

Climate Change Impacts on Water Resources and Future Water Use Options in the Great Ruaha Sub-Basin in Tanzania



Objectives

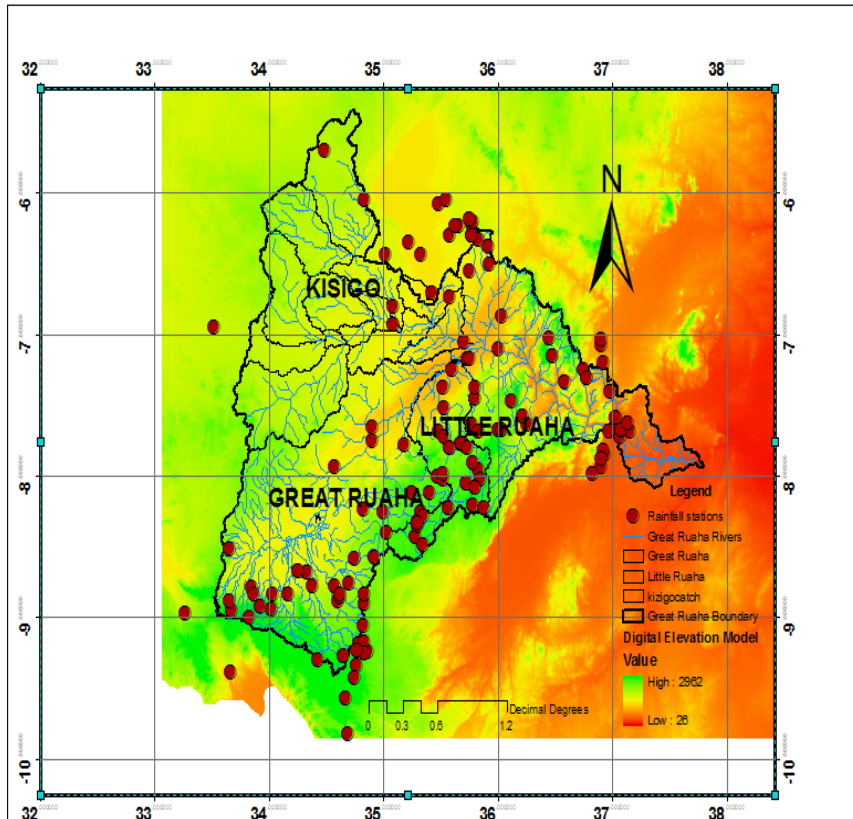
- ❑ What are the different components of the hydrological cycle affected by climatic changes and how?
- ❑ What are the long term changes in climate that have occurred in the GRR catchment?
- ❑ How have the long term changes in climate affected surface water resources in the basin?
- ❑ What are the uncertainties associated with the ability of the model to simulate the past and future

Activities

- Collect and analyze hydrological and climatic data
- Characterize and model hydrological processes
- Utilize the model for CC impact assessment
- Utilize the model for Water management assessment

