TEACH for ESD

KNOW NAMIBIA'S ENVIRONMENT

OVERVIEW

From the cold, windy coast to the dry, inland savannas and from the vast and sandy deserts to the lush, riverine habitats of the North-east - our country has a wealth of environmental diversity.

Regardless of our different backgrounds, in order to effectively teach about sustainable development, we need to know our natural **environments.** We need to be aware of the various areas of the country and **the biomes** that are found there. We need to become **ecoliterate** – which requires us to have a good understanding of **ecology**.

Our love for Namibia's vast scenic wildernesses, unique **biodiversity** and the important **ecosystem services** she provides is our foundation towards gaining a sound background of our natural environment.

1.KNOWING THE ENVIRONMENT

A large part of Education for Sustainable Development (ESD) entails teaching about the environment, how humans are affecting it and why we need to protect and restore it. In becoming good ESD practitioners, let us start by understanding the terms **environment** and **ecology**.

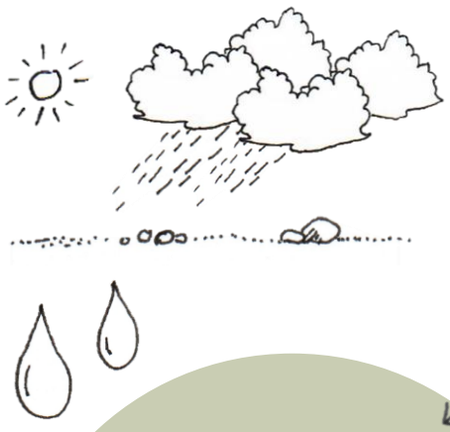
1.1 WHAT IS THE ENVIRONMENT?

In simple terms, the word 'environment' means 'surroundings'. It is used in various contexts, e.g. in education we talk about a child's 'learning environment' and 'the school environment'. So, which environment do we mean when we talk about the "natural environment?" Or "protecting the environment?" Or "teaching about the environment"?

ECOLITERACY
(Ecological literacy)

An in-depth appreciation for and understanding of how ecological systems function on Earth, in order to create sustainable human communities.

Let's explore what we mean by the term **environment**.



ENVIRONMENT

an organism's *immediate surrounding* in which it lives and operates, and all the *conditions* that influence and affect its growth and development.

ABIOTIC
(non-living) factors include our physical surroundings (physical landscape features such as soil types, geology, surface and groundwater systems etc.) and our climate (temperature ranges and fluctuations, rainfall patterns, wind, sunshine etc.).

HUMAN-MADE
this is the built environment; such as cities, schools, roads, clothing, shops, etc.

BIOTIC
(living) factors include its ecological communities (plants, animals, fungi and other organisms). This includes human beings.

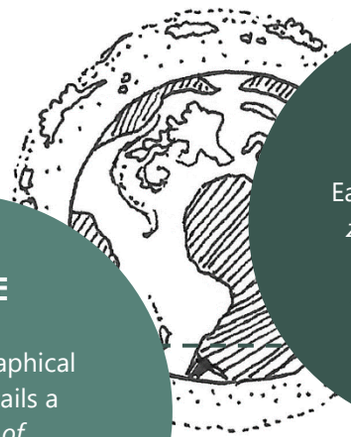
RESOURCE CHECK

To learn more about the term environment watch this video **Basic Concepts of Ecology and Environment**.

1.2 WHAT IS ECOLOGY?

Ecology is a field within the natural sciences that studies living organisms, their environment and how they **interact** with each other *and* their environment. Living organisms can be studied at various levels known as the levels of organisation.

