Watershed management, efforts beyond farm level in southern Mali

Birhanu Zemadim[1], Murali Gumma[2], Cedrick Guedessou[1] , Kalifa Traore[3] , Bougouna Sogoba[4], Ramadjita Tabo[1]
[1]ICRISAT, West and Central Africa, Bamako, Mali
[2]ICRISAT, Patancheru, India
[3] Institute d'Economie Rurale, Bamako, Mali
[4] Association Malienne d'Eveil au Development Durable, Koutiala, Mali
Corresponding author email: z.birhanu@cgiar.org

Key research activities

- National and regional stakeholders consultation forum.
- Participatory approach to establish new sets of biophysical monitoring stations to improve the gap of onsite monitoring stations and decision making beyond the level of the farm.
- Satellite imagery and analysis for land use/land cover mapping.
- Modelling from farm to watershed scale using hydrological and crop simulation models.

Results and main findings

- Significant variation (p-value 0.018) exists in runoff rate from fields treated with Soil and Water Conservation (SWC) practices (24 to 26%) and control fields (39 to 43%).
- Runoff response from the experimental stations was quick to rainfall events and runoff rate is always lower in the case of treated fields with SWC (Fig. 2).
- The investigation on 259 shallow wells revealed that well depths vary greatly (p-value 0.032 with mean value of 18.5 m). However there were no water level variations in different seasons (p-value 0.996 in dry season & 0.707 in rainy season).

Implications of the research for generating development outcomes

Watershed management research contributes towards sustainable agricultural development and hence livelihood improvement through: (i) conservation, up-gradation and utilization of natural endowments such as land, water, plant, animal and human resources in a harmonious and integrated manner with low cost, simple, effective and replicable technology, (ii) generation of massive employment and (iii) reduction of inequalities between irrigated and rain-fed areas.

How this work would continue in Africa RISING phase 2

Monitoring stations were established to capture biophysical variables over time. The watershed work consists of experimental stations to evaluate the impact of SWC practices on agricultural productivity and eco-system services. Historical changes in land use and land cover over time are studied to evaluate land degradation and changes in cropping pattern over the years. The modeling work from farm field to watershed scale enables to define appropriate sites for natural resources management and evaluate impacts of upstream intervention practices on downstream water use and irrigation. All these works need to continue in the second phase.

Fig. 1: Established monitoring networks: (a) weather station, (b) soil moisture, (c) rain gauge, (d & e) Erosion and runoff, (f) piezometer

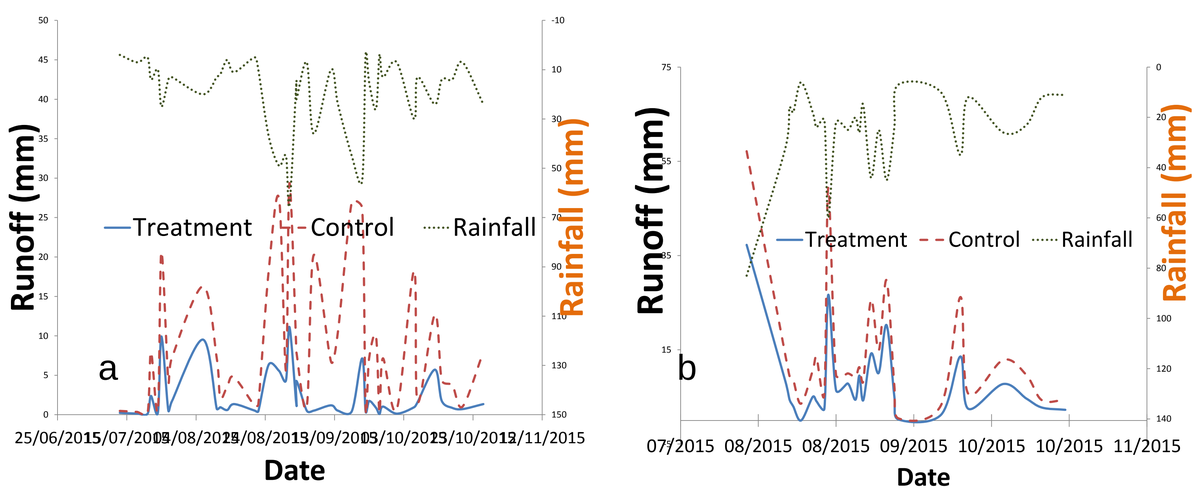

Fig. 2: Rainfall-runoff characteristics of SWC experimental station in the watershed villages of (a) Bougouni, (b) Koutiala

Current partnerships and future engagements for out scaling

Watershed research is a collective approach. Partnership was established with the national research institute (Institute d'Economie Rurale) to ensure the continuity of the watershed research and quality output. Similarly a partnership was established with the local NGO (Association Malienne d'Eveil au Development Durable) to scale proven technologies and community mobilization.

The Africa Research In Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.

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