closer to these wildlife areas (e.g. farmers seeking better grazing) will increase interaction between human and wildlife and can result in loss of livestock by predators, retaliatory killing of predators.
With increasing cattle posts at the Ombuga grasslands, reduced grazing land will force farmers to move towards greener pastures close to wildlife core areas</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td colspan="2">Negative impacts</td></tr>
<tr><td colspan="2">- Improved wildlife management and conservation of natural resources (conservancy & community forest)
- Increased tourism potential for the conservancy (employment opportunities and revenue)</td><td colspan="2">- Increased incidents of HWC particularly from lions and hyenas
- Risk of damage to water infrastructural damage and crop field by elephants
- Increased loss of livestock to predators
- Cattle posts too close to the park fence (No buffer)
- Risk of spreading of Foot and Mouth disease to wildlife (from livestock)</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="3">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Site Specific (Low)</td><td>Without Mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">Medium negative</td><td colspan="2" rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Fairly Likely</td></tr>
<tr><td colspan="2">Mitigation/Enhancement Measures (short term)
- Upgrade the boundary fence between ENP and the conservancy to keep predators inside the park</td><td colspan="3">Mitigation/Enhancement Measures (long term)
- Awareness on the importance of the buffer zone between ENP and conservancy wildlife core areas</td></tr>
</table>

8.7.2. Poaching

<table>
<tr><td>National Objective/Target</td><td colspan="3">The Environmental Sustainability Pillar of NDP5 highlights Conservation and Sustainable use of Natural Resources as one of the strategies to achieve Environmental Sustainability and Resilience. This can be done by implementing measures to combat poaching and illegal wildlife trade and Human Wildlife Conflict (HWC) mitigation. This includes improved management of protected areas and upgrading of infrastructure.</td></tr>
<tr><td>Description of impact</td><td colspan="3">Land use zones in proximity to ENP or the wildlife Core Areas of the Iipumbu ya Tshilongo conservancy will increase the risk of HWC and poaching. Wild animals move from the park into the conservancy. Expansion of human activities closer to these wildlife areas (e.g. farmers seeking better grazing) will increase interaction between human and wildlife and can result in loss of livestock by predators, retaliatory killing of predators.
With increasing cattle posts at the Ombuga grasslands, reduced grazing land will force farmers to move towards greener pastures close to wildlife core areas</td></tr>
<tr><td rowspan="2">Potential Impact(s)</td><td colspan="2">Positive impacts</td><td>Negative impacts</td></tr>
<tr><td colspan="2">- Improved wildlife management and conservation of natural resources (conservancy & community forest)
- Increased tourism potential for the conservancy (employment opportunities and revenue)</td><td>- Increased incidents of HWC particularly from lions and hyenas
- Risk of damage to water infrastructural damage and crop field by elephants
- Increased loss of livestock to predators
- Cattle posts too close to the park fence (No buffer)
- Risk of spreading of Foot and Mouth disease to wildlife (from livestock)</td></tr>
<tr><td>Impact Assessment Criteria</td><td>Rating score</td><td colspan="2">Overall Rating (Impact significance)</td></tr>
<tr><td>Extent</td><td>Site Specific (Low)</td><td>Without Mitigation</td><td>With mitigation</td></tr>
<tr><td>Duration</td><td>Long term (High)</td><td rowspan="3">Medium negative</td><td rowspan="3">Low</td></tr>
<tr><td>Magnitude</td><td>Medium</td></tr>
<tr><td>Probability</td><td>Fairly Likely</td></tr>
<tr><td colspan="4">Mitigation Measures
- Upgrade the boundary fence between ENP and the conservancy to keep predators inside the park
- Awareness on the importance of the buffer zone between ENP and conservancy wildlife core areas</td></tr>
</table>

9. Conclusion

The SEA provides guidance to mitigate negative environmental and socio-economic impacts from developmental activities.

