



GROUNDWATER MANAGEMENT INSTITUTE



JRS Biodiversity
Foundation

Remotely sensed delineation of groundwater dependent ecosystems in Khakhea-Bray Transboundry Aquifer

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Introduction

- Groundwater Dependent Ecosystems (GDEs) provides critical socio-economic and ecosystem services
- Socio-economic:
 - household
 - industrial
 - agricultural use
- Ecosystem services:
 - water purification
 - provide habitat for fauna (Hayos et al., 2016; Doody et al., 2019)

Introduction (continued)

- Information such as location and delineation of GDEs is scarce particularly in Southern Africa
- GIS + remote sensing > useful for mapping GDEs
- Thus the study aims to identify, delineate and map GDEs at Khakhea-Bray Transboundary Aquifer using multi-source spatial data

Objectives

1. To identify and delineate Groundwater Dependent Ecosystems spatial extent using geospatial techniques in Khakhea-Bray Transboundary Aquifer
2. To determine spatio-temporal changes of Groundwater Dependent Ecosystems over time (1995-2021) in Khakhea-Bray Transboundary Aquifer

Aims and objectives (continued)

3. To investigate the precipitation and climatic variability influences on Groundwater Dependent Ecosystems in Khakhea-Bray Transboundary Aquifer
4. Evaluate and map chlorophyll-a concentration in Groundwater Dependent Ecosystems during 2020 and 2021 as a proxy for water quality in Khakhea-Bray Transboundary Aquifer

Methods



Methods (continued)

- The study took place in the Khakhea-Bray Transboundry Aquifer that is located on the borders of **South Africa** and Botswana
- 24th to 26th of June 2021
- GPS coordinates points for different types of land covers
 - Water
 - Shrublands
 - Bare surface
 - Build-ups
 - Trees

Methods (continued)



Methods (continued)



Methods (continued)



Objective 1 (continued)

Proposed

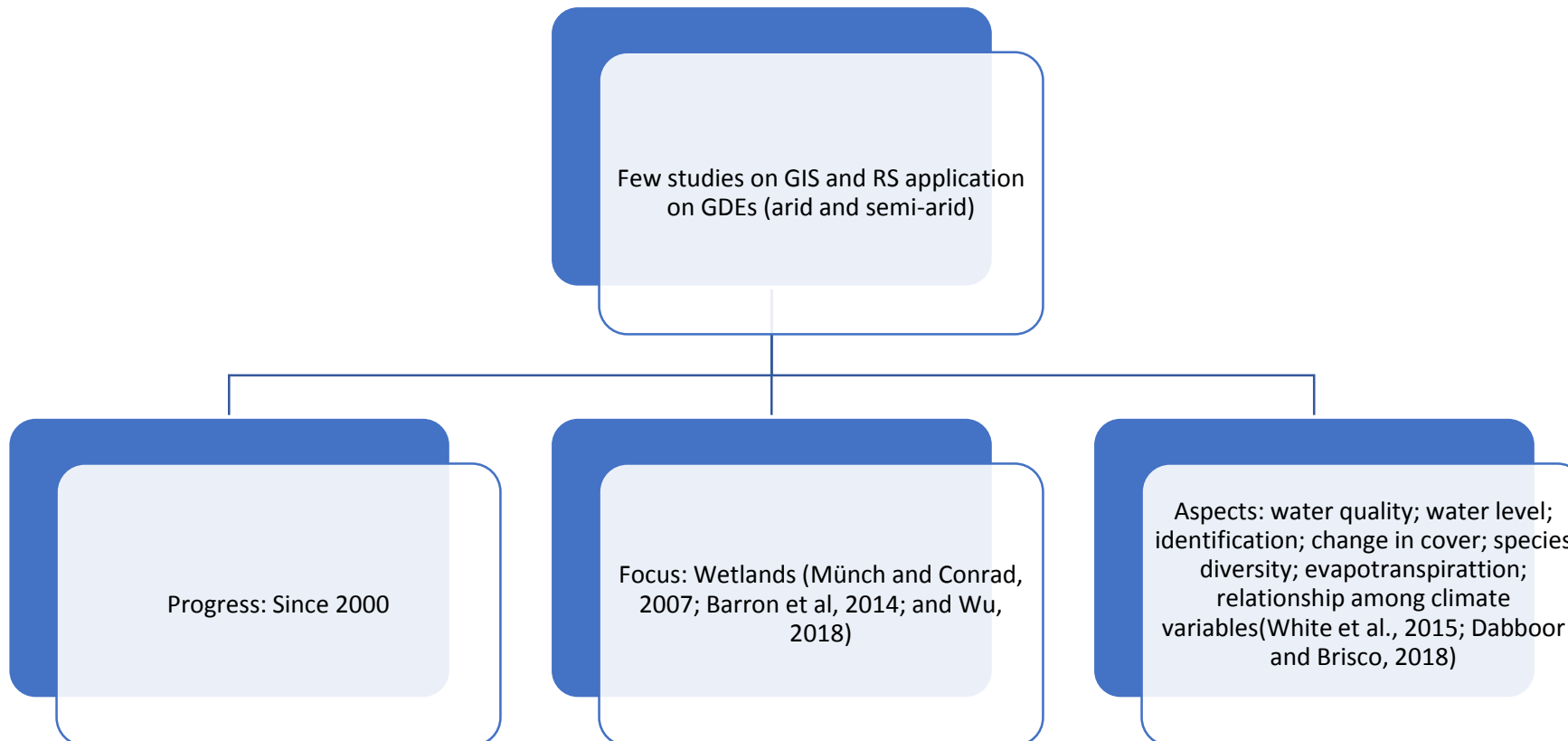
- 1.To identify and delineate Groundwater Dependent Ecosystems spatial extent using geospatial techniques in Khakhea-Bray Transboundary Aquifer.

