



Food and Agriculture  
Organization of the  
United Nations



**MORE EFFECTIVE AND SUSTAINABLE INVESTMENTS IN WATER FOR POVERTY REDUCTION**



**BRIEF**

# Water investments for poverty reduction in Rwanda





## Water investments for poverty reduction

This document presents the results of the assessment of agricultural water management (AWM) investment potential using a livelihood mapping approach. The work presented is the result of an extensive participatory process in the country.

This work was developed in the framework of the project “More effective and sustainable investments in water for poverty reduction” funded by IFAD and implemented by FAO in collaboration with IWM under the CGIAR Research program on Water Land and Ecosystems (WLE). The project aims at improving food security and reducing rural poverty of smallholder farmers, providing guidance and technical support to enhance the quality, impact and sustainability of AWM investments.



The specific objectives of the project are:

- **Enhance knowledge** and provide a set of evidence-based recommendations and tools to prioritize and plan water interventions.
- **Provide technical assistance** to stakeholders to promote the adoption of appropriate technologies.
- **Promote the policy dialogue** to improve the effectiveness and impact of public and private sector investments in AWM solutions.

## Livelihood mapping approach

The project uses a livelihood mapping approach as the basis to assess the potential and suitability of water investment to improve people's livelihoods. For the implementation of this approach in Rwanda, the following activities were conducted:

- Assessing the needs to identify the challenges and opportunities of the AWM sector and priority technologies.
- Mapping the main livelihood zones to identify different types of producers and rural livelihood strategies, as well as the main needs and constraints related to water in different contexts.
- Mapping the potential beneficiaries and AWM investment potential.
- Mapping the suitability of selected AWM technologies.

## A. NEEDS ASSESSMENT

A needs assessment analysis has been carried out in Rwanda to identify the needs, relevance, potential and opportunities for improving the impact and effectiveness of agricultural water management (AWM) interventions in terms of: research, technical assistance, training and policy support. These activities were conducted between July 2015 and January 2016, and resulted in the preparation of a needs assessment report.

### 1. Stakeholders

This consists on the consultation of the stakeholders concerned in the identification of the relevant AWM to be implemented in the country. The stakeholders consulted were Rwanda Agriculture Board, Rwanda Natural Resources Authority, National Cooperatives, JICA, farmers, local government, gender monitoring officer, among others.

### 2. Needs assessment workshop

This workshop held in Kigali, Rwanda, on 24 July 2015, was an opportunity to introduce the project to all national stakeholders involved in AWM and to share the project's goal and objectives with the Rwandan authorities. It gathered 34 stakeholders and the following activities were completed: (i) project was presented ; (ii) constraints and priority areas of support in AWM were identified ; (iii) AWM interventions to overcome those constraints were proposed.

### 3. Interviews and field visits

A total of 23 experts from the institutions listed above were interviewed.

Field visits were also conducted in four districts in the Eastern province in different project sites.

