Impacts of climate change on groundwater potential and recharge in the drought-prone Runde Catchment, Zimbabwe.

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Introduction

- Global groundwater use (Wolf et al., 2015).
- In SADC, water and sanitation (MacDonald et al., 2012).
- Runde, drought-prone (SADC-GMI, 2019;Chitongo, 2013).
- GCMs and climate variables
- UN-MDGs 7, improve water, sanitation and natural resource.
- In Zimbabwe GWP estimation & validation

Problem statement

- Information about spatial variation of aquifers (GoZ, 2016).
- There is a notable groundwater depletion (SADC-GMI, 2019)
- The future climate change impacts on GWP is not known

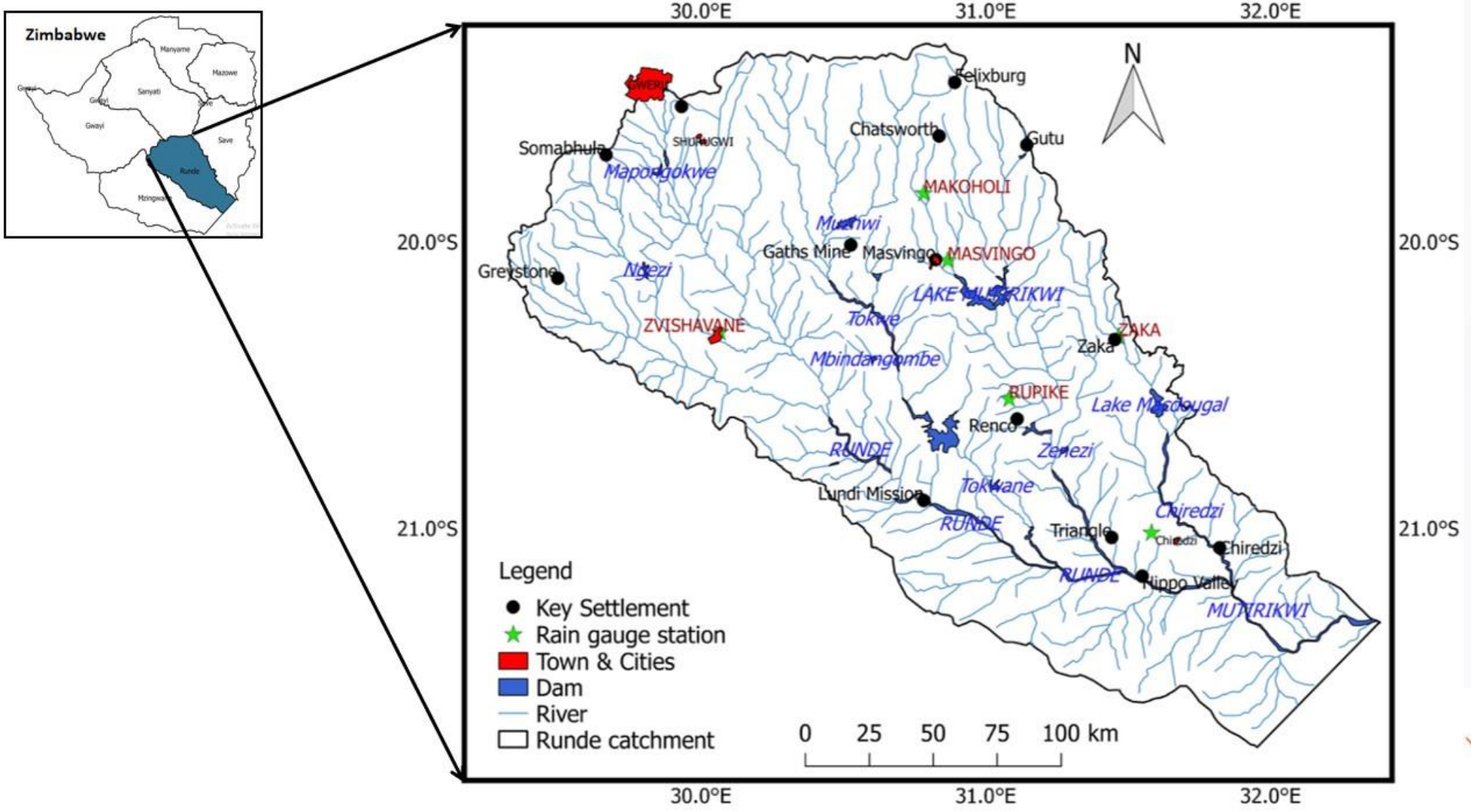
Objectives

- To assess the impact of climate change on GWP
- To determine the spatial variability of GWP.
- To analyse the spatial and temporal variability of GWR.
- To analyze downscaled future climate variables for Runde.
- To assess the impact of climate change on GWP.

Research questions

- What is the temporal and spatial variability of GWP?
- To what extent does climate influence GWP and recharge?
- How significant are the shortages or surpluses GW allocation?
- What effect does spatial and temporal on future GWP?

Study area



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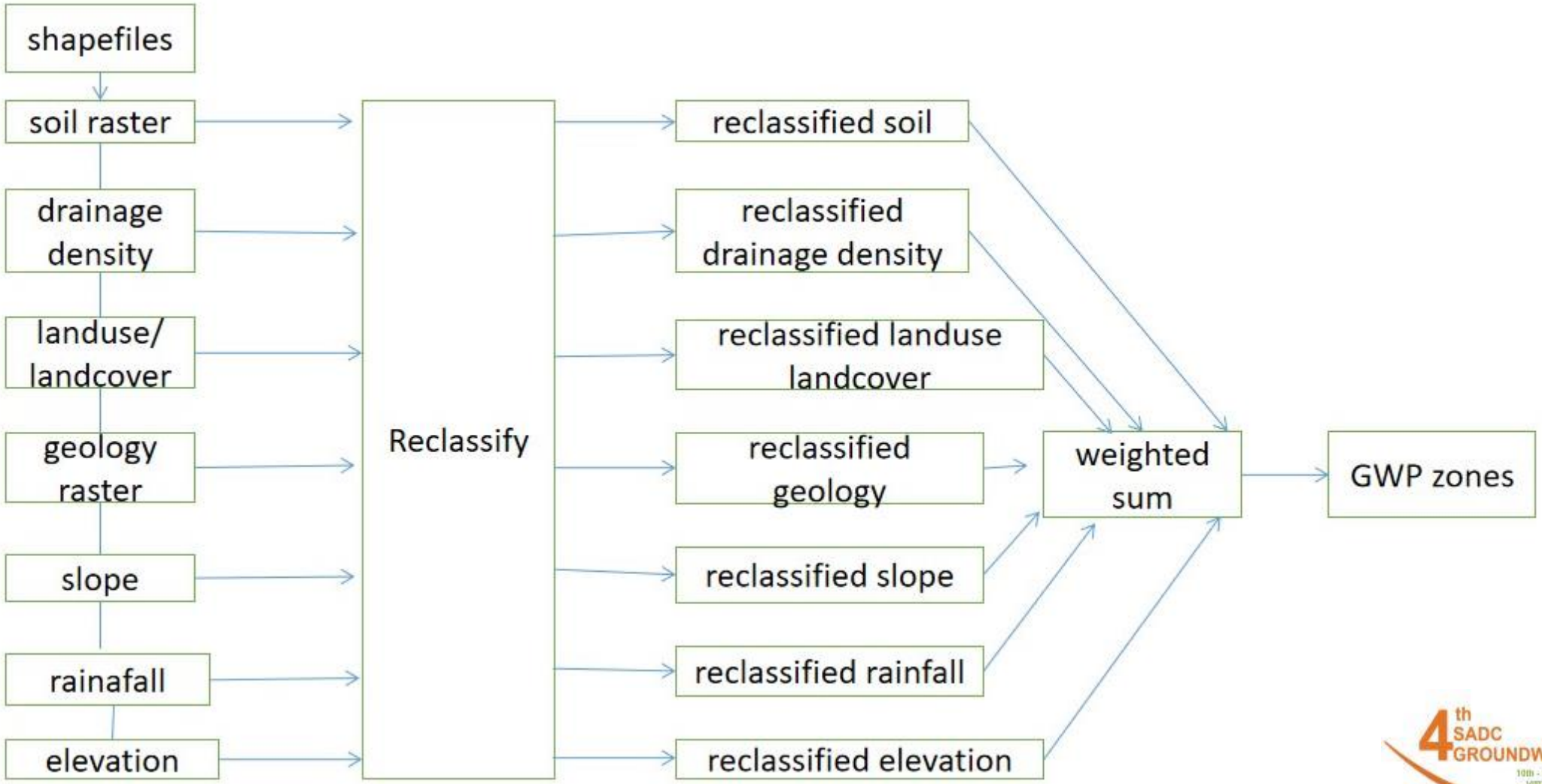
Materials and methods