LEVELS OF ORGANISATION

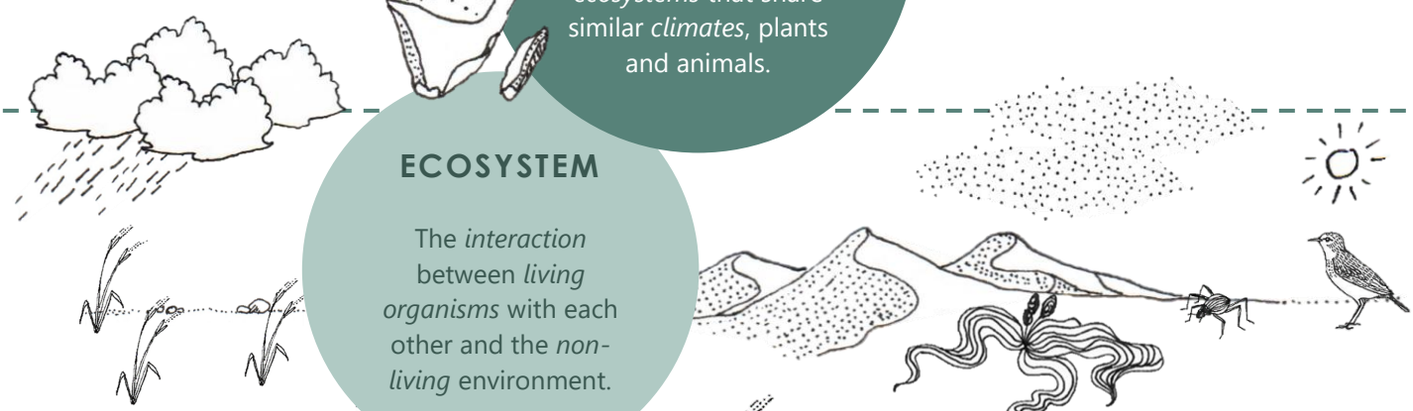


BIOSPHERE

Earth's self-regulating *zone of life*. It is the sum of all biomes and ecosystems of the world.

BIOME

A large geographical area that entails a *collection of ecosystems* that share similar *climates*, plants and animals.



ECOSYSTEM

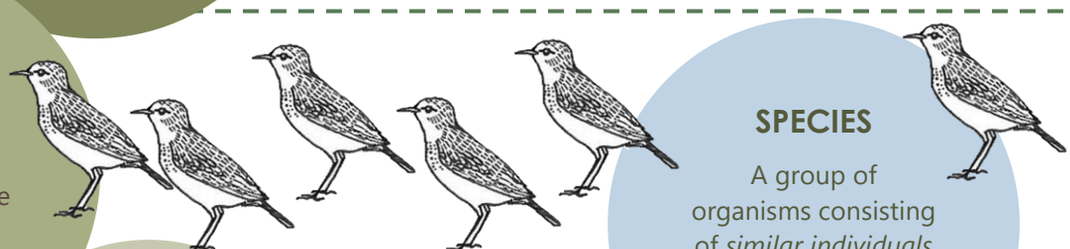
The *interaction* between *living organisms* with each other and the *non-living* environment.

COMMUNITY

A group of populations of two or more *different* species occupying the same geographical area at the same time.

POPULATION

The *number* of organisms of the *same species* that live in a particular *geographic area* at the *same time*.



SPECIES

A group of organisms consisting of *similar individuals* capable of *producing fertile offspring*.

ORGANISM

One individual of a species.

RESOURCE CHECK

To learn more about ecology, watch the videos: **Introduction to Ecology** and **Key Terms in Ecology**.

2. EXPLORING NAMIBIA'S ENVIRONMENT

Namibia is the driest country in sub-Saharan Africa and covers an area of 825,615 km^2. It has very low rainfall and high evaporation rates, leaving Namibia with a harsh and variable climate. Namibia has a diverse range of landscapes and biodiversity.