Figure 1. Overview of the stakeholders interviewed

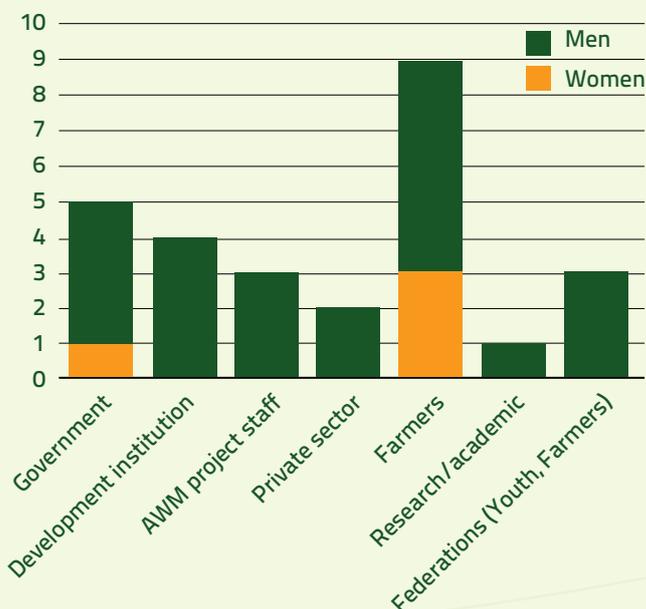
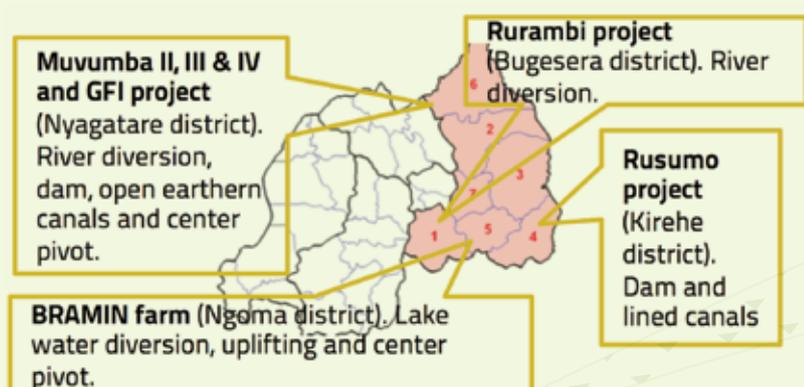
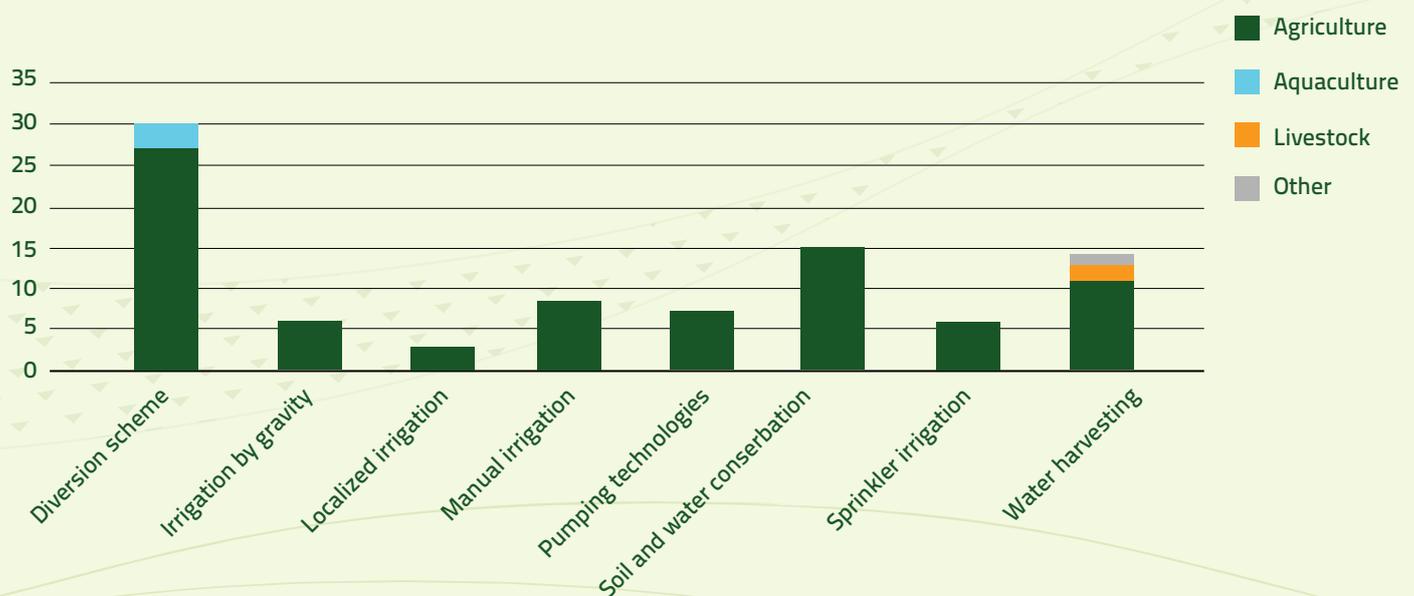


Figure 2. Field visits



The graph shows the main priority technologies identified during the consultations:

**Figure 3. AWM identified**



#### 4. Discussion of preliminary results with the national team

The criterion used to define the most relevant technologies was their suitability to smallholder farmers. The main cross-cutting priorities highlighted were:

- Build and strengthen capacities on AWM.
- Provide technical assistance and mentoring support to smallholders and providers on AWM
- Establish the necessary local capacity to put farmers in charge of water management.

