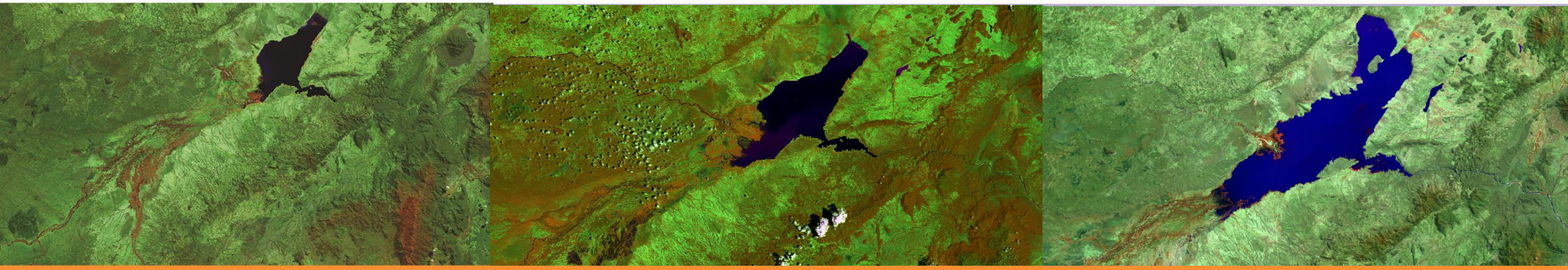


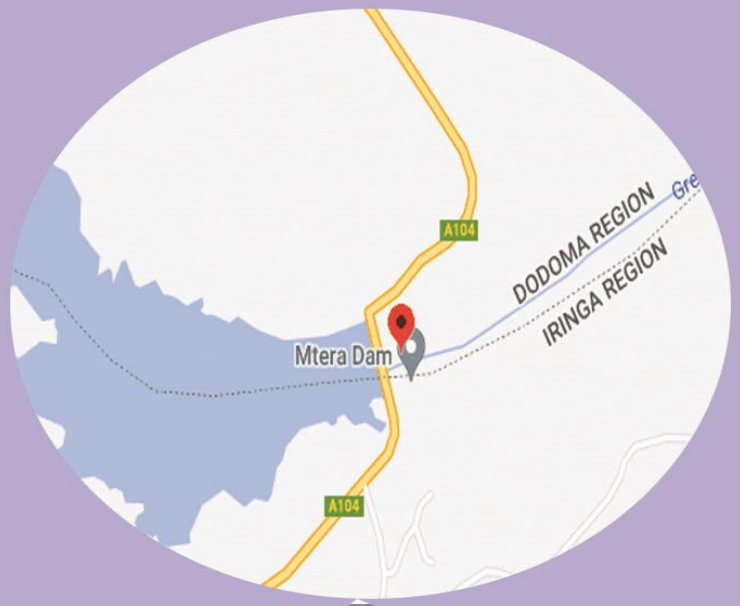
DROUGHT MONITORING WITH LANDSAT-8

Case Study: Mtera Hydroelectric Dam -Tanzania, 2015-2022

Leon Orotta

BR Real Estate Developers Ltd

STUDY AREA



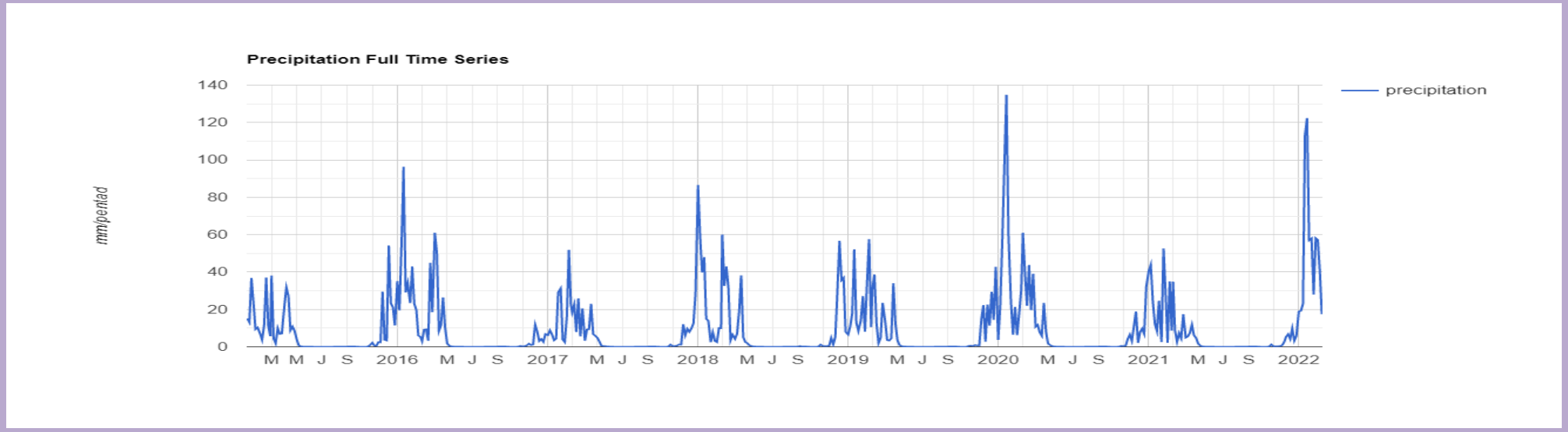
Mtera Dams

- A Rock fill type dam established in 1981
-Largest hydro electrical dam in Tanzania
-It measures 660 square kilometers (250sq mi)
-It has Capacity of 80 megawatts (110,000 hp).

