Spatial Information System for Management of Small-scale Irrigation Schemes in Northern Ethiopia

PhD proposal qualifier presentation

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Introduction

Rainfed-agriculture is the main production system in the study area,

However

- Due to moisture stress, production is limited to rainy season
- The production and productivity through this system is very low

In order to tackle this challenge, the regional government has introduced several irrigation schemes

Continued

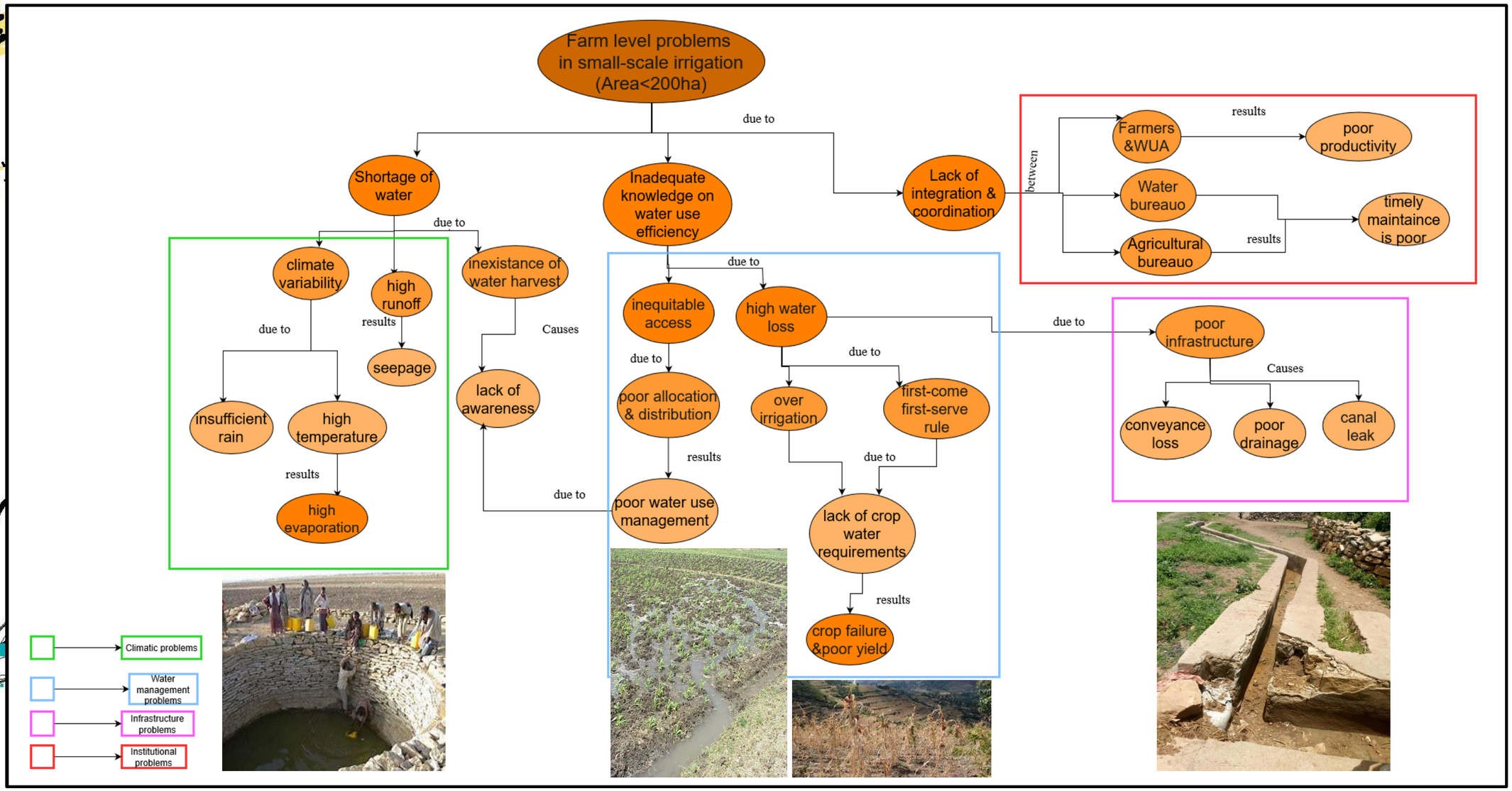
- Irrigation is vital for realizing full potential of agricultural sector
  - Efficient utilization of water resources
  - Sustainable economic growth and poverty reduction
  - Required in many arid and semi-arid areas during periods of insufficient rainfall

Continued

The Ministry of Water Resources Irrigation and Electricity (MoWIE)

- Irrigation development is classified based on the size of the command area:
  - Small-scale (less than 200 hectares (ha)),
  - Medium-scale (200 ha to 3000 ha) and
  - Large-scale is greater than 3000 ha