In essence, the SEA entails mainstreaming of environmental and socio- economic aspects and advocacy for integration into the regional decision- making process.

9.1. Strategic Environmental Management Plan (SEMP)

Strategic Environmental Management Plan (SEMP) serves as the tool to monitor the implementation of mitigation measures identified in section 8.

The SEMP:

- Expand the mitigation measures identified in section 8
- Outline cumulative Impacts
- Flag / highlight activities that will require detailed assessment through specific Environmental Impact Assessments (EIAs), in accordance with the EIA regulations and specialist studies may be conducted for incorporation into project-specific EMPs (e.g. heritage issues, hydrological studies, sand mining, waste management, etc)
- Provide monitoring indicators
- Roles and responsibilities

10. REFERENCES

Angula, M., & Kaundjua, M. B. (2014). Community perceptions of climate change and vulnerability impacts in Oshana and Ohangwena Regions. *Journal for Studies in Humanities and Social Sciences*, *November 2016*.

Arendt, R., Reinhardt-Imjela, C., Schulte, A., Faulstich, L., Ullmann, T., Beck, L., Martinis, S., Johannes, P., & Lengricht, J. (2021). Natural pans as an important surface water resource in the cuvelai basin—metrics for storage volume calculations and identification of potential augmentation sites. *Water (Switzerland)*, *13*(2), 1–21. https://doi.org/10.3390/w13020177

CES. (2019). *Environmental Impact Rating Methodology*. Coastal & Environmental Services. http://www.cesnet.co.za/pubdocs/J G CALEDON ECO 121GR200916/10. Appendix J - Environmental Impact Rating Methodology.pdf

Curtis, B., & Mannheimer, C. (2005). *Tree Atlas of Namibia*. National Botanical Research Institute (NBRI).

Enviro-Dynamics. (2013). *Environmental Impact Assessment for the proposed Otjivalunda Salt Mining and Salt Production Facility- Heritage Specialist Study*.

Enviro Dyanmics. (2013). Otjivalunda Salt Mining and Soap Production Focal Meeting. *Minutes of Meeting during Public Consultation of the EIA of Salt Mining and Soap Production at Otjivalunda*.

Geneletti, D. (2016). Ecosystem services analysis for strategic environmental assessment: Concepts and examples. *Handbook on Biodiversity and Ecosystem Services in Impact Assessment*, *January 2016*, 41–61. https://doi.org/10.4337/9781783478996.00008

Green Facts. (2022). *Ecosystem services*. Green Facts- Facts on Health and the Environment.

Griffin, M. (2005). *Anotated Checklist and Provisional Conservation Status of Namibian REptiles*.

Hipondoka, M., van der Waal, B., Ndeutapo, M., & Hango, L. (2018). Sources of fish in the ephemeral western iishana region of the Cuvelai–Etosha Basin in Angola and Namibia. *African Journal of Aquatic Science*, *43*, 199–214. https://doi.org/10.2989/16085914.2018.1506310

IAIA. (2022). *Strategic Environmental Assessment*. International Association for Impact Assessment.

Klintenberg, P. (2007). More water, less grass? An assessment of resource degradation and stakeholders' perceptions of environmental change in Ombuga grassland, northern Namibia. In *Department of Physical Geography and Quaternary Geology: Vol. PhD thesis* (Issue April 2007).

Klintenberg, P., & Seely, M. (2004). Land degradation monitoring in Namibia: a first approximation. *Environmental Monitoring and Assessment*, *99*, 5–21.

MAWF, & AfDB. (2019). *Namibia Water Sector Support Program (NWSSP): Environmental and Social Management Framework (ESMF) Report* (Issue October).