- Most spatial data was acquired from satellite RS
- Other spatial data, soils, geological and lithological maps
- GIS-based multi-criteria evaluation Analytical Hierachy Process (AHP)

Materials and methods cont'd



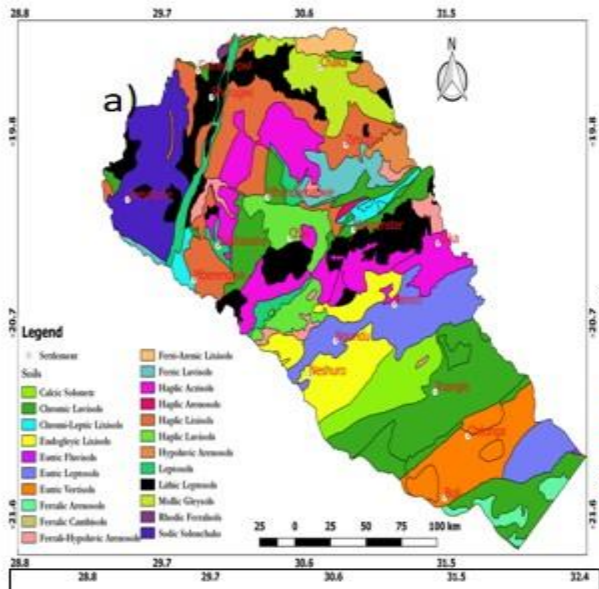
Materials and methods cont’

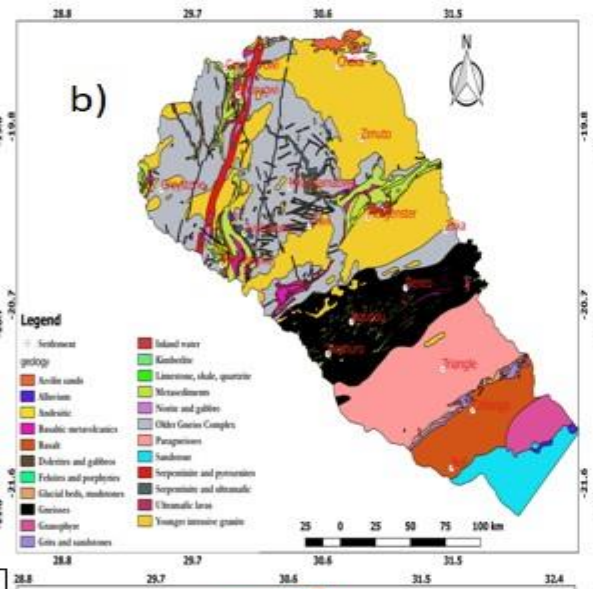
- Climate variables projected were obtained from 6 GCMs
- CORDEX-Africa manual

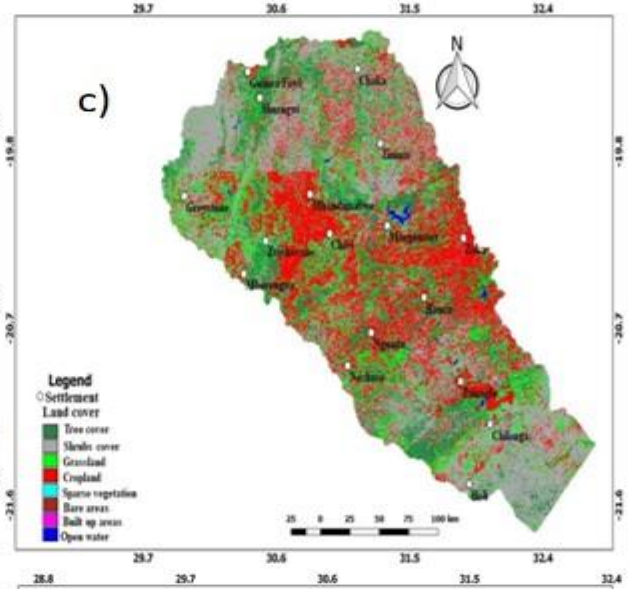
Materials and methods

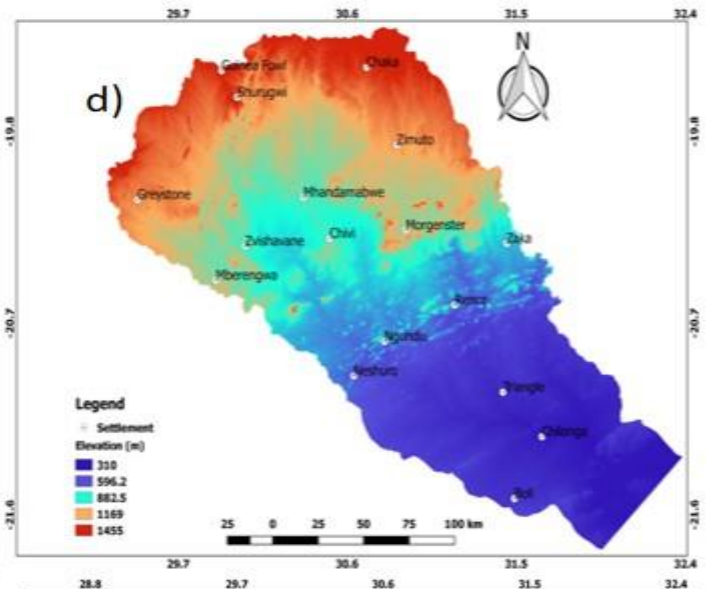
RCM Institution name	Institution Acronym	RCM model name	GCM model name	GCM Institution Acronym	Simulation Acronym
Sveriges Meteorologiska och Hdrologiska Institut	SMHI	RCA4	CanESM2	CCCma	SMHI-CCCma
			Miroc 5	MIROC	SMHI-MIROC
			HadGEM2-ES	MOHC	SMHI-MOHC
			CSIRO	CSIRO	SMHI-CSIRO
			EC-Earth	DMI	SMHI-EC-Earth
			CNRM-CM5	CNRM-CERFACS	SMHI-CNRM