Data Collection, Processing and Analysis

(a) Rainfall data



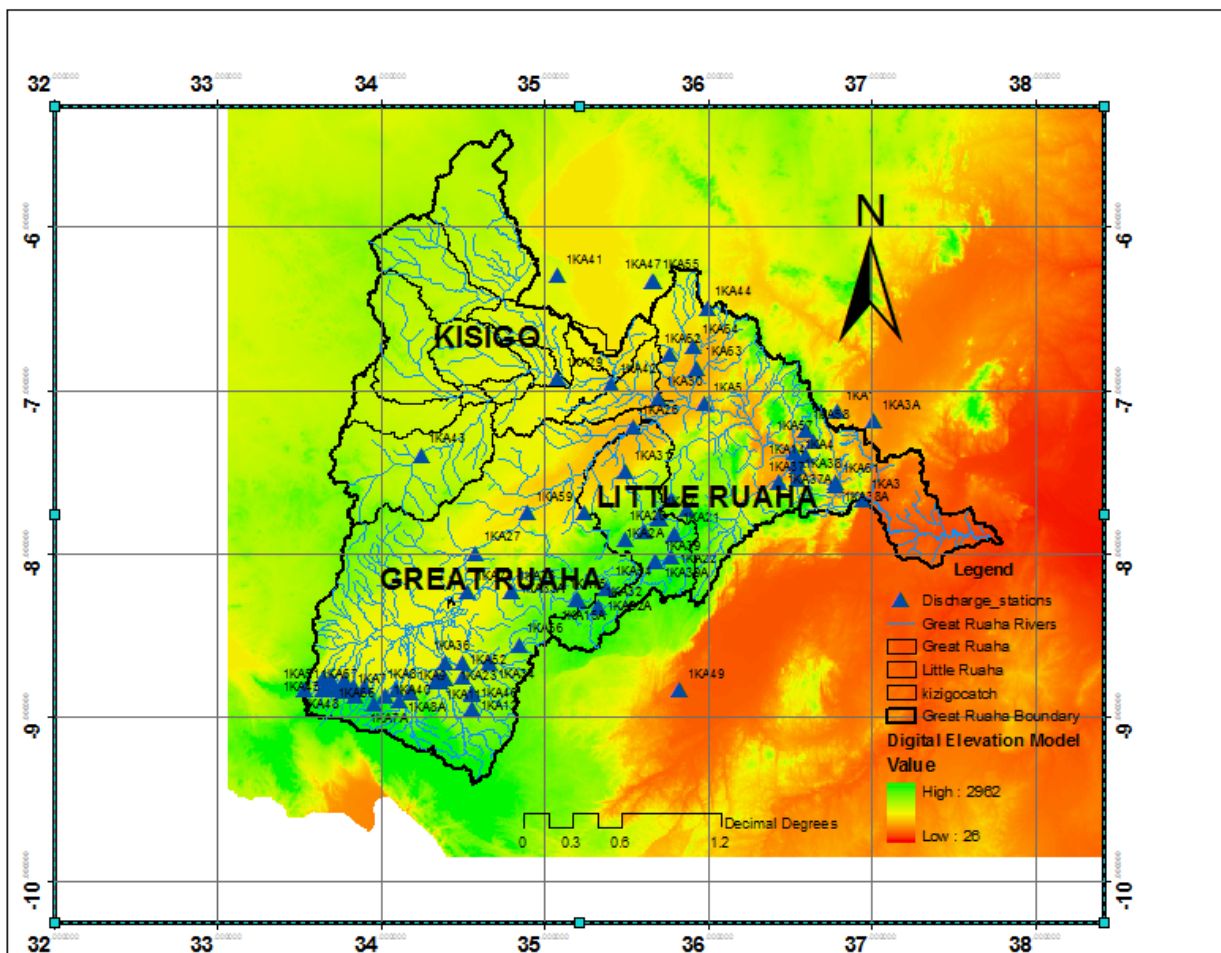
Stations	Av. Record Length (years)	Min RL	Max RL
68	32	1	86

Tools:

- FOTRAN Programs
- MS Excel (Visual Basic)
- ArcGIS 9.3

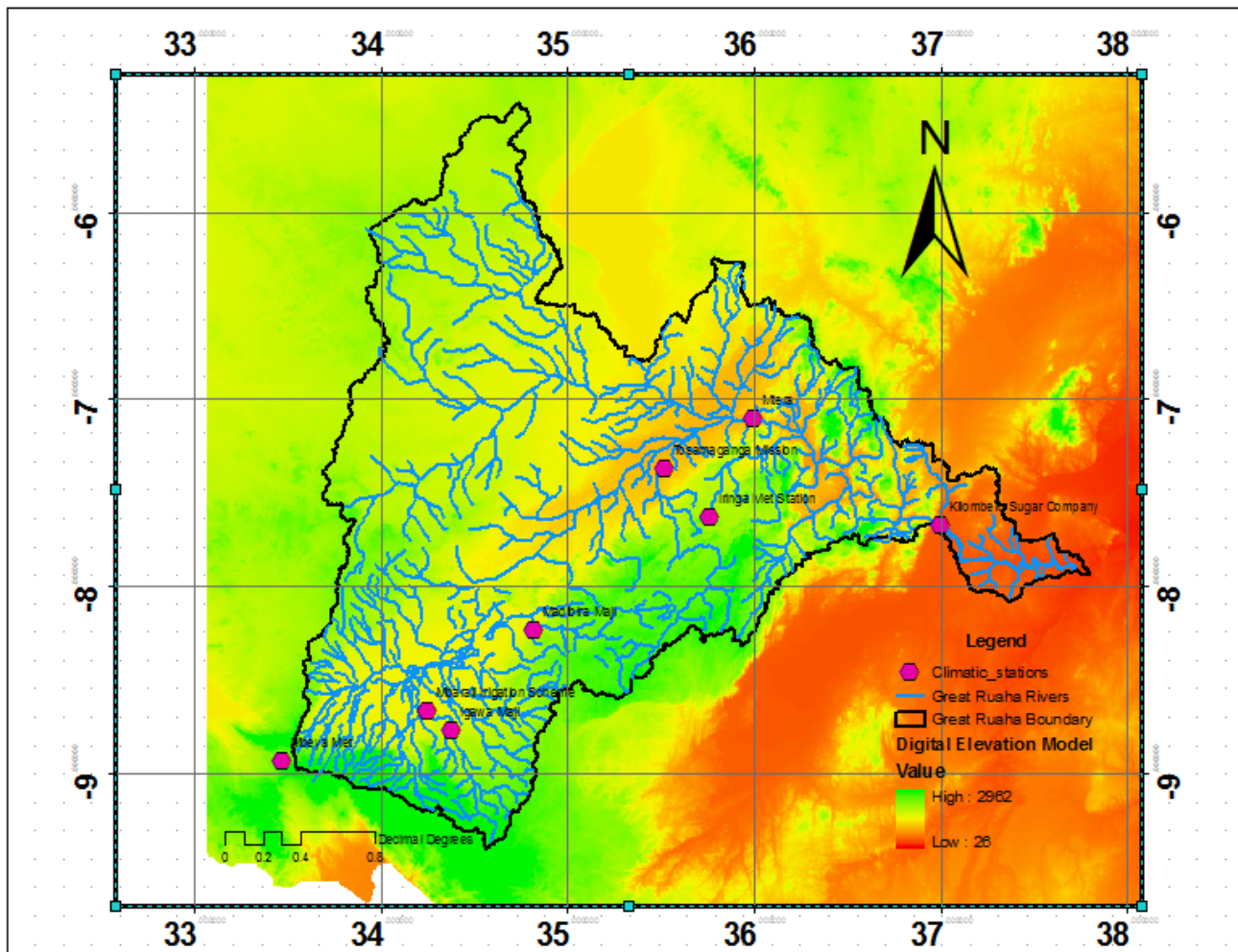
Stations	Av. Record Length (years)	Min RL	Max RL
26	38	8	56

□ b) Discharge



Stations	Av. Record Length (years)	Min RL	Max RL
5	40	57	23

□ c) Climatic



Spatial data

- ▣ DEM:

- 90m SRTM (www.srtm.csi.cgiar.org)
- Shuttle Radar Topographic Mission
- World wide coverage (V3 pit filled)

Projection:

- WGS 1984 UTM Zone 36S

- ▣ Tools:

- Google earth
- ArcGIS 9.3

Spatial data

Land-cover

Land = AVHRR (glcf.umiacs.umd.edu)

- ❖ Global Land Cover Classification
- ❖ Satellite raster (1km resolution)

Soil

Soil = FAO/UNESCO (www.fao.org)

- ❖ Digital Soil Map of the World
- ❖ 1:5 000 000 (raster 5x5 arc-minute)

