

JRC activities on water management in developing countries

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Joint International Workshop

**EU FP7 MARSOL and EU HORIZON 2020 FREEWAT projects and EU EIP MAR Solutions -
Managed Aquifer Recharge Strategies and Actions (AG128)**

Pisa - April 21st 2015

WRM IN PARTNERS COUNTRIES

- **Activities developed in close collaboration with DG DEVCO – ENV in support to:**
 - EU Development Policy
 - EUWI : Scientific and Technical support through the development of Knowledge Management, Information and Analysis Systems
- **Our objectives:**
 - To develop knowledge management and integrated analysis systems for improving decisions in the water sector
 - Support to the Implementation of networks of Centers of Excellence
 - Coordination of Scientific activities among the institutional partners and policy makers
 - Development of Web-based Tools for sharing information, data and knowledge
 - Development of integrated data analysis tools combining multiple environmental and social variables in the Water sector (environment, socio-economy, health, governance, financial aid flow, education, ...) to provide EC services and institutional partners with a high level scientific and technical support.

WATER4DEV focus on:

Research and **Technology** services
for Supporting EC **Water Management Policies** for
Growth and Development

- Promotion of **knowledge networks**
- **Research:** water resources analysis
- Development of **Water Information Systems**
- **Support to policy making**



Current Research work orientation

Integration of model facilities with analytical tools/database/information system

Development of water and environmental
databases/geographical information systems
(i.e Cuba, Mekrou, Latin America region...)

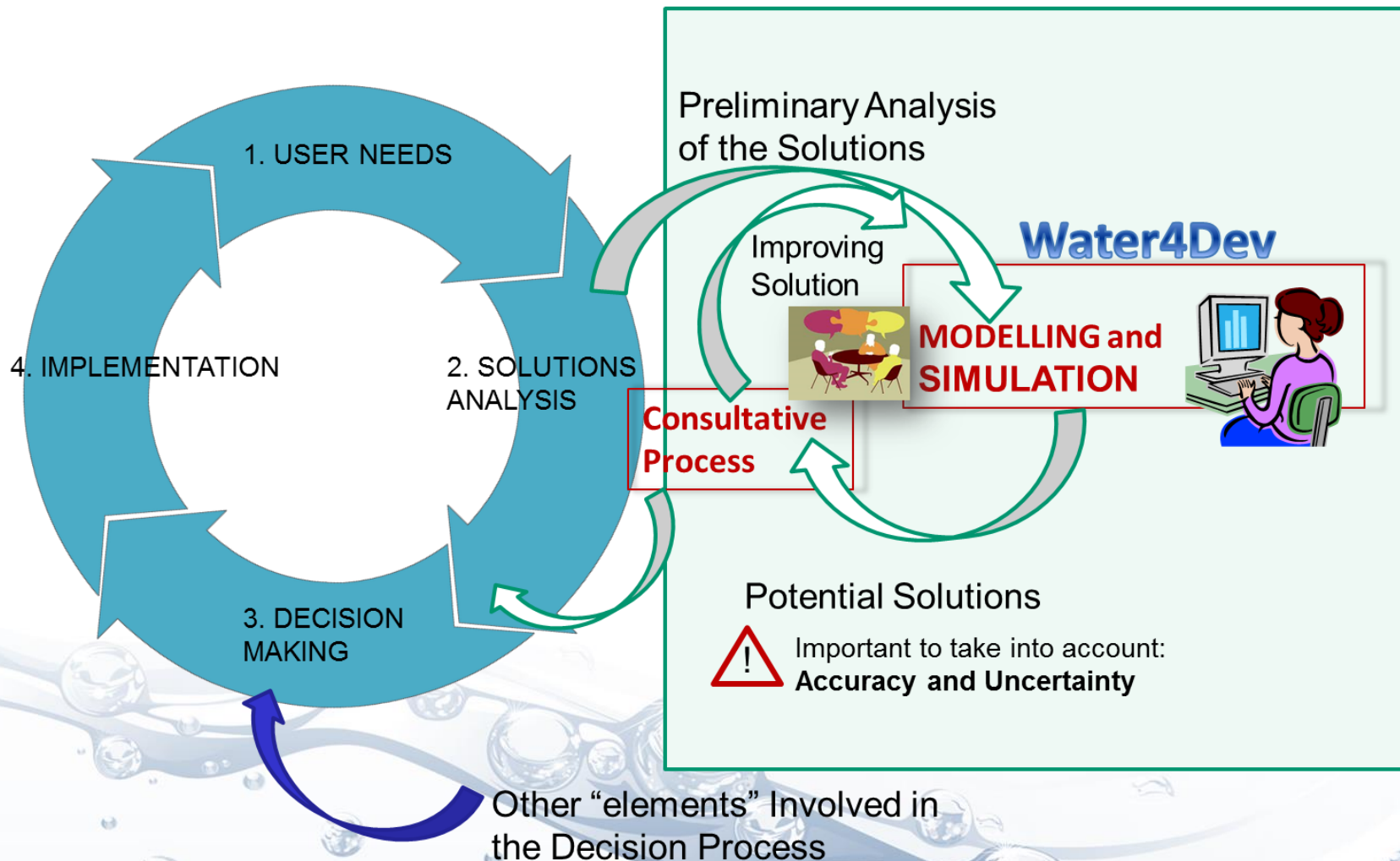
Models to add simulation facility
and allow scenario exploration



