Status of Farmers’ Organizations in Watershed Villages of Mali

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Abstract

In order to understand the functioning, socio-economic and cultural impacts of farmers’ organizations in the watershed villages of Mali a study was conducted to explore and produce necessary information about the presence of farmers’ organization and feasibility of watershed approaches in six villages of Koutiala district. Data collection carried out from April to July 2014 using 21 focus group discussions, 2 stakeholder meetings, face to face interview using interview schedule with the 43 members of all farmer organization in 6 villages. The results revealed that there were 21 farmers’ organizations working in the 6 villages of Koutiala. All the 21 organization had a legal status of farmer organization (FO) and were not business enterprises, of which 17 men FO and 4 women FO. The members had overall vision of mutual help and solidarity. Further, 80% of FOs presidents were men and only 20% were women. Members of were nominated by vote, on the basis of trust, and criteria of literacy, personal behavior and competence. Women FO had no severe penalty rules in comparison to men. The oldest women organization was 14 years while men farmer organization was 56 years old. Men farmers’ organizations cultivated cotton as cash crop. In order to get sustainable development in watershed it is imperative to involve men and women...
members in the farmers’ organisations and provide capacity building training to improve the agricultural production by collective action in terms of access of inputs and technologies.

**Keywords:** Watershed, women farmer organization, men farmer organization, Mali

**Introduction**

Africa host more than 100 million poor people in waterconstrained environments relying on rainfed agriculture and it is recorded that deprivation, hunger and water stress are correlated (Falkenmark, 1986). Most of these people live in a band that extends from Senegal through Mali, Burkina Faso, Niger, Nigeria and Chad (Rockstorm et al., 2009). The current study focuses on one one of those nations, Mali, a massive landlocked country in West Africa, two thirds of which is desert.

Despite exporting cotton and other commodities throughout Africa and beyond, the proportion of the country's poor has declined from 55.6% (66.8% for the rural population) in 2001 to 43.6% (51.0%) in 2010 (IFAD, 2013). Although the vast majority (70 per cent) of this population lives in rural areas (IMF, 2013) where poverty is more prevalent and most people rely on food and income from agriculture. (IFAD, 2013). Malian farmers face multiple issues like excess of water in rainy season and lack of water in dry season. They are dependent on rains for agriculture. In low inputs agriculture systems in the semi-arid zones like those of Mali, the development of water conservation techniques is essential to ensure the sustainability of farming systems (Traore, 2003). Thus integrated watershed management is a method to conserve water and other natural resources, as well as to maintain natural resources sustainably.

A watershed is a hydrologically defined region drained by a network of streams that converge together in such a way that the water leaves at an downstream location through a common point. A watershed consists of soil, vegetation and water, together with people and animals that are incorporated into the system. Sustainable watershed management therefore requires the reasonable use of land and water resources for optimal growth, reducing danger to both natural and human resources. Watershed management is therefore the process of directing and coordinating land use and the use of other watershed resources in order to provide people with the necessary goods and services while increasing the resource base without adversely affecting natural resources and the environment (Wani et al., 2001). This approach according to Germain et al., 2007, is a strategy to manage natural resources with regards to interactions between biophysical resources, social institutions and human activities within the landscape. This approach is also a valid way to avoid dealing with single farmer or community in the watershed since it integrate different disciplines related to social, technical, institutional and political domains.

Retrospectively, many watershed projects have failed in the past due to lack of delivery mechanisms and policies that create awareness and prompt participation of local institutions and communities (Batchelor, 1999). Therefore for a successful watershed program special efforts are required to be made for
community participation through local or farmers’ organization which are different forms of organisations performing various roles such as research, advocacy, economic (production and marketing) and local growth (Stockbridge et. al., 2003). They are formed amongst potential beneficiaries on the concept of collective action. Collective action occurs when individuals collaborate willingly as a group and organize their actions in solving common problems (Shiferaw et al., 2006). In broad terms, collective action may be characterised as action taken by a community (either directly or on behalf through an organisation) to pursue members who are considered to share interest. In broad terms, collective action may be characterized as action taken by a community (either directly or on behalf through an organization) to pursue members who share common interest. (Marshall 1998). Against this backdrop, as involving local communities is considered utmost important for establishing a successful watershed program. A study was envisaged with a title “Status of Farmers’ Organizations in Watershed Villages of Mali”. The aim was to understand the functioning, socio-economic and cultural impacts of farmers’ organizations in the watershed. Hence, a quick assessment study was conducted to produce necessary information about the presence of farmers’ organizations and feasibility of watershed approaches in Mali.

