Digital Earth
AFRICA

Amos T. Kabo-Bah

University of Energy and Natural Resources, Ghana

Email: amos.kabobah@uenr.edu.gh

UNIVERSITY OF ENERGY AND NATURAL RESOURCES, SUNYANI
Founded: 2011
Hosts:

Regional Centre for Energy and Environmental Sustainability (a World Bank Funded Project)

https://rcees.uenr.edu.gh/

It is an **African** Centre of Excellence committed to provide accredited tailor-made **postgraduate programmes in the fields of Energy and Environment** with the aim to develop and train expertise geared towards universal energy access, energy efficiency and promoting renewable energy.

Earth Observation Research and Innovation Centre (EORIC):

EORIC is a research arm of the University responsible for the acquisition of near real time satellite-based data, air-borne and in-situ data, metadata and products, automatic weather monitoring, operations and management of unmanned aerial systems, virtual regional fire monitoring and modelling, organization of training programs in the use of Earth Observation (EO) and Geographic Information Systems (GIS) techniques, collectively towards making informed decisions in the areas of water, disasters, health, energy, climate, agriculture, ecosystems and biodiversity.

EARTH OBSERVATION RESEARCH
& INNOVATION CENTRE

Earth Observation Research & Innovation Centre

University of Energy & Natural Resources (UENR)

VISION

To become a leading African Research Centre in the promotion and dissemination of value-added satellite and in-situ based data and information, transfer of ultra-modern affordable space science skills and technologies for meeting the needs of society

MISSION

To promote, facilitate and support the acquisition and application of geospatial technologies in interdisciplinary research and education in areas of water, disasters, energy, climate, agriculture, ecosystems, weather, health and biodiversity

DIVISION

- Satellite, Weather and Climate
- Unmanned Aerial Systems
- Climate Informatics
- Advanced Virtual Fire Laboratory
- Virtual Environmental Laboratory
- High Performance Computing

01

EARTH OBSERVATION SATELLITE - DIRECT BROADCAST - EOS-DB GROUND STATION

The 2.4m high-quality, high-precision elevation-over-azimuth satellite tracking antenna system was installed in 2015 for acquisition of Earth Observing Satellite-Direct Broadcast data from Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) Satellites.

SATELLITES

- NASA Terra
- NASA Aqua
- Suomi NPP
- NOAA 18
- NOAA 19
- Metop-A
- Metop-B
- FENGYUN 3B

FUNDED BY

SDF skills development fund

NATIONAL PARTNERS

SIC

Forestry Commission

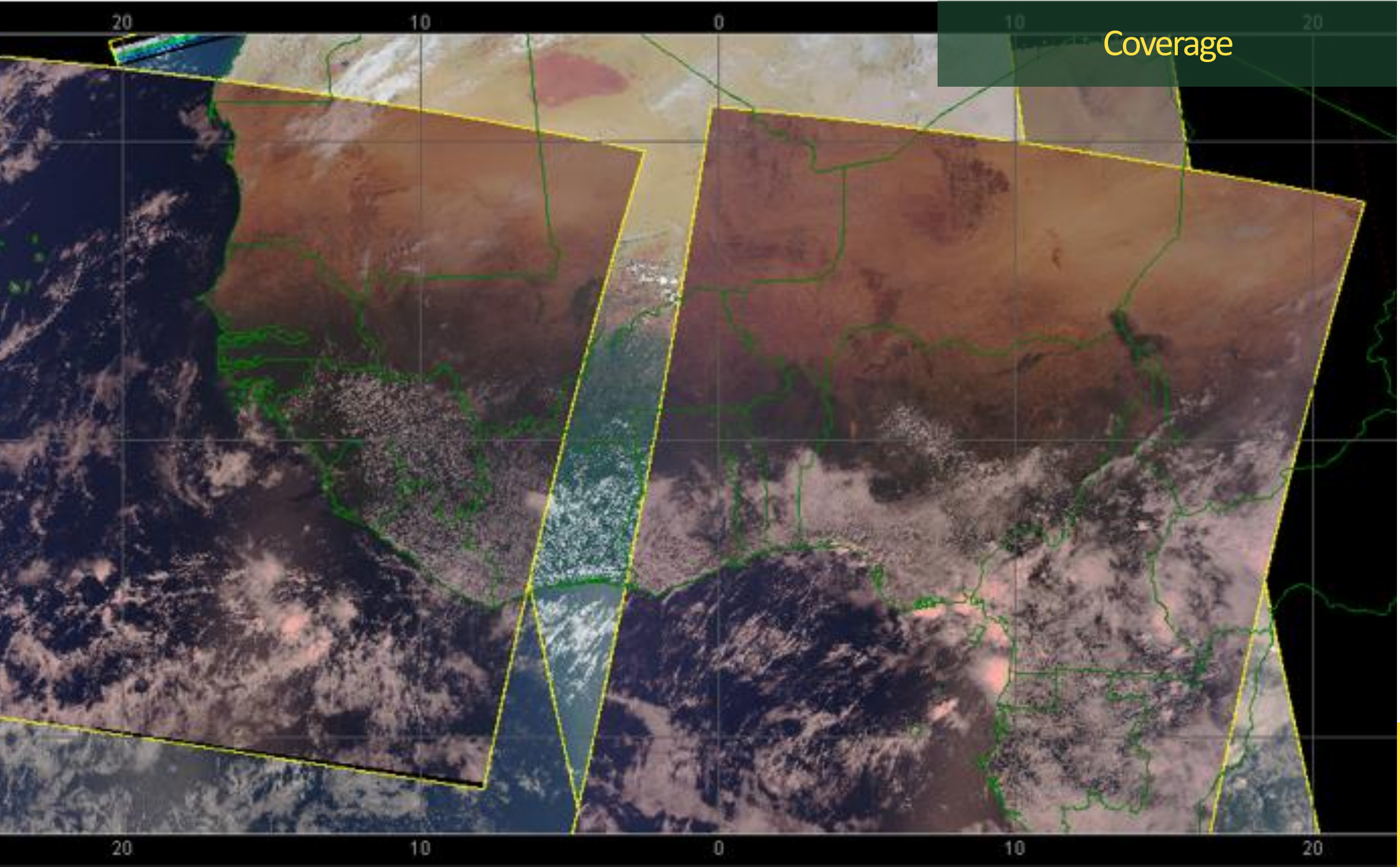
NADMO GHANA

INTERNATIONAL PARTNERS

CSIR our future through science

Canada Natural Resources Canada Canadian Forest Service

Coverage



02

GEONETCAST RECEPTION STATION

The 3m mesh, C Band antenna was installed in 2013 for decoding the signal and recreates the data/products according to a defined directory and the file name structure from the Eutelsat 8W.

03

AUTOMATIC WEATHER STATION

The automatic weather station established on the 2nd of June 2014 and started successfully logging data on the 4th of June 2014. The Automatic Weather Station provides daily weather data for the Centre.