Water4Dev Tools

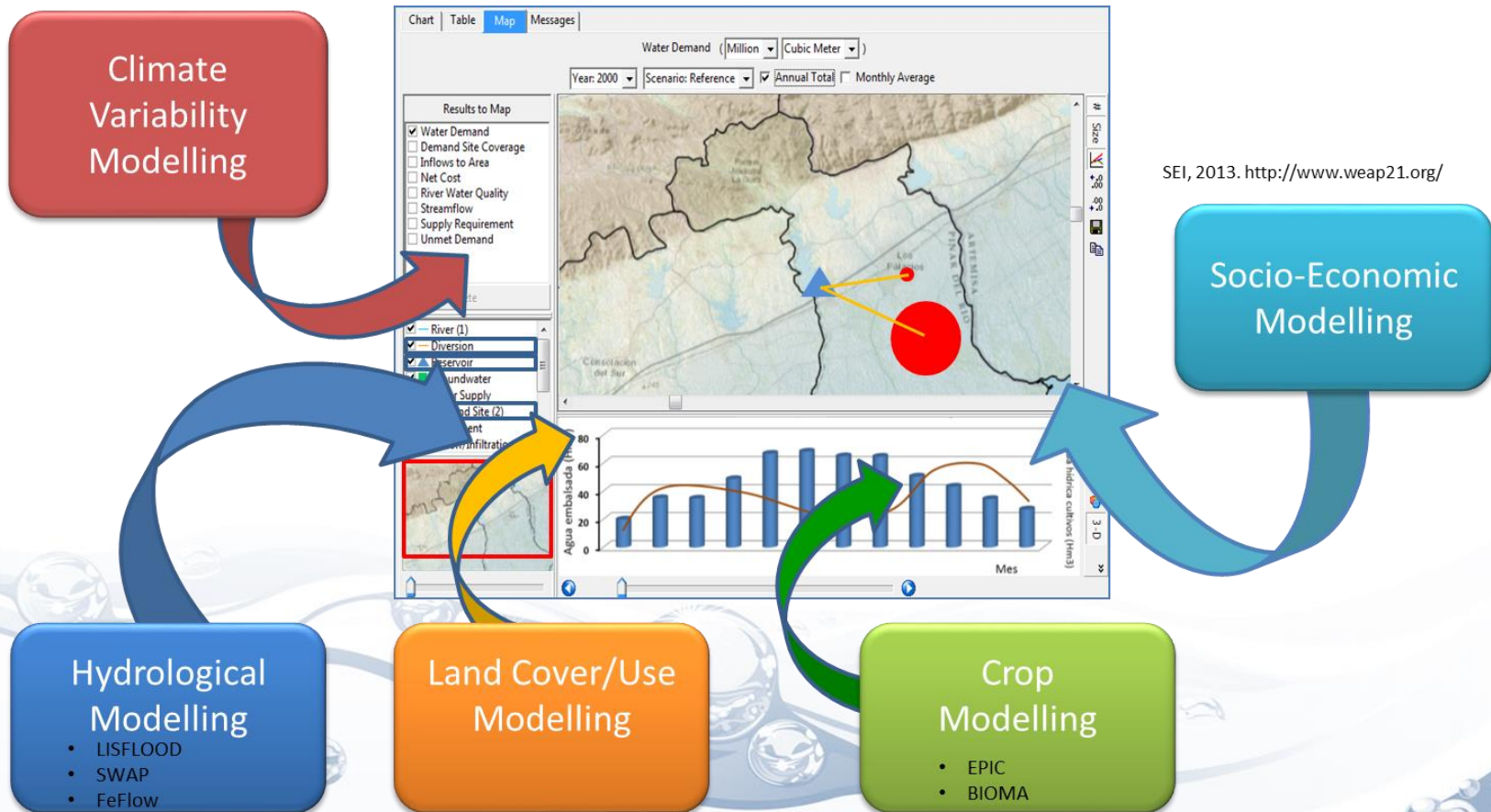
Development of water management integrative Spatial
Decision Support Systems (SDSS) for developing and
emerging countries