Research Questions
An active farmers’ organization is capable of combating vulnerabilities related to natural resources, poverty, food security and cash needs. It may be assumed that the particular rural organization based on men and/or women may increase the use of the household resources through better utilization of natural resources thereby opening up new opportunities for income generation and food security. Whether this is true or not was the subject to research.

The research questions of the study were:

1. What are the socio-economic and legal profiles of existing farmers’ organizations in the watershed?
2. How does membership influence men and women’s life?
3. How are the farmers’ organizations achieving food security and social security?

Materials and Methods

Site characteristics
As a landlocked country extending over 1,241,328 square kilometers in West Africa, Mali shares more than 7,000 km of border with seven countries: Mauritania, Algeria, Niger, Burkina Faso, Ivory Coast, Guinea a
nd Senegal. Mali is divided into eight regions including one district (Bamako) and 703 municipalities, of which 666 are rural. The population is very young, with almost 65 per cent below the age of 25. Mali is divided into eight regions, one district (Bamako), and 703 municipalities, 666 of which are rural. The population is very young, with nearly 65% under 25 years of age.

Figure 1: Map of Koutiala

The present study was conducted in Koutiala circle which is located in the Sikasso region of southern Mali at a distance of 450 km from Bamako (Mali’s capital). The study focused in the six watershed villages of Kani, Karangasso, Koumbri, Try, Finkoloni and N’Goukan action sites (Figure 1 and 2)

Figure2: Map of villages

There were two stakeholder analyses conducted in April and June 2014 in the village of Kani and Karangasso. The multidisciplinary team conducted diagnostic survey in the watershed villages and
conducted meetings with farmers and elaborated discussions followed by field visit to collect primary information. As a follow up an exploratory study was conducted to ascertain the presence of farmers’ organizations in the watershed villages. All the farmers’ organization in the six villages were assessed during the study period. Twenty one Focused group discussions (FGDs) were conducted initially to ascertain the farmers organizations in each six village and later from each of farmers’ organization three representative farmers (representing small, medium and large farmers) were selected to respond to individual questions at farmer level.

A 'large farmer ' is the one who had a farm size greater than 30 hectares with desired access to agricultural inputs (animal traction, fertilizer input, improved seeds, weed control, and market access) according to the local condition in Koutiala region.

Medium farmer is a farmer with a farm size of between 5 and 30 hectares and the availability of agricultural inputs is limited / insufficient. Marginal farmer or sometimes called 'small farmer ' owns a farm size of less than 5 hectares, with no agricultural inputs available (Birhanu et al., 2014). Thus during the exploratory study face to face interviews, were conducted with 43 farmers of the six villages of 21 farmers organizations. Biophysical maps of the sites were prepared. The primary as well as secondary data were collected. Data were collected from May to July 2014, and initial screening of the data was conducted to verify its reliability. Once data were screened and cleaned analysis was conducted using SPSS 19 for drawing meaningful conclusions.

Results and Discussion

Socio-Economic and Legal Profile of Farmers’ Organization

Commitment qualities of the individual members to the group activities and goals will indicate the degree of collective action across groups. This may include the degree to which individual members relate to other members of the group and whether they contribute or adhere to the values of the group or the extent to which the individual members share a common vision (Shiferaw et al., 2006). It was found that in the six villages there were 21 active farmers’ organizations. As indicated in Table 1 out of which four were women organizations. In general the vision behind all the organizations was to be stronger while being together and contribute to sustainable agricultural development. None of the organizations were business enterprises. Their legal status was farmers’ organization. The main objectives of the organizations in the order are as follows:

1. Solidarity and mutual assistance in case of illness, accident and financial issues.
2. Overall development of villages including agricultural development around crops like- cotton, sorghum maize, millet, and groundnut
Out of the six villages, Kani village had the maximum number of men farmers’ organization (five) and the minimum of two were observed in village N Goukan, which were men farmer organization. As indicated in the table 1, the age of the president varied from 30 to 61 years. Interestingly, the information on maximum members came from the women organization Benkadi, villages of try which had 125 members, while minimum 17 members each were from other women organization Siniyessigue and one men organization Koumbri.

