NATIONAL EXPERIENCE ON LAND COVER WORK BY THE NSA

NATIONAL TECHNICAL TRAINING WORKSHOP ON ENVIRONMENT STATISTICS

4 December 2019

Roof of Africa Hotel, Namibia

Enrico Bezuidenhoudt

GIS Analyst

NSA

Est. by Statistics Act 9 of 2011
Namibia Statistics Agency

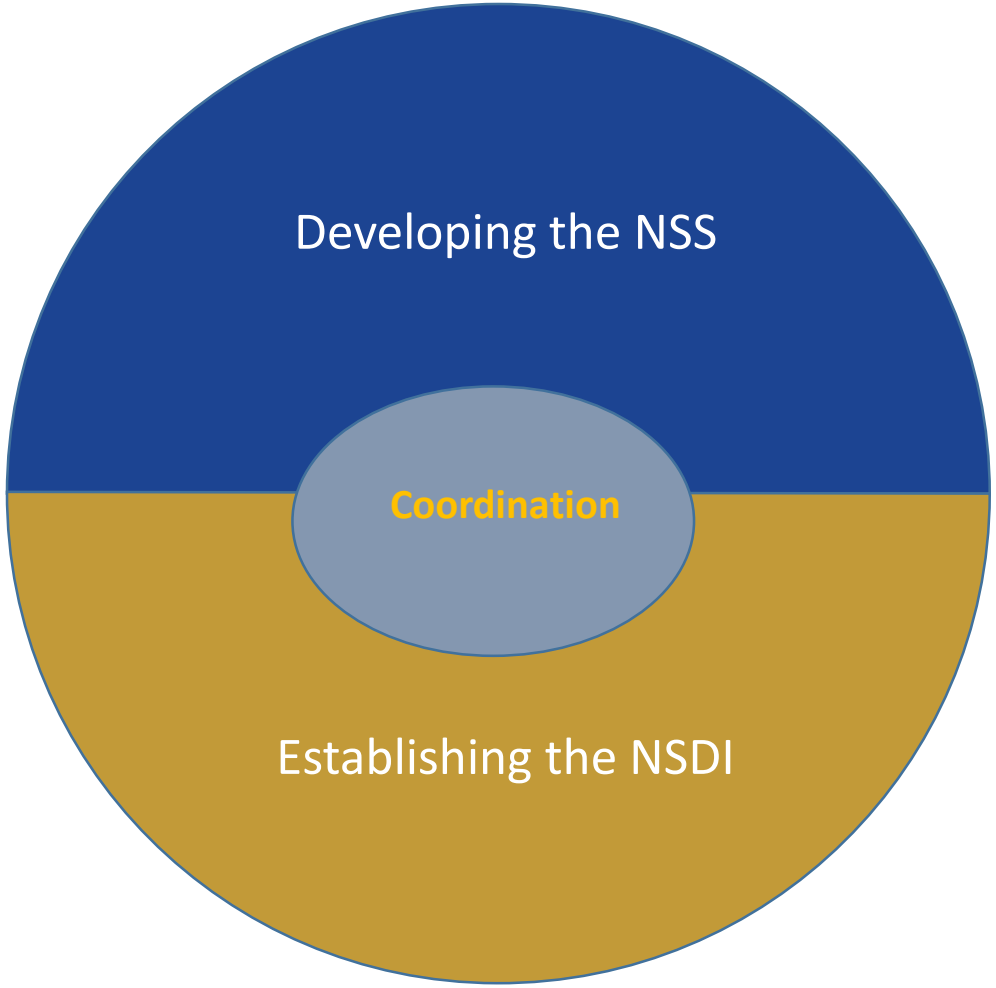
NSDI Namibia

OUTLINE

1. NAMIBIA STATISTICS AGENCY
2. NATIONAL SPATIAL DATA INFRASTRUCTURE
3. FUNDAMENTAL GEOSPATIAL DATA THEMES
4. WHAT IS LAND COVER?
5. OVERVIEW OF NATIONAL DATA ON LAND COVER AND LAND USE
6. WHAT IS LAND COVR DATA USED FOR?
7. PROBLEM IN NAMIBIA
8. NEED FOR STANDARDIZATION
9. SUSTAINABLE DEVELOPMENT GOALS
10. DEVELOPMENT OF A NATIONAL LAND COVER CLASSIFICATION SYSTEM FOR NAMIBIA

1. NAMIBIA STATISTICS AGENCY

One Organisation



Two Responsibilities

2. NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI)

GOVERNMENT GAZETTE

OF THE

REPUBLIC OF NAMIBIA

N$15.20 WINDHOEK - 18 August 2011 No. 4777

CONTENTS

Page

GOVERNMENT NOTICE

No. 148 Promulgation of Statistics Act, 2011 (Act No. 9 of 2011), of the Parliament .....