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Water4Dev Decision Support Tool :

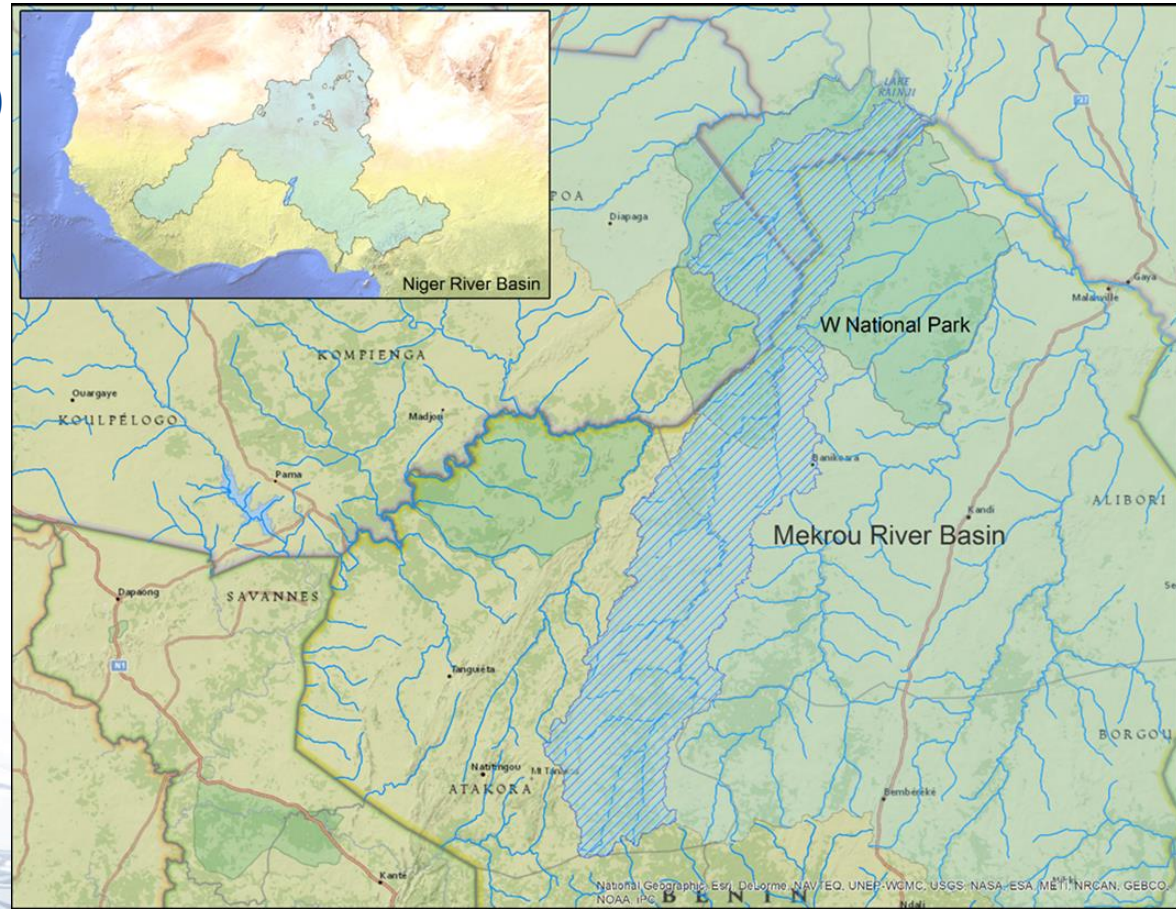
- Integration Agriculture (% Irrigation), Municipal and Industrial Water Demand, Social and Economic Assessment, (Nexus Agriculture – Water – Energy)
- Assessment the Impact of Climate Variability on Water Resources



Mekrou Project

"Water for growth and poverty reduction in the Mékrou transboundary river basin ", (2014-2017) funded by DEVCO

