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| logo_ec_17_colors_300dpi | EUROPEAN COMMISSION  JOINT RESEARCH CENTRE  Directorate Sustainable Resources (Ispra)  **Water** **and** **Marine** **Resources Unit** |

TECHNICAL SPECIFICATIONS

Programming support for GIS integrated Biophysical modelling analysis for to the assessment of the Water-Energy-Food Security Nexus in Africa

# Scope

The work will support the JRC to carry out scientific and technical work linked with biophysical hydrological modelling, GIS analysis for an optimal management of water and nutrient resources. In this context, the JRC performs simulations with biophysical models to determine the impact of alternative management and policy measures on water resources in view of developing sustainable plans (including environmental, economic and social concerns) of water uses across various sectors of activities. The support will specifically focus on GIS and data analysis, harmonization and quality checks and model simulations (scenario analysis) as described below.

# Objectives

The aim of the work is to support JRC in the context of Water Energy Food Ecosystem project in Africa for:

1. Setup of data sets for hydrological - biophysical modelling for different regions in order to use the coupled GIS and biophysical models for these areas. This includes: data setup and quality assessment; dataset processing and manipulation with scripts for model input database optimization and validation;
2. Refinement and tuning (calibration/validation) of biophysical hydrological modelling system in the river basin of interest of specific WEFE analysis (such as the Niger)
3. Integration of biophysical and socioeconomic data to support the assessment of food security and the potential for investment in agriculture production in the context of WEFE framework in the river basin.

# Results

The following results are expected:

1. Document preparation (presentations, reports, support documents, analysis) for the organization of the scientific workshops, technical training and meetings with African counterparts.
2. Refined agricultural hydrological modelling tool combining detailed and local verified datasets in the river basin and/or areas of interest of specific WEFE analysis (such as the Niger). This includes the development of GIS layers the data setup and quality assessment needed for tuning and running the models.
3. Contribute to the elaboration of JRC technical annual reports, on the assessment of project development and achievement of technical results.
4. Contribute to the publishing of scientific research in peer-reviewed journals or JRC Scientific technical Reports.
5. Overall documentation on the work done.

# Task description details

1. The aim of this task is to refine the calibration and validation of existing modelling systems for different regions in order to used within the context of WEFE analysis. This includes data setup and quality assessment, model calibration/validation, geodata analysis and optimization, data processing with script (R) and GIS analysis (Spatial analysis).
2. The aim of this task is to manage the preparation of document (presentations, reports, support documents, model setup, GIS data, exercises and analysis) for the organization of the scientific workshops, technical training and meetings with African counterparts.
3. The aim of this task is to implement scenario analysis as derived by external input (local stakeholder) for optimal resource (land, water, soil, inputs) management in the river basin/region.

The assessment will focus on several aspects linked with WEFE Nexus approach such as: water quantity and quality data, soil erosion, crop productivity, energy production and requirements, environment, population habits and requirements, dam management, etc.

# Requestedprofile

The professional profile should be that of *GIS developer* Level XXXX, with background in hydrology and biophysical mathematical models covering altogether the following skills:

* In depth knowledge of GIS software and tools
* In-depth knowledge of relational database systems
* Good knowledge of modelling tools (such as SWAT, EPIC, GREEN, )
* Good knowledge of geospatial data analysis and statistical optimization tools
* knowledge of programming languages (R, SQL, Python)
* Ability of working in an international/multicultural environment, and ability to participate in multi-lingual meetings, ease of communication
* Experience in Hydrology, environmental and agricultural biophysical modeling calibration, validation and application
* Experience or knowledge with statistical tools in relevant fields such as water accounting and/or statistical analysis

# Performance Procedure

*Technical Responsible*

*César Carmona Moreno*

IES D02 Unit, TP 121

*Service Duration*

The total amount of time to perform the tasks described above is XXX days.

*Service Time*

The service will be provided during normal working hours, on continuous basis by staff provided by the service provider. The following time will be observed for the provision of the service: Mon-Fri 08.30-17.30 following the JRC-Ispra calendar.

*Service Location*

The service will be provided on site at the premises of the Institute for Environment and Sustainability, Joint Research Centre in Ispra (I).

*Service Evaluation and Monitoring Parameters*

The work will be carried out in collaboration with the JRC staff that will follow the progress on a regular basis.

*Service Acceptance criteria*

* The successful completion of the service.
* The full appropriateness of the work as per user request.
* All intervention sheets and hours attendance sheets must be completed and signed correctly.

The Technical Responsible, or his authorised representative, will check the technical standard of the work performed. Deficiencies will be noted in the contract file and brought to the attention of the contractor in writing.