Government Notice

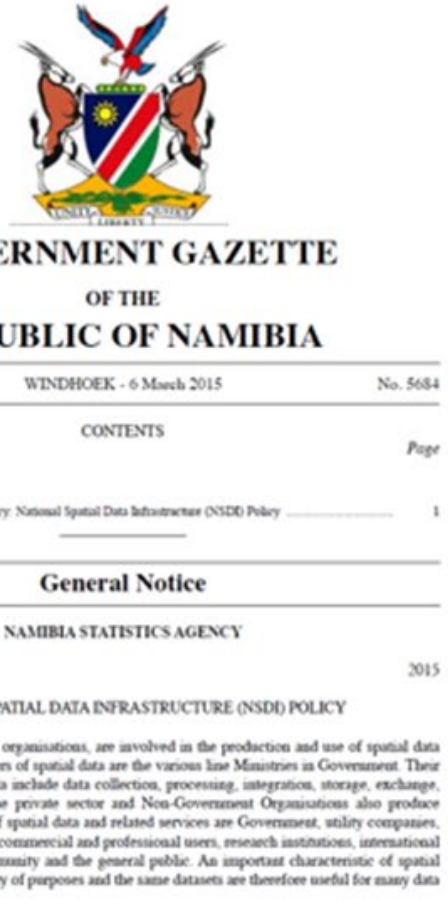
OFFICE OF THE PRIME MINISTER

No. 148 2011

PROMULGATION OF ACT
OF PARLIAMENT

The following Act which has been passed by the Parliament and signed by the President in terms of the Namibian Constitution is hereby published in terms of Article 56 of that Constitution.

No. 9 of 2011: Statistics Act, 2011.



GOVERNMENT GAZETTE

OF THE

REPUBLIC OF NAMIBIA

N$6.40 WINDHOEK - 6 March 2015 No. 5684

CONTENTS

Page

GENERAL NOTICE

No. 103 Namibia Statistics Agency: National Spatial Data Infrastructure (NSDI) Policy 1

General Notice

NAMIBIA STATISTICS AGENCY

No. 103 2015

NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI) POLICY

Many parties, individuals and organisations, are involved in the production and use of spatial data in Namibia. The main producers of spatial data are the various line Ministries in Government. Their activities related to spatial data include data collection, processing, integration, storage, exchange, access and dissemination. The private sector and Non-Government Organisations also produce spatial data. The main users of spatial data and related services are Government, utility companies, public services, private sector commercial and professional users, research institutions, international organisations, the donor community and the general public. An important characteristic of spatial data is that many serve a variety of purposes and the same datasets are therefore useful for many data users.

The Objectives for NSDI as set out in the Statistics Act 47 (2):

- facilitate the capture of spatial data through cooperation between government bodies and other organs of state;
- promote effective management and maintenance of spatial data;
- promote the use and sharing of spatial data in support of spatial planning, socioeconomic development and related activities;
- create an environment which facilitates coordination and cooperation among stakeholders regarding access to spatial data;
- eliminate duplication in the capturing of spatial data; and
- facilitate the protection of copyright of the state in works relating to spatial data.