The Mekrou River Basin (Benin, Burkina Faso, Niger)



Advantages of using Numerical Modeling in Water Resources Management and Managed Aquifer Recharge schemes

Pisa, April 21st 2015

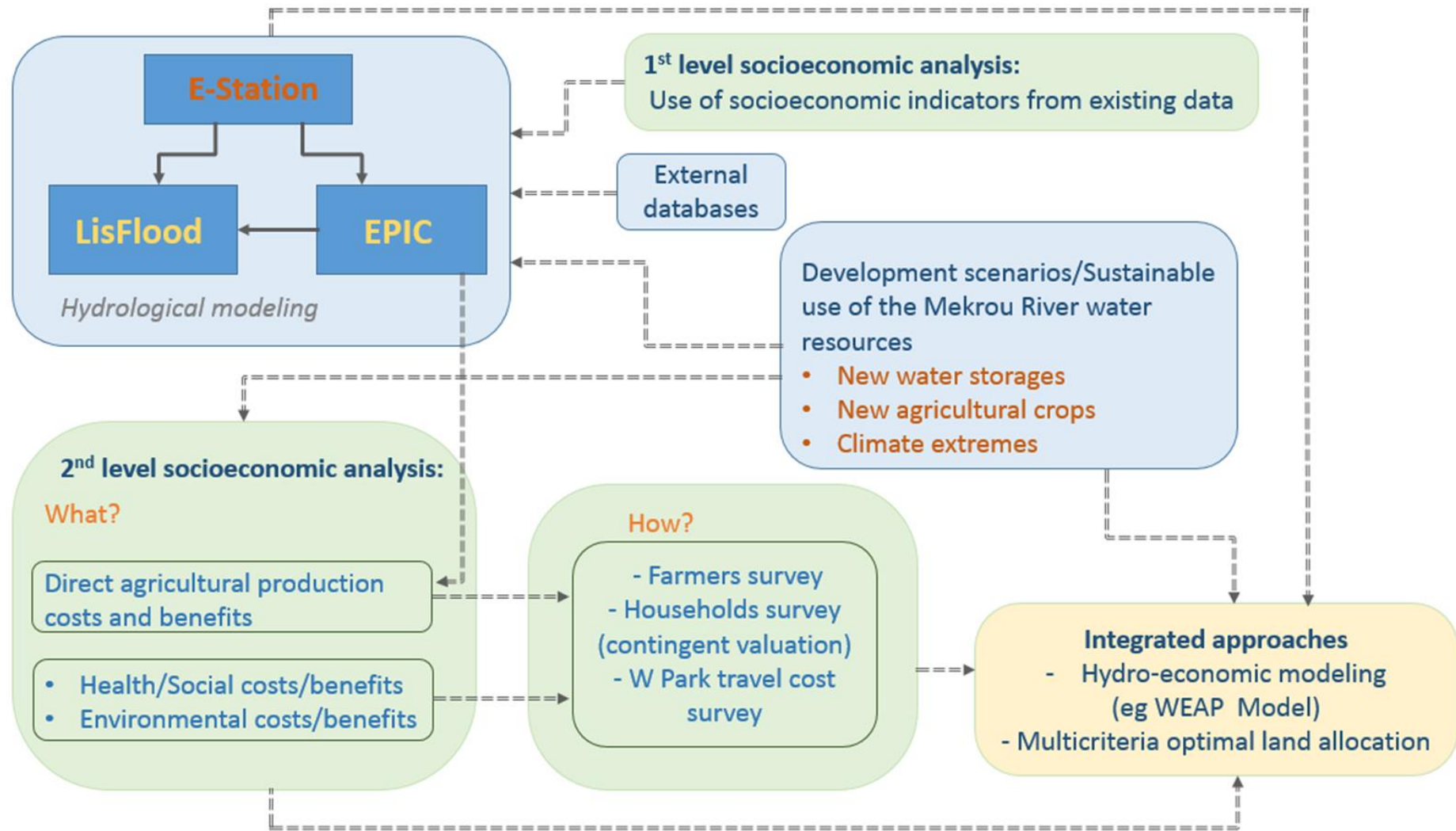
Objectives

Main objective: to support Economic Green Growth and Poverty Reduction in African countries (Burkina Faso, Benin and Niger), in relation to water use and to water conservation.

Specific objectives:

1. Establishment of the Cooperation Framework on Water for Growth long term planning in the Mekrou transboundary basin
2. Development of an Integrated Water Resource Strategy for green growth in the Mekrou River basin (food security, appropriate urban and rural development and environmental conservation to meet challenges arising from climate change) and water sector investment promotion.

