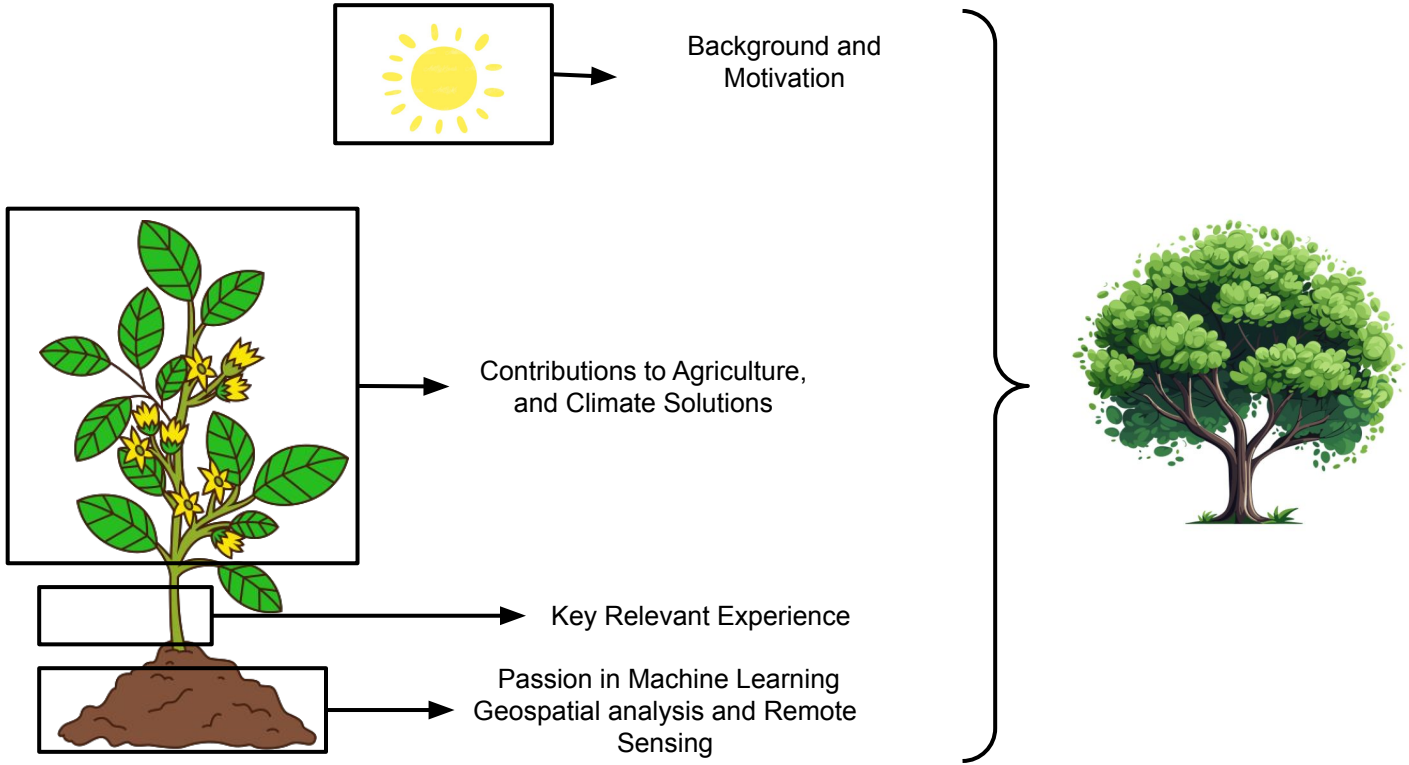
Machine Learning Engineer

Calvin Samwel Swai

Contents


Background and Motivation
Contributions to Agriculture, and Climate Solutions
Key Relevant Experience
Passion in Machine Learning Geospatial analysis and Remote Sensing

Background and Motivation

- Agricultural failure, hunger, and Societal challenges.
- Women and children.
- Experience => Passion => Education Geospatial technology.

Figure 1: Drought Zeeland, 2018. Photo credits: Akkerwijzer/Ellen

Figure 2 and 3: Societal problems, source: Calvin Samwel Swai

Key Experiences.

I. Drought propagation and interaction analysis.
II. Groundwater impacts on agricultural productivity.
III. Flood Susceptibility Mapping
IV. Flood exposure mapping and mitigation analysis.
V. Surface water quality monitoring.
VI. Publication.

Analysis of drought propagation and interaction

- Understanding drought development dynamics and impacts on Vegetation health, in Overijssel, NL

i. Drought type dynamic analysis.