Problem analysis



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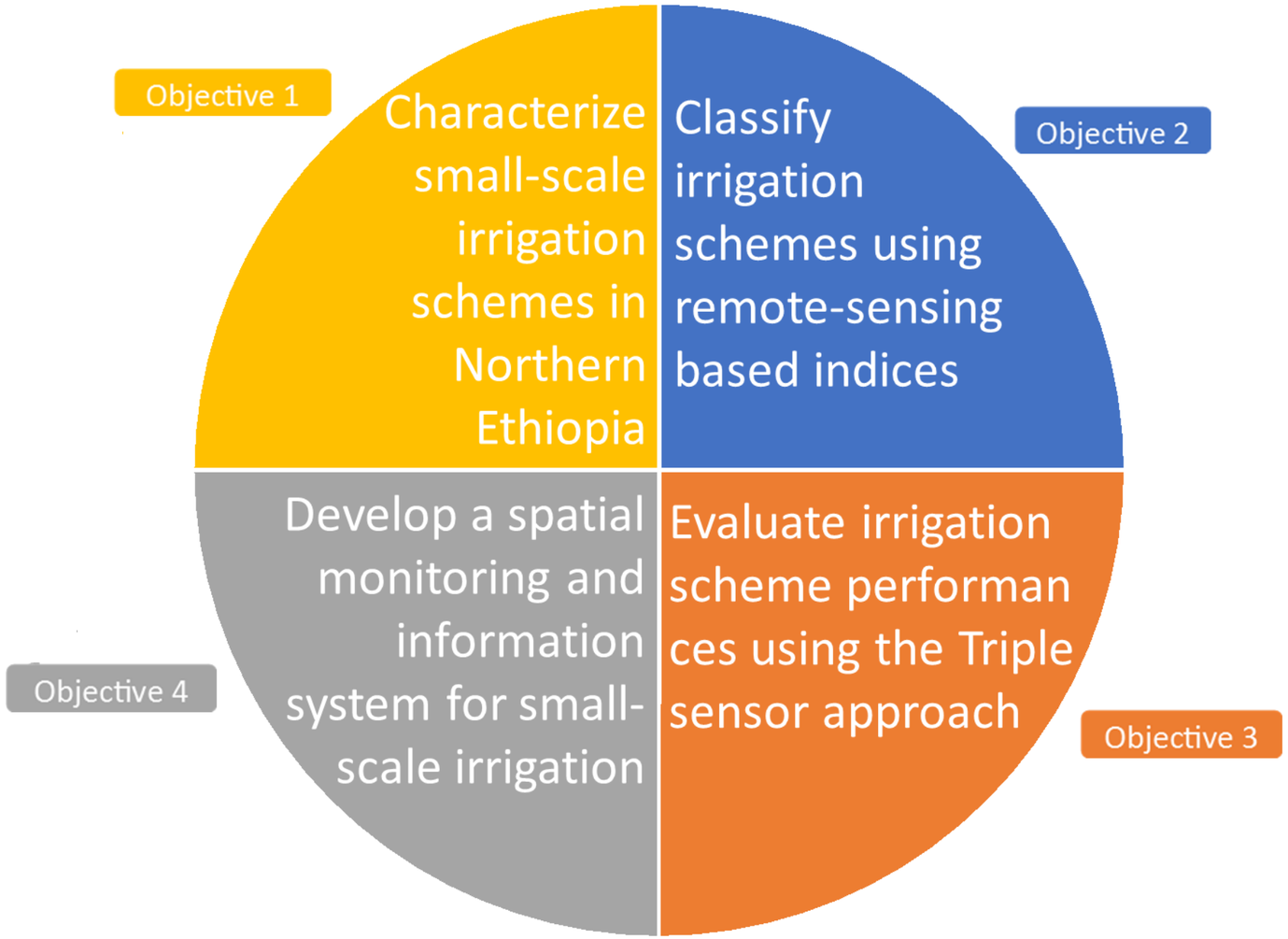
Gaps

- Inadequate knowledge on water use efficiency
- Lack of integration and coordination
- Advisory system lacks crop water requirements
- No standardized information system to monitor the existing irrigation schemes
- Irrigation water efficiencies are not well documented
- Lack of integrated assessment of small-scale irrigation schemes

Objectives

The proposed research project is to improve the planning and managements of water use efficiency and agricultural water productivity in small-scale irrigation schemes.