JRC Methodological approach



Biophysical and Multicriteria Optimization Activities

1. Database setup at JRC

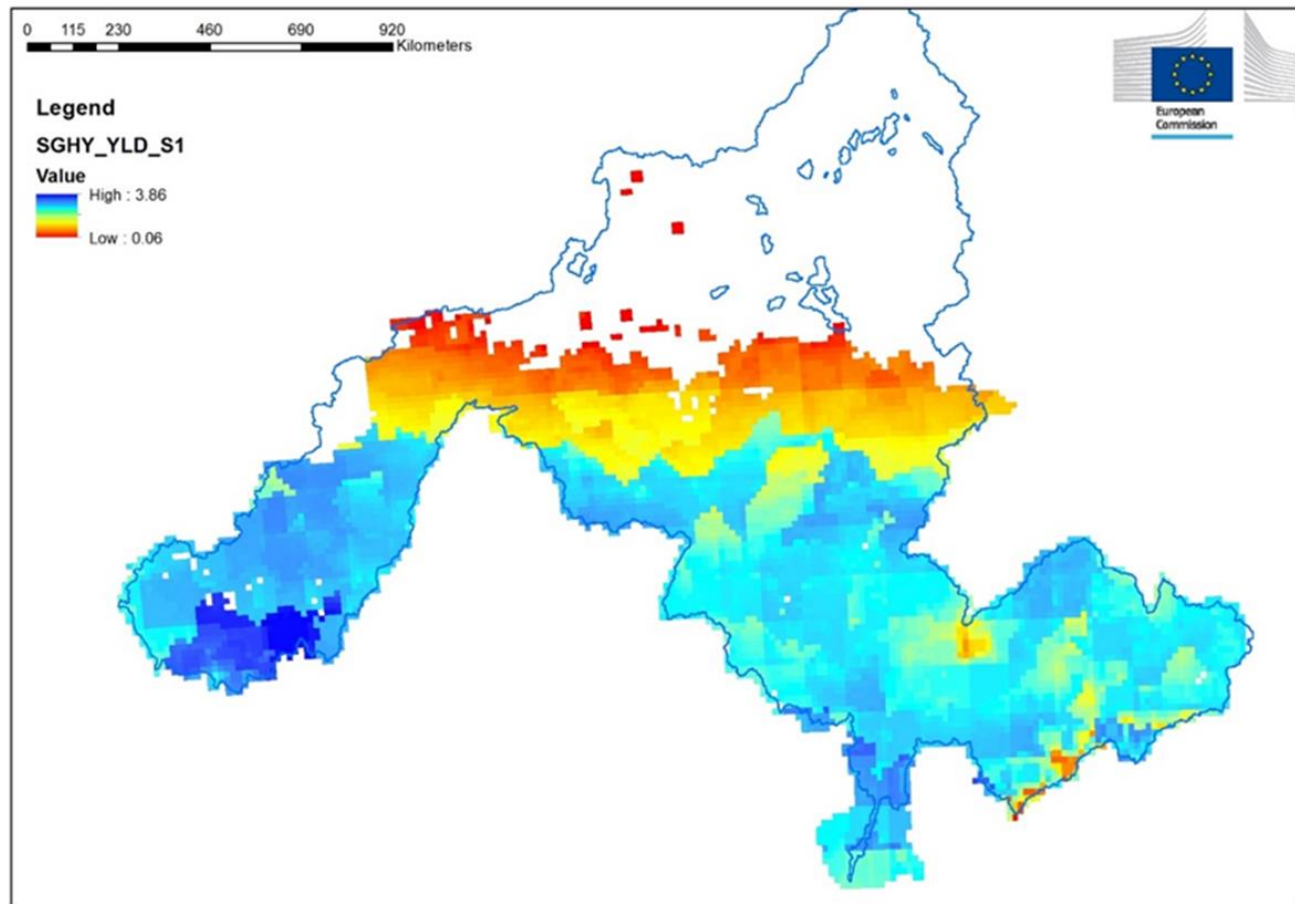
- Collection, organization and evaluation of the public available data (on-going process)
- Compilation of catalogues of national, local and regional data through a survey conducted by local universities and institutions.