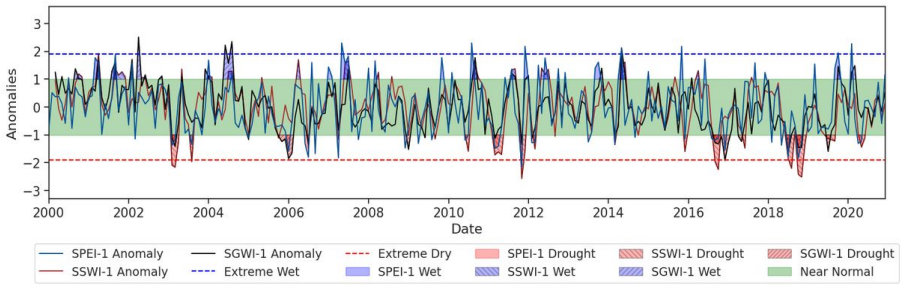


Figure 4: Temporal pattern of Meteorological, Soil Moisture, and Groundwater drought indices (2000-2020).

ii. Vegetation and Crop condition Indices development.

Primary productivity
Water Content

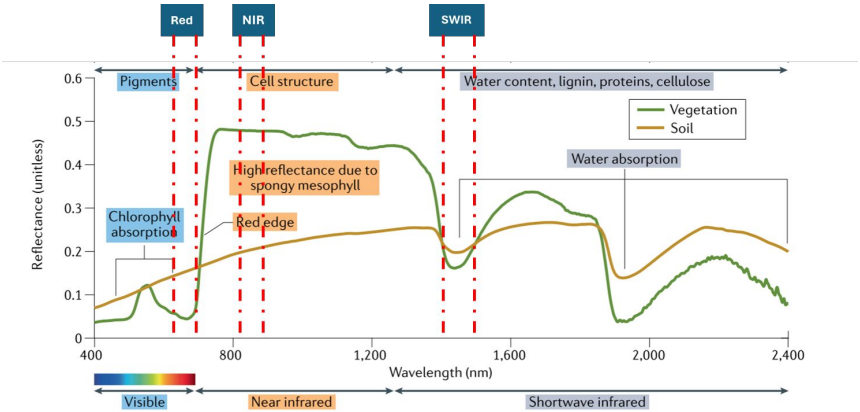


Figure 5: Reflectance behavior of vegetation: Credits: Zeng et al. (2022)

- Large Scale data analysis,
- Python programing
- Statistical analysis
- Publication

Analysis of Groundwater impacts on agricultural productivity

- Developing a Geospatial workflow to model the impact of Groundwater abstraction on Agriculture, in Witharen, NL

i. Radar RS => Surface and Root Zone Soil Moisture

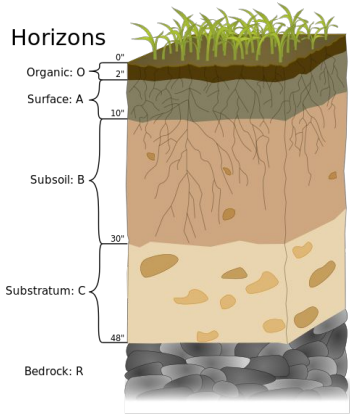


Figure 6: Demonstration of the soil moisture measurements setup across different depths. (Carranza et al., 2021)

ii. GW⇔ RZSM Spatio-temporal coupling.