MEFT. (2021). *Second National Integrated State of the Environment Report for Namibia*.
Mendelsohn, J., Jarvis, A., Roberts, C., & Robertson, T. (2003a). *Atlas of Namibia- A potrait of the Land and its People* (Second). David Philip Publishers. For the Ministry of Environment and Tourism.
Mendelsohn, J., Jarvis, A., Roberts, C., & Robertson, T. (2003b). *TheAtlasofNamibia-fullversion.pdf*. David Philip Publishers.
Mendelsohn, J., Jarvis, A., & Robertson, T. (2013). *A Profile and Atlas of the Cuvelai-Etosha Basin*. Raison and Gondwana Collection.
Menner, P. (2022). *Agamas in Etosha*. Fine Art Photography. https://www.mennerphoto.com/en/wildlife-and-animalphotography/reptiles-co/africa/45-en-photo/en-wildlife/en-wildlife-reptiles-amph/en-wildlife-reptiles-amph-africa/776-agamas-in-etosha-2-photos
MET. (2018). *Measures and Guidelines for Implementation of the Revised National Policy on Human Wildlife Conflict Management*.
Ministry of Lands and Resettlement. (2015). Integrated Regional Land Use Plan for the Zambezi Region. *Land Use Plan*, *2*(Volume 2), 101.
NACSO. (2020). *Registered Communal Conservancies*. Namibia Association of CBNRM Support Organisations.
NACSO. (2021). *Iipumbu ya Tshilongo Natural Resource Report*.
Namibia Biodiversity Database. (2022). *List of Namibian species with IUCN Red List status*. Namibia Biodiversity Database. https://biodiversity.org.na/redlistspp.php
Namibia Statistics Agency. (2017). *Namibia Inter-Censal Demographic Survey 2016 Report*.
NamWater. (2021). *North Central Water Supply Area: Zone 6. Environmental Management Plant*.
NANCI. (2022). *Eudafano Women's Cooperative*. The Namibian Network of the Cosmetics Industry. https://nanci.biz/eudafano/
Nghitila, T., Uebelhör, K., & Kehrer, D. (2011). Strategic Environmental Assessment in Namibia- To Ensure Well Balanced Participation. *Conservation and the Environment*.
NWF. (2020). *Ecosystem Services*. The National Wildlife Federation. https://www.nwf.org/Educational-Resources/Wildlife-Guide/Understanding-Conservation/Ecosystem-Services
OECD. (2010). Strategic Environmental Assessment and Ecosystem Services: SEA Toolkit. In *DAC Network on Environment and Development Co-operation (ENVIRONET)* (Issue November).
OECD. (2021). *Strategic Environmental Assessment and Environmental Impact Assessment*. Organisation for Economic Cooperation and Development.
Oshana Regional Council. (2018). *Oshana Development Profile 2018*.
Oshana Regional Council. (2022a). *Introduction to Oshana Region: Governance*. Oshana Regional Council.
Oshana Regional Council. (2022b). *State of the Region's Address-06 July 2022*.
Partidário, M. R. (2014). Strategic Environemntal Assessment (SEA) current practices,

future demands and capacity-building needs. In *IAIA training courses*.
Persendt, F. C., & Gomez, C. (2016). Assessment of drainage network extractions in a low-relief area of the Cuvelai Basin (Namibia) from multiple sources: LiDAR, topographic maps, and digital aerial orthophotographs. *Geomorphology*, *260*(July), 32–50. https://doi.org/10.1016/j.geomorph.2015.06.047
REEEI & HRDC. (2008). *Guidelines for Building in an Energy Efficient Manner*.
Shigwedha, A. (2021, January 22). Oshana to set up Green Schemes. *The Namibian Newspaper*, 7.
SPC. (2020). *Urban and Regional Planning Structure Plans*. Stubenrauch Planning Consultants. http://www.spc.com.na/services/urban-and-regional-structure-plans.html
UNDP. (2017). *COMDEKS Project: Iipumbu ya Tshilongo Conservancy, Namibia*.
WHO. (2022). *Human Development Index*. World Health Organization. https://www.who.int/data/nutrition/nlis/info/human-development-index

11. APPENDICES

11.1. Strategic Environmental Management Plan (SEMP)