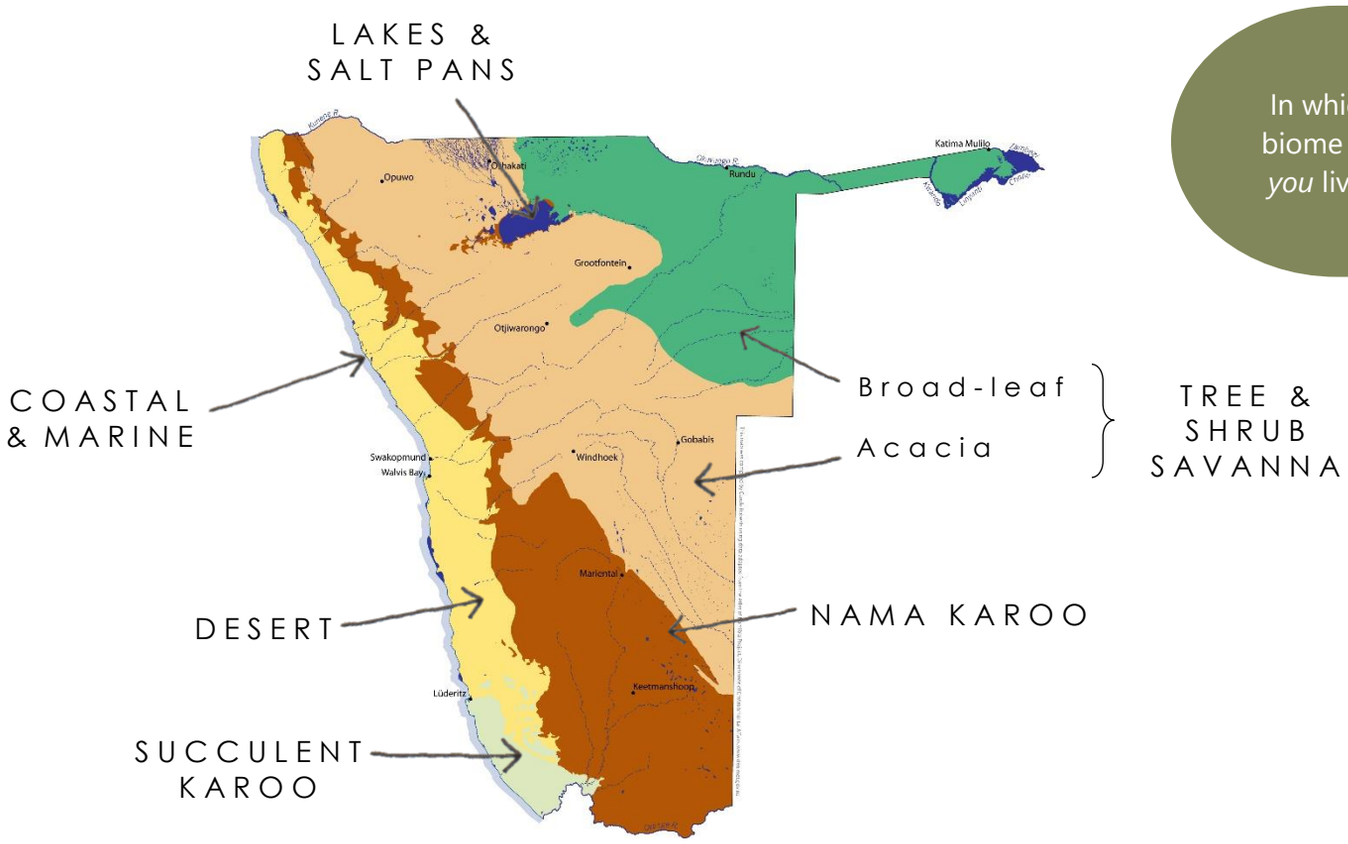
RESOURCE CHECK

To learn more about Namibia's climate and physical geography look at **Chapter 2.1 – 2.3** in the book ***Environmental Awareness for Sustainable Development,*** and **Chapters 2** and **3** in ***Atlas of Namibia: A Portrait of the Land and its People***.

RESOURCE CHECK

To virtually explore more of our beautiful and vastly diverse country, download the **All About Namibia** app and watch the **The Jewel of Namibia** video presentation**.**

We can explore Namibia by looking through an ecological lens at its **biome level**. Namibia has six different biomes in total: four terrestrial and two aquatics.



In which biome do *you* live?

Map of Namibia's biomes

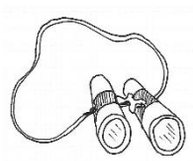
Biomes can be further divided into different vegetation types. Namibia has 29 different vegetation types.

RESOURCE CHECK

To learn more about Namibia's biomes and vegetation types, look at **Chapter 2.5** (The Biosphere) in the book ***Environmental Awareness for Sustainable Development***, as well as **Chapter 4.2** in ***Atlas of Namibia.***

2.1 COASTAL & MARINE BIOME

This biome covers the western coast of Namibia. The cold Benguela current that runs north along the coastline is responsible for our cold, nutrient-rich upwelling system. This accounts for our shores being one of the richest fishing grounds in the world! Our coastlines are characterized mainly by sandy beaches, but also include other habitats such as rocky shores and estuaries. The entire coast of Namibia is protected by a network of parks including the Dorob National Park.



