

# CLIVET Status and Next Challenges

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CLIVET Project Workshop cum SC Meeting

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# CLIVET

Impacts of Climate Change on  
Water Resources and Agriculture

-

and Adaptation Strategies in  
Tanzania

# Objectives, to enhance the research capacity to:

1. Project the future climatic changes likely in Tanzania, with focus on Great Ruaha River Basin
2. Estimate the impacts of climate change on the hydrological regime and water resources available for agricultural production
3. Identify observed or future likely changes and adaptation options in agricultural and irrigation practices, land use, cropping patterns, cropping outputs, and livelihoods, significantly influenced by climate change
4. Develop policy recommendations to national and international development strategies for incorporating climatic-change-derived impacts on water resources into future planning and adaptation in the water and agricultural sector

# Key Partners

- **Tanzania:**
  - Institute of Resource Assessment (IRA), University of Dar Es Salaam (UDSM)
  - Tanzania Meteorological Agency (TMA)
- **Denmark:**
  - Geological Survey of Denmark and Greenland (GEUS) (Principal Responsible)
  - Danish Climate Centre (DCC), at Danish Meteorological Institute (DMI)
  - Dept. of Geography and Geology (DGG), at University of Copenhagen (KU)

# Work packages

1. Impacts on physical climate (CLIMATE)
2. Impacts on water resources (WATER RESOURCES)
3. Impacts and adaptation in agriculture (ADAPTATION)

# Objective of workshop

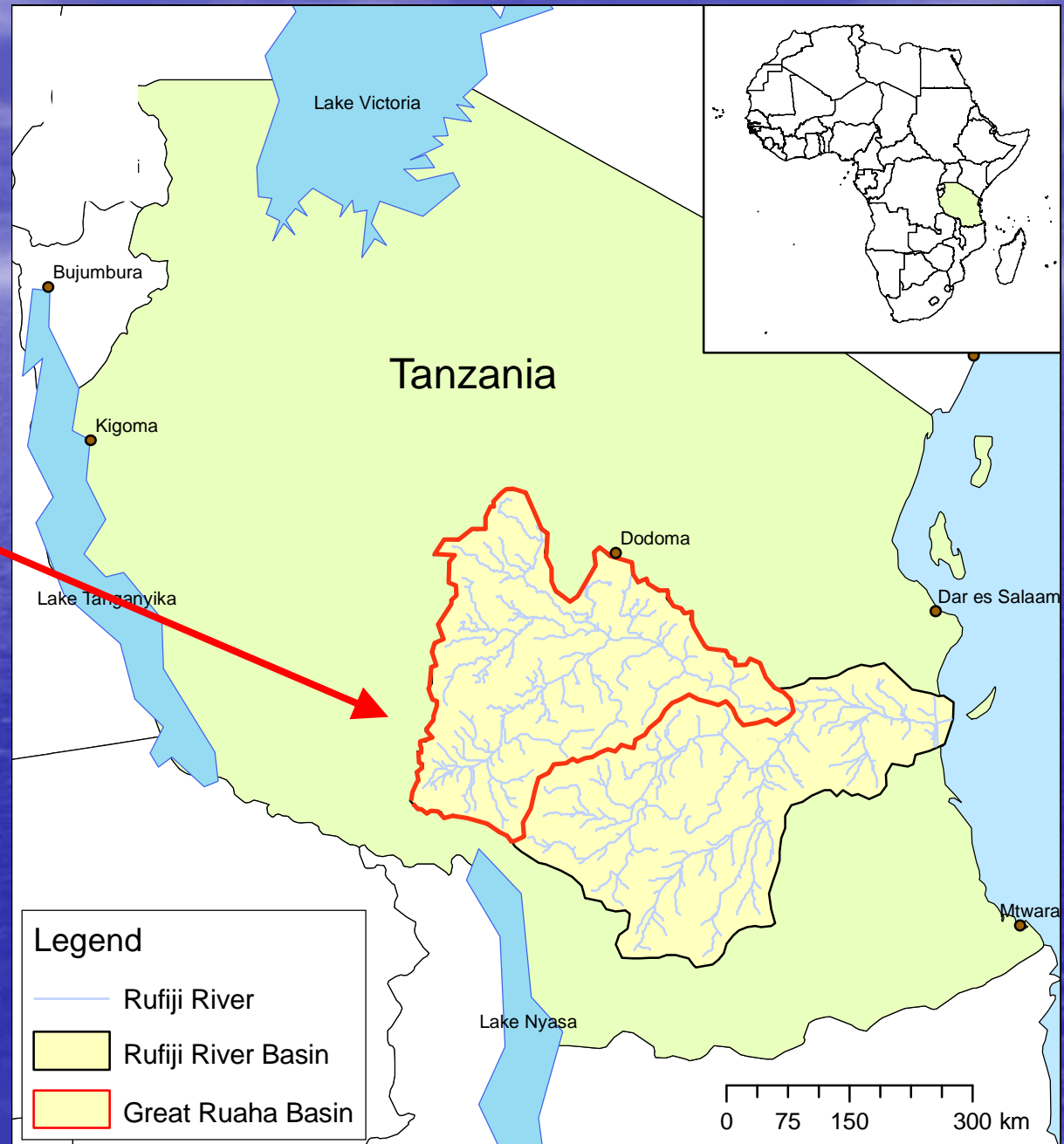
- Get the status of the work packages
- Agree on Ph.D. approaches/work plans
- Present groundwater-related work
- Coordinate approaches and activities across work packages
- Discuss immediate project needs:
  - Data and data sharing
  - Scaling and field investigations