A V F S

Advanced Virtual Fire System

Web Application

AVFS

Fire Map for West-Africa

Select different days using the date picker, country and fire source to view fires

Click for Map Options

USSD Application

"Currently Yendi feels like 28 deg and will experience overcast clouds. The average temperature is about 26 deg with humidiy of 79%. Winds will blow at speed of 3.66m/s in the SW direction. 2 fires were detected in your location"

Short code

***920*49#**

MOBILE APPS

Available on both iOS and Android, AVFSMobile brings critical fire management information to you where ever you are. Automated alerting to SMS, email or push notifications

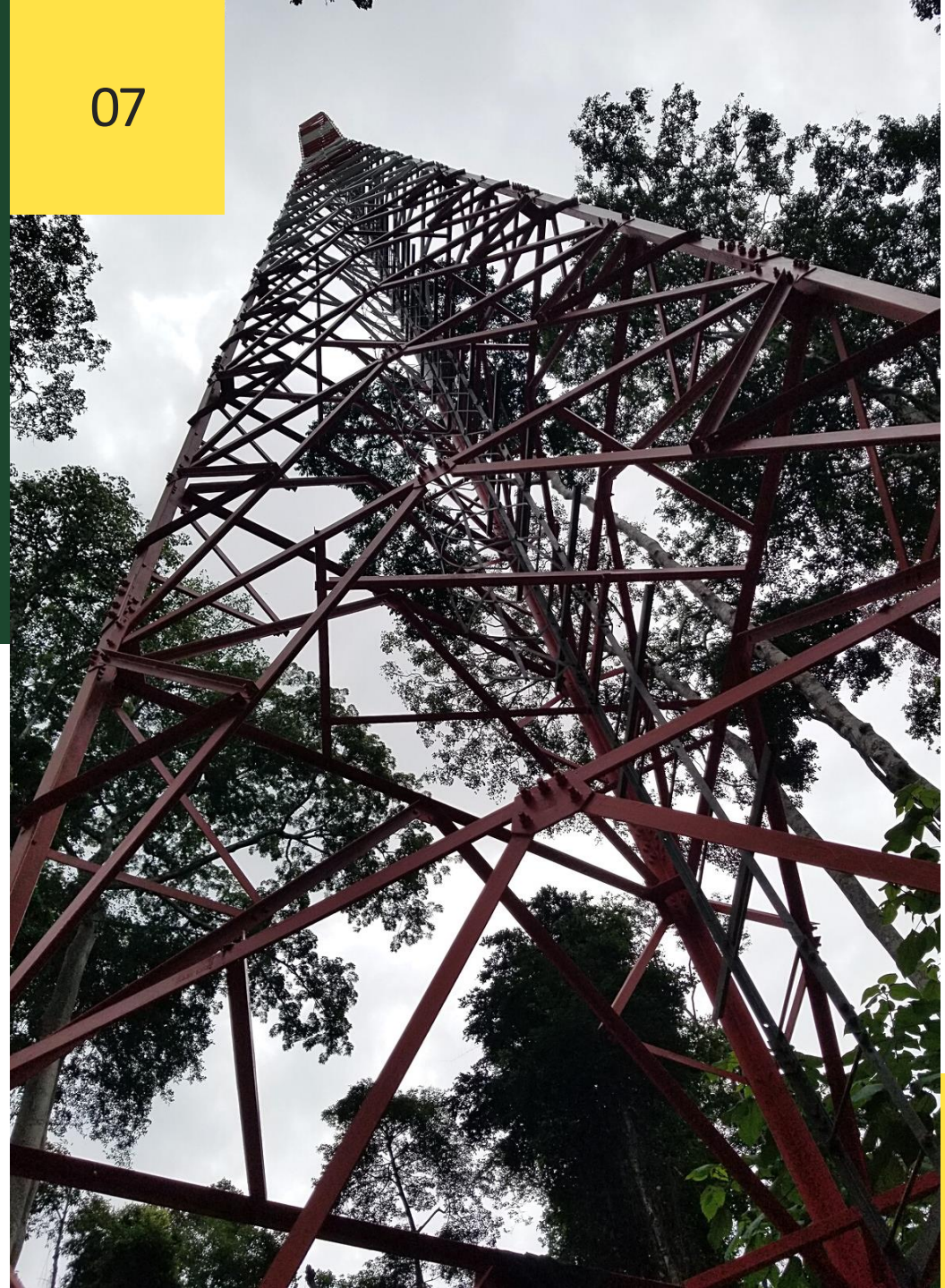
CARBON MONITORING TOWER

The project is a cooperation between the University of Energy and Natural Resources in Sunyani, Ghana and the Global Change Research Institute, Czech Academy of Sciences, The Czech Republic. The Research will be conducted at the Mendel University and Global Change Research Institute of the Czech Republic in collaboration with the Centre.

PARTNERS

CzechGlobe

Global Change Research Institute CAS



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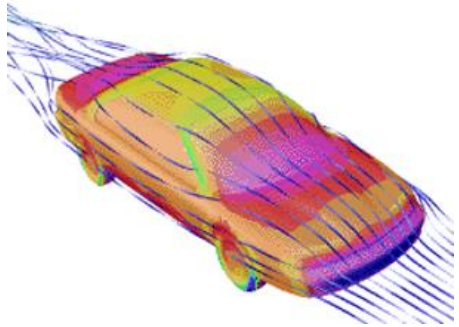
HIGH PERFORMACE COMPUTING (HPC)

The HPC Lab offers training in High Performance Computing, Computational Fluid Dynamics (CFD) and Artificial Intelligence (AI) as well as develop new tools and software packages to address specific challenges.