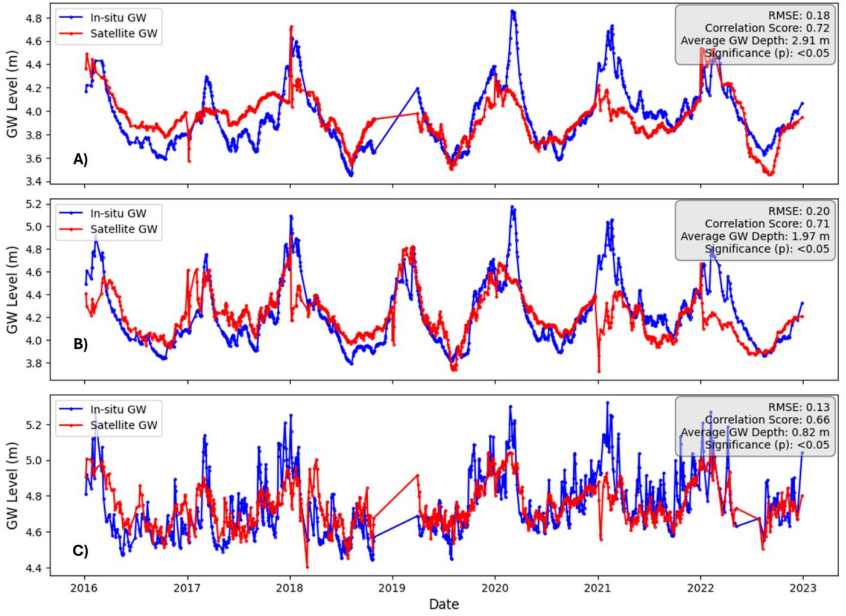
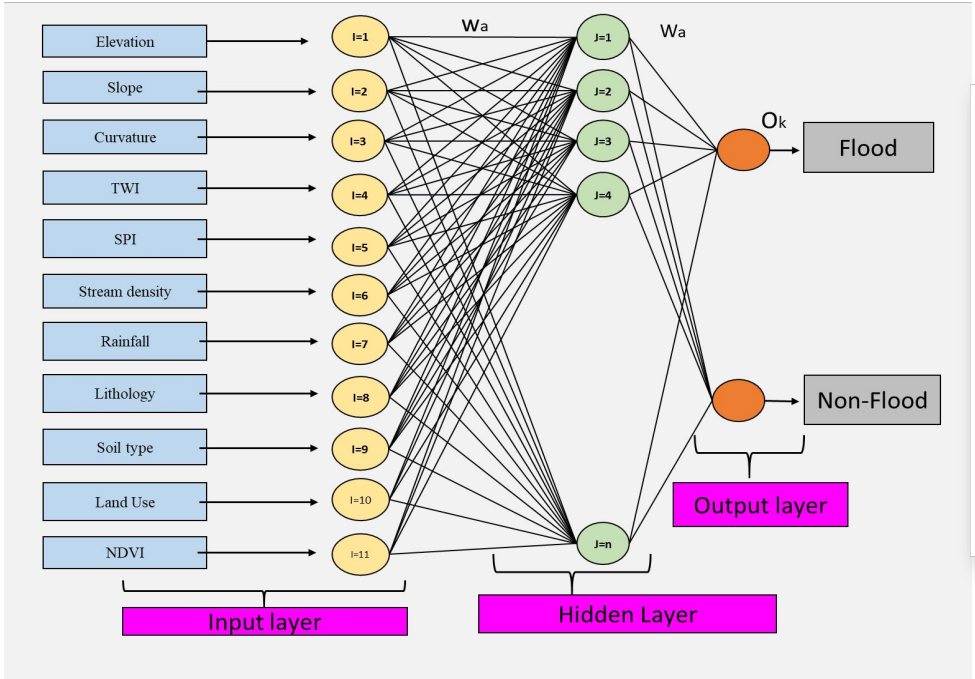
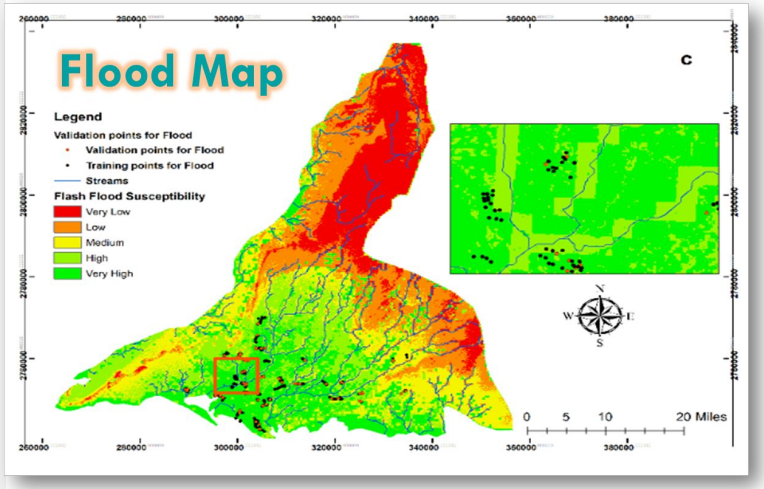


Figure 7: Demonstration of the predicted and actual groundwater time series for 3 selected wells

- Radar RS,
- Temporal analysis and Zonal Statistics
- Cloud computing and automation GEE

Flood Susceptibility Mapping through Multi-Layer Perceptron





Flood exposure mapping and mitigation.

- Developing an approach to improve flood mapping and mitigation in Kampala, Ug.

i. Stakeholder engagement

Figure 9: Stakeholder meeting, Kampala Flood exposure mapping and mitigation.

ii. Spatial Dashboards for Drainage Status Monitoring

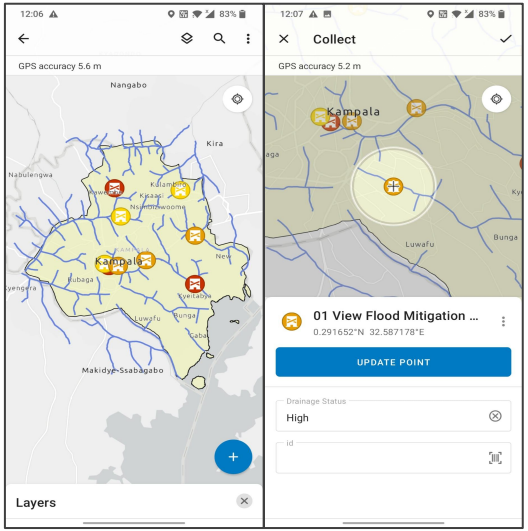


Figure 10: Crowdsourcing Interface. flood in Kampala (2020).

