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Experiences on Multiple Use Dams in Sissala West District, Ghana

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Plan Ghana works in the Sissala West district in north-western Ghana. The main livelihood of indigenes is rain-fed farming and livestock rearing. Northern Ghana experiences an 8-month long dry season each year, during which farming and livestock watering become extremely difficult. Food shortages occur and people lose their animals. Moreover, rainfall patterns are irregular, causing young crops to wither in incidental prolonged dry periods, a situation aggravated by climate changes. Plan partner communities requested support for the construction of dam facilities to support dry season farming and livestock watering. After feasibility studies, 8 dams were constructed with the aim of improving livelihoods and health of people through sale and consumption of produce from the following intended uses; Irrigation, Fish farming and Livestock watering. Over 1000 households are benefiting from the dams. A total of 95 hectares of land has been put under irrigation growing mainly vegetables. Leafy vegetables are now available on the market in the dam communities. Income levels have increased through the sale of surplus produce. Some community members have taken up fishing whilst livestock have sufficient water. Apart from the intended uses of the dams, they are serving other practical water needs which were not catered for in the design, and bring in additional sources of income; Moulding bricks, Watering dirt-roads and Household cleaning. Data collection on use demands and patterns, especially on the unexpected additional activities, needs to be continued to guide future multiple use of water projects in Plan's MUS programme.

Introduction

Plan is an international, humanitarian, non-governmental organisation with a vision of a world where all children realise their full potentials. Plan supports communities in the areas of health, education, water and sanitation, livelihoods and child rights. In Ghana, Plan works in some of the most deprived districts across 5 out of 10 administrative regions. Amongst the districts that Plan Ghana works in is the Sissala West District which is located in the northern most part of Ghana on its border with Burkina Faso. The populace is among the most deprived in the country. Over 90 percent of the populace are farmers while other income generating activities include livestock rearing, "pito" (local beer) brewing, petty trading, charcoal burning and Shea butter preparation (Holix Consult, 2003). With the exception of charcoal burning and petty trading, all the income generating activities rely heavily on availability of water especially farming which is their main source of livelihood.

Water sources in the communities are normally hand dug wells and boreholes which are usually inadequate to meet all the communities' water needs. Most of the communities' income generating activities including farming is therefore conducted in the rainy season when water is in abundance. Rain water is utilised by either harvesting as run-off water or by direct precipitation. Rainfall pattern in the area is however irregular and the season last for approximately 4 months within the year. Because of this, farming activities can only be undertaken for this period out of the whole year. Families depend mainly on their farm produce for food and income for all their other needs. The crops mainly cultivated are maize, millet, sorghum, rice, beans, yam, groundnut and cotton. With the exception of cotton which is produced for commercial purposes, the crops are mainly for household consumption.

The harvest during the farming season is expected to sustain a family throughout the year hence part of the produce from the farming season is stored for later consumption. As a result of general poverty in the area, farmers are unable to employ mechanized and improved agricultural technologies to cultivate large plots of land. The food produced is hardly sufficient to sustain families throughout the year as expected. This results in chronic hunger and malnutrition most part of the year making the indigenes susceptible to various diseases.

Also during the dry season, indigenes idle about with nothing to do. Some travel to distant places in southern Ghana in search of rare jobs and end up undertaking menial jobs to cater for their families. Without adequate shelter and protection, some girls and women who find themselves in such positions end up in prostitution with an increased risk of teenage pregnancies and STIs including HIV/AIDS.

Intervention

In view of the aforementioned problems, Plan Ghana's partner communities in the Sissala West district in their community development plans identified dams and dugouts as a priority. Plan Ghana commissioned a feasibility study in 2003 to assess the communities and ascertain the possibility of constructing dams or dugouts in the communities. After the feasibility studies, 8 sites were selected for the construction of dam facilities. Contractors were procured to undertake the works under the supervision of a consultant. Most of the materials used were obtained locally from the communities with the exception of cement, pipes and appurtenant structures and fencing material. Community members supported the construction by providing land for the project, mobilising materials like boulders for riprap on the upstream face of the embankment to prevent crocodiles burrowing into the embankment. They also provided labour for the construction of fencing around the irrigable areas. The District Assembly supported by obtaining the required environmental permits for the project and through project monitoring.

Earthen embankments were constructed across natural watercourses to form a reservoir, with a spillway located at one end of the embankment. 2 intake points are situated within the reservoir connected to conduits underneath the embankment that transports water from the reservoir. To these main conduit pipes are connected lateral pipes that distribute water to the irrigable areas and drinking troughs. On the irrigable area, water is collected in tanks distributed uniformly from which farmers fetch to irrigate their crops. Flow of water through the pipe network is regulated by a number of control valves within the pipe network. The first phase of the project consisting of 4 dams was completed by mid 2006 whilst the second phase also of 4 dams was completed by mid 2007. The reservoir capacities are between 113,400 to 702,350 cubic meters. (Plan Ghana Irrigation Fact Sheet, 2007)

By design, the dams were intended for irrigated farming, provision of water for livestock watering and fish cultivation. Each dam therefore had a fenced irrigable area between 5 to 20 hectares, 2 animal drinking troughs and all the reservoirs were stocked with fish upon completion of construction works. These were expected to improve the nutrition of community members and provide additional income for them through the consumption of produce and sale of surplus produce respectively.