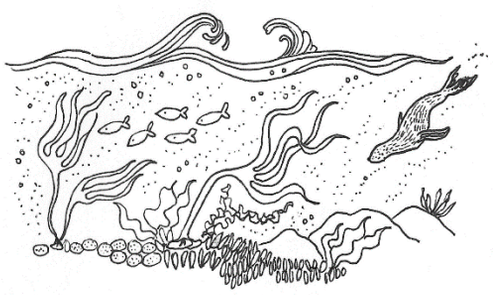
Sandwich harbor, the Orange River Mouth and the Walvis Bay lagoon are unique coastal areas that can support an abundance of birdlife. These important wetlands are protected areas, known as Ramsar Sites.

RESOURCE CHECK

Check out the Namibia's National Parks Brochure for the ***Cape Cross Seal Reserve*** and ***Skeleton Coast Park***.

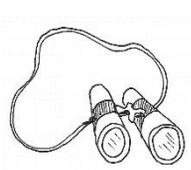
RESOURCE CHECK

If you want to learn more about our different coastal habitats and ecosystems, have a look at the ***Namibia's Coastal Regions.***



2.2 DESERT BIOME

This biome dominates the terrestrial parts of the Namibian coastline and extends inland. Here, coastal fog is the main source of water for most species, as annual rainfall is extremely low. Ephemeral rivers, sand dunes and gravel plains are unique features to this area providing habitat to many species including endemic plants, invertebrates, reptiles and frogs!



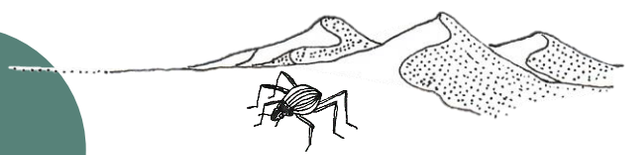
The Namib Sand Sea has been declared a UNESCO Heritage Site in 2013 – it contains some of the highest dunes in the world. You can visit this spectacular site by going to Sossusvlei.

ENDEMISM

When a species is *unique to a defined geographical area* and is usually restricted to that area.

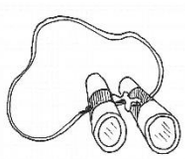
RESOURCE CHECK

Check out the following brochures of Namibia's National Parks that fall into this desert biome: ***Namib-Naukluft Park*** and ***Soussusvlei.***



2.3 SUCCULENT KAROO

This small biome is found in the south-western corner of Namibia, extending into South Africa. It is dominated by succulent shrubs and dwarf shrubs. It has a variety of habitats and boast the greatest plant diversity in Namibia. Most of this area has had little to no human interference as it was previously part of the "Sperrgebiet"- a former diamond concession area.



The newly established Tsau//Khaeb National Park is an area of pristine wilderness and contains one of two biodiversity hotspots found in Namibia. This park will soon become more accessible to visitors.

BIODIVERSITY HOTSPOT

A region with exceptional levels of *plant endemism*, experiencing high levels of *habitat loss*.

RESOURCE CHECK

Check out the Namibia's National Parks that fall into this Succulent Karoo biome:
Sperrgebiet National Park

RESOURCE CHECK

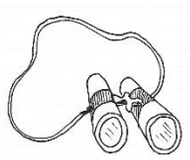
Watch the video
Why is biodiversity so important?

BIODIVERSITY

The biological variety and variability of life on Earth, including the variation at *genetic*, *species* and *ecosystem* level.

2.4 NAMA KAROO

This biome is mainly found in the south-eastern part of Namibia, with a thin strip extending to the north-western corner. It receives an annual rainfall of 100-200 mm. Dwarf shrubs also dominate this biome, which experiences a harsh daily and seasonal temperature variation.



One of Namibia's main geological features, the Fish River Canyon, spans across the Succulent Karoo and Nama Karoo. It is the second largest canyon in the world! The Naukluft mountains on the escarpment are another unique opportunity to visit this area.

RESOURCE CHECK

Check out the following brochure of Namibia's National Parks that fall into this Nama Karoo biome: the ***Ai-Ais Richtersveld Transfrontier Park.***

Within Nama Karoo and several other biomes, Namibia has a unique geological feature called inselbergs. These inselbergs have their own unique features and are attractive to visit.

