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Watershed Level Baseline Assessment in the Nariarlé Watershed, Volta Basin, Burkina Faso

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Report for Agricultural Water Management (AWM) Solutions Project

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1 INTRODUCTION

This report describes the results of a baseline assessment of current livelihood strategies in the Nariarlé watershed of the Volta River Basin in Burkina Faso. The work is part of the IWMI project entitled 'Agricultural Water ManagementX Solutions' which aims to analyse the impacts and potential of AWM interventions to improve livelihoods at the community, and watershed scales and assess the opportunities, constraints and impacts of the use of AWM technologies. Similar work has been done in two other watersheds, the Mkindo watershed in Tanzania and the Jaldhaka watershed in West Bengal, India. The work in the Nariarlé watershed was done during June 2010 in cooperation with Institut de l'Environnement et de Recherches Agricoles (INERA), Ouagadougou, Burkina Faso. After this baseline assessment different AWM scenarios were analysed.[1]

Figure 1: Villages where community level fieldwork has taken place

Within four villages, Arzoum Baongo, Tanvi Nakamtenga, Wamtinga, and Boulbi (see Figure 1), focus groups were held with different stakeholders about their current land and water resources, agricultural system inputs and outputs, health issues and different sources of income. The number of participants in each village is presented in table 1. The results were summarised in livelihood narratives for the four main livelihood strategies: Farmers concentrating on rainfed agriculture, Farmers utilising irrigation for gardening and agriculture, Pastoralists, and Fishermen. These were presented at an expert meeting aimed to identify the livelihood strategies across the watershed grounded in the detailed village level narratives. Participants mapped and discussed the current situation of water management, livelihoods and resilience of different livelihood groups. The participants worked in a part or throughout the watershed, with some involved in research and others working in local NGO's.

1 Ouattara, K., S. Pare, S. Sawadogo-Kabore, S. Cinderby, and A. de Bruin. 2012. Agricultural Water Management Scenarios in the Nariarlé watershed, Volta Basin, Burkina Faso. SEI Technical Report. Stockholm/York: Stockholm Environment Institute.

Table 1: Participants of Community fieldwork

Location	Male Participants	Female Participants	Total Participants
Arzoum Baongo	33	8	41
Tanvi Nakamtenga	16	9	25
Wamtinga	16	8	24
Boulbi	22	7	29
Total	**87**	**32**	**119**

2 BASELINE OF LIVELIHOOD STRATEGIES AT WATERSHED LEVEL

In the Nariarlé watershed, the sources of income are mainly integrated farming activities (agriculture and animal keeping) and to a lesser extent, fishing and small trading.

Rainfed agriculture and gardening are the main activities and the mean of subsistence for the majority of the farmers. Farmers have always used few fertilisers, but intensification is ongoing with the development of modern farms (agro-business). The mean size of the fields in the area is between 0.08 to 5 hectares (ha). The farms of the agro-business men range between 2 and 5 ha and combine a range of activities: gardening, fruit production and animal breeding.

2.1 Livelihood narrative for those concentrating on rainfed agriculture

Around 60 to 70 per cent of the watershed is used for rainfed agriculture (Figure 2). The crop types in the area in order of importance are sorghum (red and white), pearl millet, cowpea, maize, groundnut, paddy rice, sesame and bambara nut. Maize is produced mainly on household fields because of its requirement in fertilizer. Rainfed agriculture is dominated by the crop association cereal and cowpea. Rainfed legume cropping (mainly cowpea) is mostly done by women.