2. LisFlood and EPIC Models simulation

- EPIC has been used to calculate yields of 10 representative crops under scenarios of current (no irrigation nor fertilization) and optimal (full irrigation and fertilization) scenarios, as well as under a no irrigation, full fertilization scenario.
- LisFlood compared modelled discharge with the observed for Niger, revealing that the precipitation and temperature time series presently used in LISFLOOD corresponds to water surplus compatible with observed discharges.

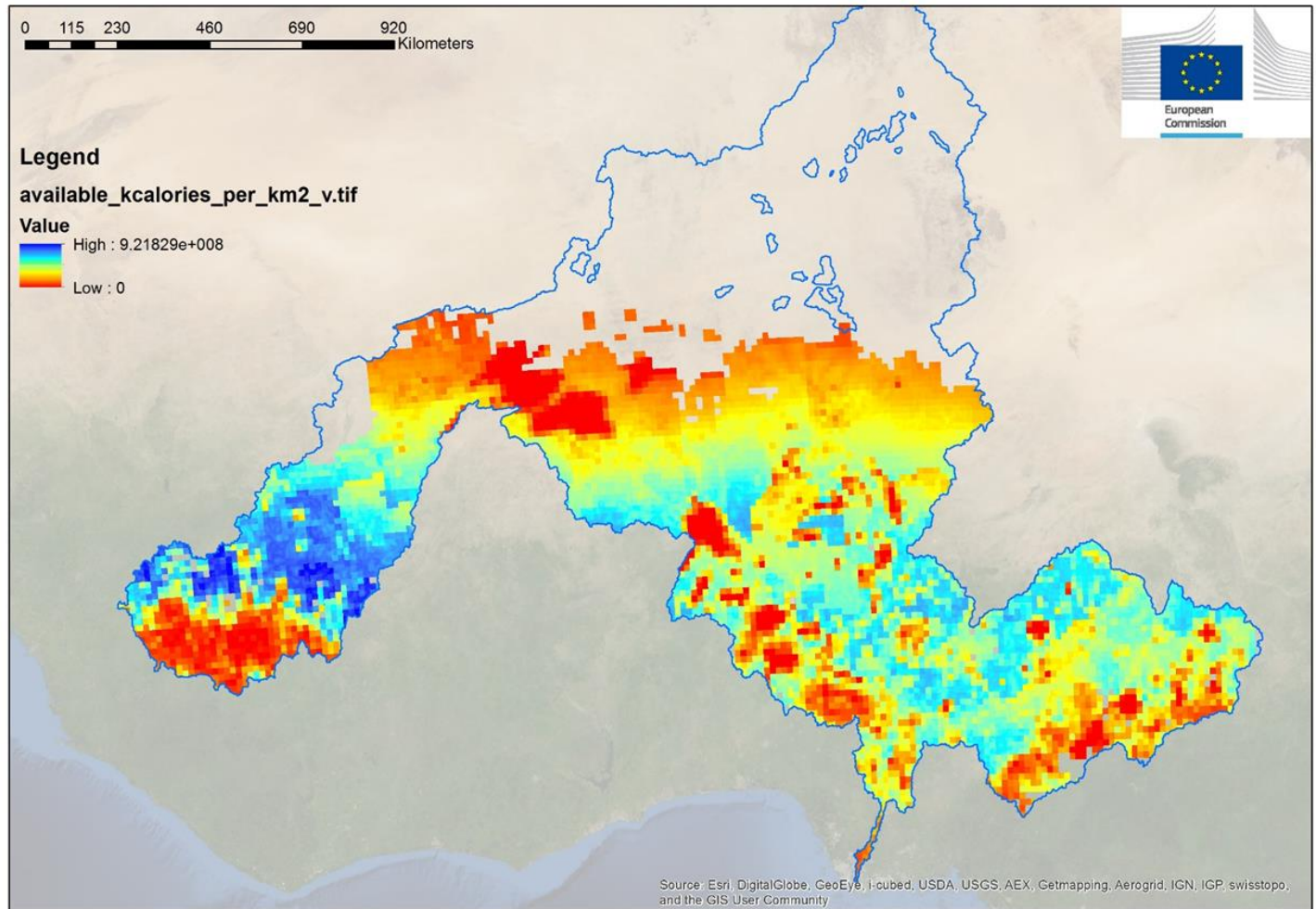
- 3. The **multi-criteria land allocation methodology** has been designed to support the potential for agricultural development based on irrigation and fertilization, taking into account water availability. “plan GIRE”, an exercise designed for the Niger basin with the goal of evaluating the potential for developing agricultural production compatible with food security.