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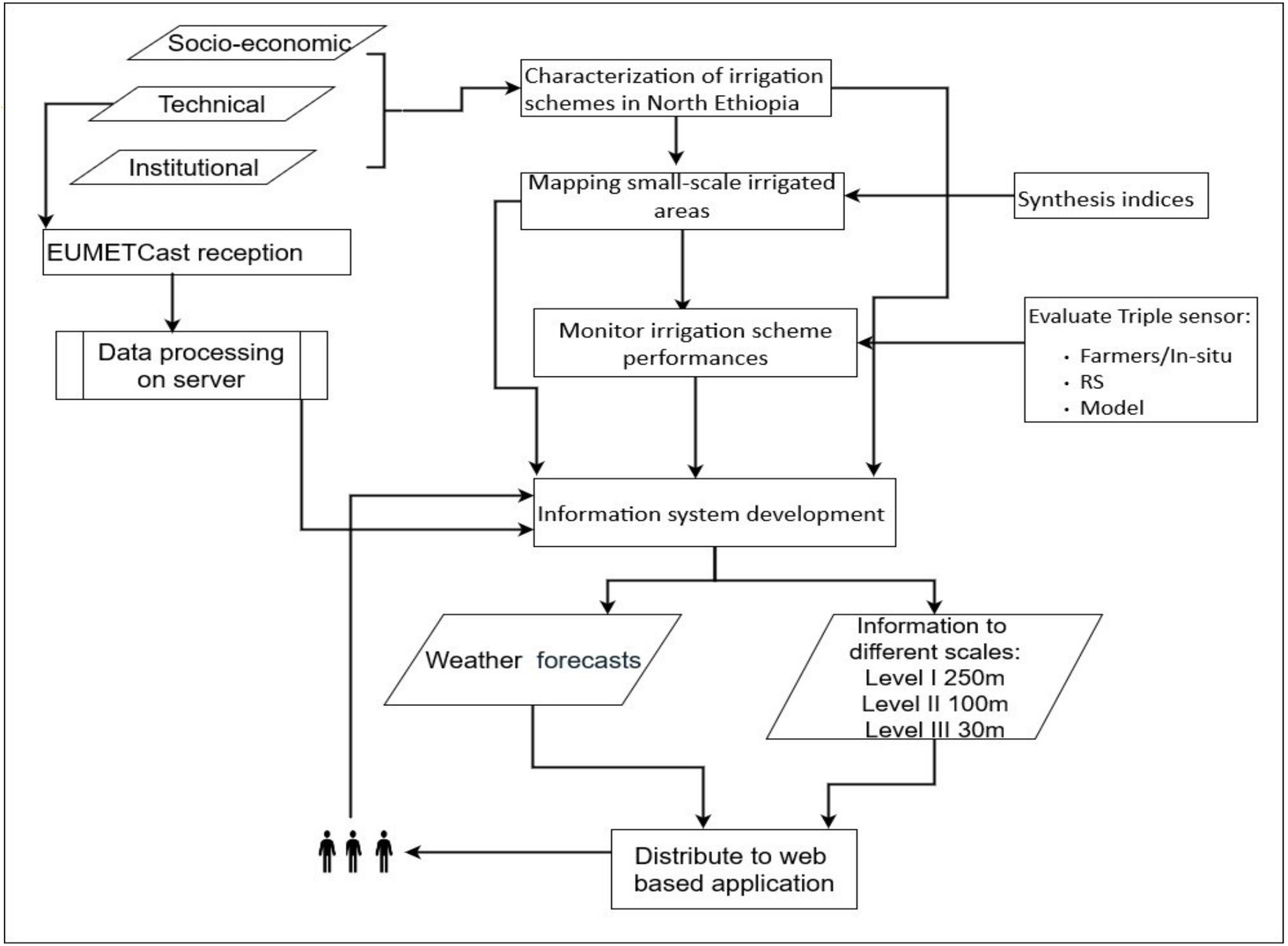
Research approach

Research workflow



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Research approach

Objective 1: Characterize small-scale irrigation schemes based on socio-economic, technical, and institutional aspects