# Ph.D. projects

Ph.D. student	Supervisors		
	Tanzania	South Africa	Denmark
<b>1. Sarah Osima</b>	Emmanuel Mpeta (TMA)	Bruce Hewitson (UCT)	Martin Stendel (DCC)
<b>2. Madaka Tumbo</b>	Deogratias Mulungu (WREM)	Denis Hughes (Rhodes)	Simon Stisen (GEUS)
<b>3. Noah Pauline</b>	Emma Livenga (IRA)	Coleen Vogel (Wits)	Torben Birch Thomsen (DGG)

Project  
area:

Great  
Ruaha  
River  
basin

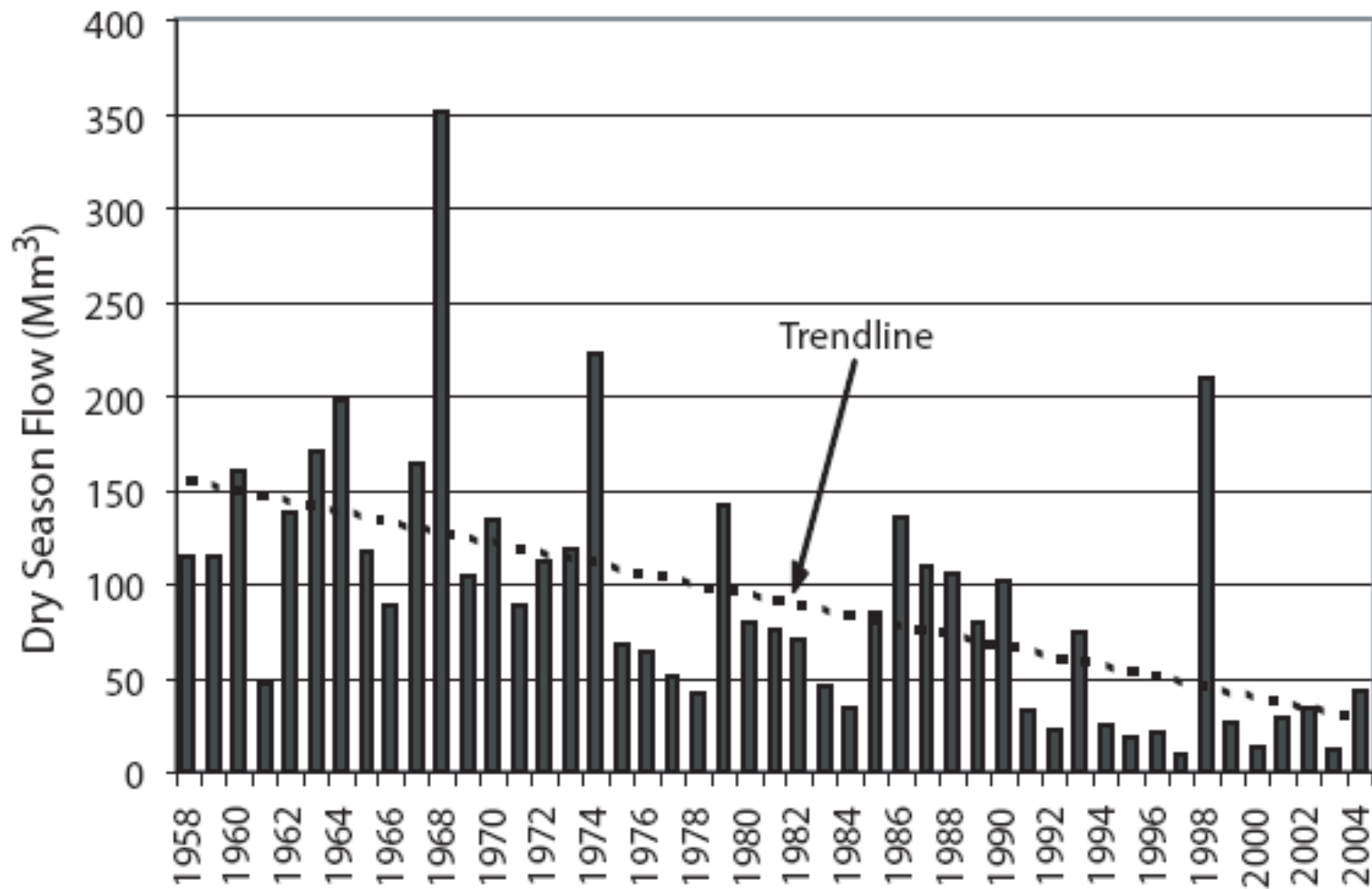