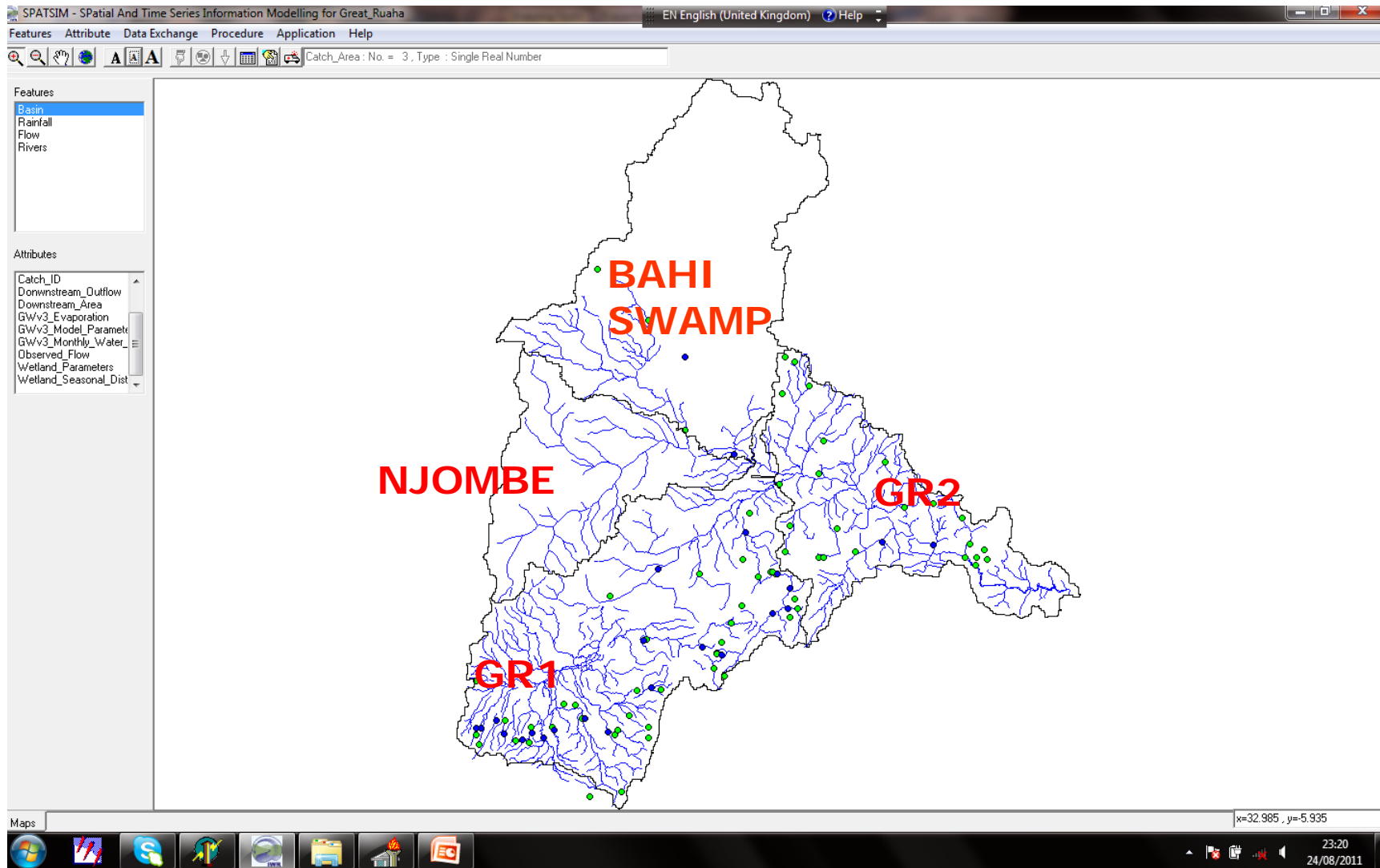
Data from previous projects

- SMUWC
- IUCN
- WORLD BANK
- RIPARWIN
 - Rainfall
 - Discharge
 - Water level
 - Technical data (Mtera and Kidatu)
 - Water level
 - Water balance of the Usangu plains