3. GLOBAL FUNDAMENTAL GEOSPATIAL DATA THEMES (UN, 2017)

Global Geodetic Reference Frame

Geographical Names

Addresses

Functional Areas

Buildings and Settlements

Land Parcels

Transport Networks

Elevation and Depth

Population Distribution

Land Cover and Land Use

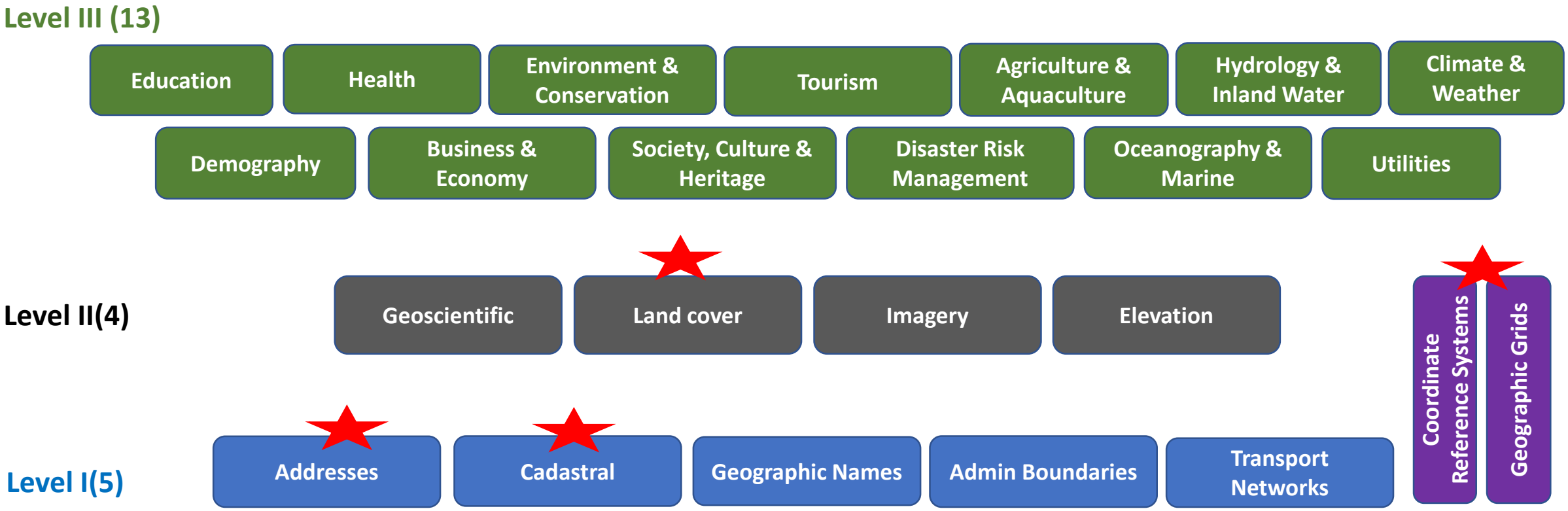
Geology and Soils

Physical Infrastructure

Water

Orthoimagery

GAZETTED NSDI FUNDAMENTAL GEOSPATIAL DATA THEMES



22 x Main Fundamental Data Themes

4. WHAT IS LAND COVER?

- “Land cover is the observed (bio) physical cover of the earth’s surface” (FAO).
- A crucial step at the beginning of a LULC mapping project is the definition of the legend.
- The land cover classes should be defined before starting the ground truth field work and should follow a certain standard, e.g. the FAO Land Cover Classification System (FAO 2000).
- More detailed classes can be defined and can be country-specific.
- Changes on land can be systematically monitored on a regular and comparative basis if a standard is available.