INSELBERG

An "island" "mountain" that is isolated from the plains around it.

SPITZKOPPE

Located near Usakos, the large Spitzkoppe is 1728m high.

BRANDBERG

Also known as the Dâures, Namibia's highest *massif* is 2573m high.

Through Namibia's various research institutes, partnerships and projects, scientists **study our country's natural environment**.
Gathering and sharing scientific and research information is key for stakeholders, such as decision-makers and educators to protect our most important ecosystems.

RESOURCE CHECK

A very informative online database for Namibian-specific research articles, maps and other resources is the **Environmental Information Services – Namibia** (EIS).

2.5 TREE & SHRUB SAVANNA

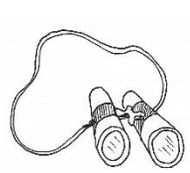
This biome occupies the north-eastern half of Namibia, but depending on the type of soil, amount of annual rainfall and altitude, it can be split into two sub-biomes: *acacia savanna* and *broad-leafed savanna*.

ACACIA SAVANNA

This savanna is dominated by acacias, such as camel thorn, and a wide variety of grass species. It supports large populations of herbivores, livestock and large predators. The acacia savanna receives 250 – 400 mm of rain annually.

RESOURCE CHECK

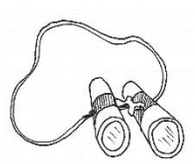
Use the ***Tree Atlas of Namibia*** to identify the trees in these biomes!



Daan Viljoen Game Reserve, large portions of central Namibia and the vegetated Kalahari are in this biome. It includes major urban areas such as Windhoek, Otjiwarongo and Opuwo.

BROAD-LEAFED SAVANNA

This savanna is characterized by deciduous tree species such as mopane, Zambezi teak and wild seringa. These forests support large mammals, such as elephants, hippopotamus and buffalo. The broad-leaf savanna receives 450 - 700 mm of rain annually. The areas is special for its wood production and subsistence farming.



This biome can be visited along the Zambezi and Okavango Rivers. Other interesting features are the Popa Falls and the Waterberg Plateau Park.

RESOURCE CHECK

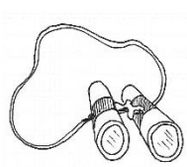
Check out the Namibia's National Parks brochures: ***Bwabwata National Park, Khaudum National Park*** and ***Nkasa Lupala Park.***

RESOURCE CHECK

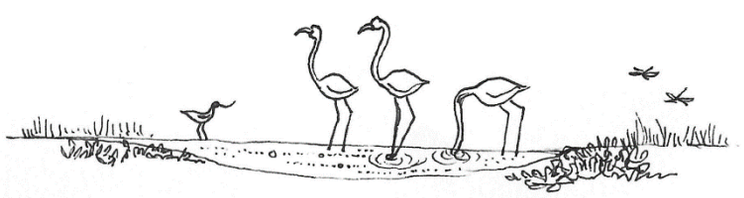
Check out the ***Waterberg Plateau Park*** article to see how this landscape future contributes to the nature of this biome.

2.6 LAKES AND SALT PANS

This biome includes both lakes and salt pans. We have two natural lake systems in Namibia: Lake Liambezi in Zambezi and the Omadhiya Lake Complex in Oshana. While Etosha is the largest salt pan, there are thousands of other salt pans scattered throughout Namibia. The lakes and pans provide important areas for birds and other animals, especially after rainfall.



Etosha National Park is one of Namibia's most iconic features with the Etosha pan in the center surrounded by savanna biomes. Lake Otjikoto and Lake Guinas, technically 'sinkholes', give a glimpse of the underground water system in the area.



RESOURCE CHECK

Check out the brochure of ***Etosha National Park***

RESOURCE CHECK

Read the article ***Namibia's Bottomless Lakes*** to learn more about these incredible sinkholes that have become such unique habitats, full of history.

3. ECOSYSTEM SERVICES

The concept of **ecosystem services** allows us to identify the many different ways in which we depend on healthy and resilient ecosystems. Life on earth, as we know it, is only possible if these natural systems function properly. Most of us do not take note of these life-giving services. Ecosystem services are grouped into the following **four different categories**.