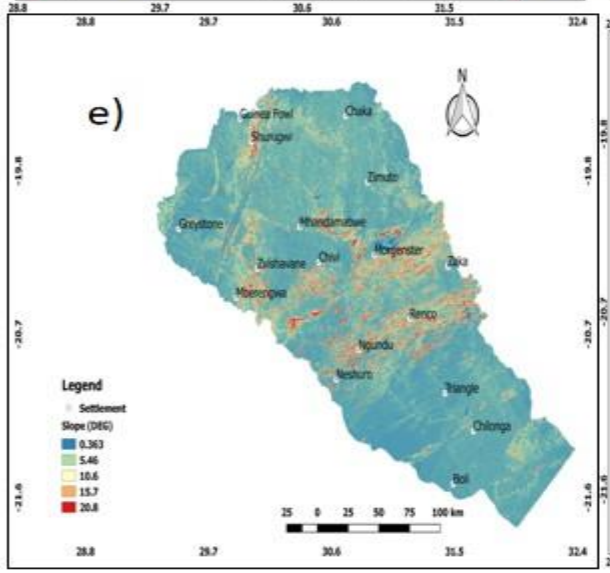
Spatial variation of iput maps to GWP

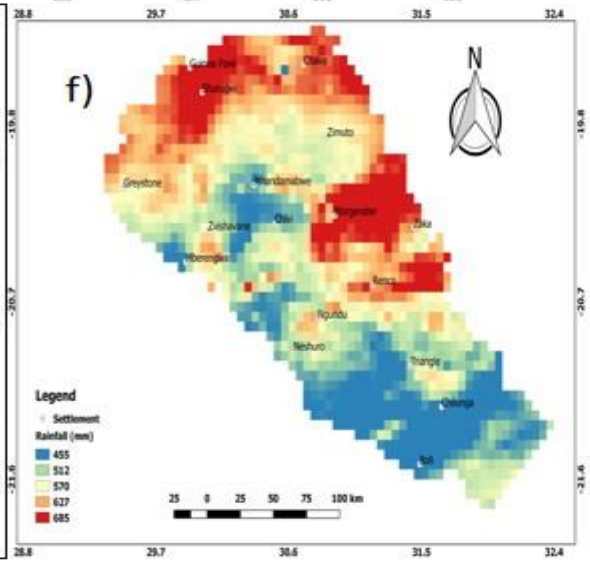


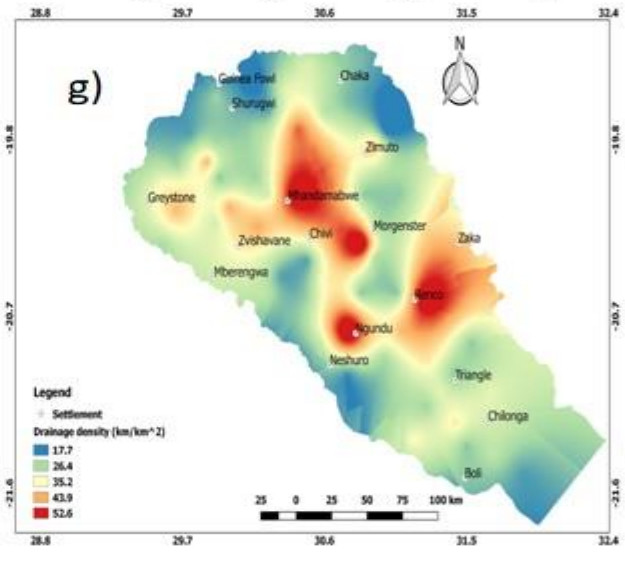


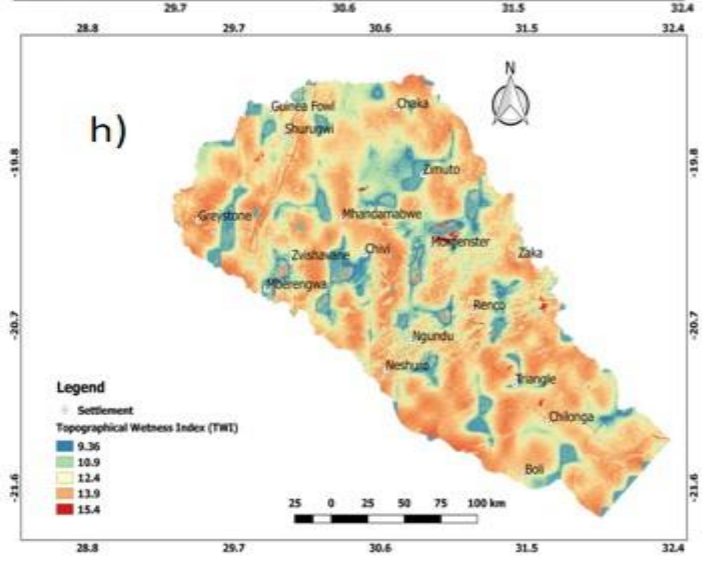