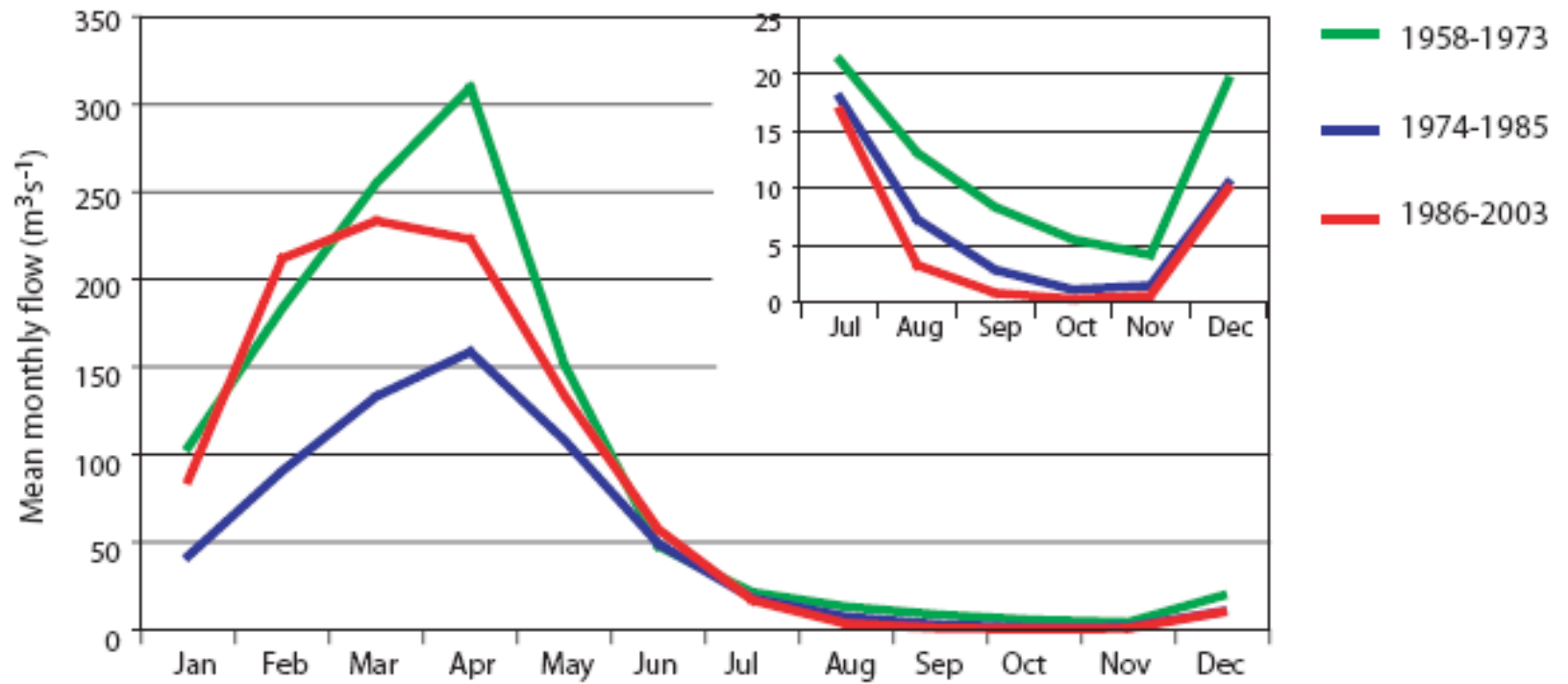
# Basin Profile:



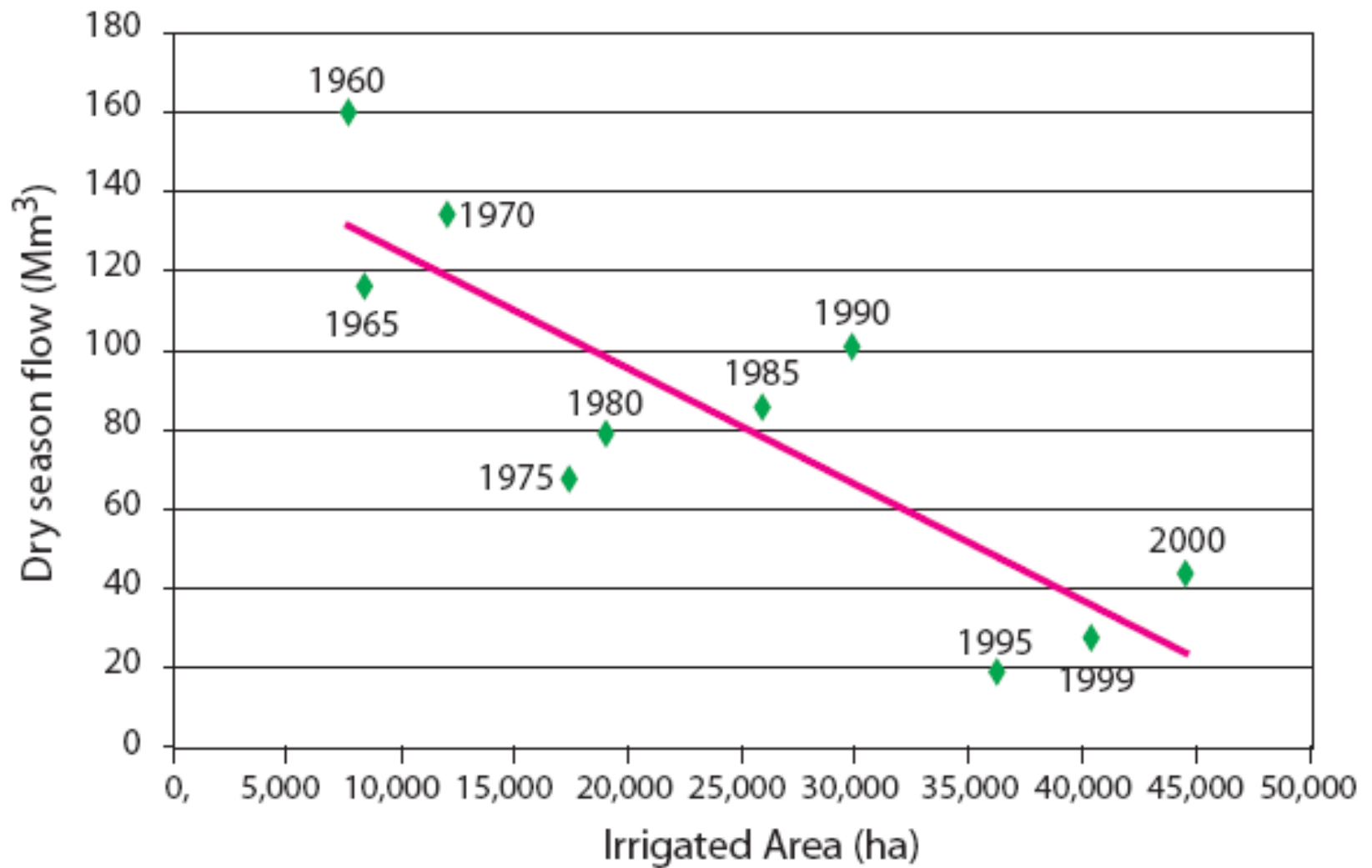
- 7% of mainland Tanzania
- Primarily agriculture, livestock
- 4-fold increase in irrigated area 1970-2002
- Mainly irrigation in the wet season
- 70% decrease in dry-season flow 1958-2004
- Great Ruaha River ran dry from 1990
- Conflicts: irrigators, herders, hydropower, environment