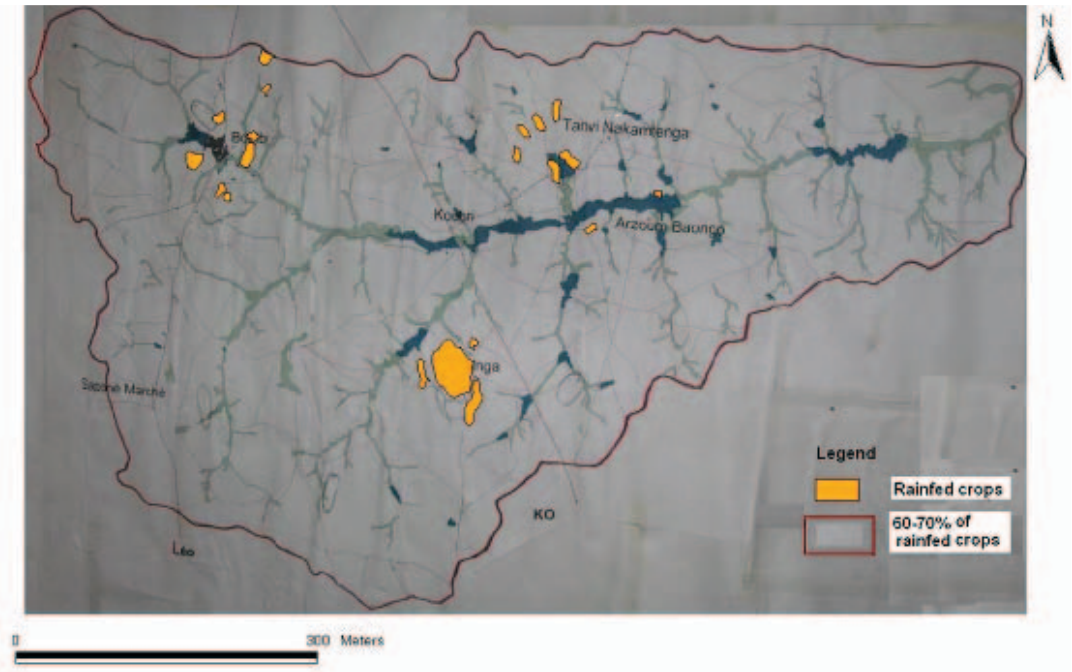

Figure 2: 60 to 70 per cent of the Nariarle watershed is used for rainfed agriculture

Soil tillage is done using ploughs drawn by donkeys or cattle. The fallow practice has almost disappeared from the watershed. Soil fertility management is done using mainly organic fertilizer produced in compost pits because of the low financial capacity of farmers limiting their ability to buy fertilisers. Improved seeds are hardly used. Farmers have experimented with improved seeds of maize, cowpea, rice and sesame with the help of the Ministry of Agriculture through its technical service.

The yields in rainfed agriculture are very low. They range between 500 kg and 2 t ha^{-1}; the mean yield for pearl millet is 600 kg ha^{-1}; for sorghum it is 800 kg ha^{-1}, and the maize yield is between 1.5 and 2 t ha^{-1}. All the harvest is reserved for the household consumption. When the family needs money

to solve problems (health, social problems, etc.), a quantity is taken and sold (mainly maize and cowpea). Most of the rainfed farmers are also gardeners.

Crop residues are mainly used as fodder for livestock. The remaining residue is put in the compost pits for the fertilization of fields.

The main constraints encountered in the agricultural activities are generally the climatic risks, access to land and lack of technical support. Specifically it is the inadequacy and impoverishment of lands, drought spells, financial problems, difficulties to access equipment and inputs due to a lack of technical support and the excessive cost of fertilizer.

2.2 Livelihood narrative for farmers utilising irrigation for gardening and agriculture

The gardening and irrigation agriculture are done near the water reservoirs on the sides or downstream of the dam (Figure 3). In addition to the traditional wells, there are gardening wells used for water supply in gardening. A project implementing gardening wells is ongoing in the watershed since 2008 and has been boosted after the first September flooding.

The size of the fields allocated to gardening ranges between 0.2 and 0.3 hectares. The downstream of the dam is mainly used for rice growing and the upstream for usual vegetables such as green beans, onion, cucumber, aubergine, zucchini, papaya, cabbage, pepper, and tomato. Corn is grown during the dry season.