#### 5. Needs assessment validation workshop

The validation workshop took place in January 2016. The AWM solutions were discussed and their levels of pertinence for implementation validated. The main technologies identified were:



**DIVERSION SCHEMES**



**PUMPING TECHNOLOGIES**



**SOIL AND WATER CONSERVATION**

## B. LIVELIHOOD MAPPING

As part of the livelihood mapping, the national stakeholders provided a general classification of farmers which was based on:

- **Farm productive characteristics:** land tenure, production for household consumption, crops, inputs, labour available
- **Farm assets:** Land, machinery and equipment, transportation, storage areas, living quarters
- **Main water management solutions**
- **Mean plot size (ha).**

All of these parameters were considered with an aim to define and understand the main productive and biophysical characteristics of the smallholder farmers in Rwanda:

Group/ % Population	Main Features	Farm Assets	Main AWM	Mean Plot Size
A/0.5%	Land tenure: Yes Self-consumption: No Crops: Yes Cash crops: Yes Inputs: Yes Labour: Yes	Machinery, Storage areas, Living Quarters, Land, Trucks	Bore holes Irrigation Infrastructure Water harvesting	>10 ha
B/25%	Land tenure: Yes Self-consumption: Yes Crops: Yes Cash crops: Yes Inputs: Yes Labour: some of them	Land, Storage areas, Average transportation	Low-cost irrigation systems High ground water storage Water harvesting	1-2 ha
C/50%	Land tenure: Yes Self-consumption: crops: Yes Cash crops: No Inputs: Sometimes Labour: No	Land Low-Cost Transportation- Bicycles	Water harvesting Traditional irrigation systems	0.5 ha
D/10%	Land tenure: Yes Self-consumption: Crops: Sometimes Cash crops: No Inputs: No Labour: No	Land	Nothing	Up to 0.5 ha
E/14.5%	Land tenure: No Self-consumption & cash crops: No Inputs: No Labour: No	Nothing	Nothing	0 ha

The livelihood zones are geographical areas in which people generally share the same livelihoods, including access to food, income and markets.

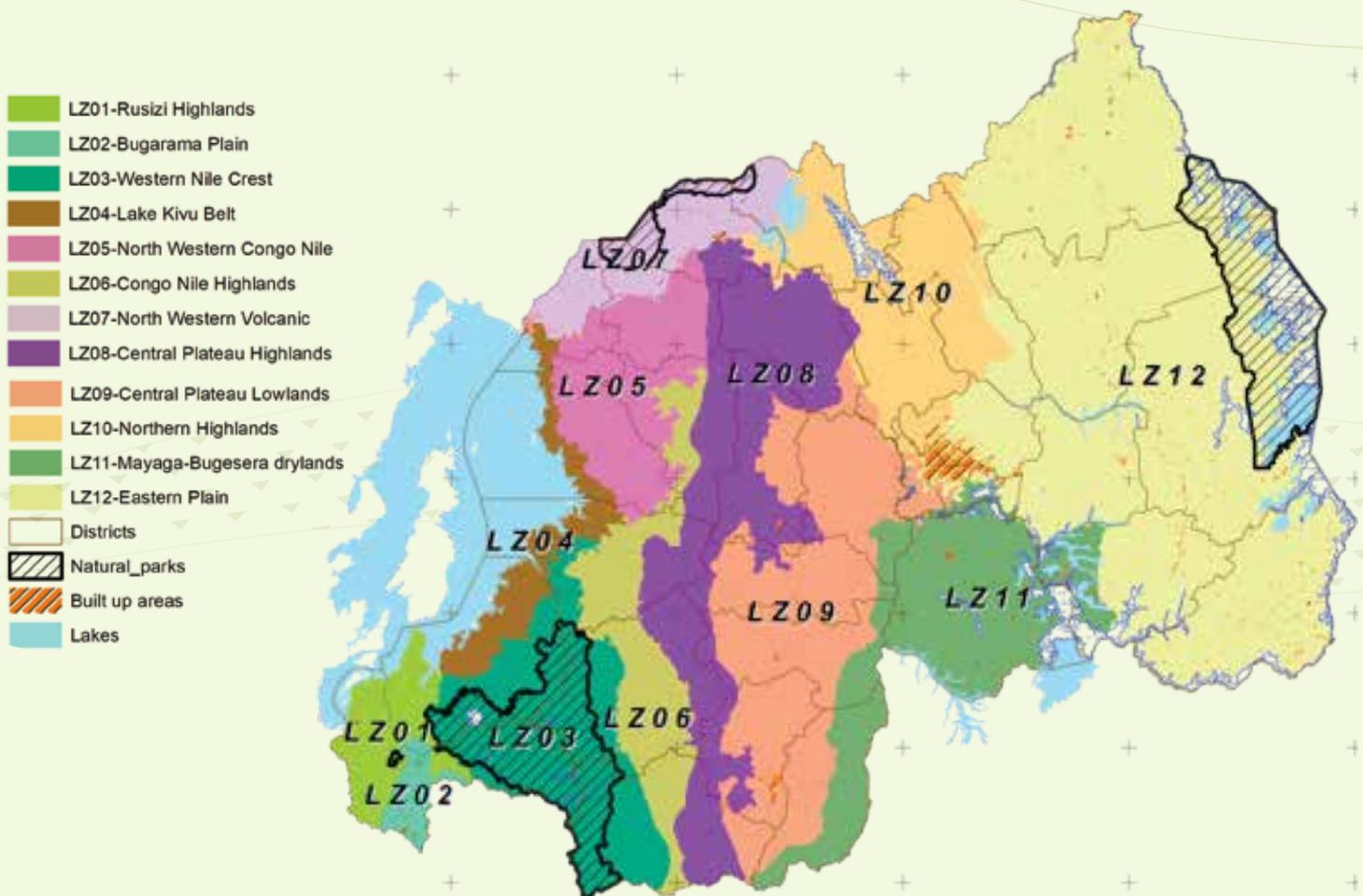
The livelihood zones map was developed mainly based on the biophysical information, a descriptive livelihood matrix that included the farm typology, available demographic and socio-economic data at sector level and expert knowledge.