Table 1: Profile of 21 Farmer Organization

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer organizations in each village</td>
<td>21</td>
<td>2</td>
<td>5</td>
<td>3.76</td>
<td>.944</td>
</tr>
<tr>
<td>Age of president</td>
<td>21</td>
<td>30</td>
<td>61</td>
<td>47.57</td>
<td>9.698</td>
</tr>
<tr>
<td>Members in farmer organization</td>
<td>21</td>
<td>17</td>
<td>125</td>
<td>37.38</td>
<td>24.477</td>
</tr>
<tr>
<td>Age of organization since establishment in years</td>
<td>21</td>
<td>3</td>
<td>56</td>
<td>21.38</td>
<td>12.068</td>
</tr>
</tbody>
</table>

Whilst, historically, farmers’ cooperatives were founded during the colonial period in Sub-Saharan Africa (SSA) to encourage the production of cash crops by farmers (Hussi et al., 1993), in the action sites farmer organizations were as old as 56 years (men organization) to as young as 3 years (women organization).

Results (table 2) indicate that on an average large proportion of farmers’ organization (80%) did not include members from other villages. Only 20% of FOs include acceptance of application from members living outside the village. Out of the four organizations only one women organization Koumbri Kokodjan in village Koumbri (3 years old, with 19 members) included members from other villages. Perhaps for want of more members the inclusion was done. While three men organizations: two–FO Kani Noumouna (with 22 years old, and 29 members) and Kani Doudouyoko (with 20 years old, and 25 members) from village Kani and 1 CPCV Koyna (with 25 years old, and 50 members) from village Karangasso included members from other villagers. The reason for exclusion by large majority could be attributed to the fact that the FO did not trust members of other villagers.
Table 2: Inclusion of other villagers

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency (Per cent)</th>
<th>Frequency (Per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3 (17.64%)</td>
<td>14 (82.35%)</td>
</tr>
<tr>
<td>Men Farmer Organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>14 (82.35%)</td>
<td>3 (75%)</td>
</tr>
<tr>
<td>Women Farmer Organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1 (25%)</td>
<td>3 (75%)</td>
</tr>
<tr>
<td>Overall</td>
<td>4 (20%)</td>
<td>17 (80%)</td>
</tr>
</tbody>
</table>

If one person can not be excluded from the benefits offered by others, each person is encouraged not to contribute to the joint effort, but to free ride on others’ efforts (Ostrom, 1990).

Table 3: Gender of the President of Farmer Organization

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17</td>
<td>81.0</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>19.0</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

It was observed (Table 3) that 81% of FOs presidents were men and only 19% women in the studied farmer organizations. Members of farmers organization were nominated by vote, on the basis of trust, and criteria of literacy, personal behaviour and competence. This means that the members ensured that the FOs were managed effectively. The membership was given on the basis of trust. In the event of conflict, the issue was discussed with the president, if he/she was unable to solve the problem then the guidance was sought from the various God father financially supporting the organizations. The office bearers varied from organization to organization. Normally they ranged from 5-14 members comprising of president and his assistant, storekeeper and his assistant, organizer and his assistant, cook, field supervisor who measured dimension of field, controller – who verified the quality of crops production (for example cotton before sale) for consumption etc. The number varied because of age and financial status of the organization. In the case of Kani village, in 5 Farmer (men) organizations woman member had a role of cooking. While in the villages Koumbri, Try and N’Goukan women had organizing and leading roles as they were mainly leading the women farmers group.

As indicated in the Table 4, the main ethnic group living in the six villages is Mianga (90.5%). The rest are Peul (4.8%) and Senefo (4.8%). Members of farmers’ organisations contributed to establishment during creation. In general farmers cooperative/organizations performance in terms of poverty reduction and the provision of essential services has not been outstanding (Lele 1981, Akwabi–Ameyaw 1997). Supported by god-fathers the FO were not business enterprises although they were owned and managed by the members. Here is the illustration- Farmers’
organization of Kani village was supported by Berthe, Dembele families, while Dembele and Daou families support the FO in Karangasso village, FO of Koumbri was supported by Dembele and Traore families, FO of Try village was supported by Coulibaly, Konate and Sanogo families, FO of Finkoloni village was supported by Coulibaly and Traore families and N’Goukan village FO was supported by Dembele families. The God fathers intervened when there was a conflict among farmers which could not be solved initially at the president level.