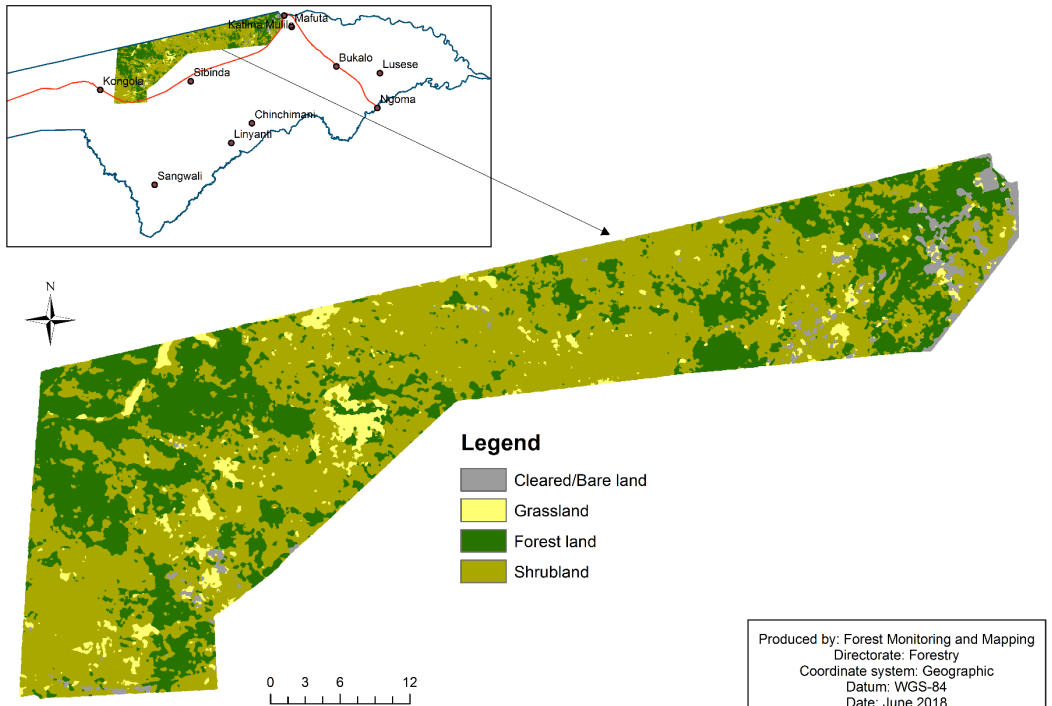
LAND USE VS LAND COVER

- It is important to differentiate between land cover and land use information:
- **Land cover describes what is there**, **land use describes how it is used.**
- The land cover of a soccer pitch is ‘grass’, the land use e.g. ‘sports facility’.

NAMIBIA SCHEME II LAND COVER

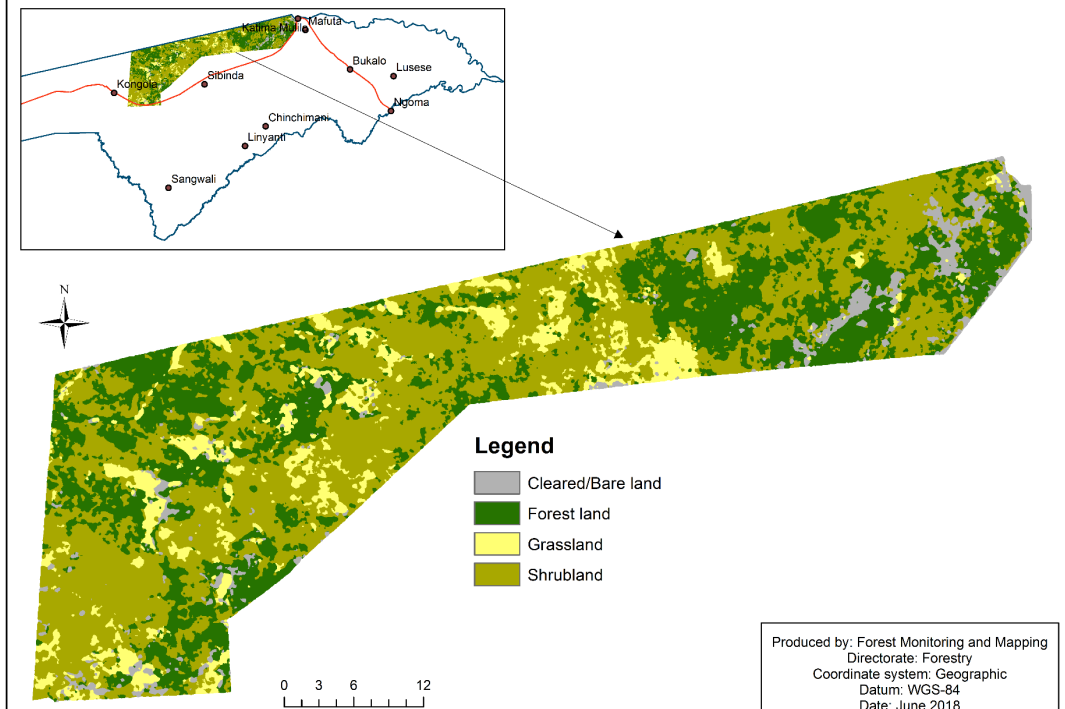
2000

Vegetation cover for the Caprivi State Forest - 2010



2010

Vegetation cover for the Caprivi State Forest - 2016



DATA AND MAP INFORMATION SOURCES

The land cover map was derived from Landsat TM and ETM images of 2000 and 2010 acquired from the USGS.
Roads, boundaries and towns were compiled from Department of Surveys and Mapping.