In rice cultivation and gardening irrigation channels and/or motor pumps are used to get water. Improved seeds are widely used for vegetable crops and rice growing. Farmers also use organic and mineral fertilizers. To fight the various worms and parasites that inhibit crop growth or flowering, pesticides are regularly applied on vegetables.

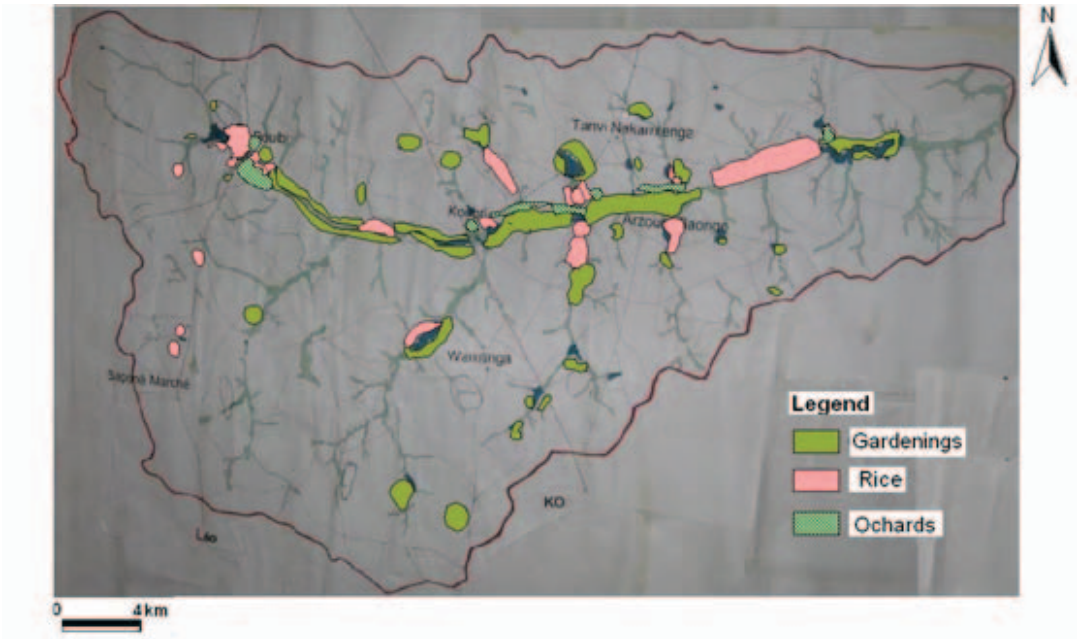

Figure 3: Locations where in the watershed irrigation occurs for gardening, rice and orchards

There are two harvests for rice and corn and a single harvest for crops like onions, aubergine, cabbage and papaya in the year. The yields (fresh product) range between 2 to 30 t ha^{-1}. The average yield of the paddy rice is about 4 t ha^{-1}. The harvests from gardening are almost totally sold (up to 90 per cent). The earnings from gardening are variable. For onion, the farmer can earn between 300 000 and 400 000 Fcfa (around 700 and 1000 USD) on 0.1 ha, for paddy rice they can earn are between 700 000 F and 1 000 000 Fcfa (1750 to 2500 USD) on 1 ha.

Although in each village women's organisations have a common plot, different villages have different land ownership arrangements. In Koubri individual women do not own land, whereas in Boulbi women can own land through inheritance.

There are often conflicts around water access between gardeners and livestock keepers. The main constraints to irrigation agriculture and gardening are siltation of dams and rivers, proliferation of invading aquatic plants, water pollution by pesticides and other chemicals, and water related diseases (malaria etc.)

2.3 Livelihood narrative for pastoralists

Livestock keeping is the second most important activity of the population in the Nariarlé watershed (Figure 4). In addition to the pastoralists, almost all farmers keep some animals. The size of the herd is very variable. The types of animals encountered are sheep, donkeys, goats and pigs, and few cattle. The pastoralists earn income mainly through the sale of milk, dung, and animals. The sale of animals, representing on average 50 per cent of their income, is for subsistence.