The data used in the livelihood mapping analysis included:

- Topographic data based on temperature lapse rate used as a proxy for altitude-ecological similarities
- Land Use Land Cover (LULC)
- Interpolation of an annual average rainfall distribution
- Socio-economic and demographic description of the physiographic zones which resulted into the livelihood zones.

As a result of this activity, 12 different zones have been identified in Rwanda clustered in 4 different groups with similar characteristics:

- Group 1: Zone 1: Rusizi Highlands; Zone 2: Bugarama Plain; Zone 3: Western Nile crest
- Group 2: Zone 4: Lake Kivu Belt; Zone 5: North Western Congo Nile; Zone 6: Congo Nile Highlands
- Group 3: Zone 7: North Western Volcanic; Zone 8: Central Plateau highlands; Zone 9: Central Plateau-Lowlands
- Group 4: Zone 10: Northern Highlands; Zone 11: Mayaga – Bugesera drylands; Zone 12: Eastern plain; Zone 13: Eastern plane- Savana



## C. POTENTIAL BENEFICIARIES ASSESSMENT

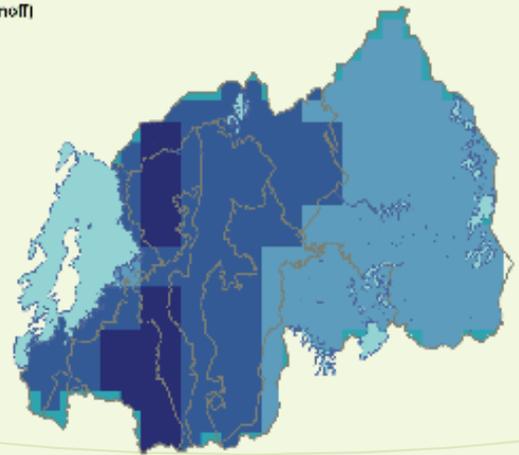
The participatory mapping process integrates the national experts' perspectives on how and where AWM can contribute to the improvement of the livelihoods of small-scale agricultural producers.

The map of potential beneficiaries has been developed considering the following criteria: water availability, population density, poverty and the perception of water as a limiting factor.

### Water availability:

Availability of run off water.