PARTNERS

GSSTI-GAEC Ghana Space Science & Technology Institute

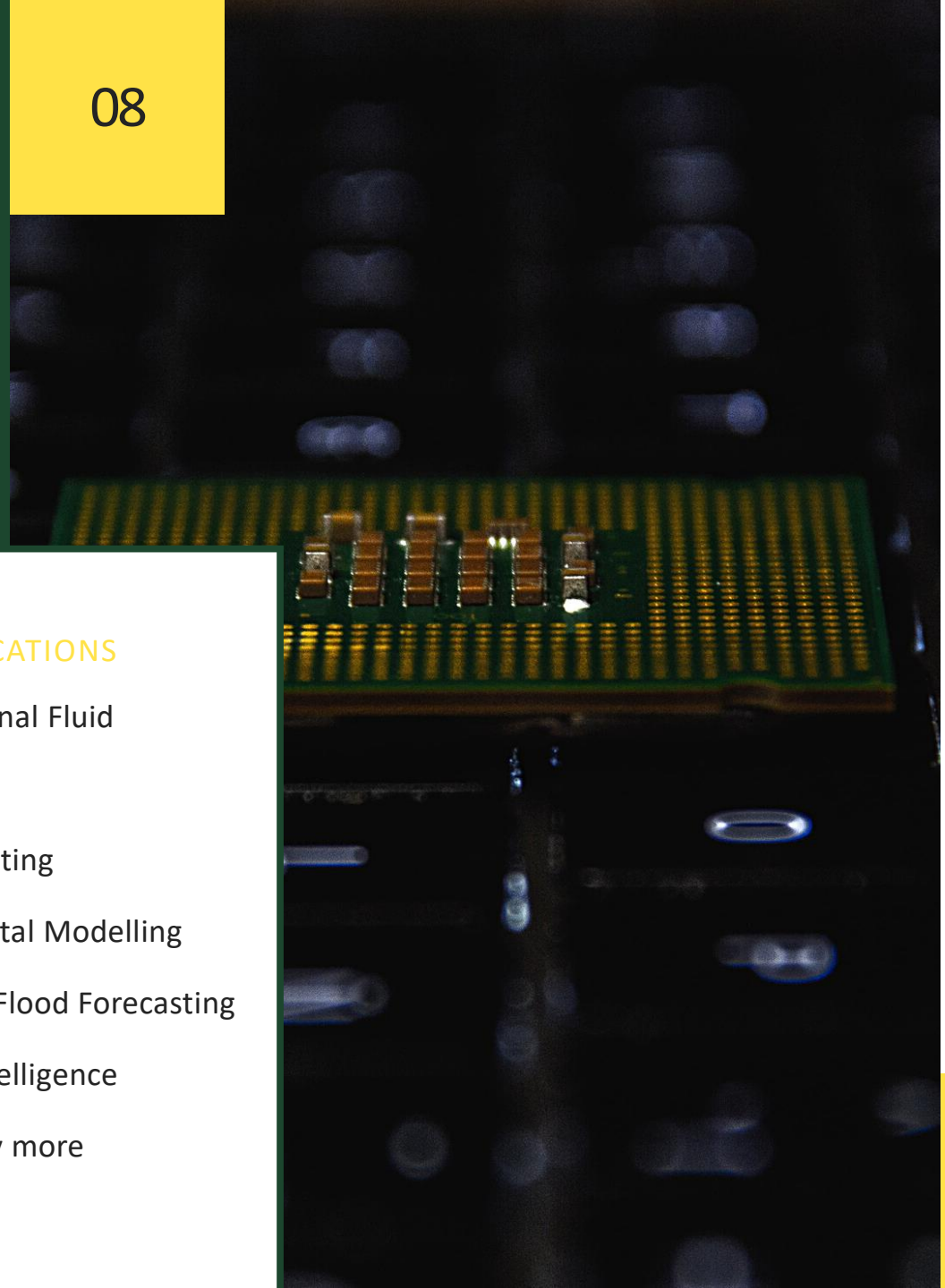
SKA AFRICA SQUARE KILOMETRE ARRAY

UNISA university of south africa

CSIR our future through science

APPLICATIONS

- Computational Fluid Dynamics
- GPU Computing
- Environmental Modelling
- Weather & Flood Forecasting
- Artificial Intelligence
- ... and many more



Digital Earth
AFRICA

Rapid land use changes and mining impacts on water security in Ghana using Water Observation from Space(WOFS)

Dr. Amos Kabo-bah, Edward Boamah,
Dr. Kenneth Mubea

Introduction

Transforming our understanding of Africa using Earth Observation, *with commitment to ensuring that the platform benefits all parts of the African continent as well as women and diverse groups*

Challenge

Achieving Africa's development priorities connects directly to how well we understand its natural resources. EO data from satellite images tells a story over time offering insights and knowledge of the changing landscape. While satellites have continually captured Africa's land surface and coastlines for decades, it has proven difficult to translate the petabytes of data into usable information.

Solution

Digital Earth Africa (DE Africa) is unlocking this satellite data and making it available for anyone to use. Through what is known as an open data cube, DE Africa translates the raw data into a format that is easier to visualize and analyze changes across land and water. As a result, an operational service providing decision-ready products will be available to governments, private sector and civil society.

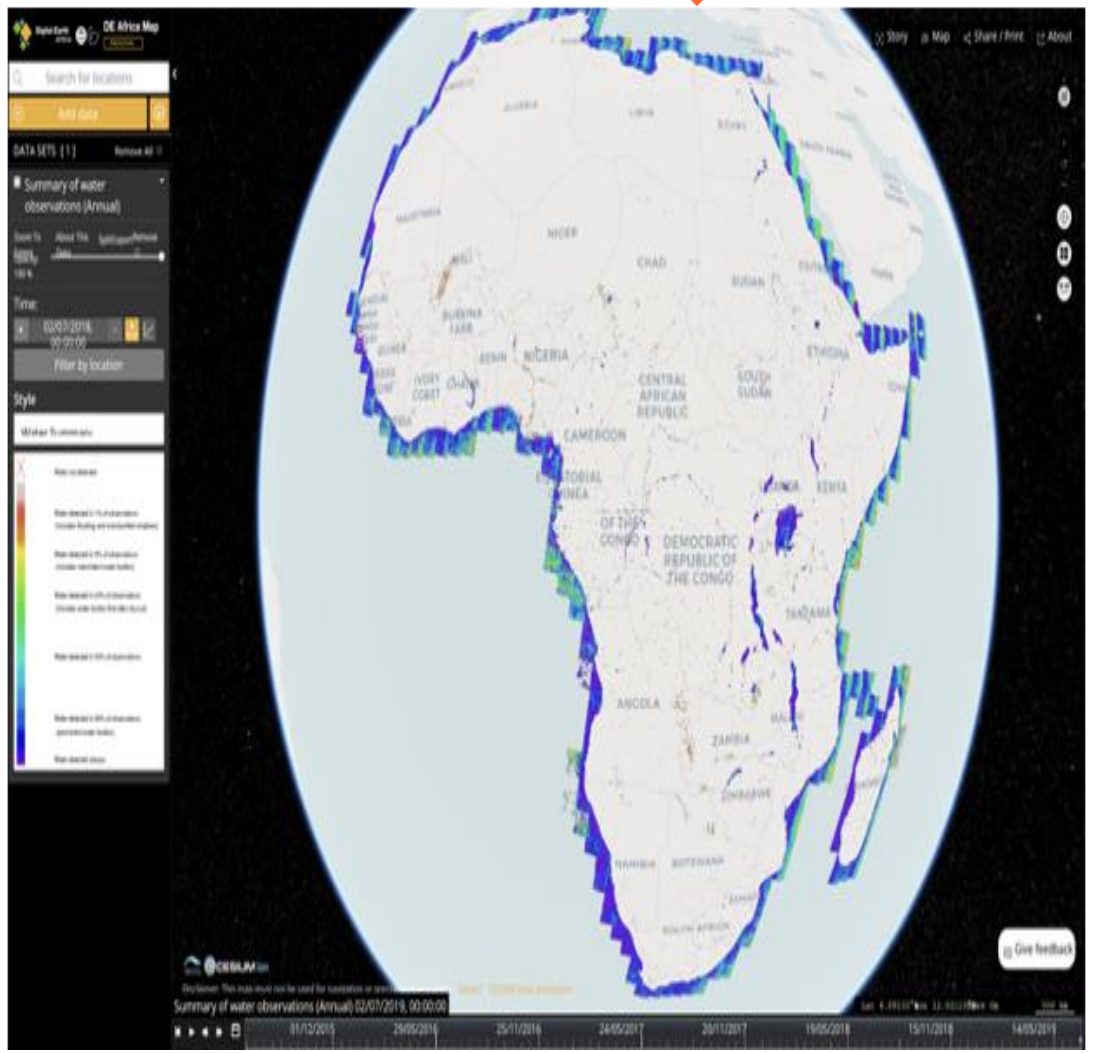
Impact

Access to this data will transform our understanding of Africa, providing vital information for informed strategic and inclusive decision-making. It will drive growth for the African economy by enabling small businesses and industry to innovate and create new products. This will increase business profitability and productivity in sectors such as land and city planning, agriculture and mineral exploration.

Water Observation from Space (WOfS)