Input/ Output parameters

Coordinate System:UTM_Zone_33S
Projection: Transverse_Mercator
False_easting: 500000.0
False_northing: 10000000.0
Central_meridian: 15.0
Scale_factor: 0.9996
Latitude_of_origin: 0.0
Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_Clarke_1866
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_Clarke_1866
Spheroid: Clarke_1866
Semimajor Axis: 6378206.4
Semiminor Axis: 6356583.799998981
Inverse Flattening: 294.9786982

Scale 1:2,500,000

LEGEND

Forestland	Shrubland	Vegetated Wetland	Rock Outcrop	Capital
Woodland	Savanna Grassland	Water Body	Bare Soil	Towns
Grassland	Annual Cropland	Settlements	Desert Dune	Roads
			Desert Sand	National Boundary

Disclaimer
The geographical designations employed do not imply the expression of any opinion whatsoever on the part of any of the agencies involved, concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries.

Prepared and produced by Regional Centre for Mapping of Resources for Development (RCMRD)
July 2014.

www.rcmrd.org

N

USAID SERVIR Eastern & Southern AFRICA

NASA

6. WHAT IS LAND COVER DATA USED FOR?

- Used for quantification of Green House Gas emissions
- Monitoring Land Degradation
- Environmental Monitoring and Accounting
- Land Use Planning
- Informed decision making on policy issues affecting climate change and environmental protection

7. PROBLEM IN NAMIBIA

- Lack of a uniform legislated standard guiding land cover classification.
- Lack of clear definitions for major land cover classes such as Forest.
- Makes it difficult to track changes over time in a consistent and standardized manner.
- Lack of land cover statistics.
- Comparability with the FAO classes not compatible with national biophysical condition.
- Difficult to conduct national reporting on NDP and SDG indicators.

8. NEED FOR STANDARDIZATION

- For many years, agencies at various governmental levels, NGOs, Universities, Development Agencies have been collecting data about land, but for the most part they have worked independently and **without coordination**.
- Too often, this means duplication of effort, or data collected for a specific purpose were found to be of little or no value.
- Major problems are present in the application and interpretation of the existing data.
  - Changes in definitions of categories / classes
  - Different data collection methods by source agencies, consultancies, etc.
  - Employment of incompatible classification systems
  - In addition, it is nearly impossible to aggregate/compare the available data because of differing classification systems and definitions used

EXAMPLE OF FOREST

- The identification of forested areas often plays a central role in global and national land cover assessment. This is due to the fact that forests are often seen as biodiversity hotspots and as carbon sinks.
- Also, they provide many direct (fire wood, timber for construction, non-timber forest products,...) and indirect (clean air, protection against natural hazards, soil stabilization,...) resources to human beings.
- The reality shows however that “forests” in various countries (or even within regions of a country) can look very differently and thus require specific definitions.

EXAMPLES

Quiver Tree Forest

Petrified Forest

Community Forest

Forest in Kavango

EXAMPLES

Namibia's forests could disappear in 20 years

News - National | 2019-03-18 Page no: 1

by Shinovene Immanuel

NAMIBIA's rosewood forests could disappear in the next 20 years if the large-scale timber harvesting continues at the current rate, environment minister Pohamba Shifeta has warned.

Shifeta – who has been oppose[illegible]r traders and harvesters – said

9. SUSTAINABLE DEVELOPMENT GOALS

- Land Cover is crucial in monitoring the NDP and SDGs
- Tracking change over-time on land cover such as Forests, Surface Water, Crops, Urban Areas, etc.