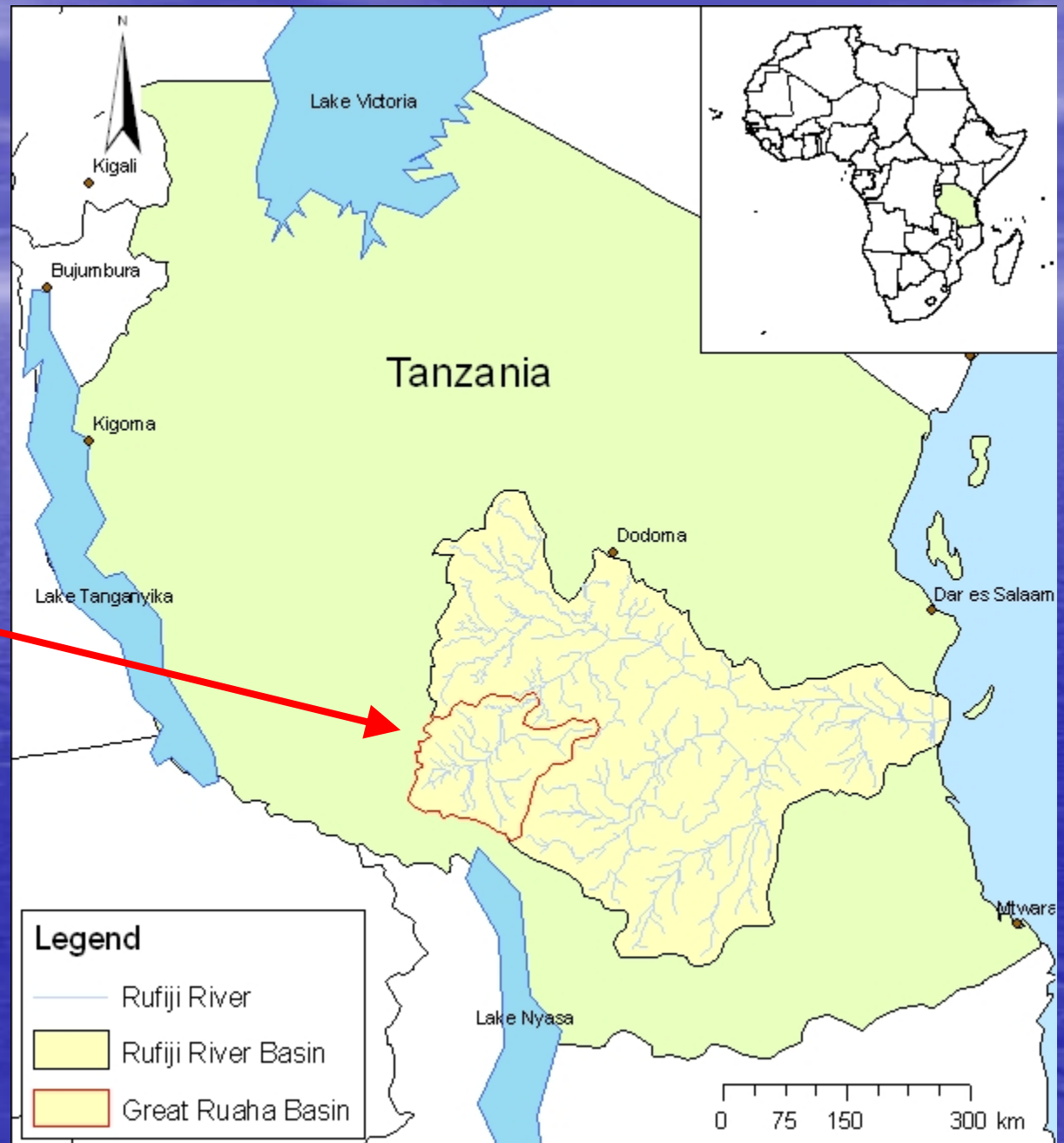


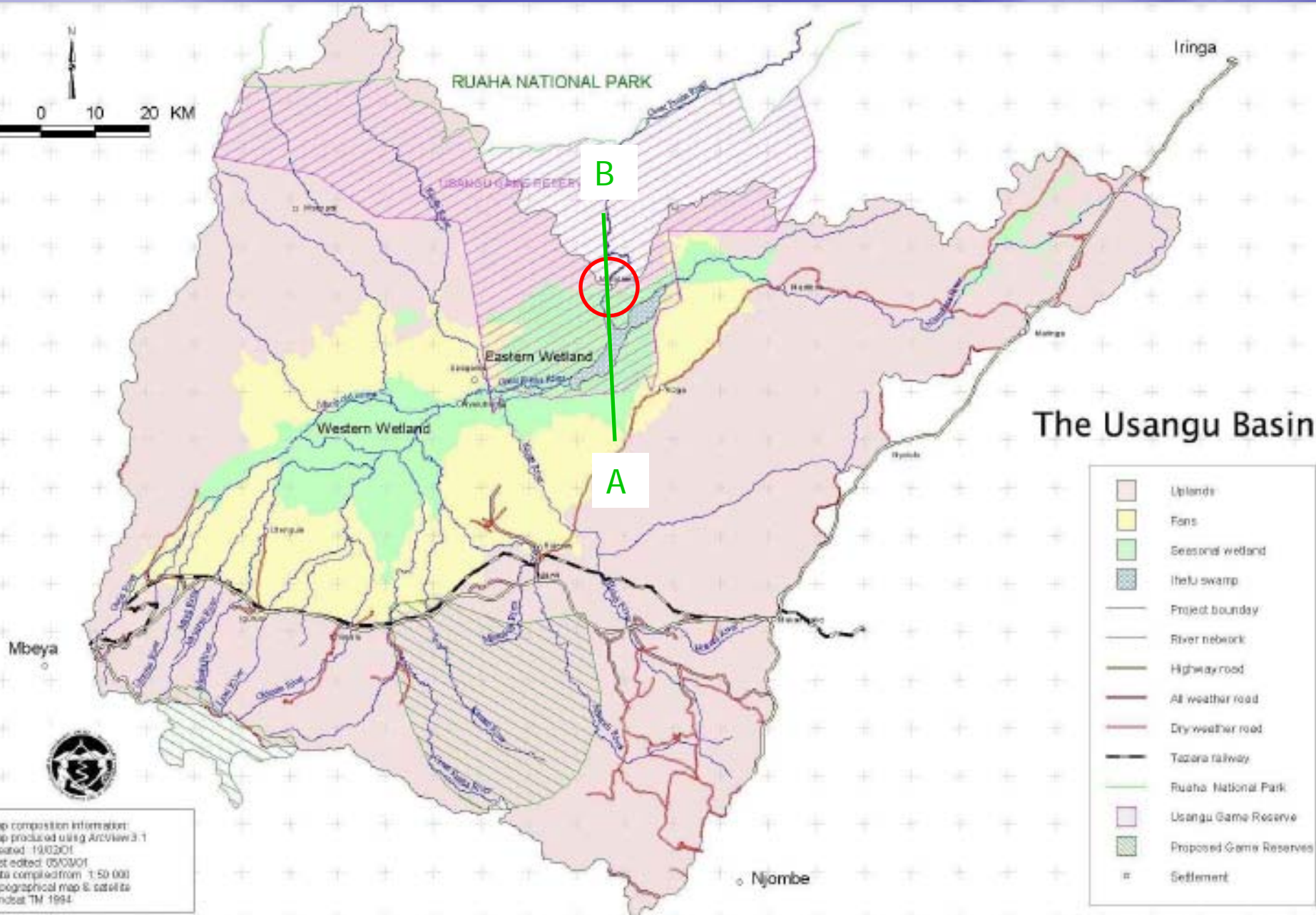
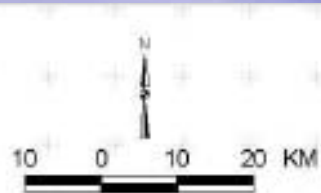
Kshaigiri et al., 2006