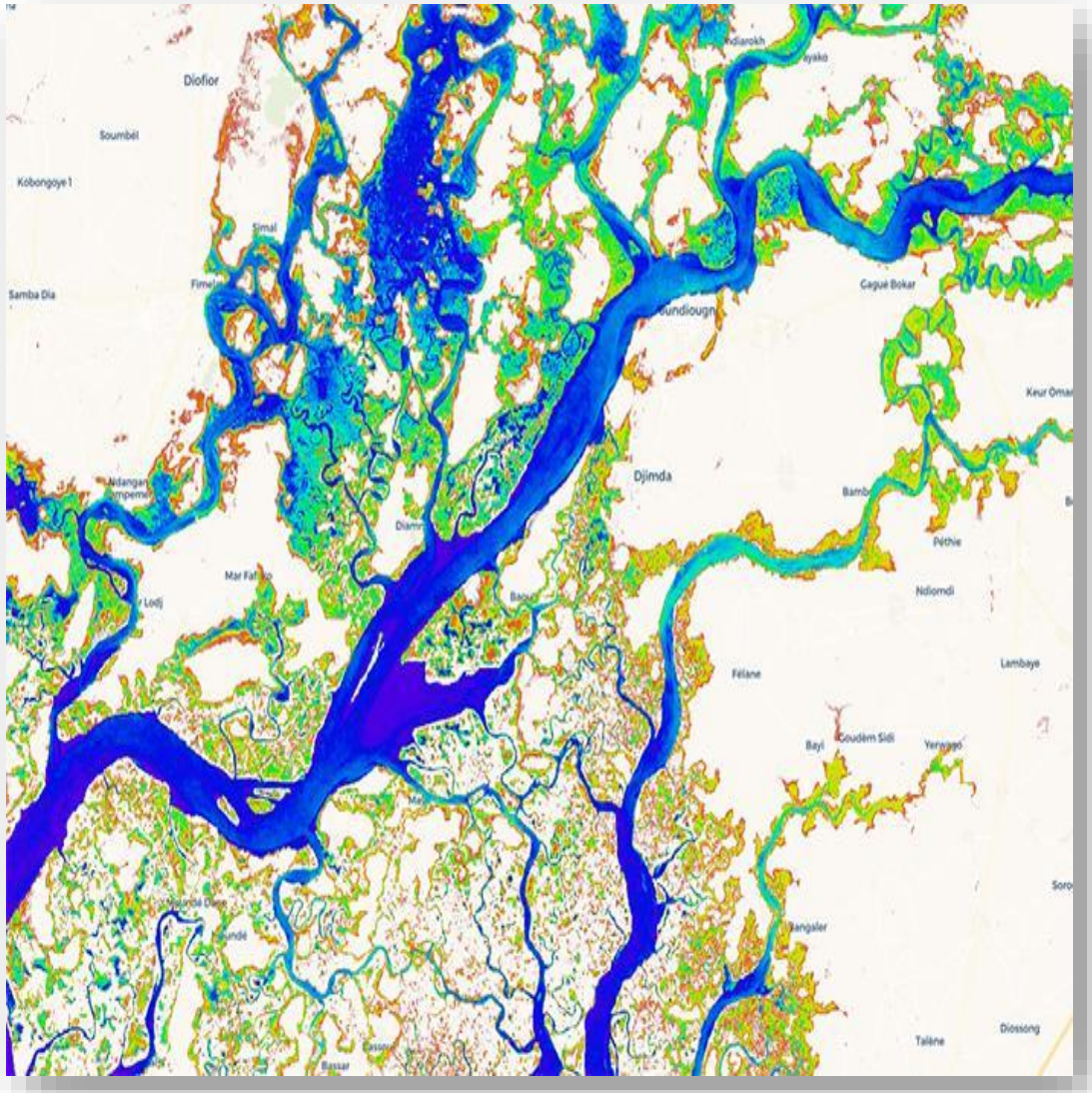
Digital Earth AFRICA

Water Observations from Space (WOfS) is a service that draws on satellite imagery to provide historical surface water observations of the whole African continent. WOfS allows users to understand the location and movement of water present in the African landscape by giving them an improved understanding of where water is usually present; where it is seldom observed; and where inundation of the surface has been observed by satellite.



Water Observation from Space (WOfS)

- WOFS – DE Africa's continental scale product
- Translates Water Observations from Space into easy to consume information on the presence, location and recurrence of water in Africa.
- Will help countries across Africa map, visualise and manage their water resources by better understanding trends over time.



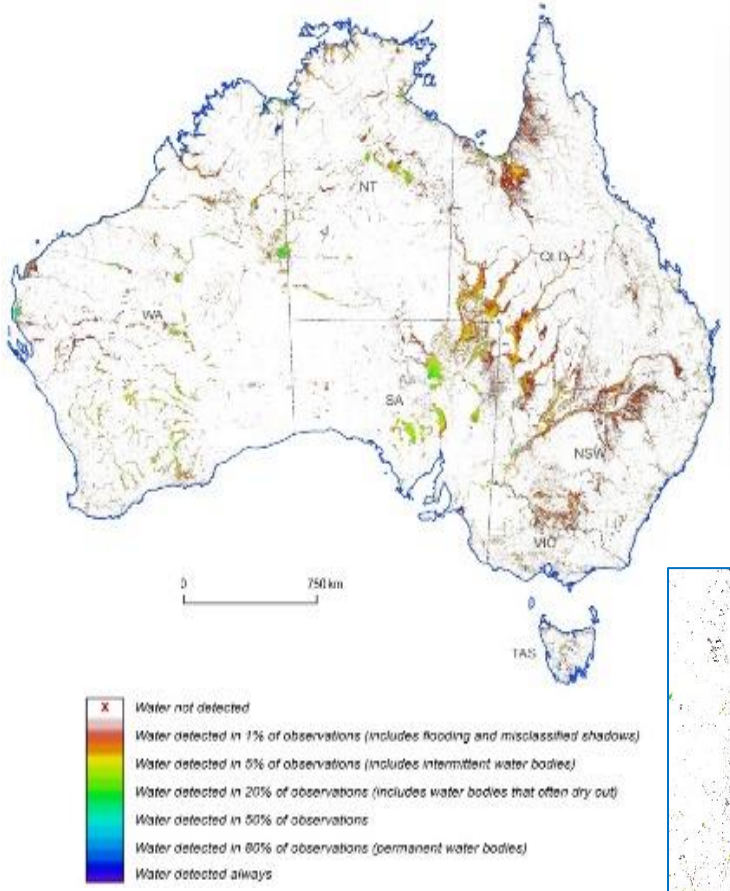
Water Observations from Space - WOfS

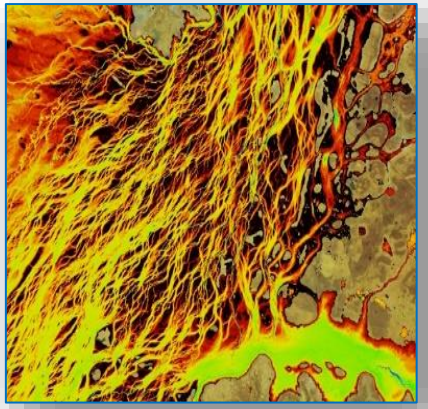
- WOfS was initially developed in Australia
- **WOfS** product is based on **Decision Tree** as a **supervised learning algorithm** for solving regression and classification problems
- **The Decision Tree** outputs were tested in three scenarios to determine the best threshold:

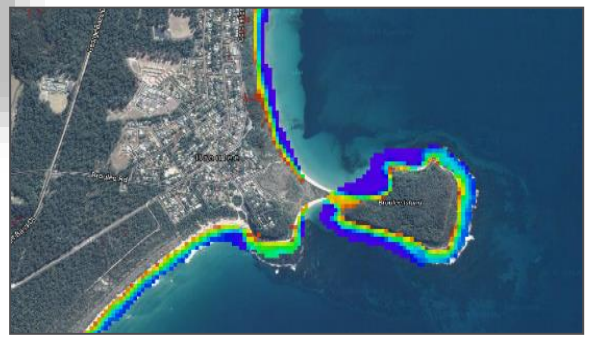
  (1) where only spectral bands were used

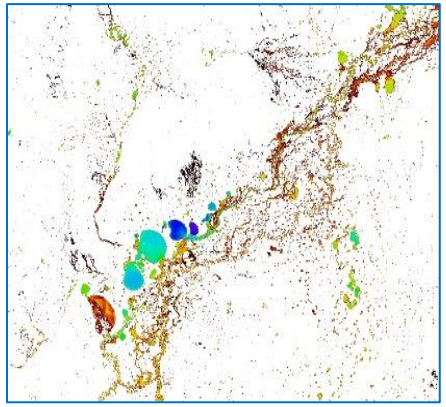
  (2) where only Normalised Difference Indices were used

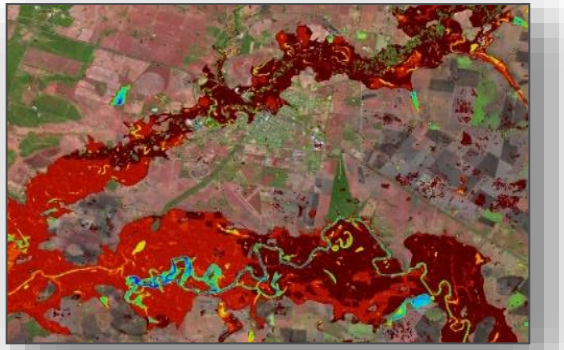
  (3) where both spectral bands and NDIs were combined.