SDG Indicators where Land Cover Plays a Role

15.1.1 Forest area as proportion of total land area

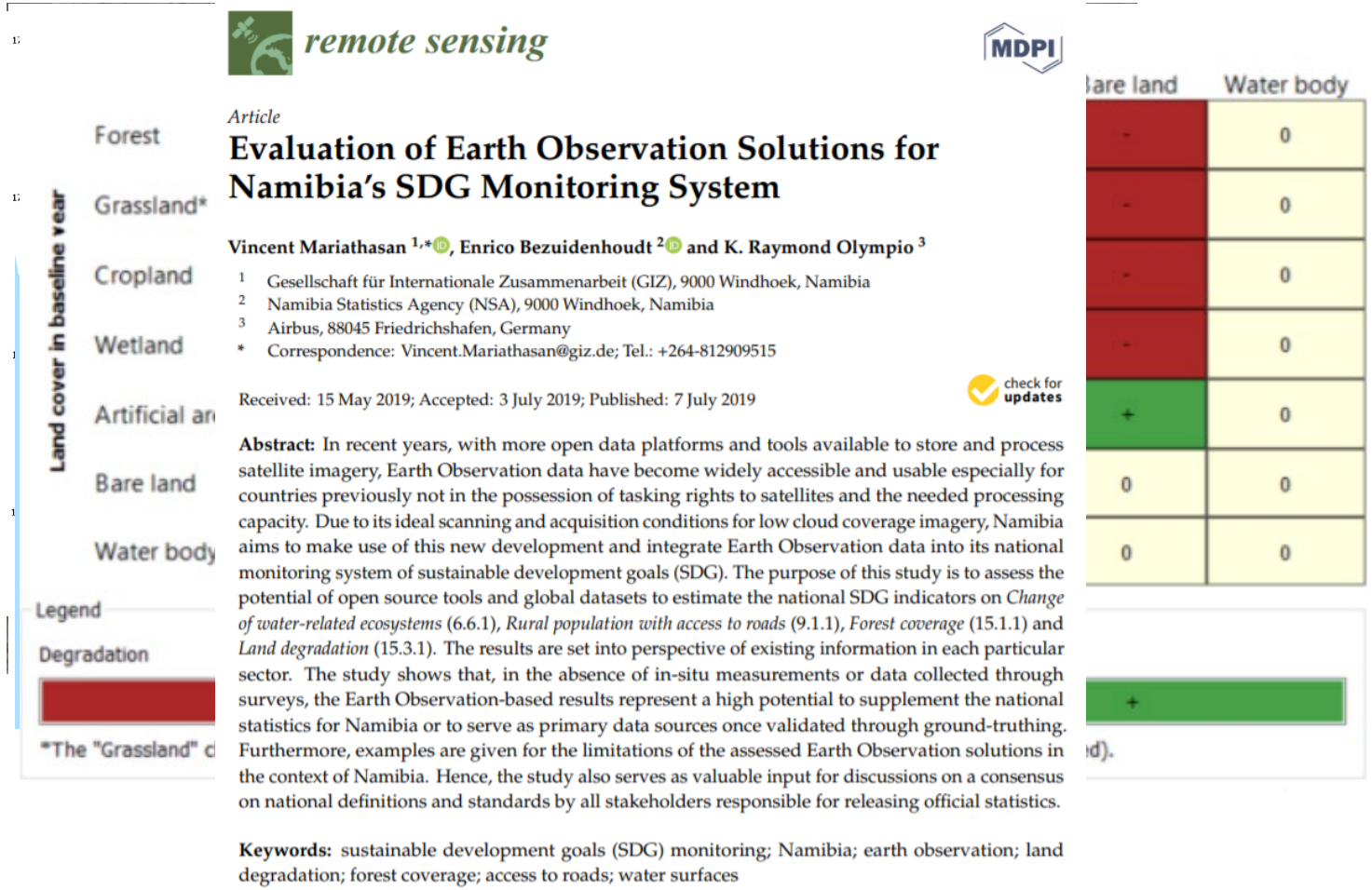
15.3.1 Proportion of land that is degraded over total land area

6.6.1 Change in the extent of water-related ecosystems over time

And many more..

EXAMPLES

- Indicator 11.3.1 ratio of land consumption rate to population growth rate
- Indicator 15.3.1 Land degradation
- Indicator 6.6.1 Change in the extent of water-related ecosystems over time
- Indicator 15.1.1 Forest coverage



remote sensing

MDPI

Article

Evaluation of Earth Observation Solutions for Namibia's SDG Monitoring System

Vincent Mariathasan [1,*], Enrico Bezuidenhoudt [2] and K. Raymond Olympio [3]

1 Gesellschaft für Internationale Zusammenarbeit (GIZ), 9000 Windhoek, Namibia
2 Namibia Statistics Agency (NSA), 9000 Windhoek, Namibia
3 Airbus, 88045 Friedrichshafen, Germany
* Correspondence: Vincent.Mariathasan@giz.de; Tel.: +264-812909515