Management and Sustainability

To ensure proper management and sustainability of the dam facilities, communities were supported to form Water Users Associations (WUAs). These were trained in management, operation and maintenance of the dam facilities and tasked with drawing up constitutions governing the use of facilities as well as day to day management of the facilities. Some community members were trained in fish farming and processing. Others received training on proper agricultural practices and animal husbandry practices. Trainings were undertaken with the support of the Ministries of Fisheries and Agriculture who continue to support the communities through provision of extension services and routine monitoring. Plan Ghana frontline staff also provide support to WUAs when the need arise.

Communities drew up criteria for allocating land since the irrigable areas were not sufficient for all community members to have plots. Current plot sizes range from 20 to 60 square meters per individual and farmers pay a levy for a plot per year. Each animal within the community is also charged a specified amount per year for drinking from the facility. A community member also has to obtain a licence from the WUA to operate as a fisherman by satisfying some set criteria and the payment of an appropriate fee. Also, the use of water from the reservoir for commercial purposes attracts a fee. Monies accrued from the charges and levies are kept in a community account and used for maintenance activities on the dams. Currently, over 1,000 individuals are utilising the facilities.

Utilisation

For the first phase projects, the first 2 years of utilisation met with challenges due to the inability of the barbed wire fence to keep animals away from crops cultivated in the irrigable areas. However, about 20% of the irrigable areas were put under vegetable cultivation for household consumption after communities had tried fencing with tree branches. Livestock in these communities and beyond had abundant water to drink. The experience with the fencing in the 1st phase informed the change in design of the fence in the 2nd phase to chain link fencing which has been successful in keeping out animals. This year, the fencing in the 1st phase has also been changed to chain link. The first year of the 2nd phase projects was more successful as communities put over 60% of the irrigable area under cultivation of mainly vegetables during the dry season. Vegetables cultivated include local leafy vegetables, tomatoes, onions, cabbage and okra.

Results, intended uses

During this year's rainy season, the communities cultivated grains on the irrigable areas which are yet to be harvested. Dry season gardening is mostly for vegetable growing. During the last dry season, in 2 communities, farmers were able to produce vegetables in excess of the community needs and sold the surplus to people from surrounding communities. Some community members reported incomes ranging from \$70 to \$600 from the sale of excess vegetables produced during the dry season. The other communities mainly consumed their produce without any surplus.



Photograph 1. Sorghum cultivation on irrigable area



Photograph 2. Cattle at drinking trough

Moreover, all livestock in the communities had water to drink and livestock from other communities also travelled to the dam communities for water. Serious fishing activities have not commenced because most of the fingerling stock had not matured and the communities have been asked to start fishing after the 2nd year of stocking. However, some amateur fisher folk, especially children, undertake fishing activities using hooks and lines mainly for pleasure and household consumption.

Results, unplanned uses

It has been observed that some of the communities are using water from the dams for other activities that were not originally planned for. These include household activities like washing of pots and pans, washing of clothing which they sometimes do at the dam sites and even at times for drinking and cooking even though they have been educated on the harmful effects of consuming water from the reservoirs

Houses in the communities are usually built from bricks moulded from mud. During the heavy rains, parts of some houses collapse and therefore the dry season is always a time for renovations on houses. Communities utilise water from the dams for their construction activities such as moulding bricks and brick-laying. Also construction contractors working in the area fetch water from the dams with water tankers for their construction activities at a fee.

Other intangible benefits of the dams include the recreational and ecological benefits. Upon a visit to the dam sites, especially in the dry season, one is always struck with the coolness of the breeze at the sites and the variety of flora and fauna. Some villagers have been observed swimming in the reservoir especially

during the hot dry season. The sites also hold a potential for tourism as some of the dams house crocodiles and several other animal species.



Photograph 3. Clothes washing at dam site



Photograph 4. Brick moulding at dam site

Lessons learnt

From initial observations, the following lessons have been learnt;

- Due to proximity of projects to communities and presence of small ruminants, appropriate fencing would have improved initial utilisation of first phase projects considerably
- Adequate provision (washing bays, treatment of water for drinking, bricks moulding bays, etc) should have been made for unplanned uses through detailed assessment of water needs at onset of project
- Projects are very capital intensive (An average of \$400,000/dam) and also certain maintenance activities are beyond communities' capacities necessitating external support
- Involvement of government agencies like the Ministries of Agriculture and Fisheries has impacted positively on the projects through support provided to communities
- Proactive leadership at the community level is necessary to ensure sustainability (Apathy and low capacity of some WUAs affects maintenance activities)

Conclusion and Next Steps

The dam projects form a part of Plana Ghana's livelihood program strategy and has demonstrated that if properly planned, water projects have a potential of improving the livelihoods of people considerably. It has been observed that virtually all aspects of a person's life, both domestic and occupational, in a community such as the dam communities are influenced by availability of water. Plan Ghana intends to carry out continual data collection on dams' utilisation and will explore the possibility of treating some water from the reservoirs for consumption of farmers at the dam site.

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