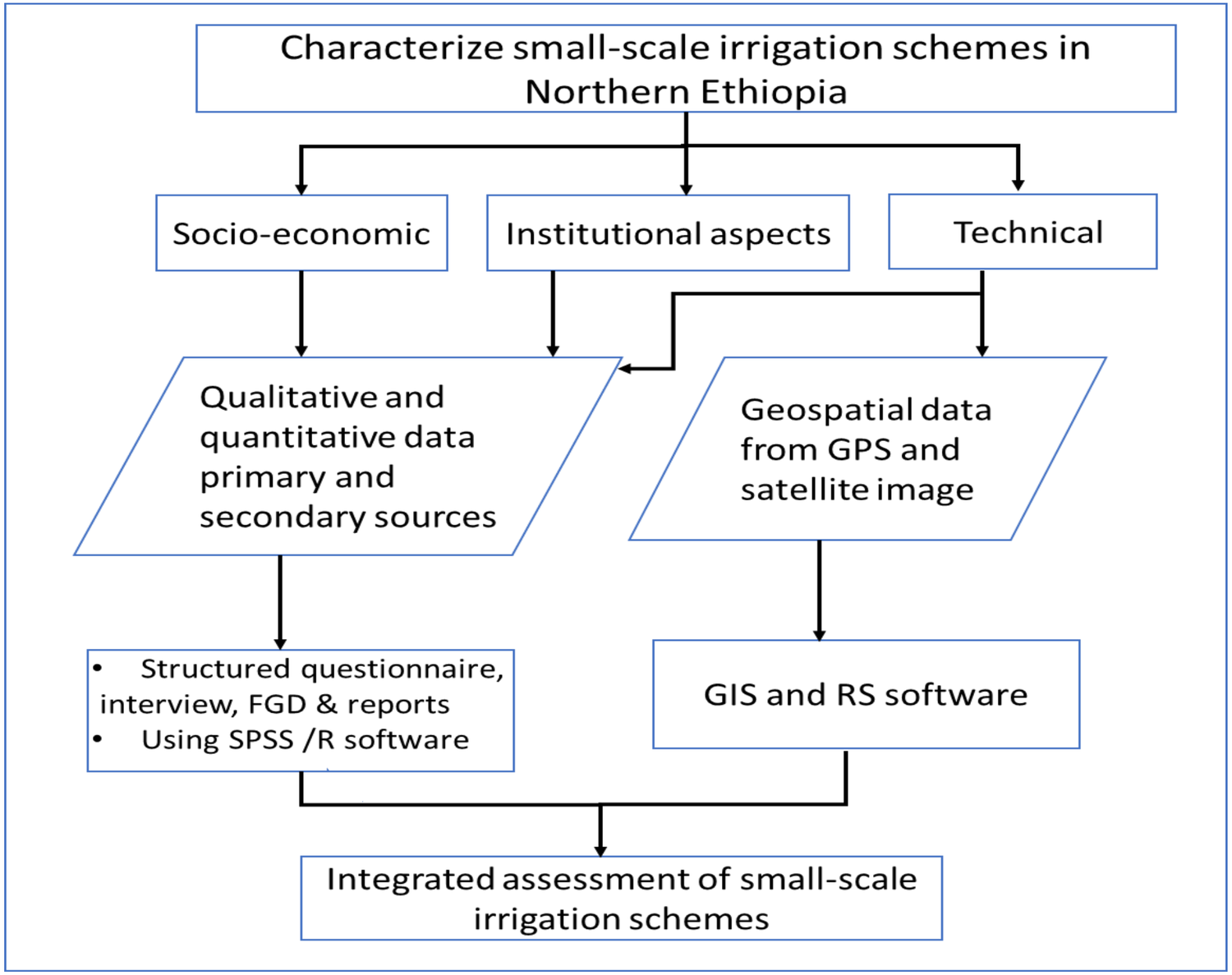
What are the socio-economic impacts of irrigation on livelihood of farmers?

What is the (technical) efficiency in use of water and water productivity in irrigation schemes in the study area?

What is the efficiency and effectiveness of local institutions in the planning and monitoring of an irrigation scheme?