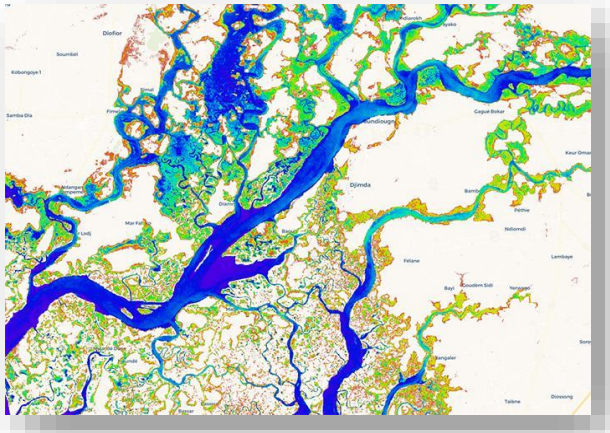


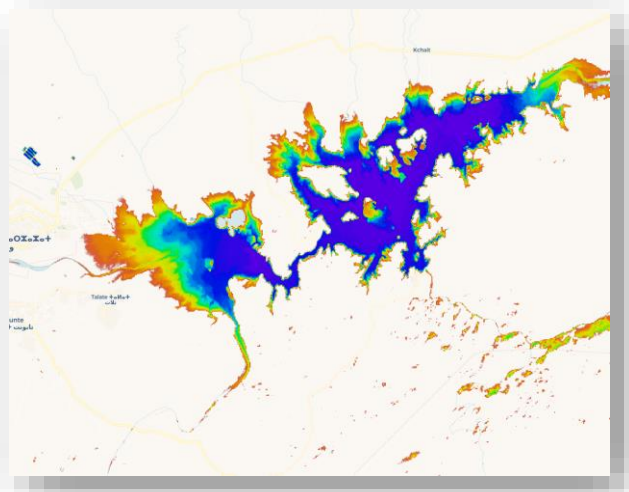


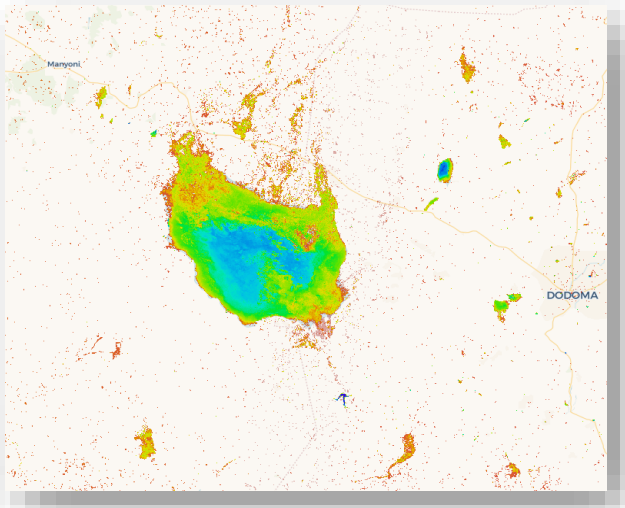




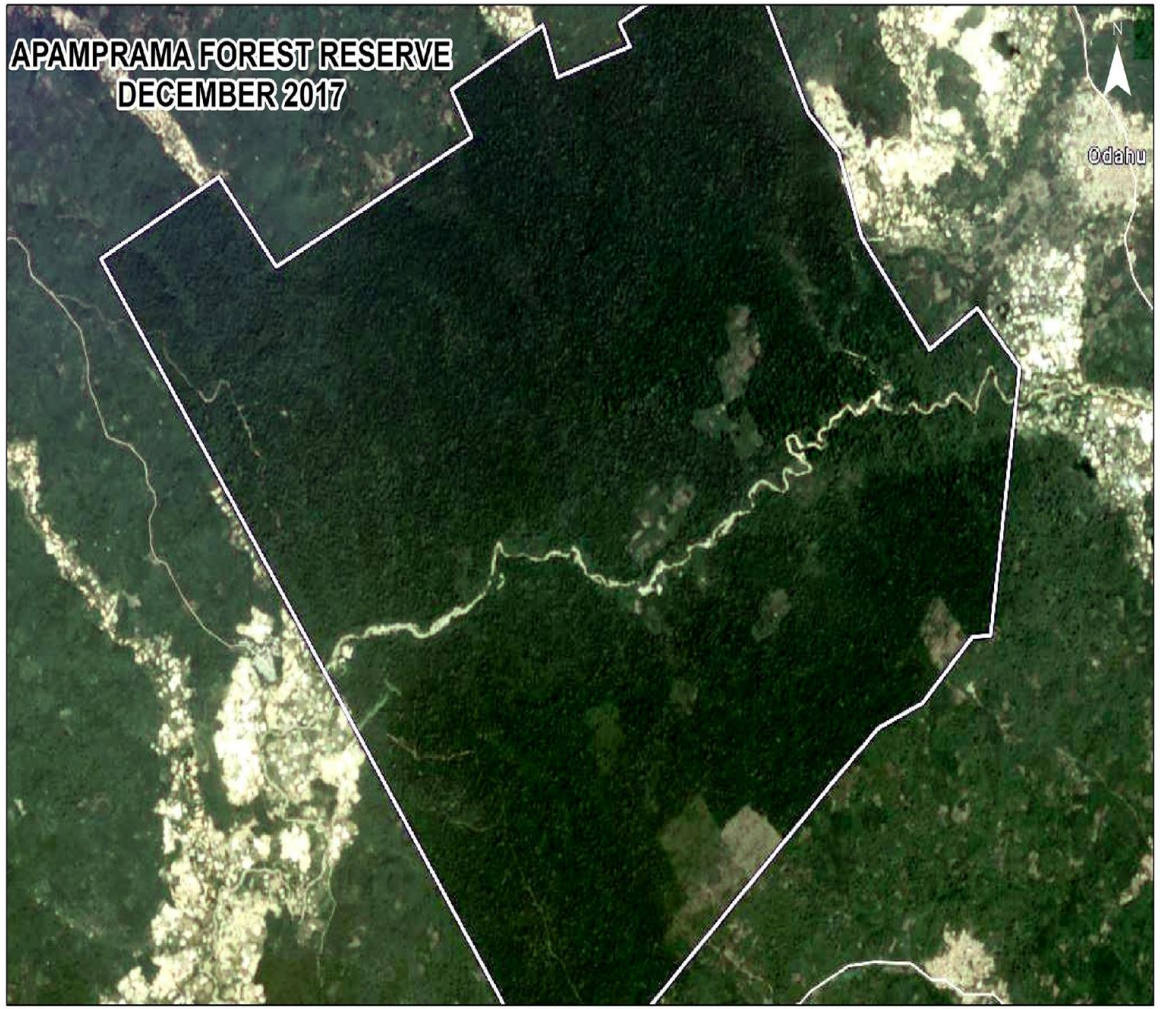