Farmers’ Organization Impact on Gender, Information Exchange and stakeholder synergies

Farmers’ organization in the six villages worked with network of international and national organizations like Institute d’Economie Rurale (IER) Association Malienne d’Eveil au Development Durable (AMEDI), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Compagnie Malienne pour le Development des Textiles (CMDT), Union des Industries Chimiques (UIC), Service Néerlandais pour le Développement (SNV), Association pour le Développement des Aires Protegées (ADAP), Programme d’Appui aux filières Agricoles (PAFA), Département de Recherche sur les system de Production Rural (DRSPR), Organisation Non Gouvernemental Groupe d’Action et d’Appui au Développement (NGO GAAD), L’Agence des États-Unis pour le développement international (USAID), Agence Française pour le Développement (AFD), Initiative Intégrée pour la croissance au Mali (Institute of Integrated Customer experience Management (IICEM), Operation Eau Koutiala, CAD, Agricultural service of Koutiala.

In each of the studied farmers’ organizations the information regarding different agricultural operation and other new developments were shared by the respective secretary of the organization. It was revealed that the impact of the farmers’ organization (FO) to the family was mostly observed during mutual assistance and happy events (wedding, baptism), unfortunate events (death, illness) and activities requiring labour intensive operations like building of house. The FOs helped member farmers in case of food shortage, financial need and returned the amount in terms of cash or grains. Despite the potential benefits from collective action, however, individual cooperative actions cannot be converted into collective action unless other potential beneficiaries decide to cooperate and do the same (Runge 1981). To achieve that the members were selected on the basis of trust and governed by rules. In general farmers organizations followed rules as mentioned below-

- Regular payment of money contribution
- No delay in meetings
- Respect other member during meetings
- No tampering during meetings
- Raise hand to speak
Fine of 5000 F CFA (approximately $10 USD) is imposed on troublemaker.

The studied Farmers’ organizations governed its members through rules. There were penalty rules, for example – in case of delay for meetings for 30 minutes, 1 hour and absence from the meetings fine was imposed that ranged from 200 FCFA to 2500 FCFA.

It is evident (from the Figures 3 to3b) that women FOs had no severe penalty rules in comparison to men FOs. According to the Figure 3 members of women FOs paid penalty from a range of 150 FCFA for a delay of 30 minutes, while men FOs fine ranged from 100 to 500 FCFA. If the delay was for an hour, the men FOs charged penalty a range from 250 to 1250 FCFA, while women FOs charged no penalty. While four women FOs charged fine 100-750 FCFA members for absence from meetings men FOs charged 30% more than that of women FOs. It shows that FOs members were advised to strictly abide by the rules and regulations. The difference in penalty payment among the farmer organization perhaps could be attributed to more responsibility, higher benefits, and more stakes in FO caused higher the penalty fines.

The maximum penalty among the women organisation was charged by Siniyessigue 750 FCFA women organization of Koumbri village, whose establishment was 10 years old. The oldest women organization was in village Try (14 years old) with a name Benkadi Muso having the maximum 125 members, while the youngest is in Kumbri village, three years old was called as Kokodjan. The other two were Cooperative Bem (N’Goukan village) and Obenekina were eight and nine years old respectively. In case of men farmer organizations, the oldest FO was 56 years old. So, the different penalty rules by FOs indicate the
group decisions which are enforced collectively in each that is a good measure of the common level of action. In terms of gender, women are involved at all forms of agricultural production, but rural Mali tends to be a “men’s world” meaning that in most situations, women are not involved in decision-making (Doumbia, 1999). However, in village Try the women organization Obenkina started with a tontine, then the production of shea-butter and finally they added agricultural activities in order to earn money in production of bean, sorghum, sesame and groundnut. To the 30 member women FO led by 61

![Figure 3(a): Fine amount (CFCA) for mean delay of 1 hour](image_url)

![Figure 3(b) Farmer organizations penalty rules](image_url)
year old woman president, initial support was provided by NGO CAAD for its establishment. The association used a portion of the money to buy bags of sorghum, millet, rice and in case of problems with one of the members, the association helps needy member with food. Women organization used to choose one day and everybody participates in the works in case of labour requirements during agricultural operations like harvesting. In village Finkoloni farmer organizations intervened for water in a project called OPERATION EAU to achieve a pump and four large wells. This suggests that farmers’ associations is having a supportive impact in members lives.