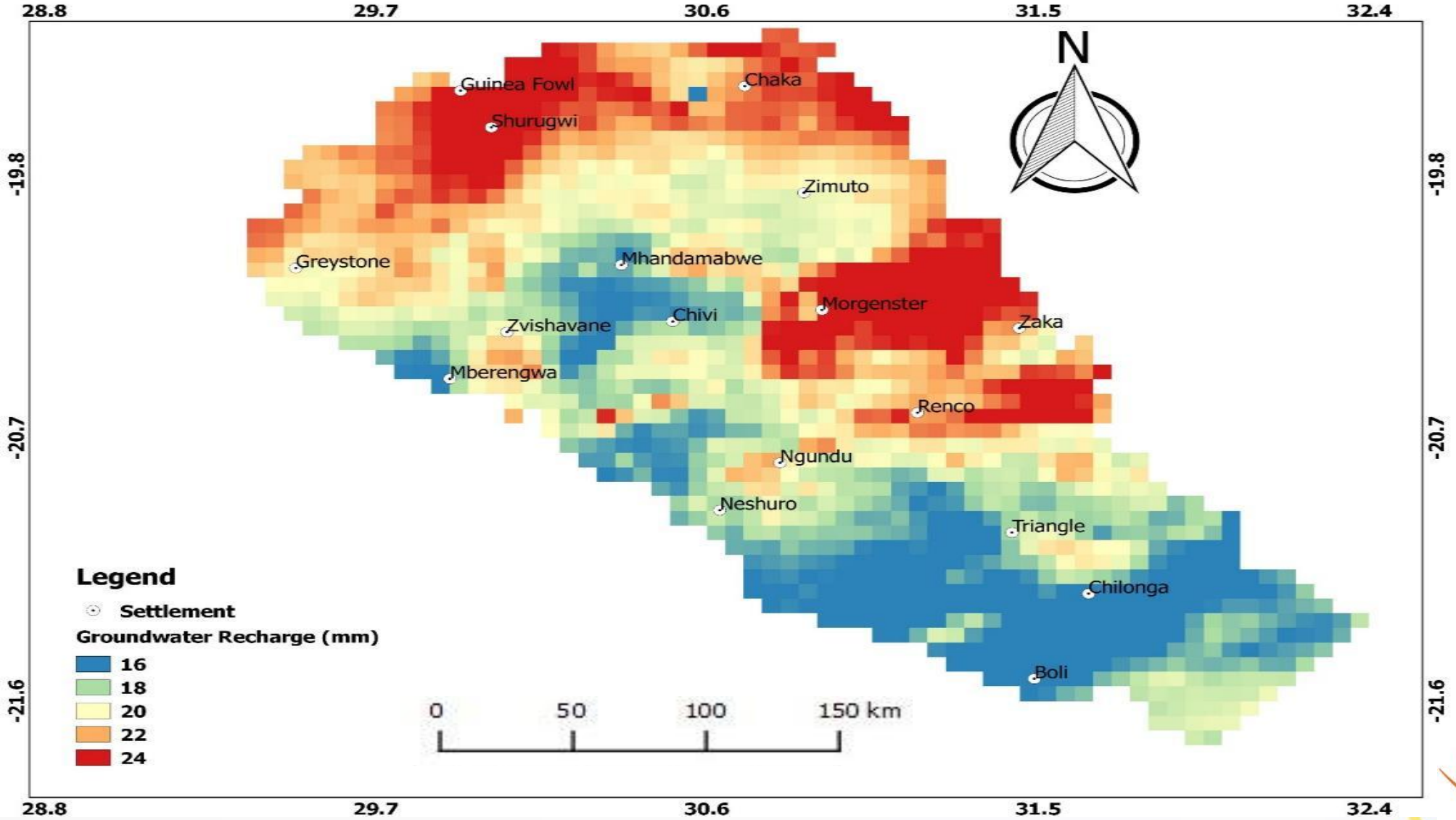








Spatial variation GWR



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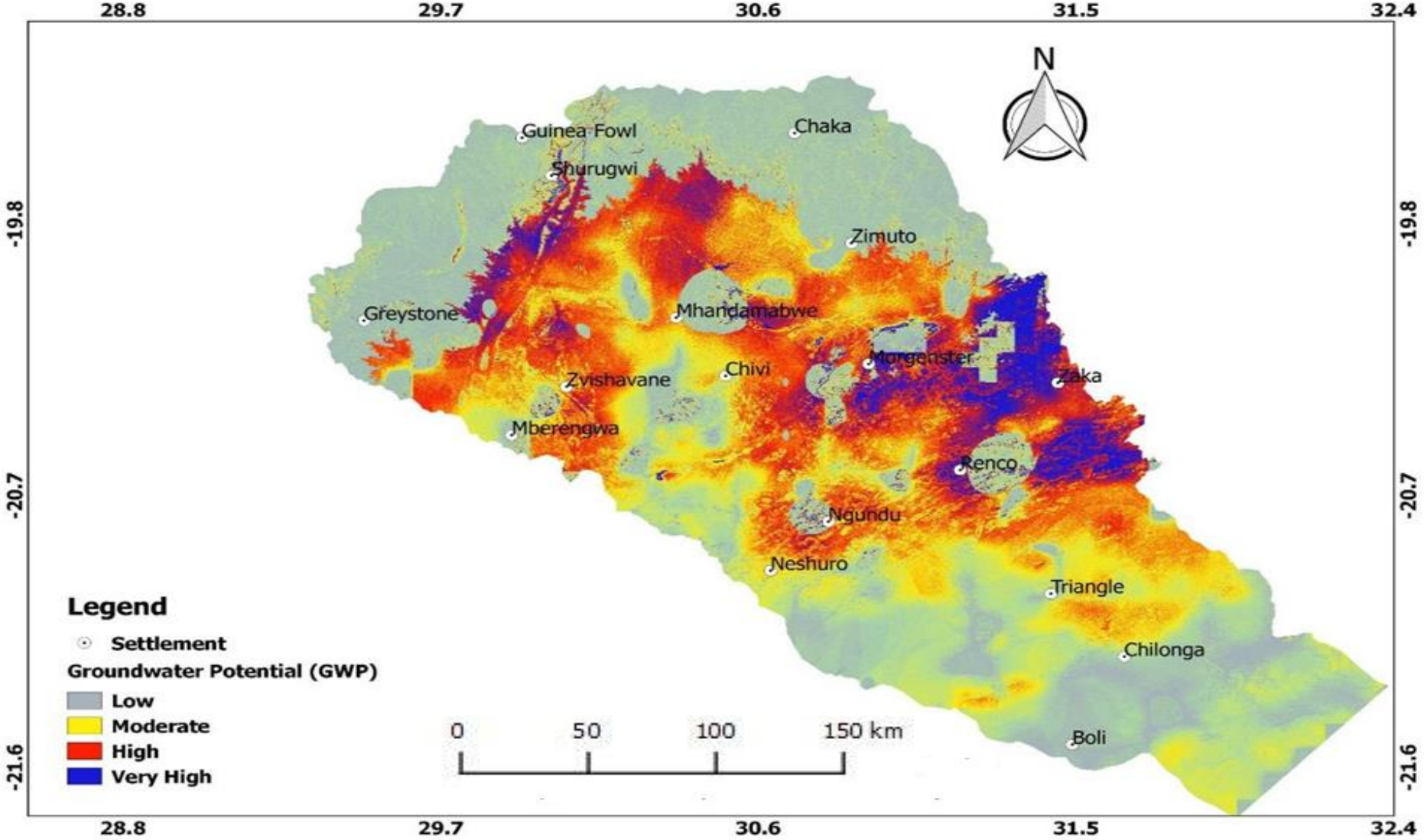
Spatial variations of GWP