WOfS for continent of Africa

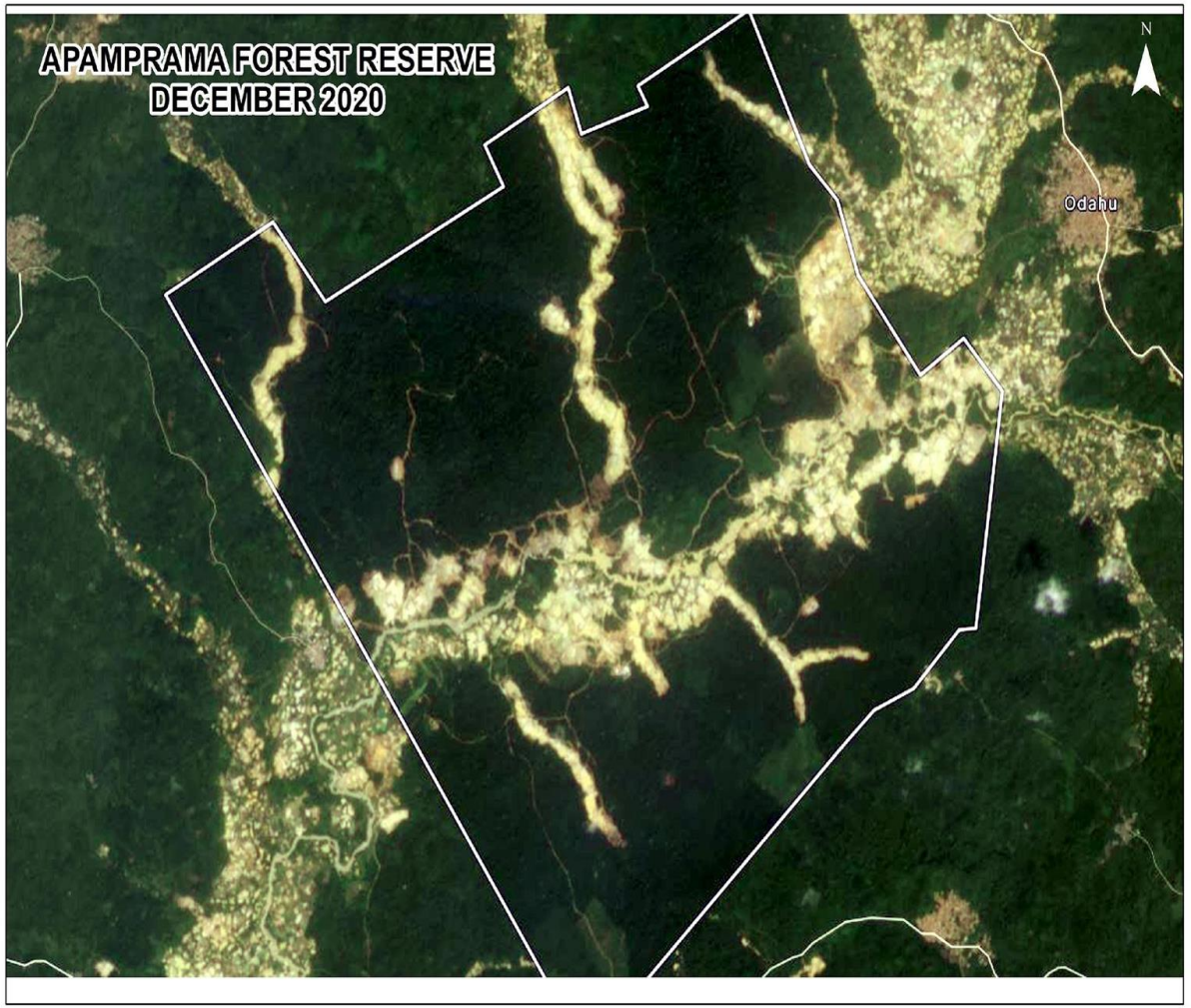




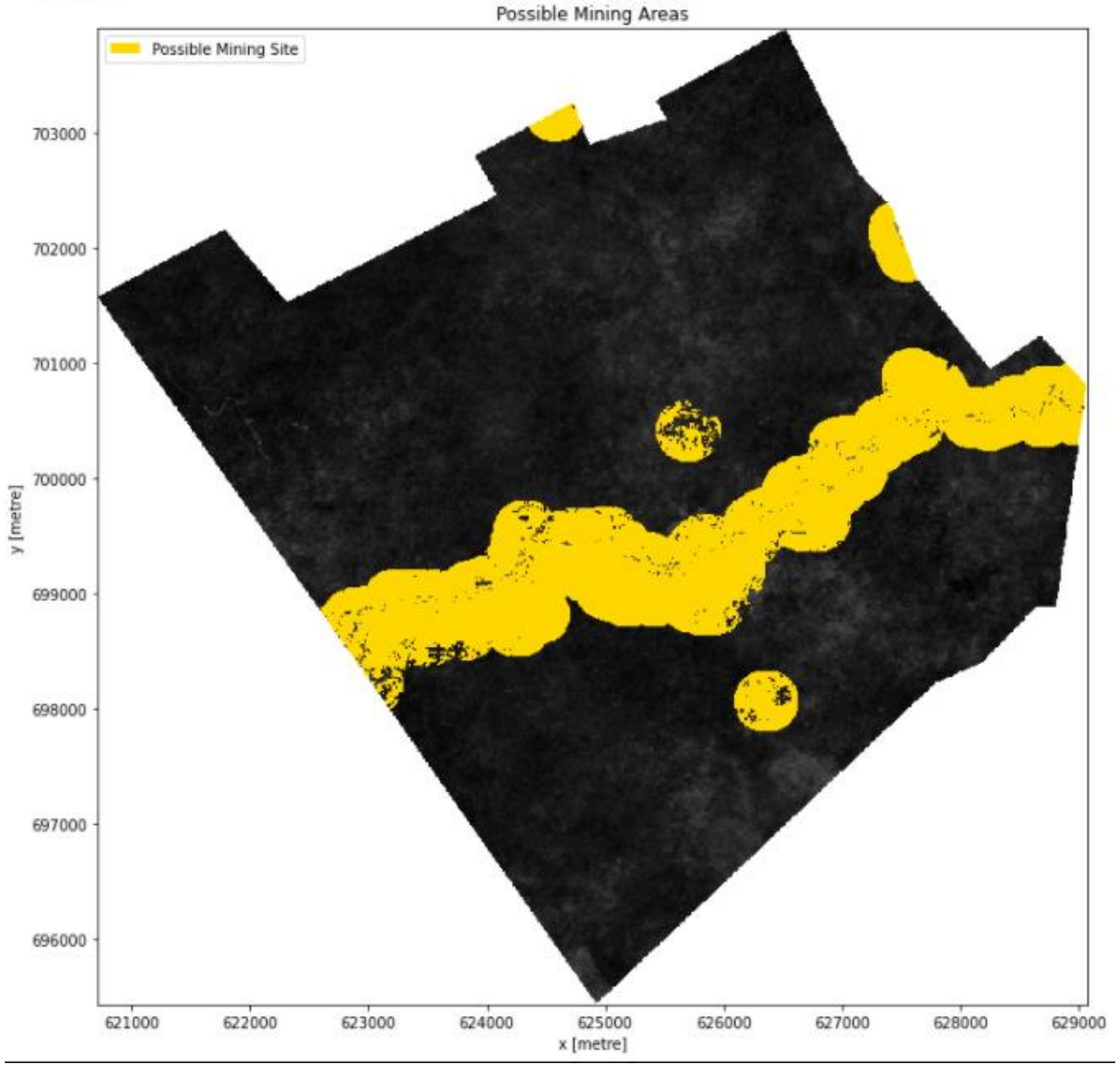


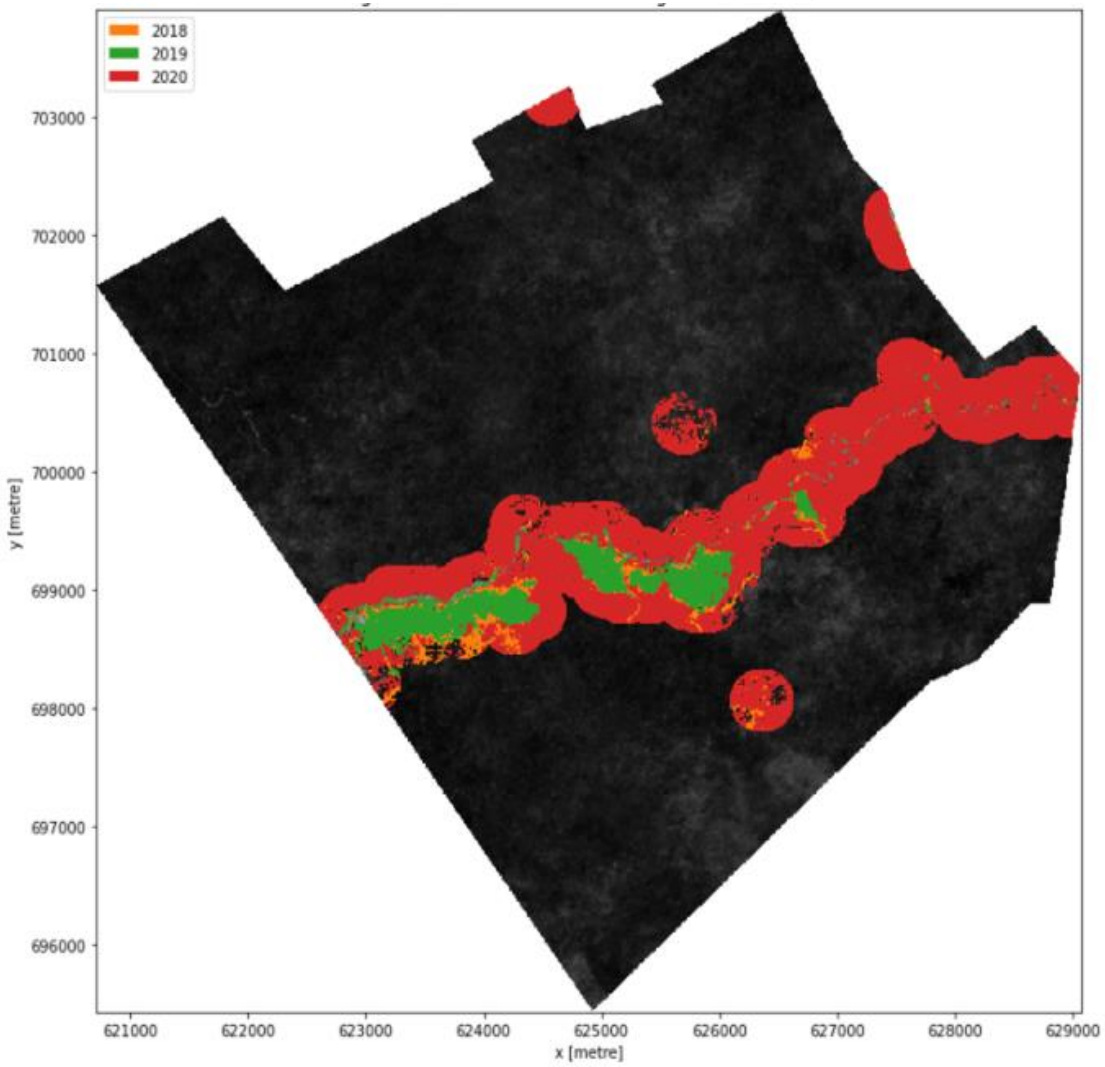