Research approach

Objective 1
Methodology



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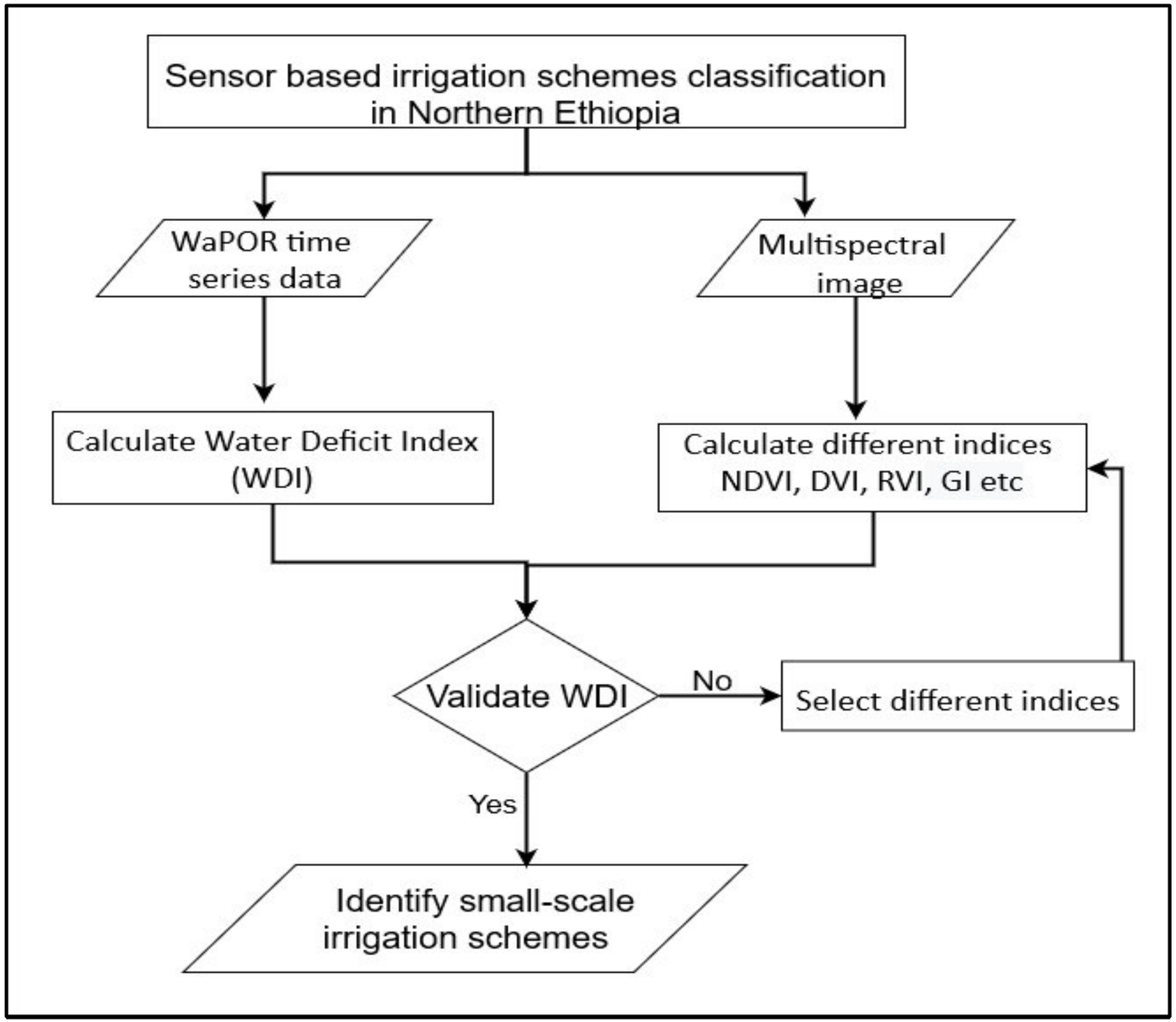
Research approach

Objective 2: Classify irrigation schemes using remote-sensing-based indices in order to facilitate feature extraction for mapping

- How to map different types of small-scale irrigation schemes using remote sensing and derived products?
- How to map small-scale irrigated areas at different scale?

Research approach

Objective 2
Methodology



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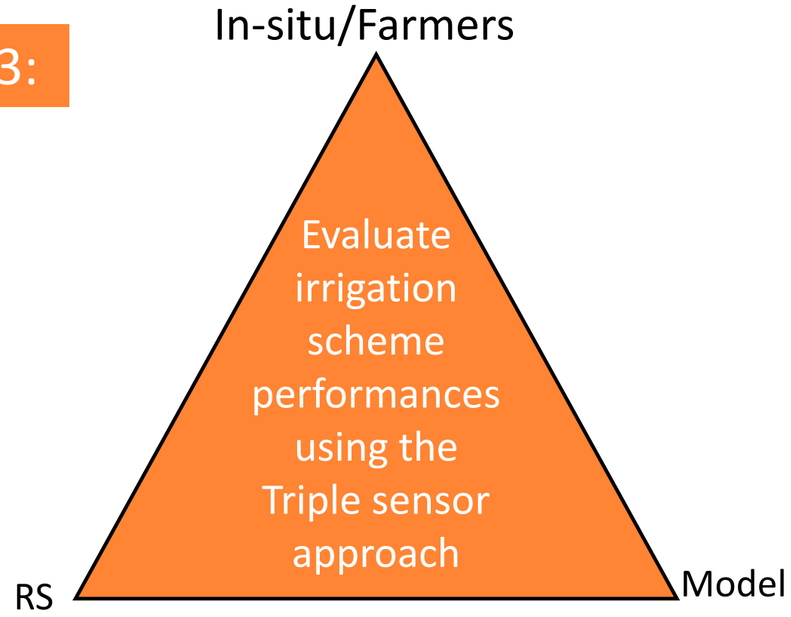
Research approach