Initial model set-up

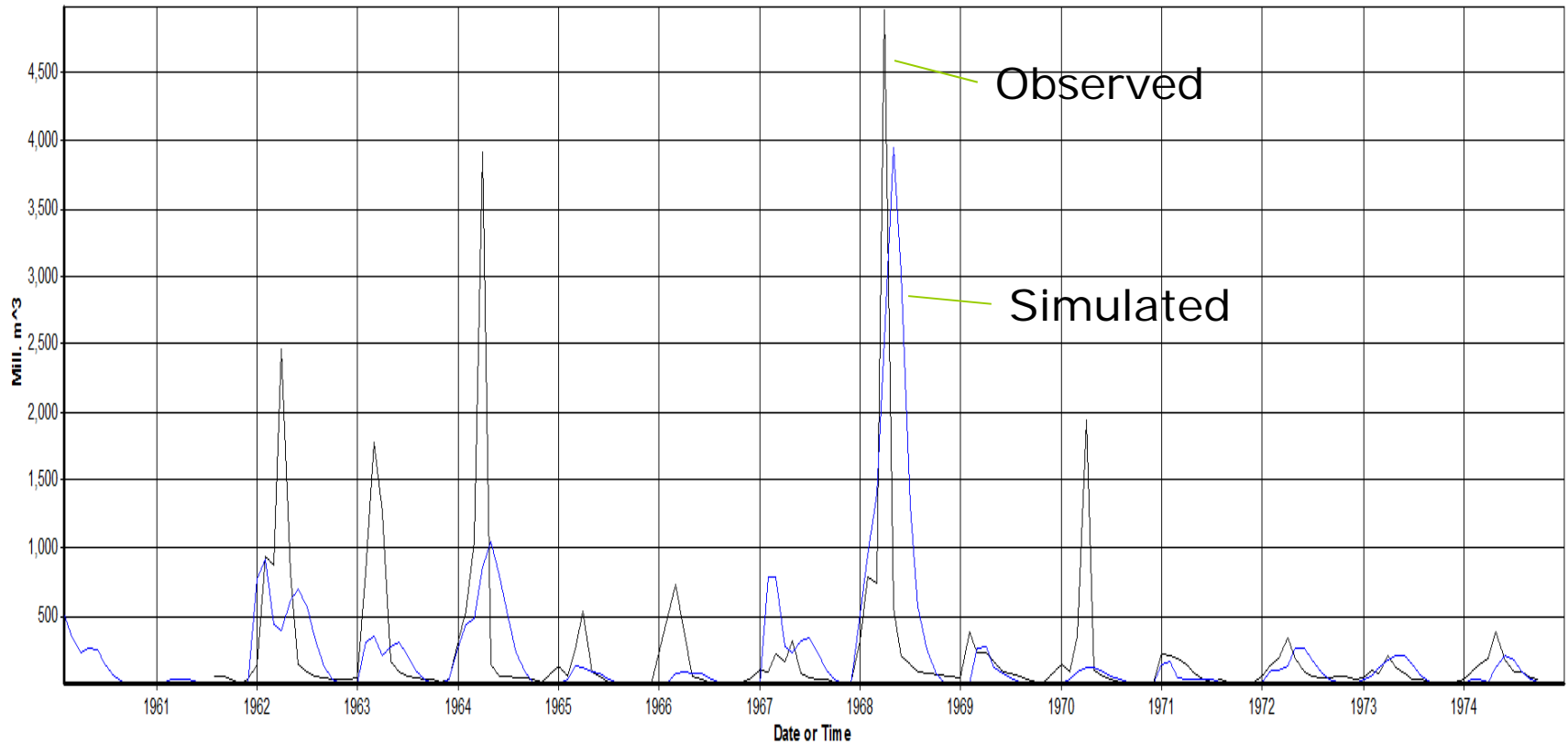
- SWAT (90% complete)
- PITMAN (SPATSIM)
 - Time series data
 - Observed monthly rainfall (catchment area rainfall)
 - Observed monthly Flows
 - Mean monthly evaporation (www.wcatlas.iwmi.org)
 - Mean monthly water use (default water use value)
 - SPATIAL DATA
 - Catchment boundary (Great Ruaha)- (hydro basins of Africa)
 - Sub-catchments (**GR1**, GR2, NJOMBE and the BAHI SWAMP)
 - Catchment area
 - Set up was done for the GR1 (1960's-1974)
 - Model parameters (41 parameters)

SPATISM PROJECT FOR GREAT RUAHA



MODEL TESTING

Graph 1



Writing (chapter 1 to 4)

- Ch 1: Introduction
- Ch 2: Study Area
- Ch 3: Literature review
- Ch 4: Data and Methods

Way forward...

- **Data processing (Variability analysis, Rating curve and data reconstruction)**
- **Supplement data collection, processing and analysis**
 - Historical land cover change images
 - Water use (selected irrigation schemes)
 - Remote sensed data
- **Model set-up, calibration and validation PITMAN and SWAT**
- **Model set-up , calibration and validation MIKE SHE**
- **Uncertainty analysis**
- **Water resources management scenarios**
- **Literature review(ongoing and continuous process)**