In the watershed, there are no formally delimited grazing areas. The grazing system is extensive and only a few parts in the bush are used as pasture. During the rainy season, the grass strips serving as boundaries between fields are used as grazing areas. The pasture quality is moderate. This obliges breeders to use corn bran and cottonseed crabe as animal food supplements. The strategy most used

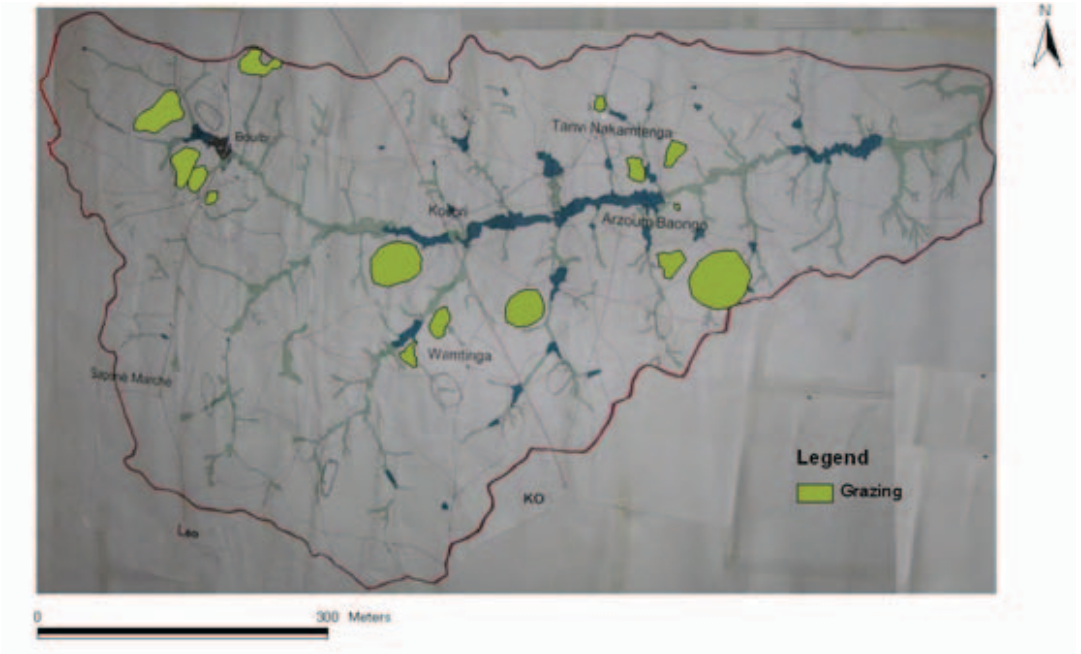

Figure 4: Map of areas that livestock keepers use

for cattle comprises two phases: in the rainy season the animals are brought to the fields to graze and till the soil. During the dry season animals feed on pasture extensively and get food supplements consisting of crop residues and tree fodder. The pastoralists practice seasonal transhumance through the watershed.

For those who keep a small number of animals, livestock is a financial security, because the money from the sale of an animal is used to solve specific problems to do with health or social needs or sometimes to do with the shortage of food especially during the lean period. Having livestock also provides significant benefits such as support for plowing fields (cattle and donkeys), the organic fertilizer from animal excreta and the transportation of fertilizer and water. Poultry is also an important part of animal keeping activities and savings in rural areas. Women tend to keep chickens and youth tends to keep chickens and guinea fowl. The sale of poultry and eggs are an important source of income for women and youth.

The areas of pasture, in the watershed, are being reduced because of the expansion of Ouagadougou. Another reason is the selling of land to the citizen for agri-business activities which are land demanding.