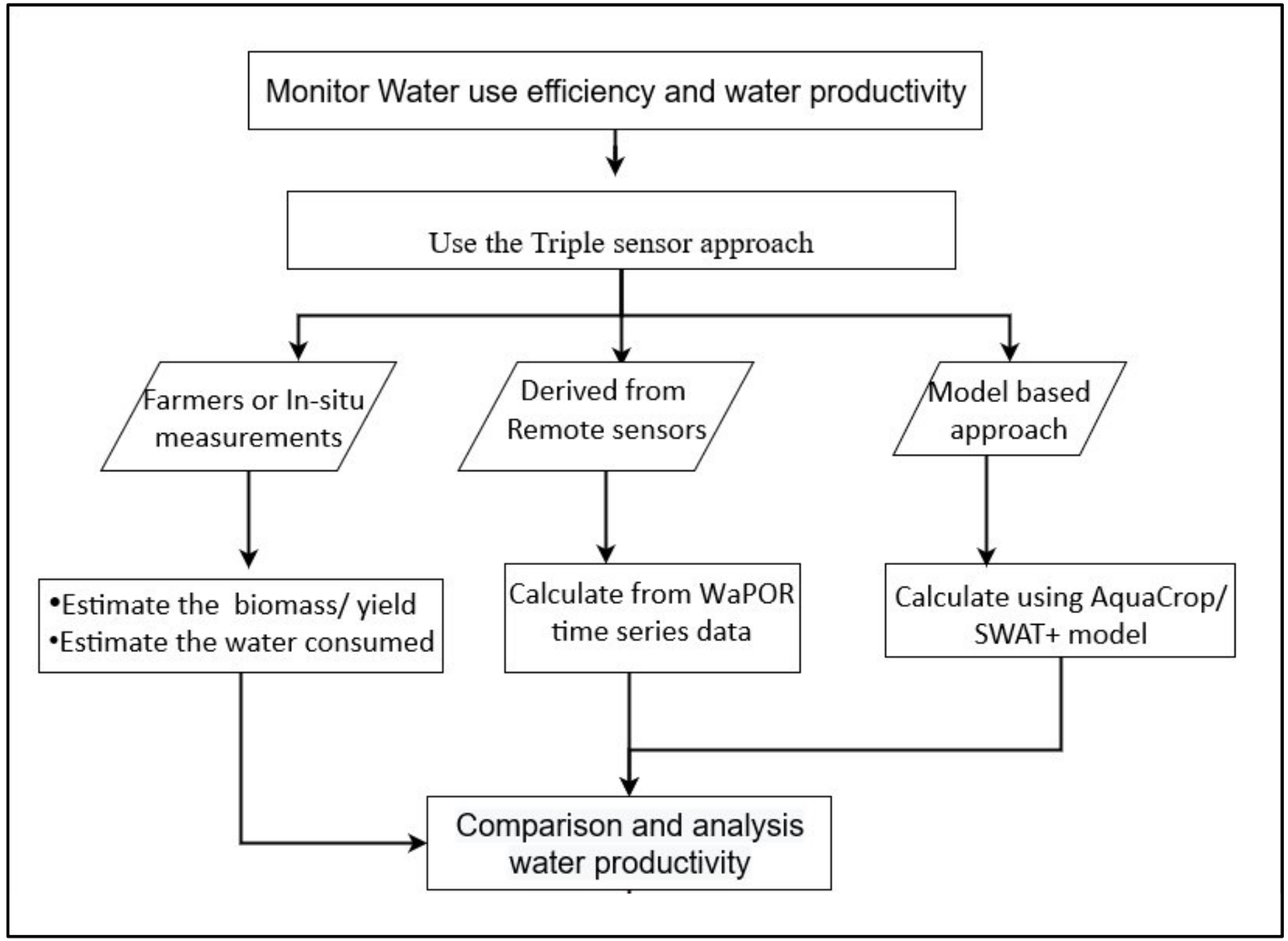
Objective 3:



- How can water use efficiency and crop productivity using the Triple sensor approach be monitored?
- What is the agricultural water productivity of the irrigation scheme at Zamra catchment?
- How to improve the assessment of irrigation productivity at Zamra catchment?