Water availability (runoff)

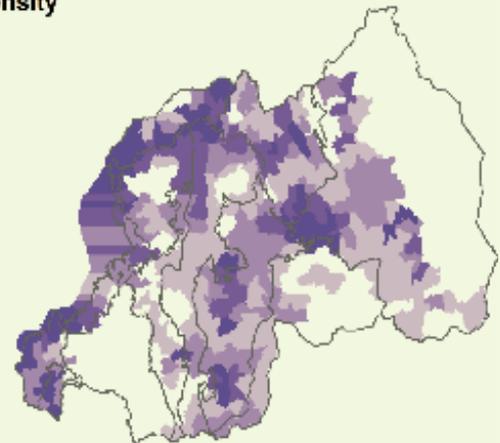
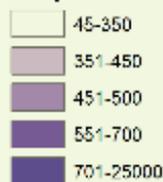


### Population density:

Measured as rural population in a given livelihood zone.

Population density

People/km<sup>2</sup>

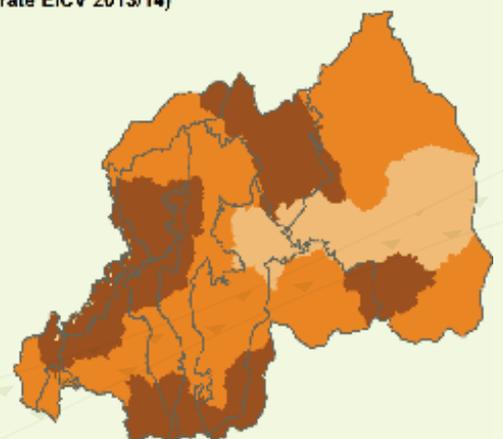
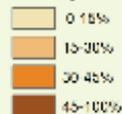


### Poverty:

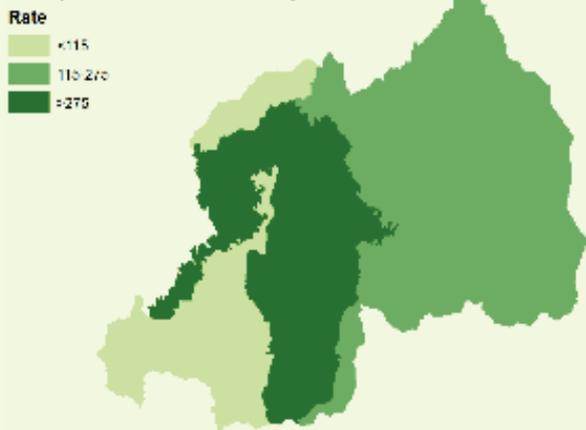
Percentage of children under the age of 5 who are underweight.

Poverty (Poverty rate EICV 2013/14)

Poverty rate



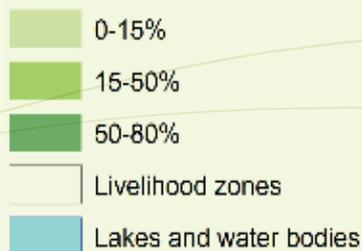
### Perception of water as a limiting factor



### Perception of water as limiting factor

Expressed as percentage of rural population perceiving water (management) as the main limiting factor for agricultural production.

### % of total population



The population is presented as an absolute number (density of beneficiaries) and as a percentage of the total rural population.

The largest share of potential beneficiaries (above 60% of the population) are in zones:

- LZ05: North Western Congo Nile
- LZ08: Central Plateau Highlands
- LZ09: Central Plateau LowlandsRW04

## D. SUITABILITY MAPS OF AWM SOLUTIONS

The suitability of the different AWM solutions was assessed using different biophysical criteria and the potential beneficiaries assessment.