Sub-  
project  
area

Usangu  
plains



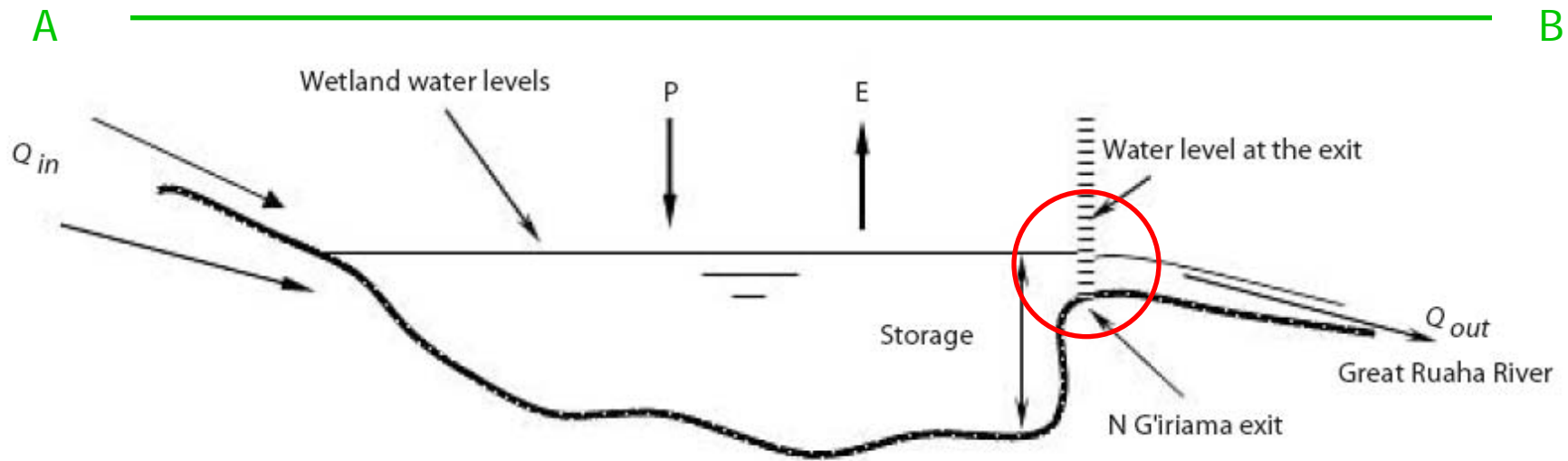


# The Usangu Basin

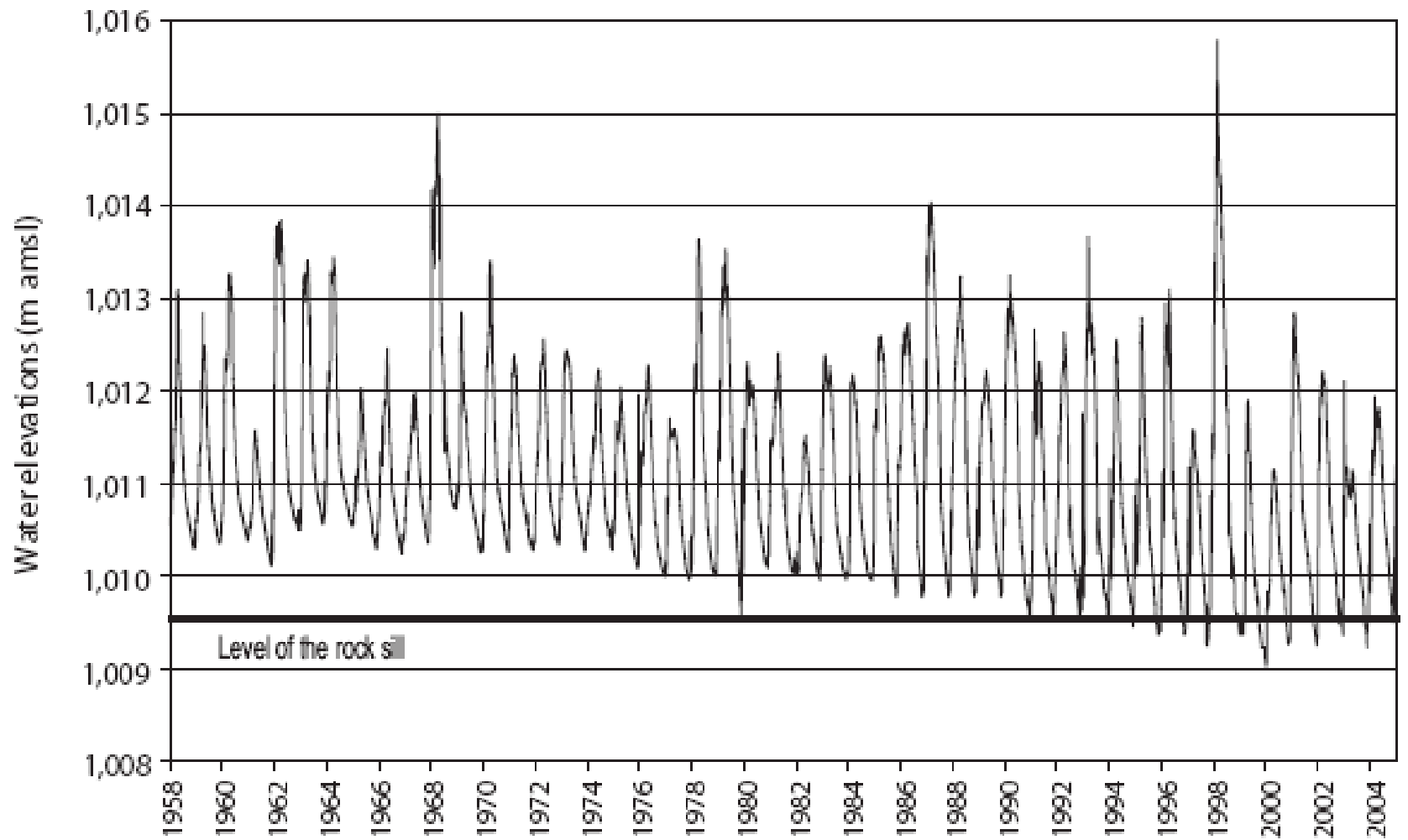
- Uplands
- Fans
- Seasonal wetland
- Ithlu swamp
- Project boundary
- River network
- Highway road
- All weather road
- Dry weather road
- Tazara railway
- Ruaha National Park
- Usangu Game Reserve
- Proposed Game Reserves
- Settlement

Map composition information:  
 Map produced using Arcview 3.1  
 Created: 19/03/01  
 Last edited: 05/03/01  
 Data compilation: 1:50 000  
 Topographical map & satellite  
 Landsat TM 1994