Received: 15 May 2019; Accepted: 3 July 2019; Published: 7 July 2019

check for updates

Abstract: In recent years, with more open data platforms and tools available to store and process satellite imagery, Earth Observation data have become widely accessible and usable especially for countries previously not in the possession of tasking rights to satellites and the needed processing capacity. Due to its ideal scanning and acquisition conditions for low cloud coverage imagery, Namibia aims to make use of this new development and integrate Earth Observation data into its national monitoring system of sustainable development goals (SDG). The purpose of this study is to assess the potential of open source tools and global datasets to estimate the national SDG indicators on *Change of water-related ecosystems* (6.6.1), *Rural population with access to roads* (9.1.1), *Forest coverage* (15.1.1) and *Land degradation* (15.3.1). The results are set into perspective of existing information in each particular sector. The study shows that, in the absence of in-situ measurements or data collected through surveys, the Earth Observation-based results represent a high potential to supplement the national statistics for Namibia or to serve as primary data sources once validated through ground-truthing. Furthermore, examples are given for the limitations of the assessed Earth Observation solutions in the context of Namibia. Hence, the study also serves as valuable input for discussions on a consensus on national definitions and standards by all stakeholders responsible for releasing official statistics.

Keywords: sustainable development goals (SDG) monitoring; Namibia; earth observation; land degradation; forest coverage; access to roads; water surfaces

Mariathasan, V., Bezuidenhoudt, E., & Olympio, R. K. (2019). Evaluation of Earth Observation Solutions for Namibia's SDG Monitoring System. Remote Sensing, 11 (13). doi: https://doi.org/10.3390/rs11131612

10. DEVELOPMENT OF A NATIONAL LAND COVER CLASSIFICATION SYSTEM FOR NAMIBIA

- Establishment of a Technical Working Group
- Technical Working Group Workshop (November 2019)
- Consolidated draft of a national land cover classification for consultation by the stakeholders
- Feedback by January 2020
- Regional Consultations
- National Workshop for February 2020
- Legal Review and Gazetting March / April 2020
- Seek funding for completing a national land cover map

Workshop on the development of a national land cover classification standard for Namibia

- A first workshop took place on 14 and 15 of November 2019, aimed at kick-starting the discussions on the development of a national land cover classification system in Namibia.
- This workshop brought together experts from various Namibian Institutions (Namibia Statistics Agency; Ministry of Agriculture, Water and Forestry; Ministry of Environment and Tourism; Ministry of Mines and Energy; Ministry of Land Reform; University of Namibia; Namibia University of Science and Technology) and international organizations (GIZ, UNDP), who have spent 2 days developing the first frame of a national standardized land cover classification system

xx	**Forest**	*Symbol*
Level: 1	**Parent**: *none*	
Definition	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use. Including planted forest that meet the required criteria.	
Criteria	**Metrics:** • canopy cover of more than 10% • land spanning over more than 0.5 hectares • trees higher than 5 meters (or able to reach this height) **Mandatory features:** • Trees meeting the criteria stated above • Soil **Optional features:** • Deadwood • Grass • Bush/Shrubs • Water **Character:** • Natural • Planted • Semi-Natural **Typical land uses to be found in this class:** • Timber and non-timber harvesting • Tourism • Conservation **Layers / strata:** • Sand / Soil (lower layer) • Grass, Shrubs (mid layer) • Trees (upper layer)	

	• No leaves May – July • With leaves Aug – March **Physical / chemical parameters:** • Soil pH (*to be discussed, what is the exact impact of the pH*) **Other temporal aspects:** • Grassland changes to bare soil from June-October **Geographical indications. Where can this class mostly be found in Namibia?** • Mostly North Eastern central and western (*to be more discussed and agree upon*)
Includes	• Deforested and afforested areas, if they meet the definition • Small scale Infrastructure (i.e. roads, power stations, MTC towers), lakes, rivers, etc. located within a forest
Excludes	• "Fake" forests (e.g. Quiver tree Forest, Petrified Forest) • Orchards • Botanical Gardens

Reference data	• Forest Inventory (MAWF) • State forest Land Cover • Bush Information System (to be launched 2020 MAWF)
Possible sub-classes	• Open forest • Medium forest • Dense forest (*specific definitions of the sub-classes still to be discussed*)
Examples	