**Food Security**

Below table 5 indicates farmers organizations were using improved seeds of various crops mainly cotton, sorghum, millet, and groundnut. This indicates the presence of existing cooperation between FO and international and national partners helped farmers to have access to improved crop varieties. The following crop varieties were used by farmers organizations. The main cash crop in the studied villages was cotton. The cotton growing farmers in the 16 farmer organizations were getting support from the Compagnie Malienne pour le Development des Textiles (CMDT).

The villages were known for producing cotton, sorghum and groundnut. The villages (table 6) faced competitors in terms of crop production are also listed as follows.

**Table 6: Crops production in the villages and competitors**

<table>
<thead>
<tr>
<th>Location</th>
<th>Known for</th>
<th>Face competition from FO/villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kani</td>
<td>Cotton</td>
<td>Kayes, Soukouba, Karangasso, Zebala, Dogan, Faracoro, Yafoule, N’Benneso</td>
</tr>
<tr>
<td>Karangasso</td>
<td>Cotton, Sorghum,</td>
<td>Kani, Tieresso, Dougouyana, Nitabougourou, Negosso, Vocca and Kagnina, Doukan and Soukouba</td>
</tr>
<tr>
<td>Koumbri</td>
<td>Cotton and Sorghum</td>
<td>Famssasso, Kle, Basso, Nienasso and Köso, Manssasso, Yanasso, and Koutiala</td>
</tr>
<tr>
<td>Try</td>
<td>Cotton, sorghum, groundnut</td>
<td>Chicobobo, Sinsina, Kanico, Beresso, N’Goukan, Mougina and Farakora villages</td>
</tr>
<tr>
<td>Finkoloni</td>
<td>Cotton, sorghum</td>
<td>Wodjina, Koroto, Koloto and Kopola villages</td>
</tr>
<tr>
<td>N’Goukan</td>
<td>Groundnut, cotton</td>
<td>Napoussola, Try, Kanico, Bayan, Nitabougourou Villages</td>
</tr>
</tbody>
</table>

Other crops grown by farmers for self-consumption and sale in local market are –sorghum, groundnut, millet, maize, soybean, okra, pepper, eggplant (jakatou), sesame, bean, rice, etc, which were grown both by men and women. For planting the food crops, seeds are either stored and preserved from the harvested crop or purchased from the local market. The selected produce to be used as seed is harvested and hanged.
inside as seed for next planting. Farmers also informed that they bought seeds from other farmers or from market in case of shortages or in case when they saw, the crop from the neighbour’s crop has more production and fewer insects, pest, diseases attack. Cotton seeds were mostly purchased from CMDT. A bag of 40 kg of cotton costs 1075 FCFA. In general, our study found out that although farmer organizations felt that they had no impact on market, water and crop prices, as they were merely responding to the demand. Thus perceived FO(s) having limited impact on actively participating in the market.

The prices of crop seeds are as follows:

<table>
<thead>
<tr>
<th>Seed/kg</th>
<th>Cotton</th>
<th>Soya</th>
<th>Groundnut</th>
<th>Maize</th>
<th>Bean</th>
<th>Rice</th>
<th>Sorghum</th>
<th>Ground nut pear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price 2014 (FCFA)</td>
<td>26.88</td>
<td>300-350</td>
<td>1500</td>
<td>400</td>
<td>400</td>
<td>250</td>
<td>175</td>
<td>250-500</td>
</tr>
</tbody>
</table>

Despite the farmers believed that there was no impact of FO to the farmer’s crop as each family was responsible for harvest in his/her field. However, the authors opinion was because of the collective cooperation farmer organization were getting credit for seed, fertilizer, pesticide and price for their cotton crop as well as individuals benefitted thru knowledge sharing and exchange. Men farmers organizations were involved in production of crops mainly- cotton and sorghum.