Apamprama Forest Reserve





Apamprama Forest Reserve



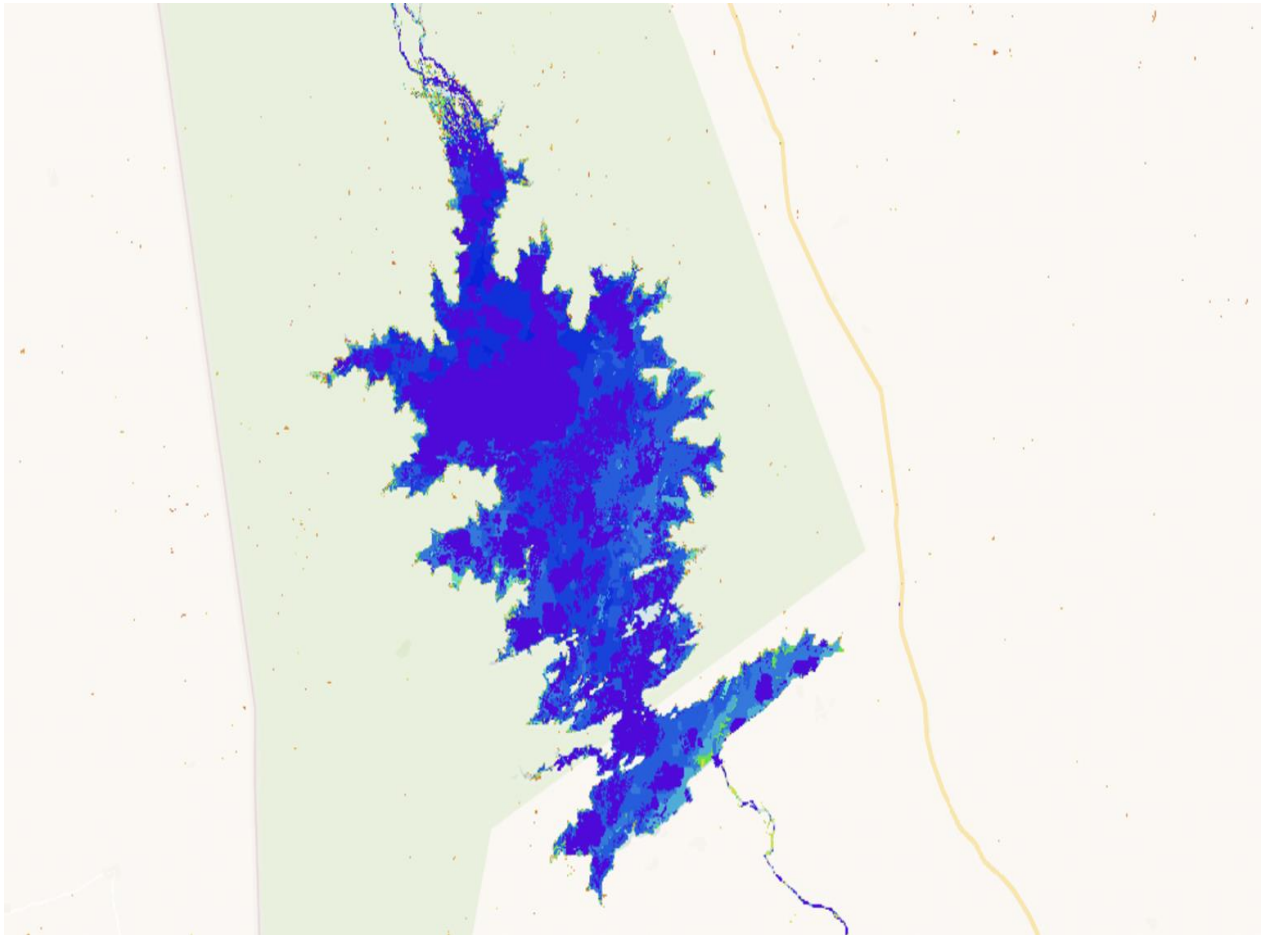


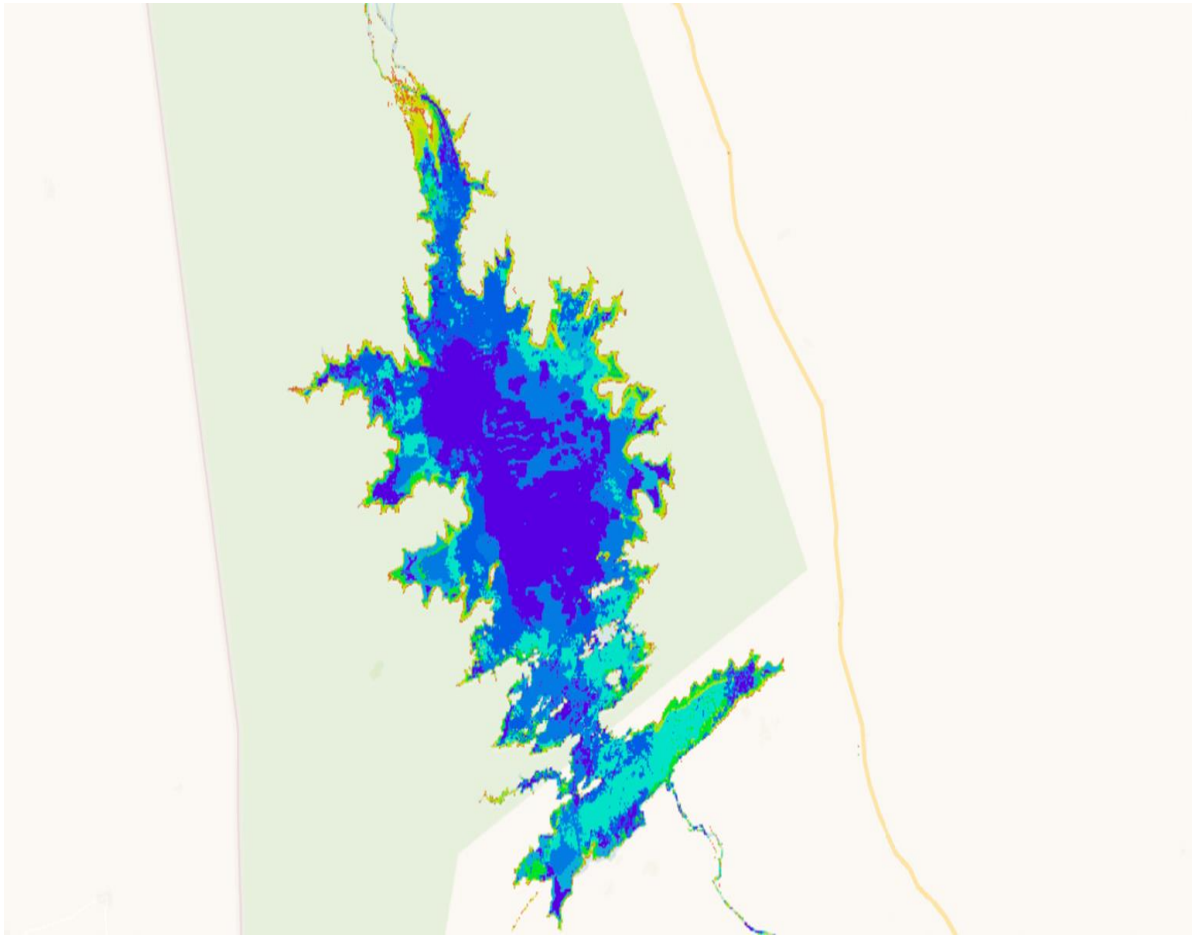