Research approach

Objective 3
Methodology



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Research approach

Objective 4

Develop a spatial monitoring and information system for small-scale irrigation

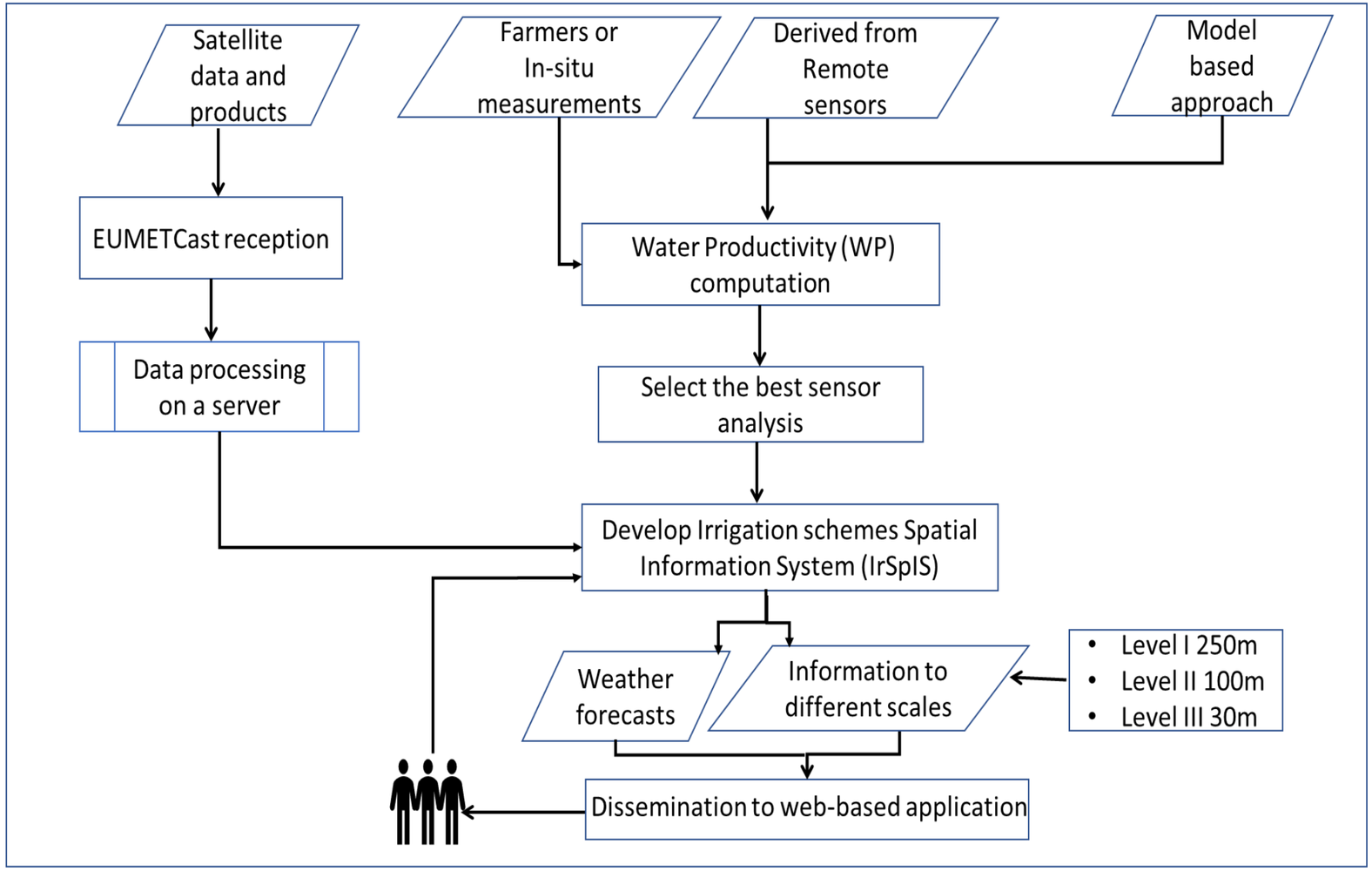
What type of information should be provided at different scales and users?

What should be the characteristics of an operational irrigation spatial information system?

How will the IrSpIS improve the irrigation system performances?

Research approach

Objective 4
Methodology



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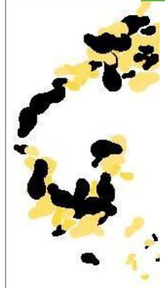
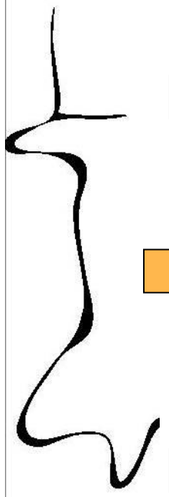
Research approach

Objective 4
Methodology





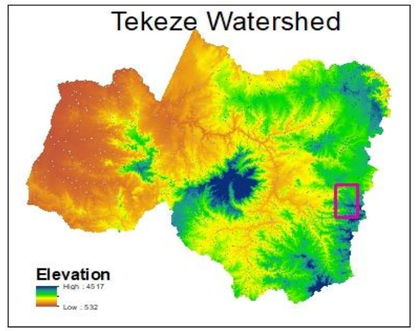
Different spatial and temporal scales information to different users