<table>
<thead>
<tr>
<th>Prices and packing cost</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of cotton crop in FCFA</td>
<td>2013</td>
</tr>
<tr>
<td>Price of bag for packing groundnut</td>
<td>250</td>
</tr>
<tr>
<td>Price of bag for packing groundnut</td>
<td>200</td>
</tr>
</tbody>
</table>

There were no processing units in the villages. Men organizations were mainly involved for cotton production, while women organizations were involved in groundnut. The farmers felt they had no impact on marketing of other crop produce. As in case of cotton the price was fixed by CMDT. Perhaps the farmer organization(s) can get optimum price for cereals by storage and selling when the price is good. Nevertheless, producer’s awareness related to financial benefits of collective marketing and bulk sales need to be improved. They should get access to premium markets in order to secure higher benefits use to handle their sales through the association. Women and men had active participation in commercially weekly village fair, thus the FOs had a limited impact in market in terms of profit as even farmers without membership in FO can sell produce to village market. In terms of inputs supplies, credit access, FOs had
an impact on the lives of the farmers. As reported in the study the FOs provided financial assistance of the association to its members in case of temporary difficulties, members refund afterwards the amount due with interest of 100 FCFA per month. The fertilizer and pesticides were provided by CMDT. The crops were sold to the unique buyer CMDT which set the prices it makes one sample contract with farmer and buys all his stock. The members of the 21 farmers’ organization earned money by selling the crops to local market. In case of cotton, the transportation was organized by CMDT in the market places which are in trucks then taken to factories. Till the market from their respective houses the farmers organize transportation in local animal drawn carts. The farmers do not pay any storage cost. Only cotton storage was done in store rooms in all 21 FOs. The food crops like maize, millet, sorghum are stored in attic / granary for storing harvest. The attic is treated with ash for these crops. The traditional practice included treating attic with ash and with a grass named Niokodjalan for sorghum, maize and millet storage. FOs were requested for the labour requirements, if the labour in each of the smallholder farm was insufficient. Mostly, the farmers mainly depended upon their families for harvest. Mainly big farmers afforded more resources.

CONCLUSION

The study conducted revealed that there are 21 farmers’ organizations working in the six villages of Koutiala. Among these five are women led organizations. While men led farmers’ organizations focus mostly on major cash crop (Cotton) and Sorghum and Millet women organizations focus on ground nut productions, which are the cash crops. This implies that gender difference were obvious in the crops that the farmers choose, as the cash crop cotton was men’s crop and their penalty rules are strict in comparison to women who are growing groundnut, which implied better access of inputs, seeds for the cotton crop vis a vis groundnut. Climatic variation in semi-arid regions increases supply and price fluctuation as efficient demand is low and small holder peasants are often unable to sell to buyers outside their local markets (Shiferaw et al., 2006), therefore, farmer organizations are required to be linked with more marketing channels, and such channels are increasingly important for women farmer organization as well.

Our analyses of the six villages in the area of soil and water conservation reveal that there are hardly any rainwater and soil water conservation structures. Local communities lack skills in conserving rainwater and reducing soil erosion. Only recently local NGO AMEDDD introduced the CBT technology to the villages. While the application of CBT helps to prevent soil erosion and conserve soil water few farmers practiced the technology. Lack of its wider application is attributed to lack of awareness in the usefulness of the construction and the higher cost of construction for small farmers. This requires intervention measures to enable local farmers benefit from soil and water conservation technologies, like that of CBTs. It is necessary to conserve the water in the soil and recharge the groundwater resource. Surface water harvesting options may look feasible. However our field observation shows that because of extreme evaporation...
conserving water in open water storage is difficult. At least it’s not cost effective. Techniques to reduce evaporation for example improving infiltration, percolation, covered and lined ponds would be helpful.

Farmers, men and women, should be informed regarding different marketing channels for selling their produce along with capacity strengthening of the farmers associations into viable business enterprises. Involving women and youth may perhaps lead to better impact of technology. There is a need to introduce better oxen, oxen cart in the villages for not only better transportation, but also farmer use oxen for ploughing their fields. For better feeding of the large and small animals there is a strong need to introduce better feeding practices by introducing mangers, forage plantation on the bunds, introducing of fodder choppers as feed is scarce and is wasted by improper feeding, thereby putting pressure on biomass. As crop residue is also used as mulch. Apart from that need was observed for better agricultural implements in weeding, harvesting etc.

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