What is Drought?

Naturally occurring phenomena that exists when Precipitation has been significantly below normal Recorded levels, causing serious hydrological imbalance that adversely affected land resources production systems.

Standard Precipitation Index (SPI) Between Dodoma and Iringa Region (2015 – 2022)



Links: https://code.earthengine.google.com/07891473b52acb273956b9cb320542b3

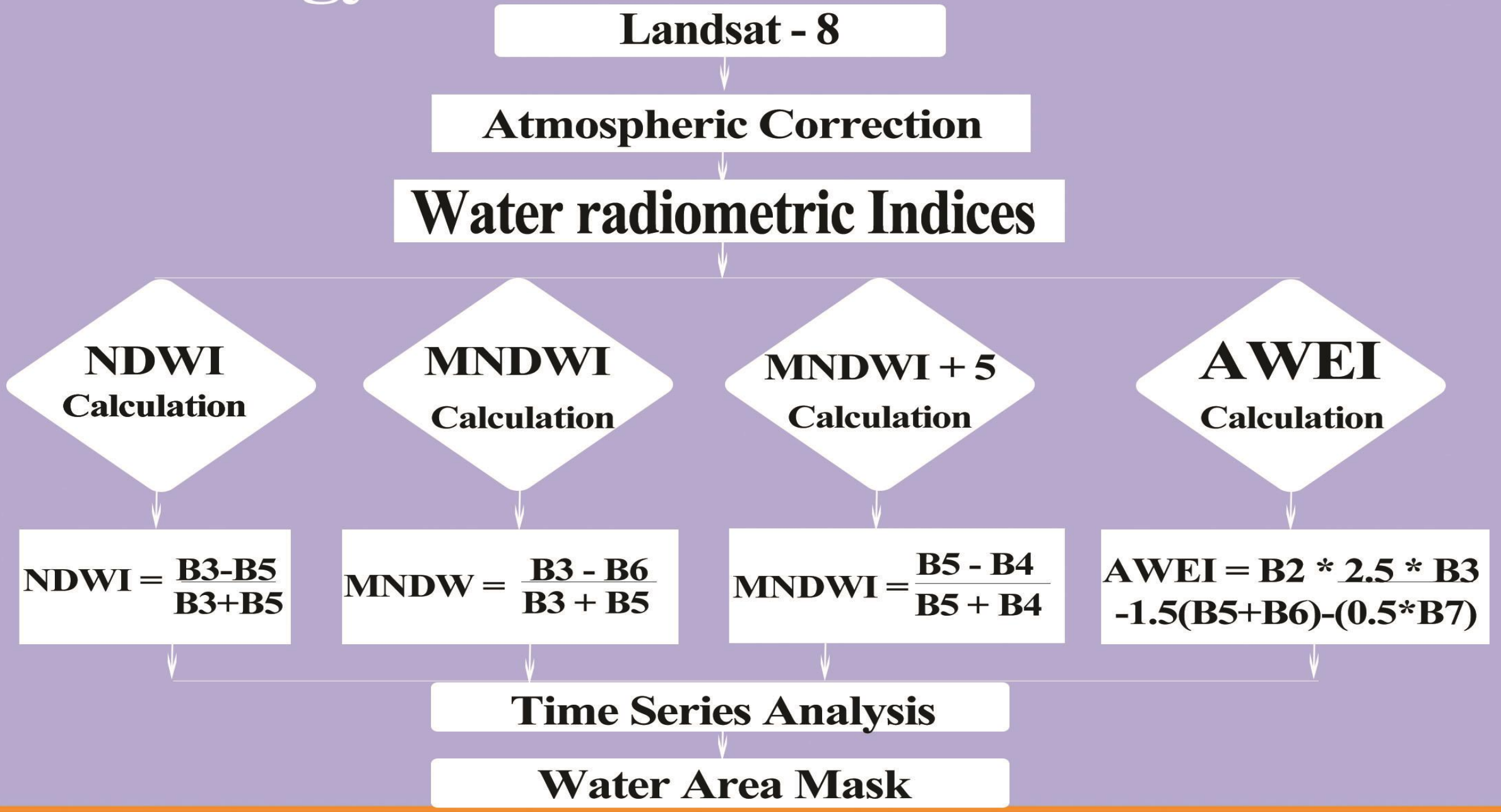
Objectives of this study

-Application of different water radiometric indices over droughty affected area

-Assessment of surface water area changes from Landsat-8 derived water masks

Software and Tools

Methodology



Result 1

Indices	Category	2015	2016	2017	2018	2019	2020	2021
NDWI	Minimum	- 0.56	-0.54	- 0.56	-0.55	-1	-1	-1
	Maximum	0.244	0.24	0.31	0.23	1	1	1
MNDWI	Minimum	-0.512	-0.46	-0.685	-0.47	-1	-1	-1
	Maximum	0.383	0.42	0.41	0.52	1	1	1
MNDWI + 5	Minimum	-0.201	-0.26	-0.278	-0.21	-1	-1	-1
	Maximum	0.589	0.609	0.627	0.627	1	1	1

Table: Estimated NDWI Values in the Mtera Dam

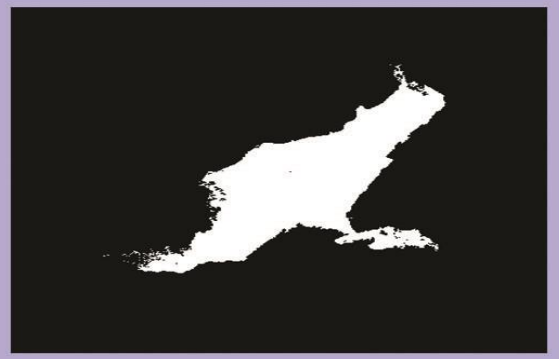