# Usangu wetlands



Kashaigiri et al., 2006



Kashaigiri et al., 2006

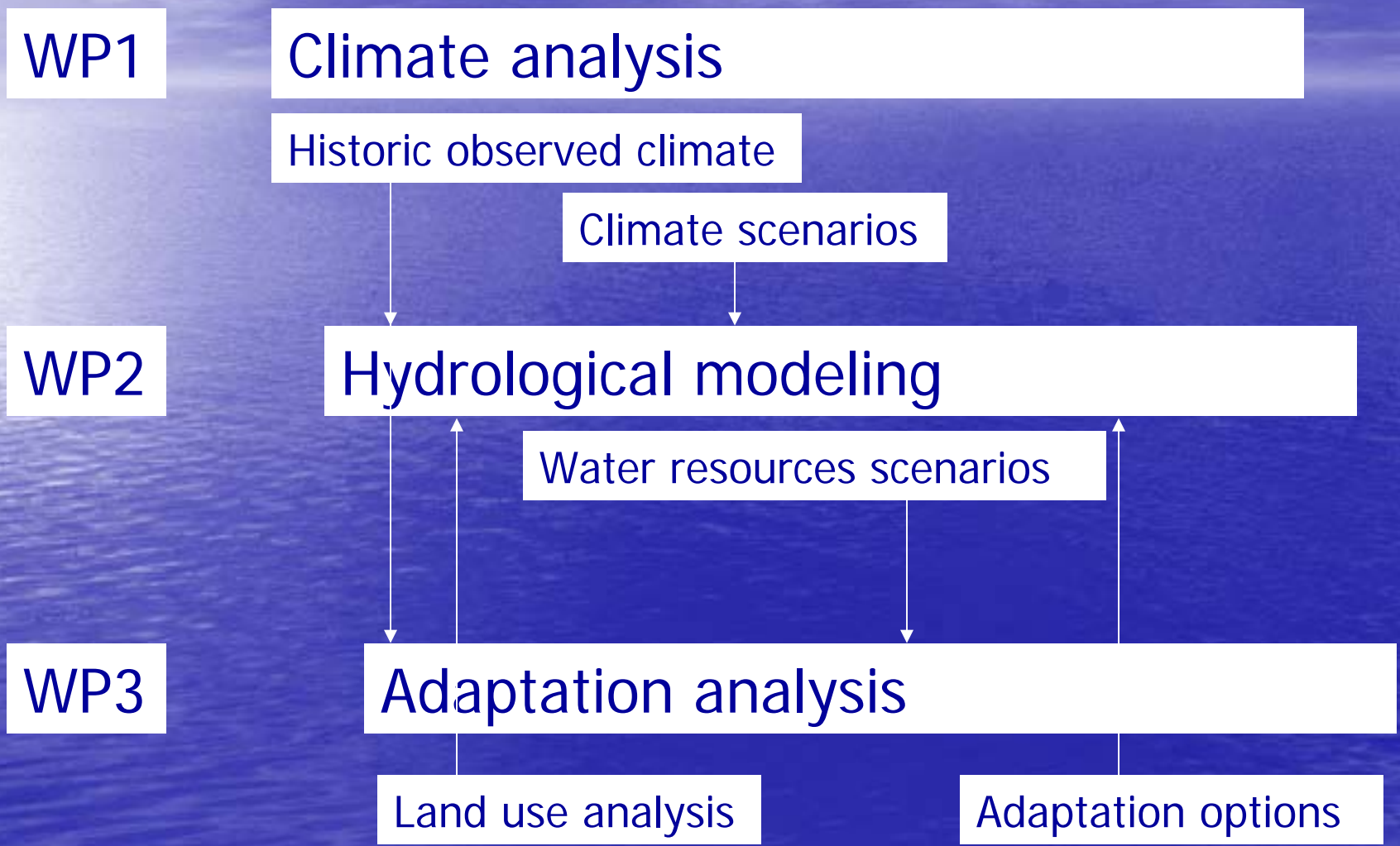
# Novelties of work packages

- **WP1:**
  - Detect and hindcast significant historic climatic variability/trends
  - Refine regional CC projections for Tanzania
- **WP2:**
  - Distributed physically-based model of integrated hydrologic response coupled with historic land use changes
  - Evaluate potential impacts of CCV
  - Propose water resources management that reconcile water demands from irrigation and hydropower
- **WP3:**
  - Analyze farmers' perceived challenges, and drivers and strategies for adjusting livelihoods
  - Determine component of CCV (directly and indirectly)

# Challenges of overall project

- Inter-disciplinary project
- Interaction between work packages
- Many supervisors for each Ph.D. student
- CC only one factor to influence the water sector in GRR Basin