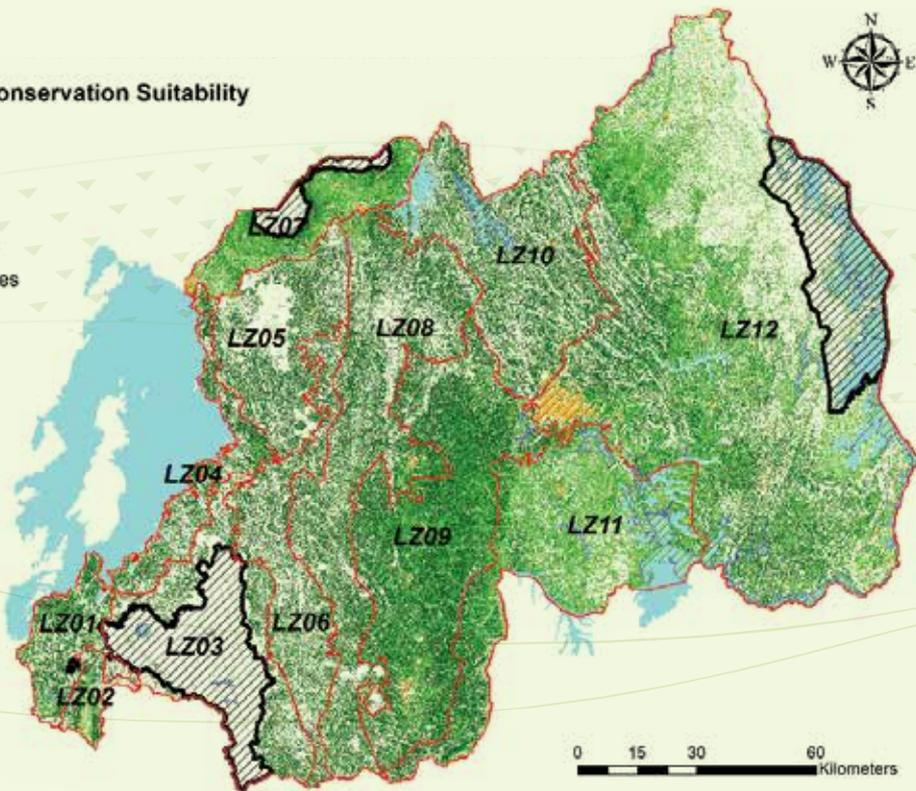
The measures here presented were identified by the national stakeholders.

### Soil and water conservation

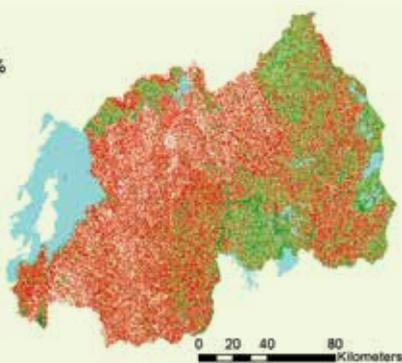
This category includes different soil conservation practices, mainly the establishment of terracing practices that are coupled with runoff harvesting ponds lined with High Density PolyEthilene (HDPE) or earthen.

The criteria used are: the slope, the rainfall, the land use, the runoff water harvesting site suitability and the potential beneficiaries.

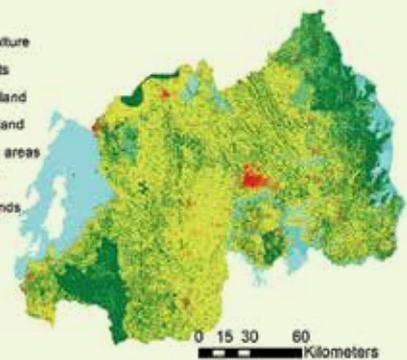
**Soil and Water Conservation Suitability**



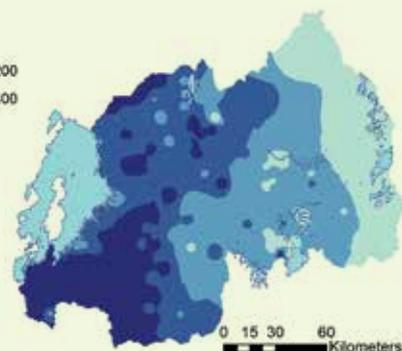
**slope**



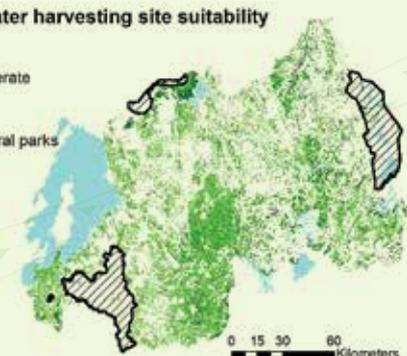
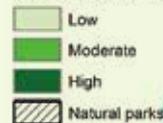
**Land Use**