- Stakeholder engagement,
- Visualization and Spatial Dashboard
- Climate risk analysis

Surface water quality monitoring.

i. Improving coverage, frequency and quality of Surface water quality monitoring under a limited budget.

- Chlorophyll-a and Turbidity from farms.

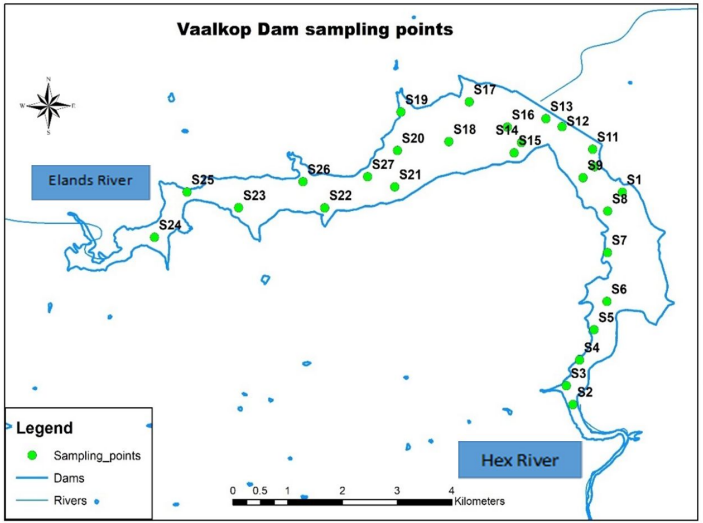
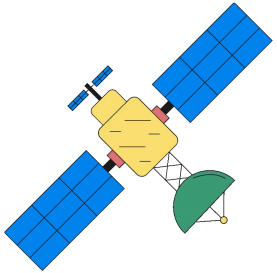
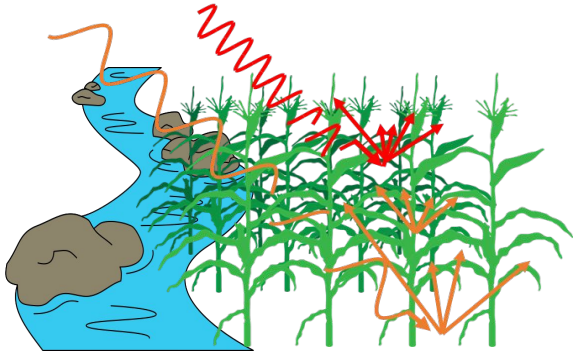


Figure 11: Vaalkop dam and the water quality monitoring locations, SA

- Spatial interpolation,
- Python programing
- Machine Learning.
- Water Resources monitoring

Publications.





i. Scientific Collaborations publications.

- **Vitens** collaboration.
- **Calvin Samwel Swai (2024)**; Unraveling the Spatial-Temporal Dynamics of **Drought Anomalies** and Their Interactions with Vegetation. (https://purl.utwente.nl/essays/102081).
- Neema Sumari, Fanan Ujoh, **Calvin Samwel Swai**, and Muchen Yang (2023); Urban growth dynamics and expansion forms in 11 Tanzanian cities from 1990 to 2020 (https://doi.org/10.1080/17538947.2023.2218114).
- Neema Sumari, Paulo Mandela, and **Calvin Samwel Swai** (2022); Impact of Urban Expansion on Land Surface Temperature in Dodoma and Morogoro Metropolises, Tanzania. here.

THANK YOU

Alignment with Mission and Future Goals.

i. Shared vision for data driven sustainability:
- Passion in finding geospatial solutions.
- Background in handling agricultural challenges.
- Experience in working with large-scale climate datasets.

ii. Collaboration with Stakeholders:
- Effectiveness of local solutions to global problems.
- Communicate complex data to actionable solutions

My Future with eleaf

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- Women and children.
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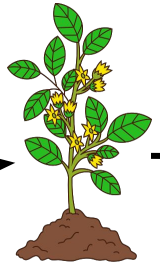
Figure 2 and 3: Societal problems, source: Calvin Samvel Svrai

Figure 1: Drought Zeeland, 2018. Photo credits: Akkerwijzer.Ellen



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