WOfS Monitoring - Bui Dam

WOfS Monitoring - Bui Dam

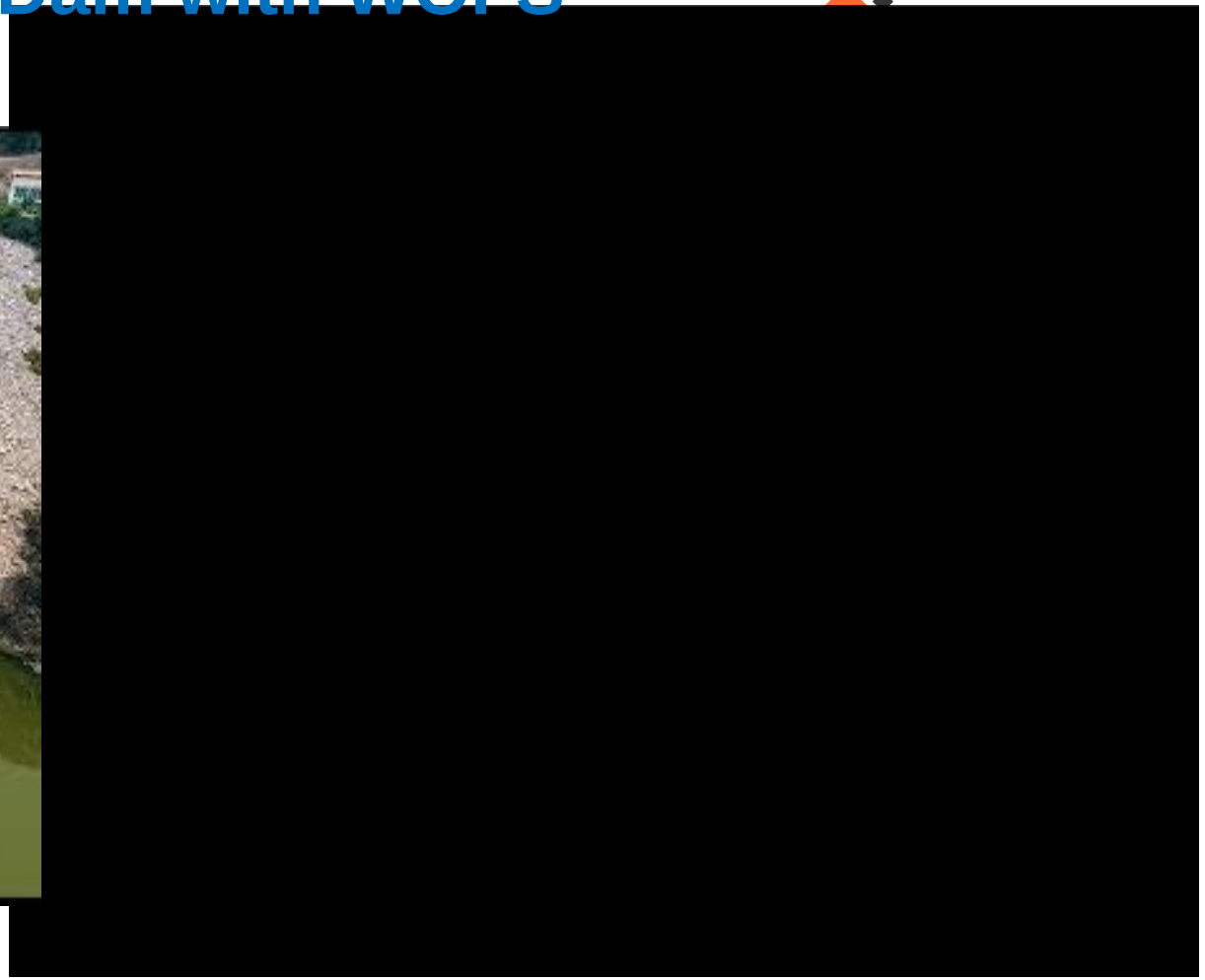
2013

2019





Historical View of Weija Dam with WOFS



THANK YOU