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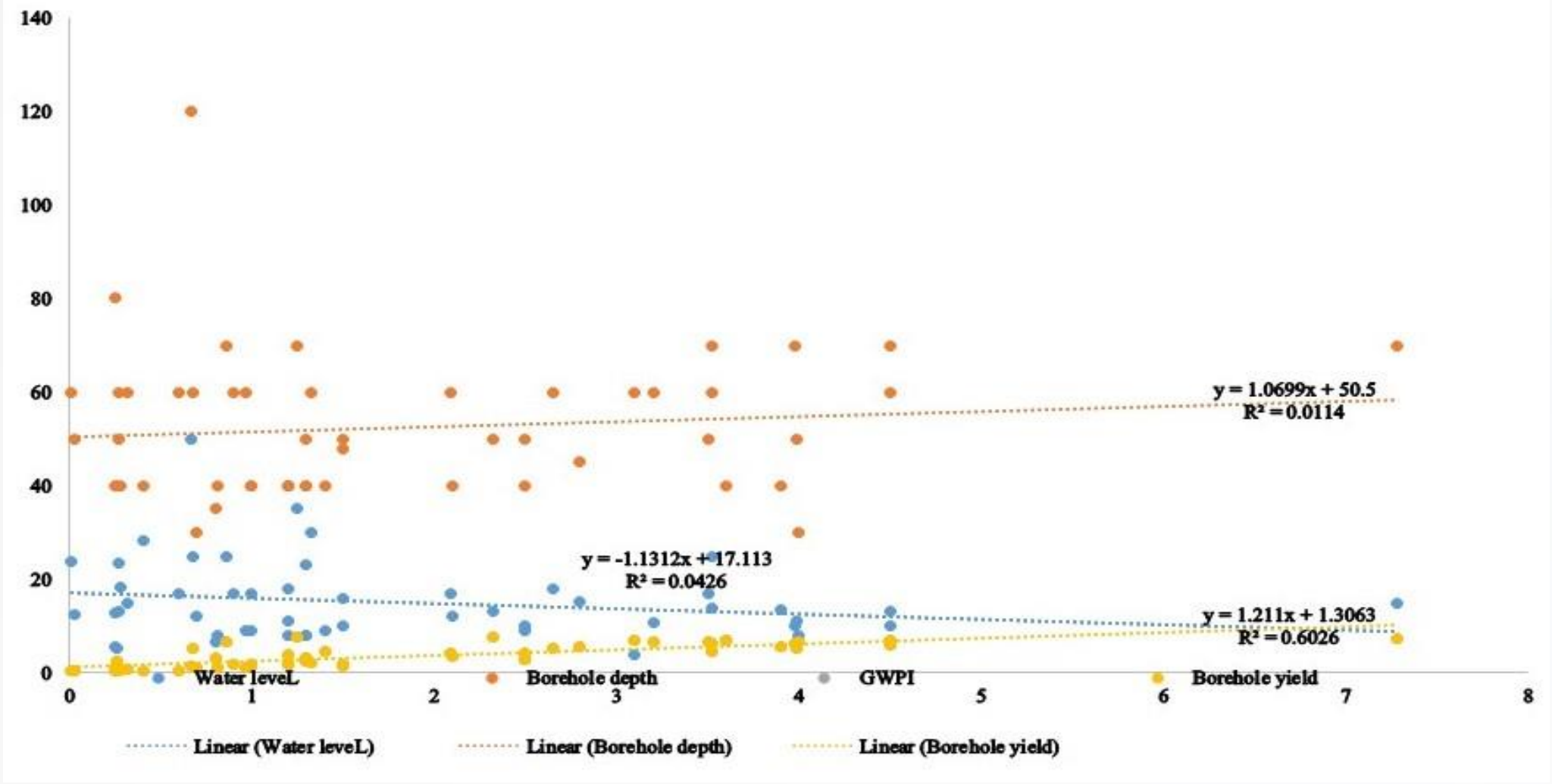
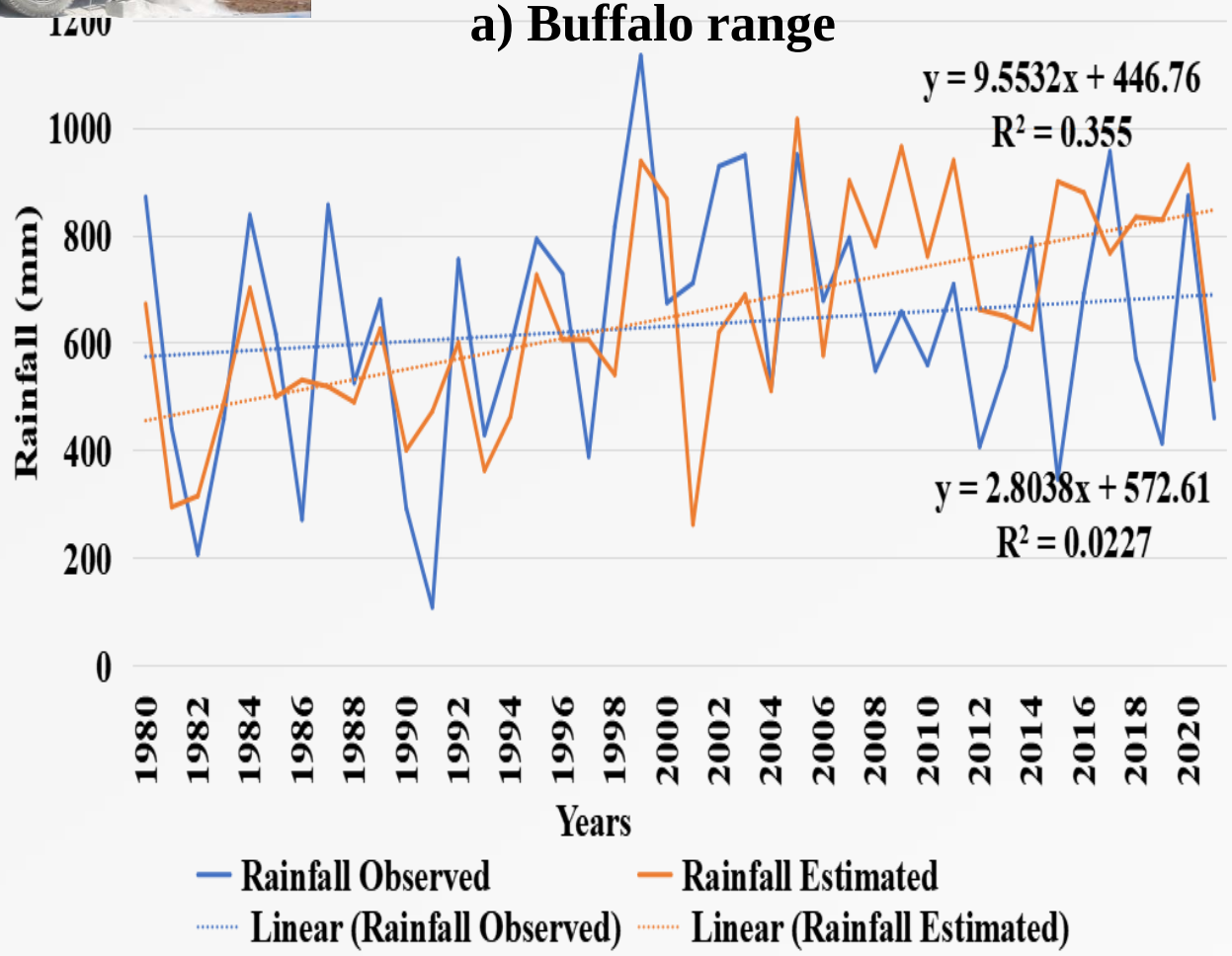
GWP VALIDATION