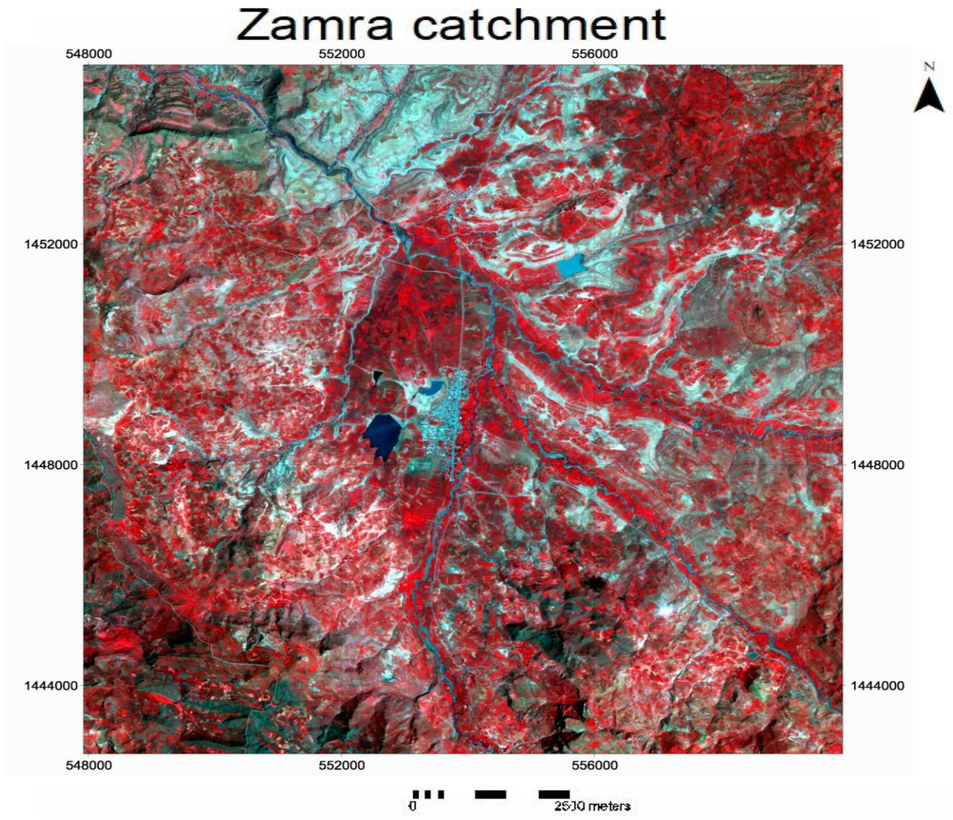
	Low (250m)	Medium (100m)	High (30m)
Scale			
Spatial scale	Zamra catchment	Irrigation scheme	Irrigated field
Temporal scale	Seasonal	Monthly and seasonal	3-10 days
Information	• Total irrigated area • Crop water productivity • Weather forecast	• Amount of water in the reservoir • Irrigated area • Crop water productivity	• What to produce • When and how much irrigate
Users	• Woreda irrigation experts • Landuse planners • Regional irrigation experts	• Development Agents	• Water Use Association

Case study

This study will be conducted in Northern Ethiopia Tekeze watershed, specifically in the Zamra catchment

- Area is approximately 3492km^2





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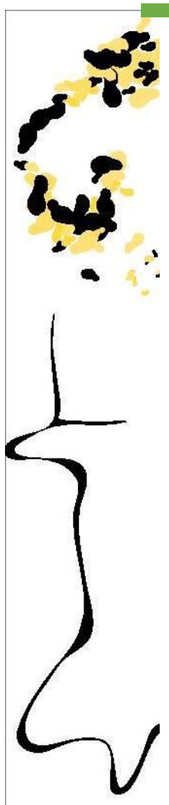
Expected outputs



- Integrated assessment of small-scale irrigation schemes
- Mapping small-scale irrigated areas
- Monitoring of irrigation schemes water use efficiency and water productivity
- Develop a spatial monitoring and information system for small-scale irrigation
- To support irrigation managers towards improving water use efficiency and agricultural water productivity
- Two MSc student theses will be included
- GTPII is to increase food production of irrigated lands by expansion of irrigation schemes and rehabilitating existing ones
- Special emphasis on food security, water use efficiency and sustaining the environment

Time table

Activity	Years															
	I (Nov 2018- Dec2019)				II (Jan2019- Dec 2020)				III (Jan 2021- Dec 2021)				IV (Jan 2022- Dec 2022)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Literature review																
Qualifier																
Fieldwork																
Objective 1																
Activity 1																
Activity 2																
Activity 3																
Objective 2																
Activity 1																
Activity 2																
Activity 3																
Objective 3																
Activity 1																
Activity 2																
Activity 3																
Objective 4																
Activity 1																
Activity 2																
Activity 3																
Activity 4																
Final thesis																
Progress reports																
Defense																

Objective 1
Objective 2
Objective 3
Objective 4

Q: Quarter

Thank you

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