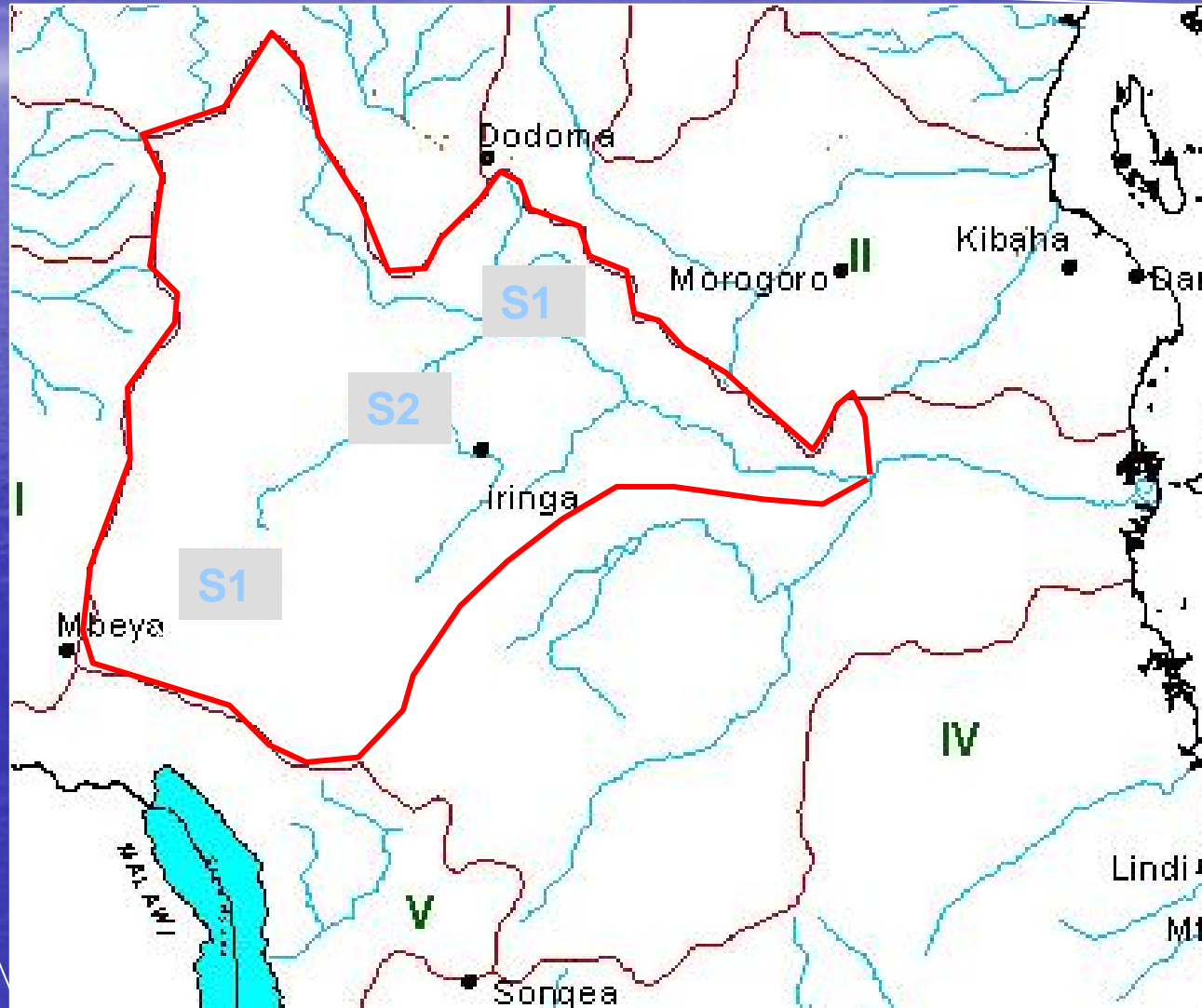
# Interaction between WPs



# Role of groundwater in hydrology and adaptation

- Groundwater may provide a more reliable water source for the farmers
  - Indications of development of wells for agriculture in the GRR Basin
  - Groundwater affects hydrological responses
- =>
- Groundwater will be included in the dynamic hydrological model (WP2)
  - Hydrogeological investigations will be carried out to better understand groundwater (Christian and Theis)
  - Adaptation options involving groundwater will be investigated (Jegan)