PROVISIONING SERVICES

Nature provides us with energy, food, textiles, water and building materials.

REGULATING SERVICES

Healthy, natural systems help control climate, both locally and globally, and protect against natural hazards; they purify water and air; animals pollinate important crops for us and assist in disease control.

SUPPORTING SERVICES

Natural systems perform important processes such as nutrient cycling, soil formation and primary production, i.e. photosynthesis.

CULTURAL SERVICES

Nature has spiritual, recreational and educational benefits for many people, and has aesthetic value.

RESOURCE CHECK

Watch the video **Why Nature Counts** and then read through ***The Value of Nature*** to better understand what nature does for us as humanity.

RESOURCE CHECK

Read **Section 3.3 "**Identification of ecosystem services" (pg. 25-28) and read up on "Namibia's ecosystem zones and their services" (**Section 5,** pg. 40-177) in the ***Development of an Inventory of Ecosystem Services in Namibia*** report.

Which *cultural* ecosystem services do *you* depend on?

RESOURCES

SOURCE KEY Hardcopy Softcopy Online

1. KNOWING THE ENVIRONMENT

Basic Concepts of Ecology and Environment

VIDEO: This video explains the terms environment and ecosystem; and the difference between the two. Through the explanations you will learn the basic concepts.
AUTHOR: UPSC, Amit Sengupta
Link: https://www.youtube.com/watch?v=fxVGiq1kggg

Introduction to Ecology

VIDEO: This video is an introduction to ecology and speaks on the various concepts and components that define ecology. It presents the ecological building blocks, interconnected in their nature.
AUTHOR: Teachers Pet (2015)
Link: https://www.youtube.com/watch?v=GlnFylwdYH4

Key Ecology Terms

VIDEO: This animated video gives brief explanations and definitions of commonly used ecological terms.
AUTHOR: Fuse School Global Education (2016)
Link: https://www.youtube.com/watch?v=E6WAQpRulhA&t=16s

2. EXPLORING NAMIBIA'S ENVIRONMENT

Environmental Awareness for Sustainable Development - a Resource Book for Namibia

BOOK: Chapter 2 gives an overview of Namibia's entire environment (section 2.5 looks at the biosphere). Chapter 3 takes a look at the various ecosystem services we receive from our country's natural environment.
AUTHOR: S. Gerrad, P. Heyns, M. Pfaffenthaler & G. Schneider (2017)
Link: http://www.namibianuranium.org/wp-content/uploads/2021/02/Environmental-Awareness-For-Sustainable-Development-A-Resource-Book-For-Namibia.pdf

Atlas of Namibia: A Portrait of the Land and its People

BOOK: Chapter 4.2 of this book gives an in-depth description of Namibia's biomes and vegetation types. Chapters 2 and 3 look at Namibia's physical geography and climate and contain many descriptive maps.
AUTHOR: J. Mendelsohn, A. Jarvis, C. Roberts & R. Robertson (2002)
Link: https://www.researchgate.net/publication/263546846_Atlas_of_Namibia_A_Portrait_of_the_Land_and_its_People

All About Namibia

APP: An informative tool, it gives extensive data and graphics on each regions' areas of interest and features.
AUTHOR: Legends of Africa, Namibia
Link: https://play.google.com/store/apps/details?id=com.app.p9385EA

RESOURCES

SOURCE KEY Hardcopy Softcopy Online

Jewel of Namibia Nat Geo Live

VIDEO: This short film documents Namibia, exploring all of the natural environment. Photographer Frans Lanting and Christine Eckstrom give a presentation of natural diversity with their beautiful photographs.
AUTHOR: National Geographic (2011)
Link: https://www.youtube.com/watch?v=hv-JMEOYl8M&t=517s