Results

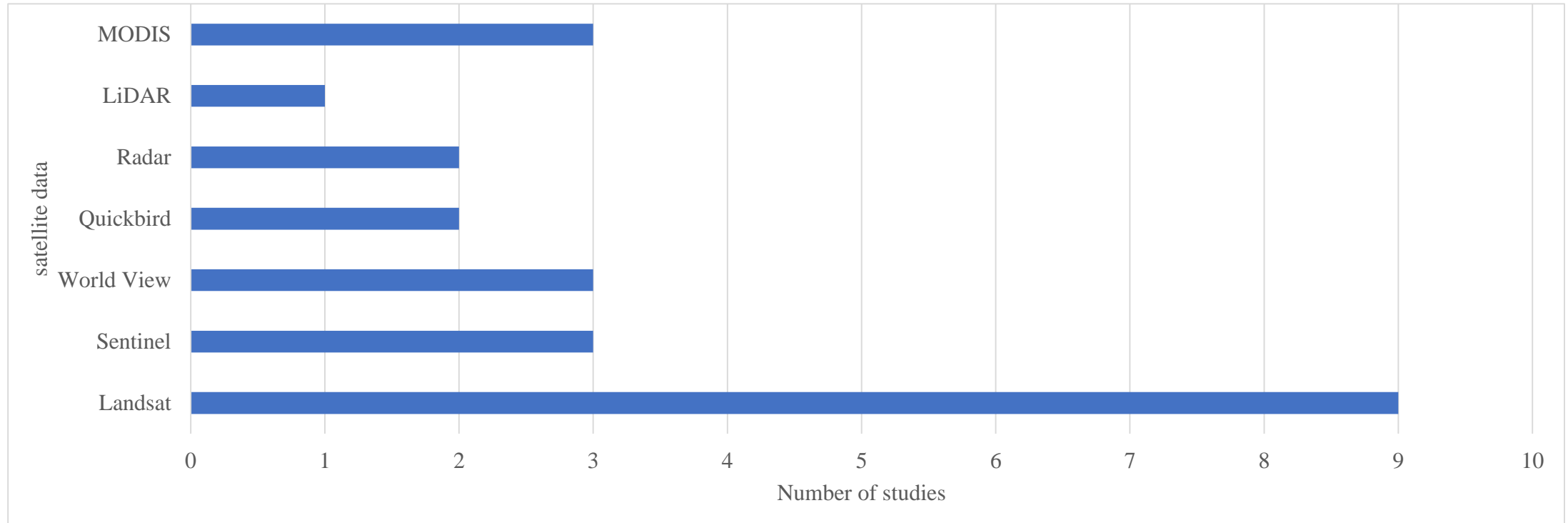
- Identification achieved-experts
 - Pans (wet and dry)
 - Spring
 - Wetland
- Delineation
 - NDVI
 - NDWI
 - DEM

Literature search (in progress)

- Progress>challenges>future opportunities



Literature search (continued)



The application of satellite data on GDEs studies

Literature search (continued)

- Methods
 - Satellite images from multispectral satellite images
 - Widely used multispectral satellite images (Landsat)
- Characteristics:
 - freely available
 - repeated global coverage
 - wide swath-width (above 185 km)
 - covers a large area

Literature search (continued)

- Algorithms or techniques
 - Widely used: Image classification (supervised); and vegetation (NDVI) and water (NDWI) indices
 - NDVI – used for GDEs delineation (principle: greener vegetation, potential GDEs) (Pérez Hoyos et al., 2016)
 - Produce better results when integrated with other aspects like DEM

Way forward

- Submit first Literature review draft to the supervisors and journal on the 30th July 2021 and October 2021, respectively.
- Data collection for wet season-comparison
- Analyse collected data



THANK YOU



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