# Suggested study sites

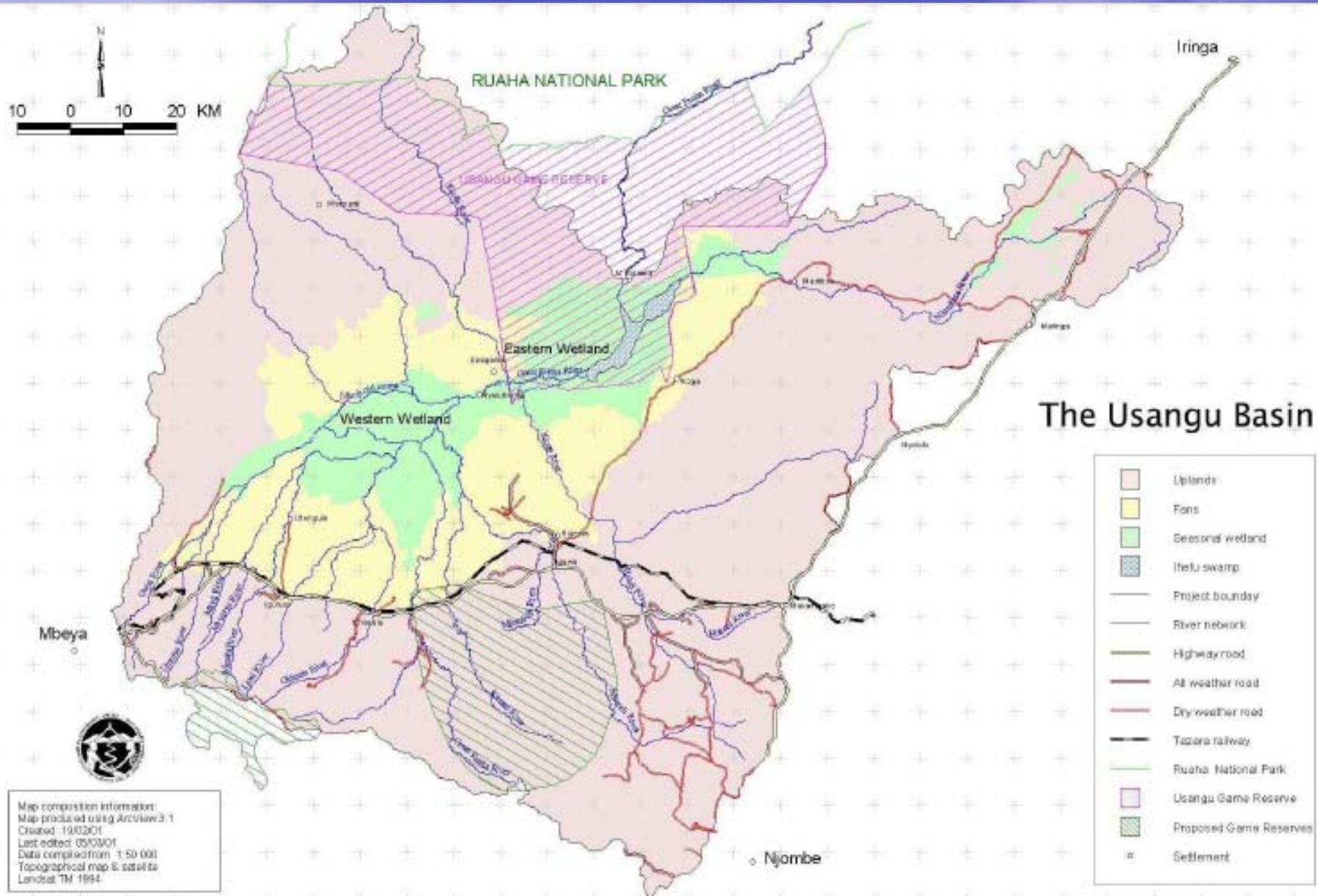


Great Ruaha  
River Basin

S1

Study sites

- S1: Rujewa - Usangu
- S2: Kiponzelo - Mazombe
- S3: Mahenge - Mbuyuni





Thank you!

Contact: [kgv@geus.dk](mailto:kgv@geus.dk)





Noah, Coleen, Emma, Torben

Sarah, Bruce, Emmanuel, Martin

Madaka, Denis, Deo, Simon

# CLIVET Steering Committee

- **Tanzania:**

- Prof. Pius Z. Yanda (Emma Liwenga)
- Dr. Emmanuel Mpetta
- Prof. Deogratias M.M. Mulungu

- **Denmark:**

- Karen Villholth
- Torben Birch-Thomsen
- Martin Stendel
- Simon Stisen