Example of simulated yield for **Sorghum** under optimal conditions for the Niger basin.



(optimal irrigation and fertilization + plus water & nutrient availability + transport costs to estimate the actual yield delivered to market)

Example: Kcal production under a scenario of “Optimal economic value produced”



“Value added” maps to be generated by the JRC as a contribution to the information system and further input to optimal agricultural land allocation approach

- ☐ Priority for Irrigation
- ☐ Floodplains (DEM – Digital Elevation Model)
- ☐ Erosion Hazard
- ☐ Siltation of reservoirs
- ☐ Consumptive use – Groundwater Availability Assessment & Map
- ☐ Consumptive use – Surface Availability Assessment & Map
- ☐ Potential for manure / sludge use as fertilizer
- ☐ Flooding risk areas
- ☐ Soil fertility depletion (as a threat to food security)

Under consideration

- ☐ Dilution water requirements
- ☐ Priority for sanitation / Urban Impact on water quality

Implemented Socioeconomic Activities

1. Socioeconomic data inventory

- Available data from the three countries (Benin, Burkina Faso, Niger) including existing official publication data for the three countries: population census data, agricultural census data, business surveys, etc., as well as tools that already are applied in the region to estimate socioeconomic issues.

2. Definition of the socioeconomic research/policy priorities

- Defined in a participatory and consultation context with local actors
- A Websurvey has been conducted in October 2014 to evaluate the priorities
 - Experts websurvey (41 experts from Benin, Burkina Faso, Niger)
 - Stakeholders in person interview survey (27 stakeholders in Benin's river basin)

3. Travel Cost survey for W Park visitors

4. Preparation of a households survey

W Park Travel Cost Survey



1. In cooperation with PNE Benin the survey took place in February/March 2015
2. In total 191 persons have been interviewed (52 W Park visitors and 139 citizens of villages located near W Park)
3. Validation and analysis of responses is pending
4. Expected values for: ecosystem services of W Park, Recreational activities, Water value

Household survey

1. Under design – Scheduled application: July 2015
2. 600 (min) Questionnaires within the Mekrou River Basin
3. Content of the Questionnaire
 - Domestic Water Use
 - Agricultural Water Use
 - Ecosystem Services – WTP (Contingent Valuation)
 - Flood and drought resilience
 - Socio-economic information

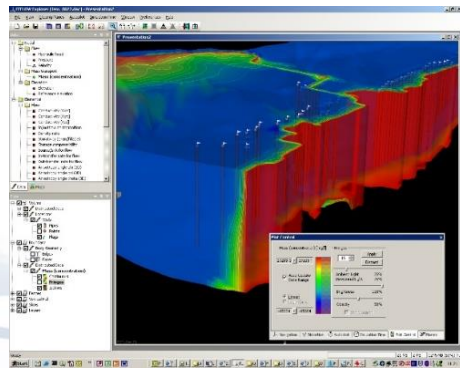
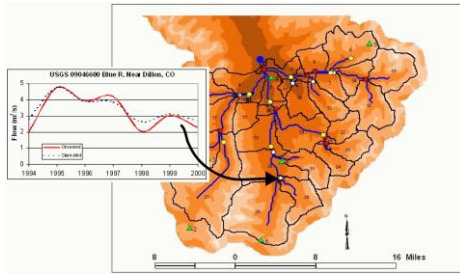
Planning of actions in 2015 and 2016

Activity / Time planning	2015												2016											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1 Web-Survey for the socioeconomic priorities																								
2 Implementation of the W Park survey																								
3 Development and Implementation of the Mekrou River Basin Household Survey																								
4 Collection and homogenization of local biophysical data																								
5 Set up of the database management system																								
6 Niger optimal agricultural land allocation exercise																								
7 Comparison LISFLOOD's improved global model version with the LISFLOOD's African setup																								
8 Calibration of the Niger basin																								
9 LisFlood model setup on a 1x1 km grid instead of the 0.1x0.1 degree grid (Depending on data availability)																								
10 Integration of the socioeconomic assessment in the JRC information platform																								
11 Socioeconomic indicators																								
12 Preparation of the Mekrou "diagnostic"																								

BASAL project (Cuba)

Design and development of a water management information system addressing water availability face to climate variability, water demand, allocation strategies and optimal management policies