**Rainfall**



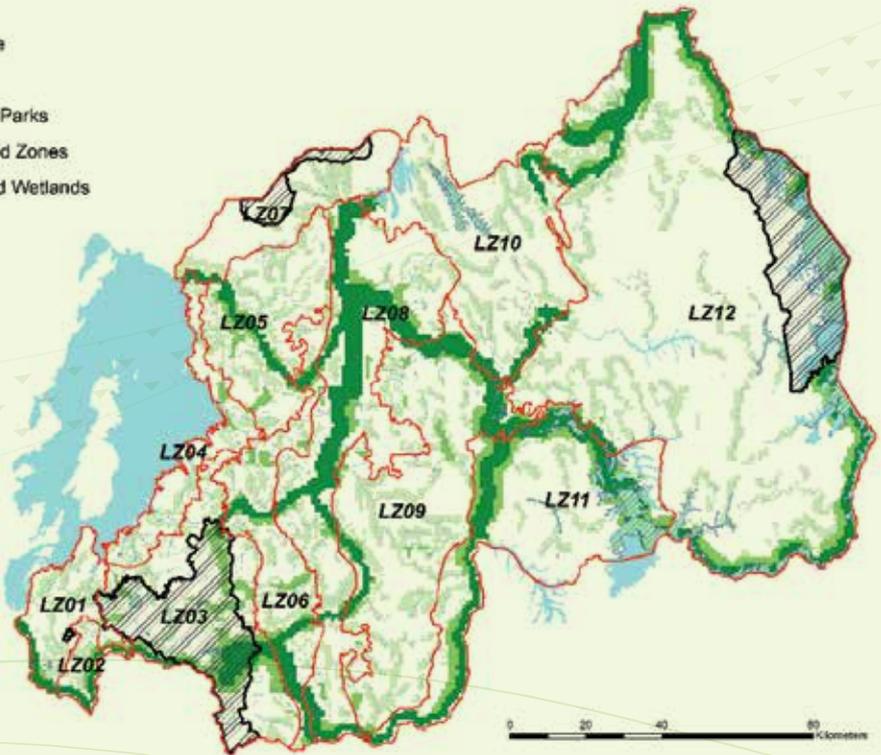
**Runoff water harvesting site suitability**



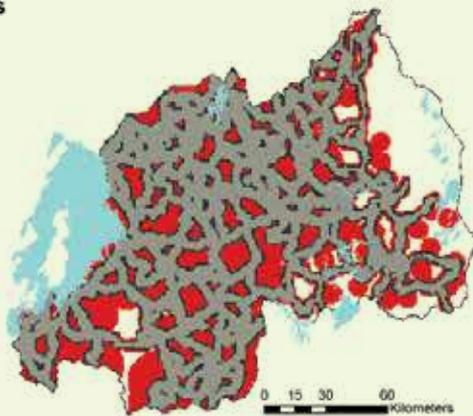
## River diversion schemes

This category mainly includes: river diversion for flooded rice, diversion combined with irrigation by gravity, river diversion for fishing, river diversion and up-lifting.

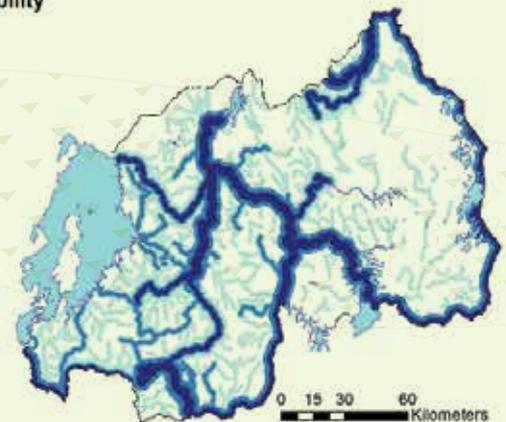
The map was developed considering the criteria: the slope, the access to rivers and the distance to markets.