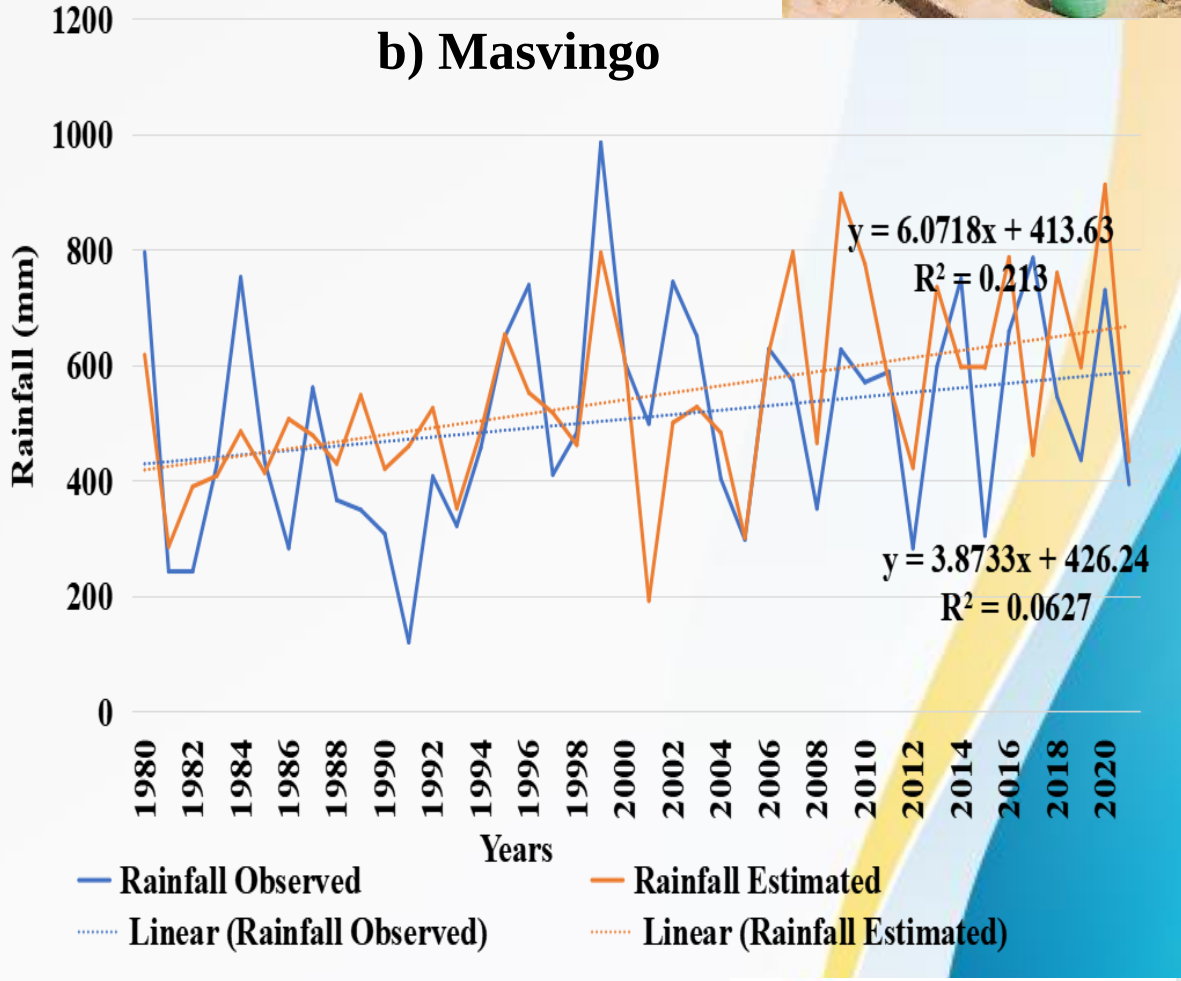


SIMULATED AND OBSERVED TRENDS

a) Buffalo range



b) Masvingo



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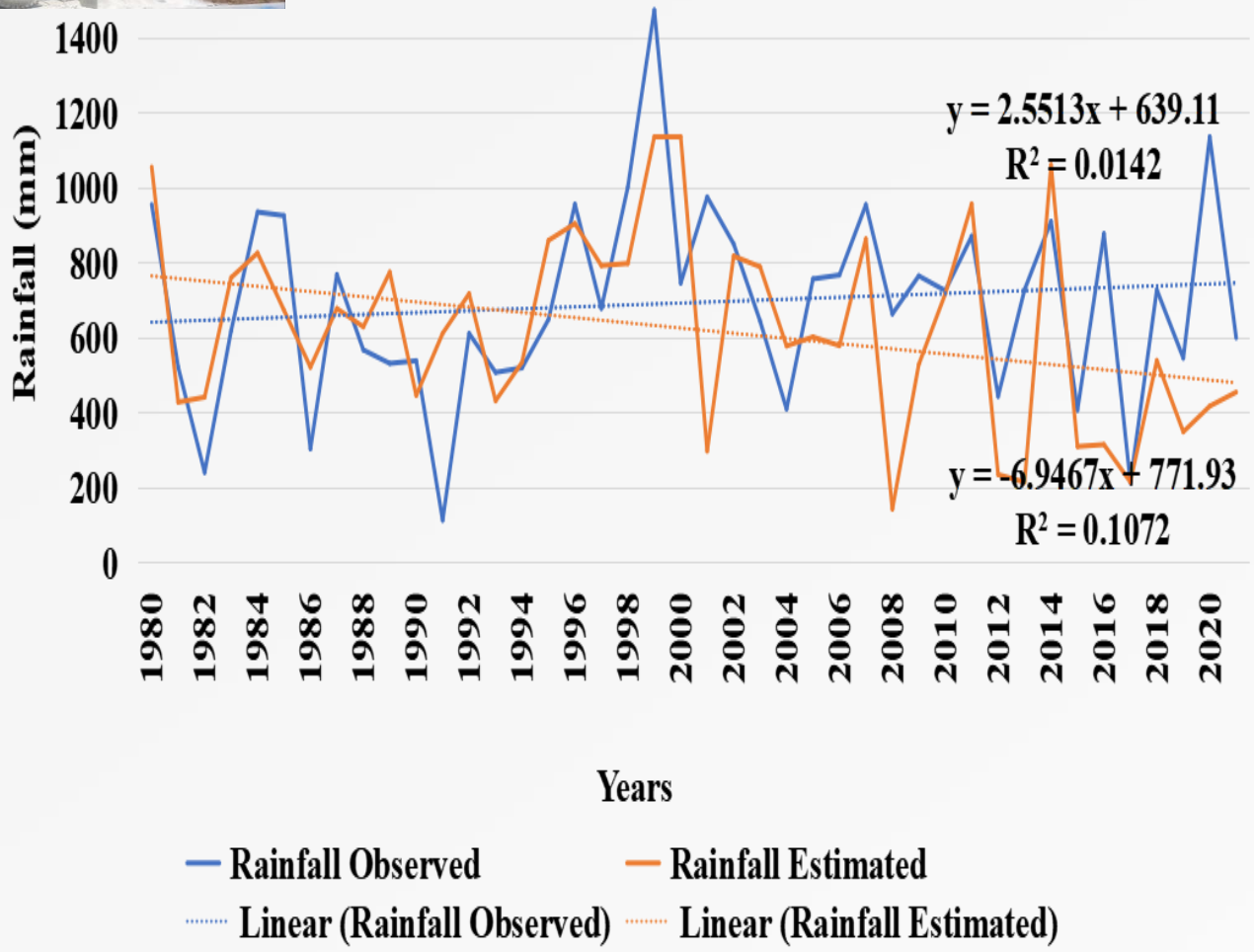
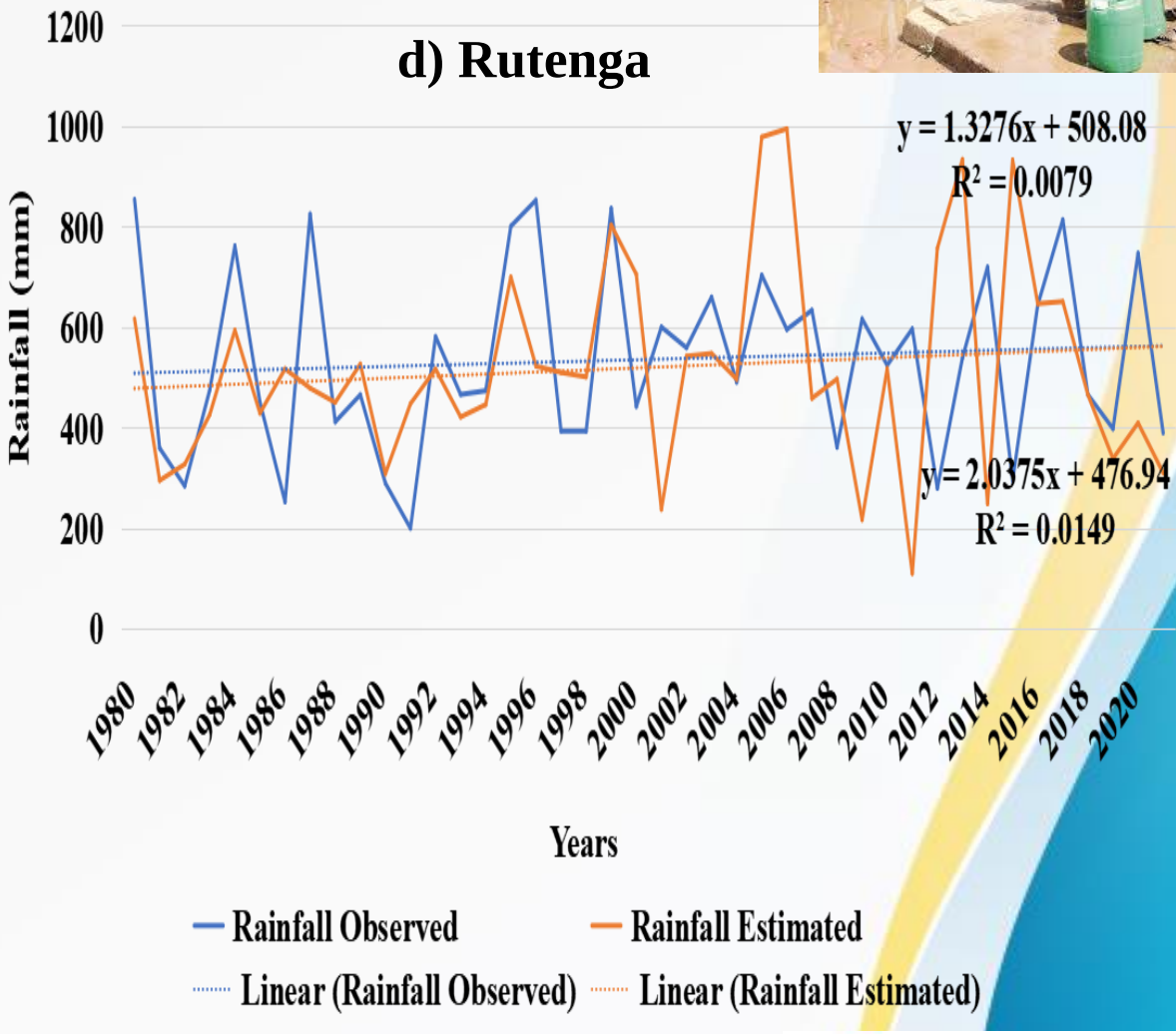
SIMULATED AND OBSERVED CONT'D