The livestock keeping faces challenges with the lack of access routes to water, pasture of poor quality, insufficient availability of agro-industrial by-products and lack of technical support. There are also issues with livestock monitoring. The project of the extension of Ouagadougou called "Le grand Ouaga" negatively influences the development of the farming in the watershed as it reduces the areas available for pasture further. Farmers also sell land to citizens of Ouagadougou for agri-business activities, which often are land intensive.

2.4 Livelihood narrative for fishers

Less than 3 per cent of the population is involved in fishing in the large dams of the watershed (Figure 5). There is no particular condition to access to water for this activity because the dam is considered as communal property. When the water level is very low fishing is forbidden. Fish breeding is increasing with the involvement of groups in producing alevins to enrich water points. Fish is captured using fishing nets after attracting them with cereal bran. Some fishers use traps set in the water over night. The fishing product is variable but consists of carps, silurids, sardines, captains and shellfishes (shrimp). The fishing products are sold in the local market or sold to wholesalers that come to the village. The fishing activity is intense during the rainy season. At this period the prices are relatively low. When the water level decreases the activity decreases as well and at this time the prices are more interesting. A fisher earns at least 2000 F cfa (5 USD) per day. Generally fishers have another activity in addition to fishing like cropping, breeding or tailoring.

This livelihood faces difficulties with the conservation of fishing products, the use of prohibited pesticides that kill fish, and the invasion of aquatic plants. The use of fishing nets with meshes that do not conform to the regulation is another threat for fishing. Fishing is monitored in the area, but this is done by a different ministry from the one which hands out fishing licences.

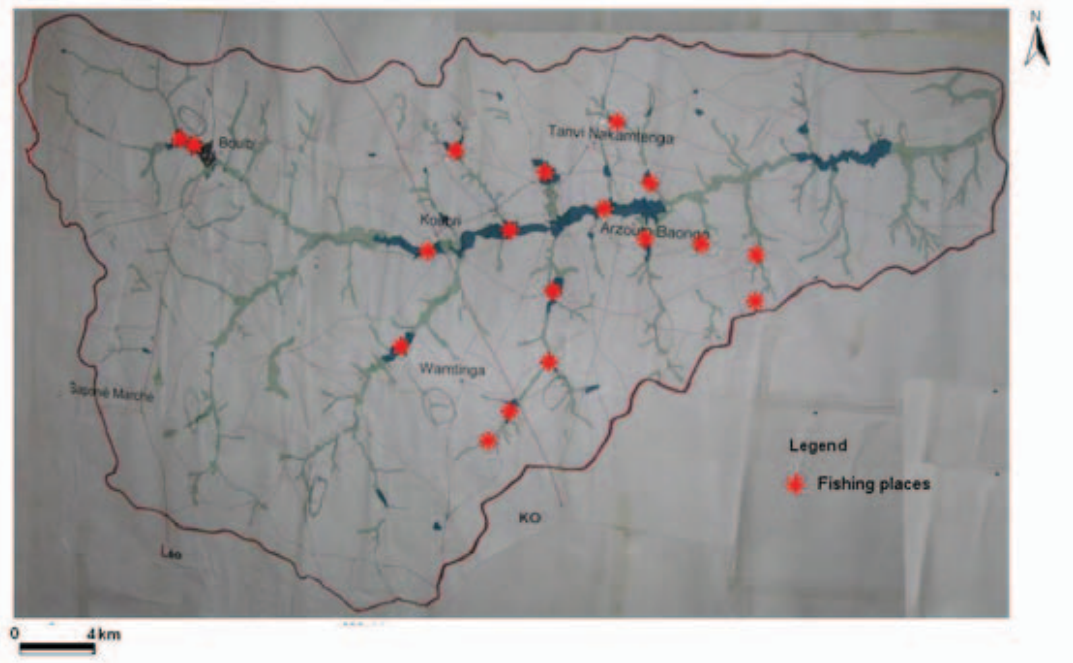

Figure 5: Map of locations where people fish

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