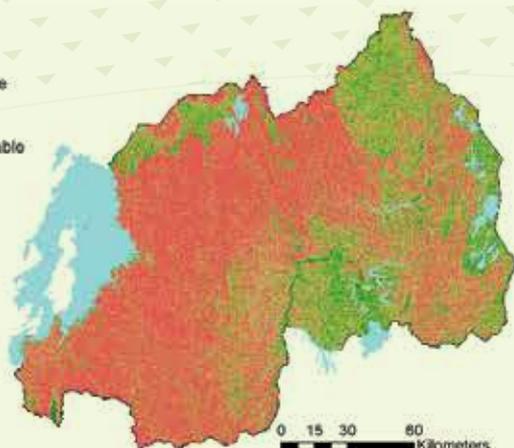
### Access to Markets



### River Accessibility



### Slope

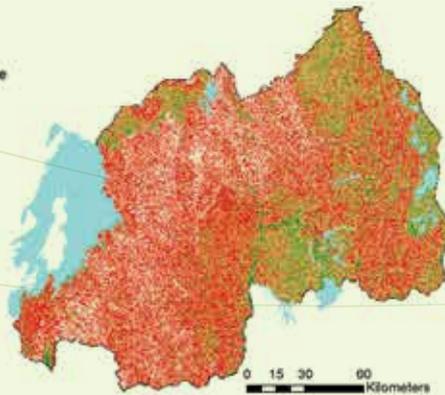
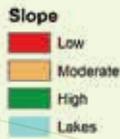
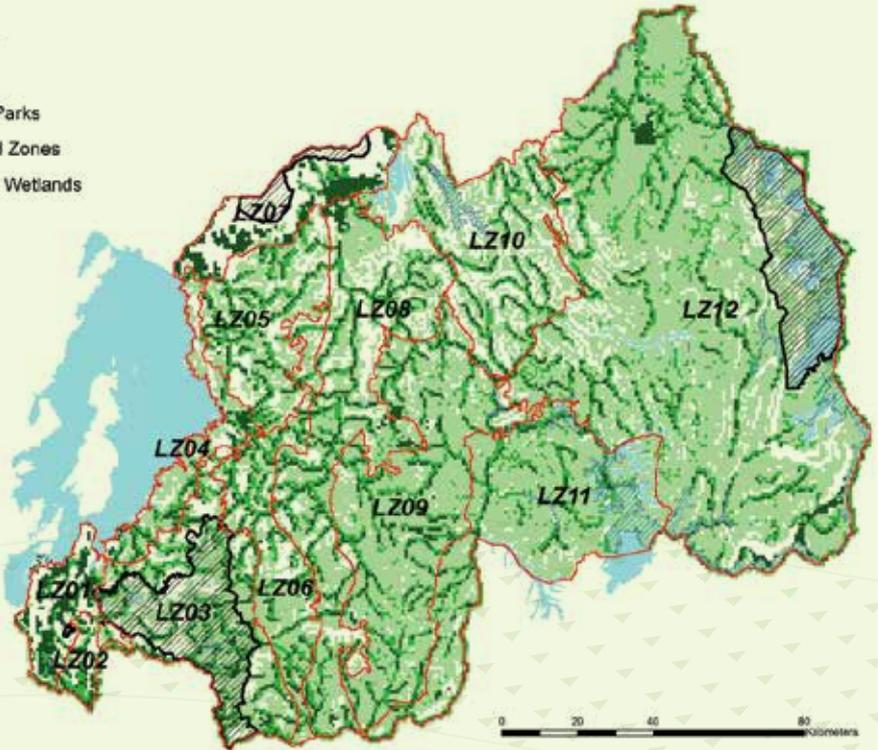


## D. SUITABILITY MAPS OF AWM SOLUTIONS (CONTINUED)

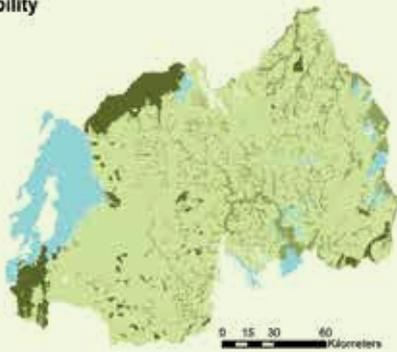
### Pumping technologies

This category includes a wide variety of technologies, from farmer-designed simple systems composed of diesel pumps and horse pipes to hillside irrigation using sprinkler and pivot center systems with or without regulatory dams.

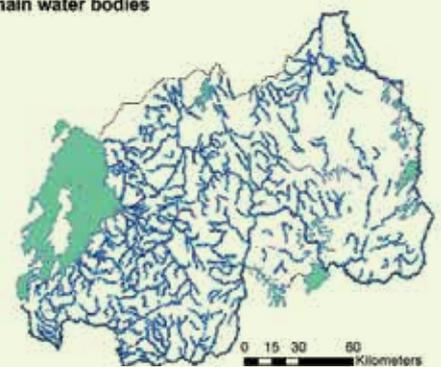
This map considered the groundwater availability assessment, the slope and the access to market as the main criteria.



### Groundwater suitability



### Proximity to main water bodies



The project is funded by IFAD and implemented by FAO and IWMI under the CGIAR Research Program on Water Land and Ecosystems (WLE)