Result 2 : Water Area Mask

Water Area = 236.24 sq km
2015

Water Area = 556.66 sq km
2016

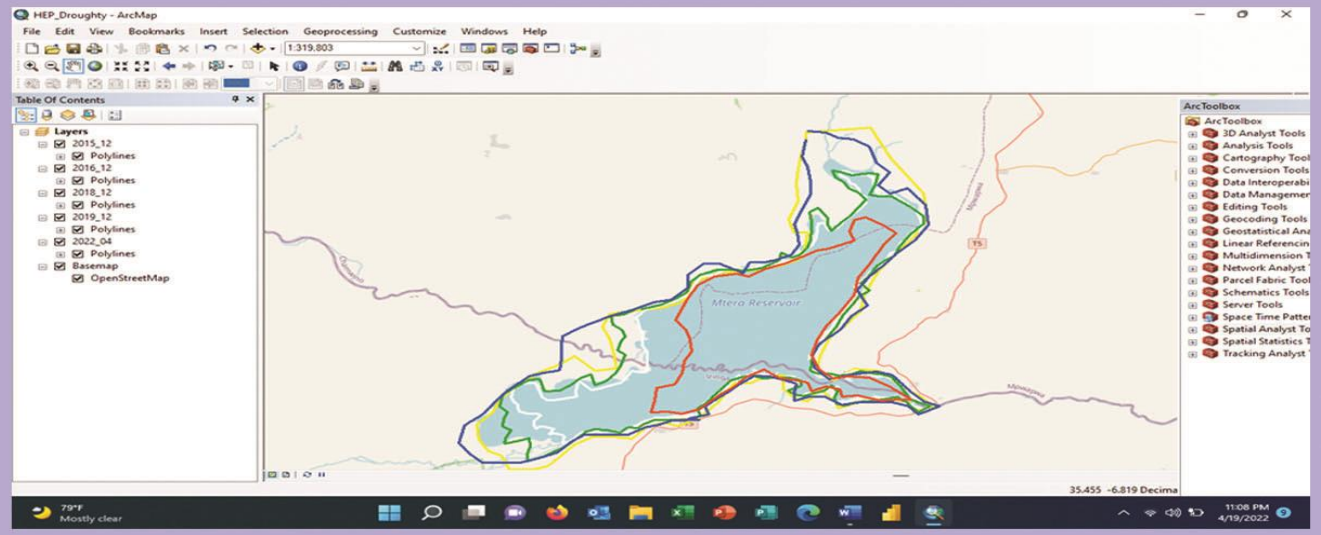
Water Area = 312.56 sq km
2017

Water Area = 313.16 sq km
2018



Water Area = 351.89 sq km
2019

Water Area = 557.82 sq km
2020



Conclusion

-Remote Sensing of water spectral indices is possible.

-Multiple historical and near real time remote sensing based data provide consistent and large scale coverage to asses past and monitor current meteorological, hydrological and droughts.

Data include: Precipitation, NDWI, MNDWI, ET and Ground estimates

- NDWI and MNDWI can be used to asses water fluctuation of any Dam.
- The BR has been conducting research on how to monitor and report on sustainable Development Goals (SDGs) Indicator 6.6.1 change in the extent of water related ecosystem overtime.

Thank you

Leon Orotta
Machine Learning Engineer (GIS and Remote Sensing)
BR Real Estate Developers LTD
Arusha – Tanzania
Email: leondorotta@outlook.com survey@brrealestate.co.tz
Phone: +255 621328904