Namibia's National Parks

BROCHURE: Information brochures of 10 of Namibia's most popular National Parks, including information on their biodiversity and conservation efforts. Check the last link for additional fact sheets for each park.
AUTHOR: Ministry of Environment and Tourism (n.d)
Cape Cross Seal Reserve: https://www.namibiahc.org.uk/perch/resources/pdf/cape-cross-brochure.pdf
Skeleton Coast Park: https://www.namibiahc.org.uk/perch/resources/pdf/skeleton-coast-park.pdf
Namib Naukluft Park: https://www.namibiahc.org.uk/perch/resources/pdf/nnp.pdf
Sossusvlei: https://www.namibiahc.org.uk/perch/resources/pdf/sossusvlei.pdf
Sperrgebiet National Park: https://www.namibiahc.org.uk/perch/resources/pdf/sperrgebiet-national-park.pdf
Ai Ais Richtersveld Transfrontier Park: https://www.namibiahc.org.uk/perch/resources/pdf/ai-ais.pdf
Bwabwata National Park: https://www.namibiahc.org.uk/perch/resources/pdf/bwabwata-national-park.pdf
Khaudum National Park: https://www.embassyofnamibia.fr/perch/resources/pdf/khaudum.pdf
Nkasa Lupala National Park: https://www.embassyofnamibia.fr/perch/resources/pdf/mamili-park.pdf
Etosha National Park: https://www.namibiahc.org.uk/perch/resources/pdf/etosha-national-park.pdf
Additional fact sheets: Link: https://www.namibiahc.org.uk/national-parks.php

Namibia's Coastal Regions

BOOKLET: Individual booklets describing the coastal environment of the regions situated along Namibia's coast. Read for information on their natural environments, economic activities and potential future issues.
AUTHOR: T. Robertson, J. Mendelsohn, A. Jarvis & R. Swart (2012)
Link: http://jaroconsultancy.com/sites/default/files/Namibia%27s%20coast.pdf

Why is Biodiversity So Important

VIDEO: In this video, Kim Preshoff differentiates between the three types of biodiversity (ecosystems, genetic and species), explaining how environmental resilience comes from their interconnectedness.
AUTHOR: TED Ed (2015)
Link: https://www.youtube.com/watch?v=GK_vRtHJZu4&t=17s

Environmental Information Service (EIS) Namibia

WEBSITE: This website provides a wealth of environmental information in Namibia. It is a citizen science tool as well as being a source of data, photographs and a portal with links to sites on specific topic areas.
AUTHOR: Environmental Information Service
Link: http://www.the-eis.com/

RESOURCES

SOURCE KEY Hardcopy Softcopy Online

Tree Atlas of Namibia

BOOK: This is an atlas to all trees in Namibia with a description and where the tree occurs.
AUTHOR: B. Curtis & C. Mannheimer (2005)
Link: https://treeatlas.biodiversity.org.na/

Waterberg Plateau Park

WEBSITE: This article introduces the Waterberg Plateau as a geological feature and explains how it so heavily contributes to the surrounding natural environment, illustrating how landscape features influence biomes.
AUTHOR: NamibWeb (n.d)
Link: https://www.namibweb.com/waterberg.htm

Namibia's Bottomless Lakes

ARTICLE: This article begins with the formation and history of Lake Otjikoto and its sister lake, Lake Guinas, before going on to explain this natural phenomenon, the unique habitat and how the "lakes" are used.
AUTHOR: Travel News Namibia (2018)
Link: https://www.travelnewsnamibia.com/news/stories/featured-stories/namibias-bottomless-lakes-otjikoto-guinas/

3. ECOSYSTEM SERVICES

Why Nature Counts

VIDEO: A country so dependent on its natural resources, this video shows the relationship between Namibia's natural resources and their "contribution" to the country; addressing the importance of nature.
AUTHOR: Chris Oberholster (2017)
Link: https://www.youtube.com/watch?v=t-SMK7xb3iE

The Value of Nature

PRESENTATION: This presentation summarises how Namibia's natural resources contribute to the country's economy. It also addresses the cost to biodiversity and how to bridge this environmental-economic gap.
AUTHOR: Resource Mobilisation for Biodiversity Conservation (2018)
Link: https://resmob.org/wp-content/uploads/2018/10/The-value-of-nature.pdf

Development of an Inventory for Ecosystem Services in Namibia Report

BOOKLET: This inventory documents Namibia's ecosystem zones and the synthesis of its ecosystem services.
AUTHOR: L. Harper-Simmonds, J. Mendelsohn, J. Roux, J Pallet, C. Brown, A. Middleton and J. Kruse (n.d)
Link: https://www.met.gov.na/files/downloads/179_ResMob-Inventory%20report2-final.pdf