c) Mberengwa

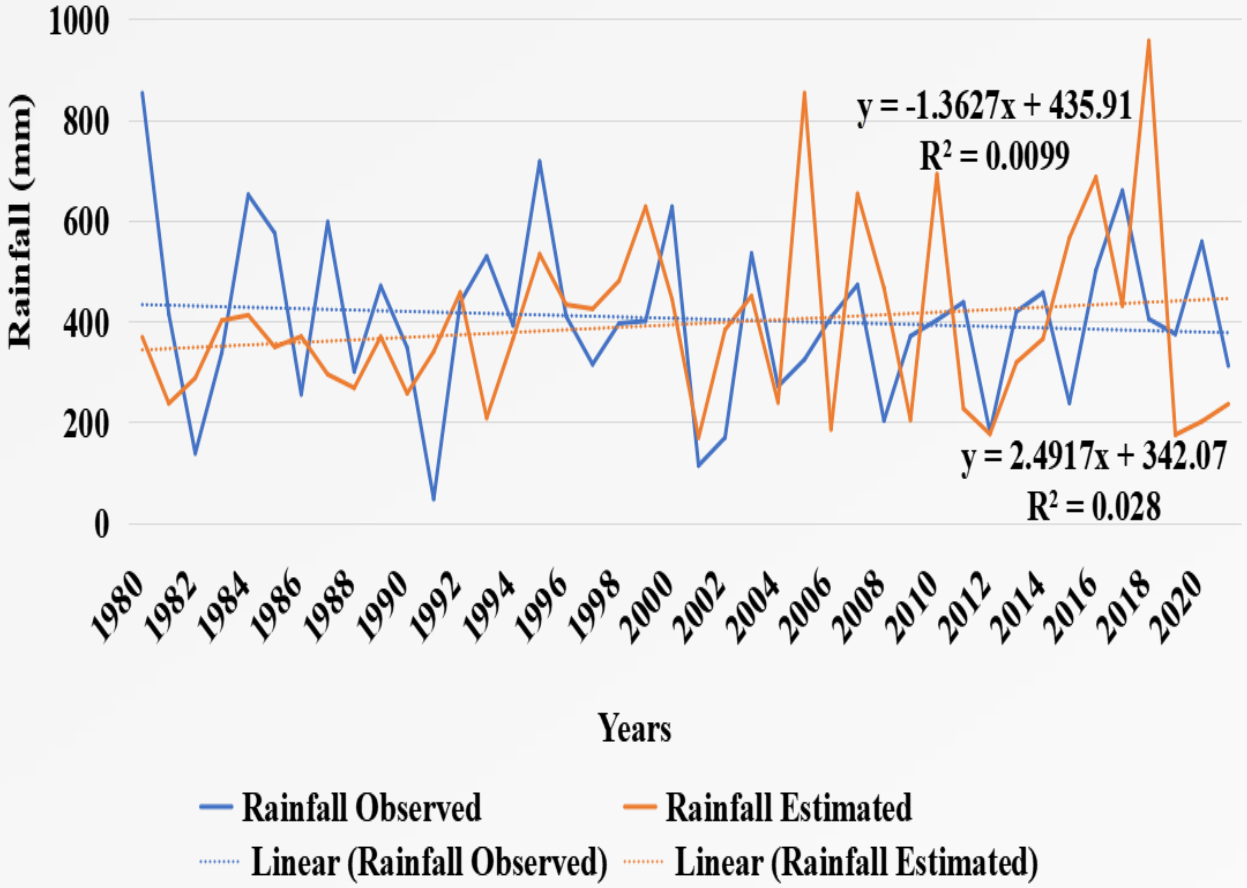


d) Rutenga

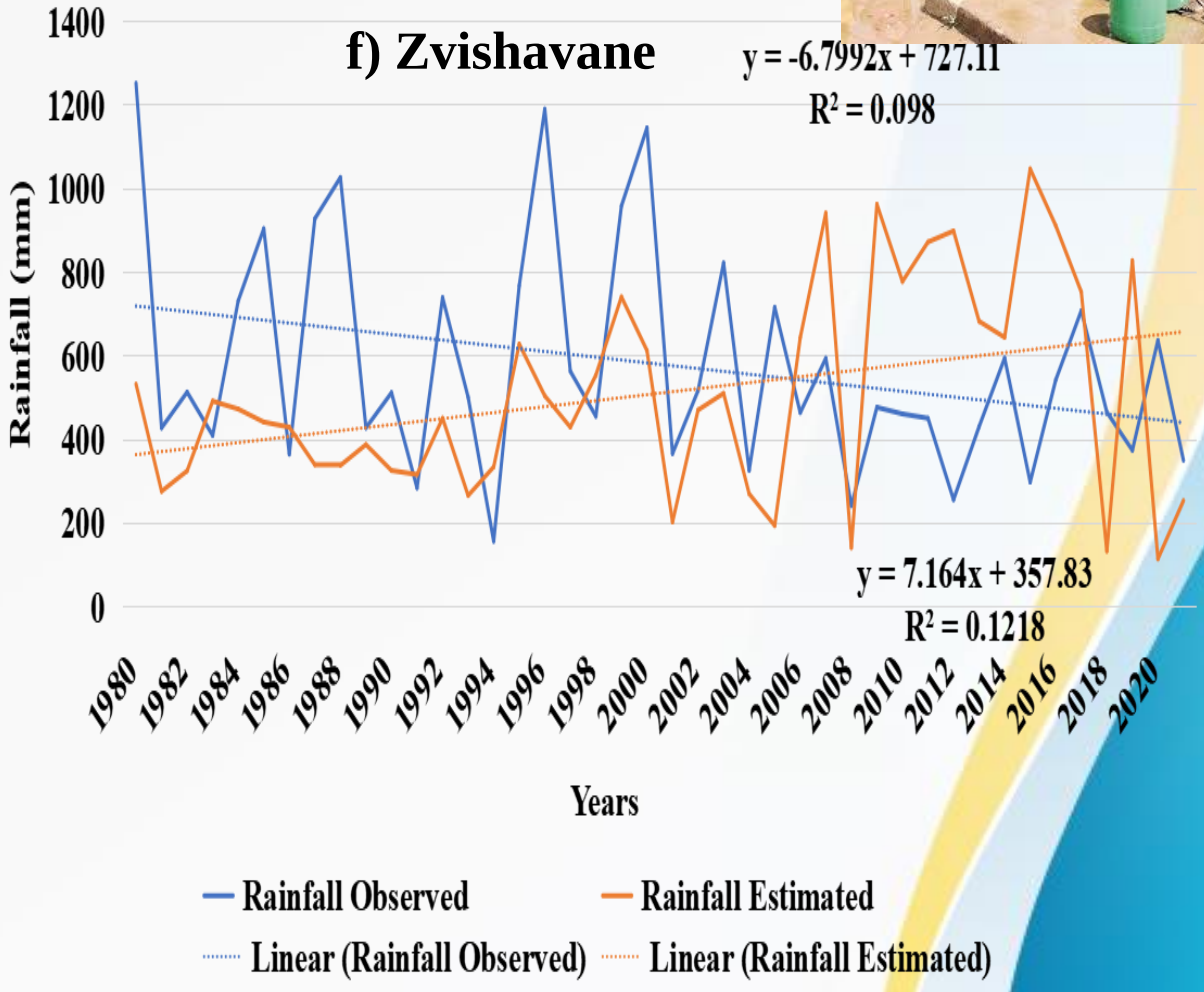


SIMULATED AND OBSERVED TREND CONT'D

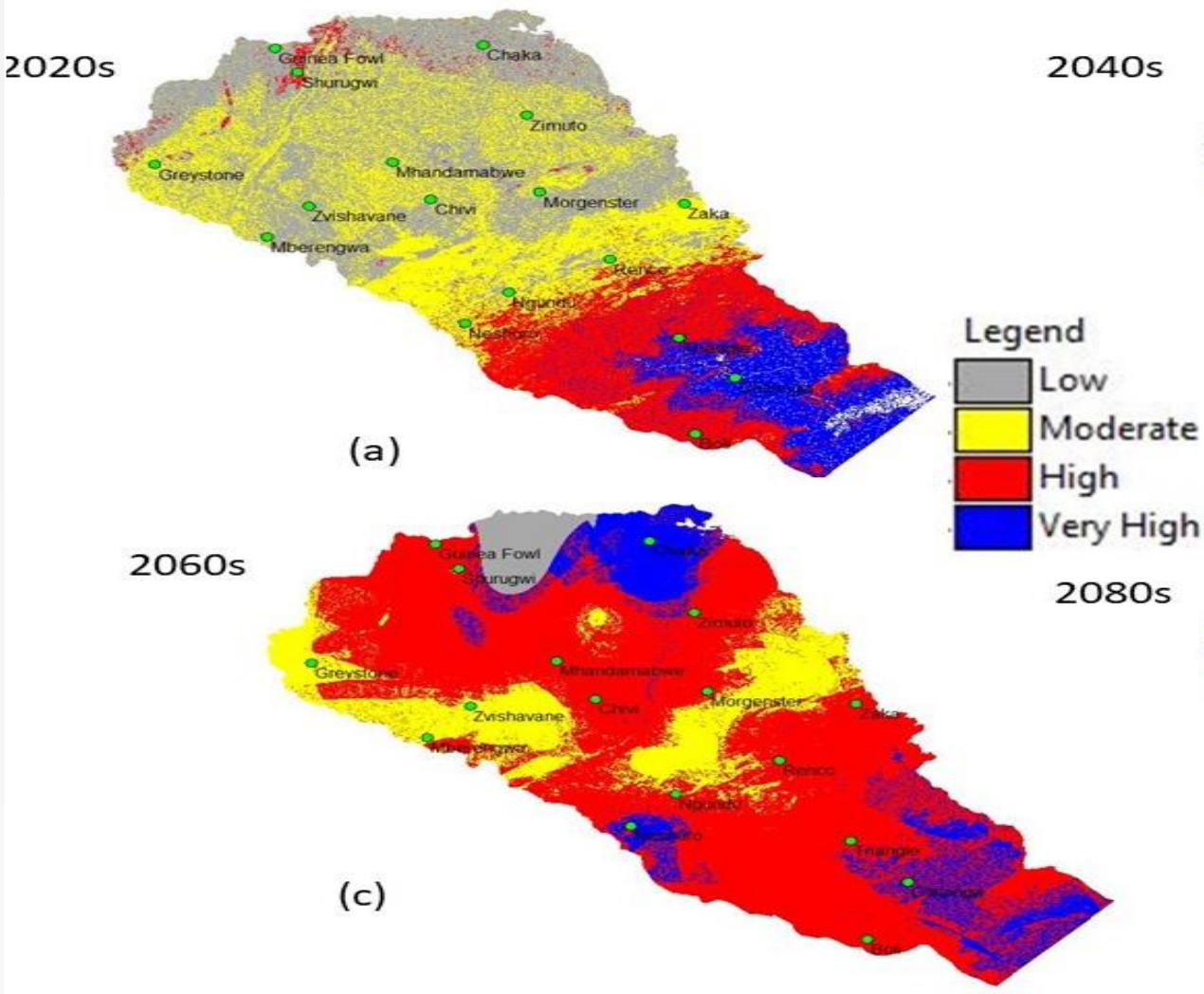
e) Zaka



f) Zvishavane



Projected GWP zones



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Conclusion

- GIS and remote sensing can handle complex data for GWP prediction.
- Runde groundwater potential and recharge map.
- There is an average variation of 10.5 % on GWP due to climate change.

Recommendations

- Soil and water conservation strategies and policy
- RWIMS database
- Automatic weather station mandatory

- THANK YOU
- SIYABONGA
- NDATENDA

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