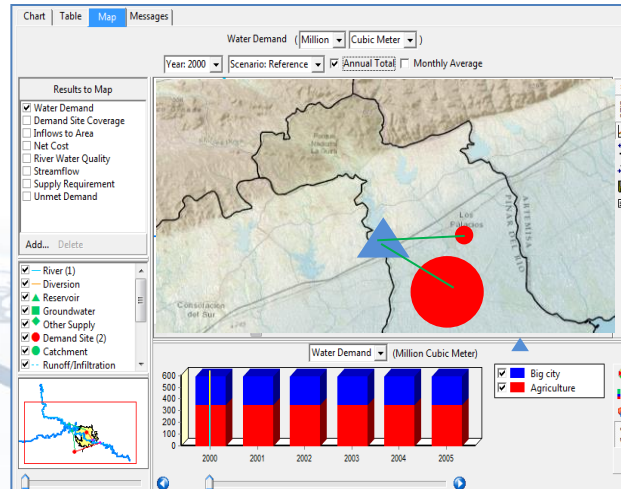
Water availability



Infrastructures (dams, channels)



Water demand



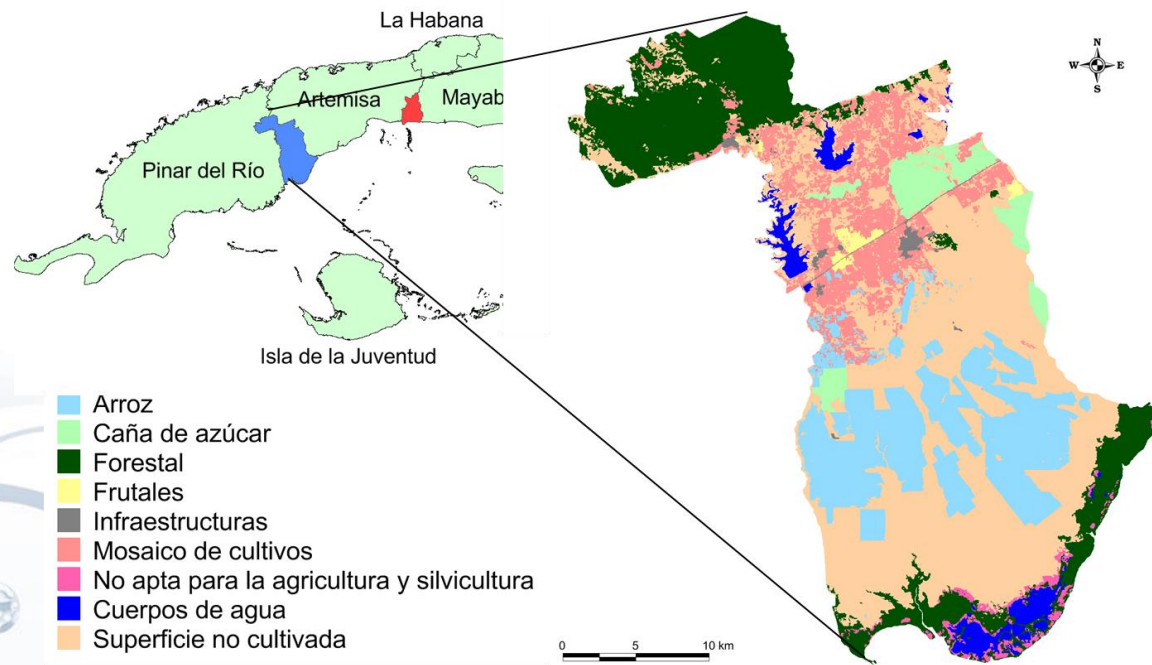
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Objectives

- Improve knowledge about impacts of climate variability, climate change and land use change processes on food production, water availability and socio-economic development.
- Provide stakeholders and decision-makers with tools to support informed decision-making regarding water resources, particularly to guarantee the sustainable long-term food production and suitable socio-economic development.

Los Palacios Study Area



BASAL project outline

User needs

- Analyzing water management and the impacts of climate change on agricultural production
- Tools to support local decision making
- Technology and knowledge exchanges



Expected output - Basal Project

- ❖ **Database**, containing all data gathered, connected to the integrated model
- ❖ **Diagnosis**, analysis of the main problems regarding water management, compiling information from experts and stakeholders.
- ❖ **Integrated model and model applications**
A spatial integrated model, for the retrospective exploration of different management strategies and climate scenarios.
- ❖ **Management recommendations**
Management recommendations to be included in the local planning strategy, derived from an expert's discussion workshop, supported by the application of the integrated model.
- ❖ **User manuals, trainings and assistance**

Thank you !!!!