DATA SOURCES

- Source – Landsat, Sentinel, EarthWatch
- Computation – Google Earth Engine, Machine Learning
- Future –Data Cube

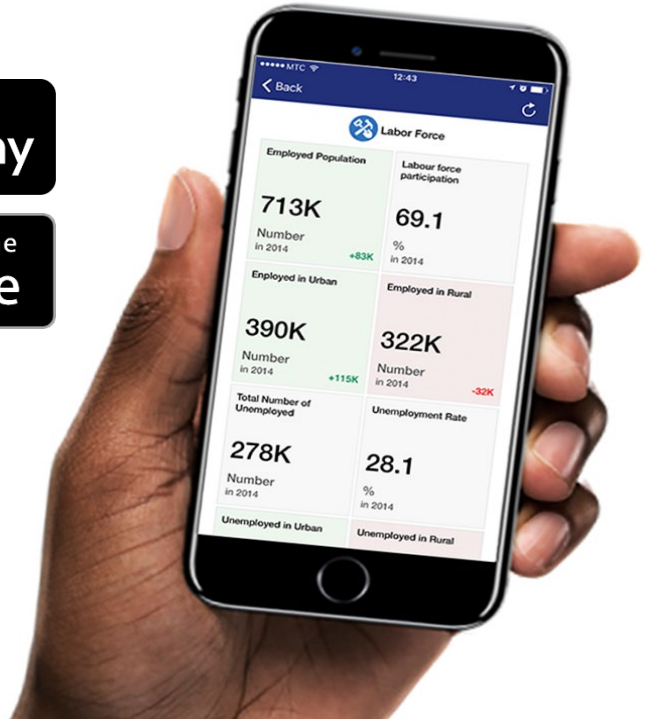
THANK YOU

1. NSA MOBILE APPLICATION

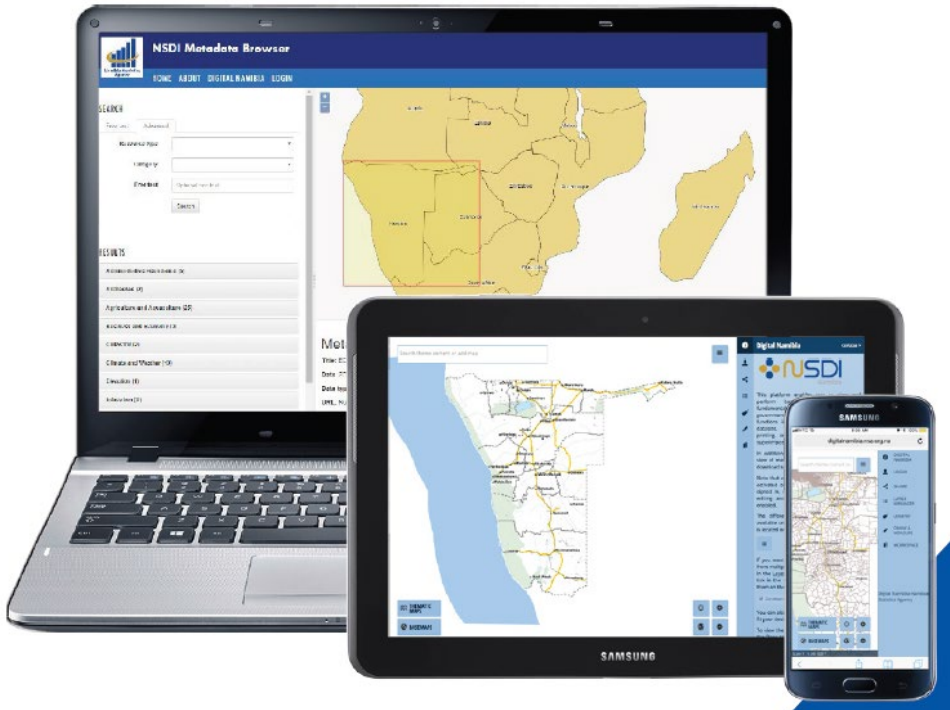
Download the NSA App

GET IT ON Google Play

Download on the App Store



2. NSDI Geographic Portal



https://digitalnamibia.nsa.org.na/

http://geofind.nsa.org.na/

Namibia Statistics Agency