



**JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY**

Water Research and Resource Center (WARREC)
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Terms of Reference

Hydrological Modelling of the Tana River Basin Using SWAT Model

Context

The Water Research and Resource Centre ((WARREC) of JKUAT is working in partnership with the University of Manchester (UoM) of the United Kingdom (UK) and the Water Resources Authority (WRA) of Kenya to implement a project developing a “Water Stewardship Portal” for the Tana Basin of Kenya. The WARREC/JKUAT component in the project is developing the *“hydrological modelling component of the water stewardship portal (WSP) project using the Soil and Water Assessment Tool (SWAT) model”*. This is a six-month project to be implemented from **June to November 2018**.

Rationale

The Water Act 2016 Section 12(a) tasks WRA with the responsibility ‘to develop the principles, guidelines, and procedures for the allocation of water resources’. WRA’s water allocation plans (WAP) ensure that the reserve is safeguarded and that water resources are shared in compliance with the law. WAPs shall be consistent with the National Water Resources Management Strategy (NWRMS), the National Water Master Plan 2030, respective Catchment Management Strategies (CMS) and Sub-catchment management Plans, as well as the Water Resource Management Rules (2007). This project will contribute data and scientific information, to help WRA develop water allocation plans for the Tana River Basin, while also meeting the deliverables for the project component under UoM.

WRA’s Guidelines for Water Allocation (2010) outline the general principles for the equitable allocation of the available water resources for various competing needs in a sustainable manner. These principles include prioritisation, re-allocation and proportional allocation, as well as water demand management, efficiency and compliance. They also provide the procedural and methodological frameworks for conducting this process.

Objectives of the Assignment

The **main Objective** of this assignment is to conduct hydrological modelling of the flows of the Tana River in Kenya using the *Soil and Water Assessment Tool (SWAT) model*.



The Specific Objectives include:

- 1) SWAT model Calibration for Tana river
- 2) SWAT model Validation for Tana river
- 3) SWAT model Sensitivity Analysis for Tana river
- 4) Documentation of all assumptions and input data types and formats for use in the model
- 5) Prediction scenarios of Tana River flows for water allocation to various sectors and users.

Tasks and Methodology

The following Tasks are allocated to this assignment:

- 1) Literature review of the subject matter, especially on Tana river hydrology, water use and allocation, WRUAs, their roles, hydrological modelling, SWAT model and any other relevant information.
- 2) Data collection from WRA's databases and other sources
- 3) Field visits for data collection, verification of facts and ground truthing
- 4) Use of GIS tools (preferably AcGIS tools) in the project modelling and results presentations
- 5) SWAT model Calibration for Tana river
- 6) SWAT model Validation for Tana river
- 7) SWAT model Sensitivity Analysis for Tana river
- 8) Documentation of all assumptions and input data types and formats used in the model
- 9) Prediction scenarios of Tana River flows for water allocation to various sectors and users.

Deliverables

The deliverables from this assignment include:

- 1) A comprehensive report that includes all the model findings in particular:
 - Calibrated and validated SWAT model for Tana River Basin
 - Results of SWAT model Sensitivity Analysis for Tana river
 - Documentation of all assumptions and input data types and formats used in the model
 - Quantification of total flows of the Tana
 - Quantification of the reserve for basic human needs and environmental requirements;
 - Determination of natural flow and allocable yield; and,
 - Demand estimation and allocation.
- 2) Powerpoint presentation of the synthesis of the findings.

For this task, WARREC is seeking the services of a modeler to assist the Project Management Team.

Minimum requirements for the Applicant:

- Masters degree in Soil and Water Engineering, Water and Environmental Engineering, Environmental Science or related field.
- Applicants with PhD or pursuing a PhD in relevant field will be given priority
- Should be self-motivated and committed to quality scientific research.



Application method and deadlines:

Applicants are encouraged to submit their applications **via E-mail, sent to warrec@jkuat.ac.ke**, to the Office of the Director Water Research and Resource Centre (WARREC) at JKUAT, by **14th June, 2018, 17.00 hrs**. The application should include:

- 1) Letter of application.
- 2) A Concept Note of the proposed Methodology to implement the project (about 3 pages)
- 3) A Curriculum vitae.
- 4) Relevant certificates and testimonials.

