

EXTENSION ACTIVITIES AND IMPACT ASSESSMENT OF RIVER DIVERSION PRACTICES IN ABA'ALA WEREDA

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1. BACKGROUND

Traditionally, extension is seen as information delivery to farmers. Several efforts were made in the past to deliver information and new technology to the farmers particularly in the highland areas of Ethiopia. However, such efforts were not practised in the pastoral/agropastoral areas of the country where livestock production is the main livelihood. Traditional extension models are often inappropriate for use in pastoral systems. The reasons include: i) characteristics of the complex pastoral physical environment; and ii) wider economic, social and political factors (which are largely beyond the control the pastoralists and the existing extension services).

Based on the idea that the goal of extension is to bring about change that will lead to appropriate development, new integrated extension packages were formulated and implemented for the pastoral/agropastoral areas of Ethiopia. Studies have been conducted in areas where extension practices were not introduced before.

A team of experts from Ministry of Agriculture, Afar Regional Bureau of Agriculture, Melka-Werer Agricultural Research Centre, Afar Rural Development Project and Awash Melka Agricultural Development prepared integrated extension packages for the 1998 cropping season for the Afar National Administrative Region. Maize, sorghum, forage and fattening packages were developed for some selected *weredas* in the region. The packages designed for crops included improved or local crop varieties, fertilisers and water harvesting.

Training was given to development agents by a team of experts before the implementation of the different packages. Although efforts were made by the Zonal Bureau of Agriculture and the development agents to involve the required number of farmers, only three volunteer farmers were involved during the 1998 cropping season using only one local maize variety (*Fetno*) and fertiliser. Most of the farmers were unwilling to use fertilisers. Instead, there was a high demand for herbicides, which were not included in the package.

In the DHP demonstration site, the Bureau of Agriculture tried one local maize variety with fertilisers, two early maturing sorghum varieties, one local *teff* variety, and one local barley variety. In the same season, DHP-Ethiopia demonstrated three improved early maturing maize varieties (ACV3, ACV4 and ACV6), one local maize variety (unidentified), DZ-Cross 37-*teff* variety and three forage legumes (cowpea, *lablab*, and pigeon pea). The project also introduced fruit trees such as papaya, guava and pomegranate at the end of 1998 cropping season. In addition, seventeen animal health workers were trained by the project for one month in 1997.

Extension service in the area is weak. DHP-Ethiopia provides animal health service to the pastoralists, though it is limited to accessible areas. DHP-Ethiopia has been bridging the communication gap among researchers, extension service providers and pastoralists/agropastoralists in Aba'ala since 1996 through: i) repeated discussions with the community to identify problems and seek solutions; ii) greater use of animal health workers who are based within the pastoral area or move with the pastoralists; and iii) allowing the pastoralists a greater say in extension design and implementation.

The study was made to document the existing extension services and assess the impact of DHP-Ethiopia regarding river diversion. The assessment was made through series of contacts with individuals and groups of people who might be affected by the diversion regarding crop yield and any environmental consequences. Discussions were also made with zonal, *wereda* and *kebele* council members as well as extension workers.

2. ADAPTATION TRIALS AND EXTENSION PACKAGES IN ABA'ALA WEREDA

Extension systems that were practiced in other areas of the country did not reach Aba'ala due to insecurity in the past. The area was almost isolated from any national development plan for many years. Two types of extension packages have been conducted in area for the last two cropping seasons (1998 and 1999) by the Bureau of Agriculture and DHP-Ethiopia.

2.1 Bureau of Agriculture

The objectives of the extension packages by the Bureau of Agriculture are: i) to ensure food self-sufficiency; ii) to acquaint the community with improved crop and forage production methods; iii) to reduce livestock feed shortages; iv) to introduce irrigation practices; and v) to build capacity.

Based on the objectives, the following packages were proposed for the area: i) maize for 10 farmers on half a hectare (local, *katumani*, *goto* and A511); ii) sorghum for 20 farmers on half a hectare (local, *serdo*, *denkemash*, 76T1, Tu23 and Gambella 1107); iii) fattening and forage development (Rhodes grass, elephant grass, alfalfa, cowpea and *siratro*) packages for two farmers; and iv) animal health services.

The Zonal Bureau of Agriculture asked farmers to participate voluntarily in the extension packages during the 1998 cropping season. Although few farmers volunteered to participate, some of them resigned due to delay in the provision of necessary inputs. The modalities of payment for seeds and inputs were on cash (25%) and credit (75%) bases. So far, 10 farmers have been involved only in maize package, three during the 1998 cropping season (local variety) and seven during the 1999 cropping season (*katumani*). Most of the farmers were reluctant to be involved in the extension because they did not like to use fertilisers, and they demanded supply of herbicides. However, the Bureau of Agriculture failed to consider their choice.

2.2 DHP-Ethiopia

The objectives of adaptation trials, participatory varietal selection and other extension activities being conducted by DHP-Ethiopia in Aba'ala are: i) to examine site adaptability; ii) to assess perceptions towards improved varieties and identify acceptable varieties; iii) to strengthen animal health services; iv) to improve water harvesting practices; and v) to improve the living standards.

2.2.1 Adaptation Trials a Pre-requisite for Extension Service Delivery

DHP-Ethiopia undertakes the following trials to be used by the agropastoral communities of Aba'ala: i) identification of suitable food legumes (haricot bean, cowpea and groundnut) for sole crop or inter-cropping; ii) adaptation trial of fruit trees (papaya, guava, mango, avocado, banana and pomegranate); and selection of maize variety.

Three released varieties for dryland (ACV3, ACV4 and ACV6) are tested and compared with other three local maize varieties (*Arkibu*, *Berihu* and *Anjo*). The trial is being conducted with and without supplementary irrigation. In addition, one improved *teff* variety (DZ-cross 37) is under trial with and without supplementary irrigation.

The project in collaboration with Dryland Crop Science Department of Mekelle University College, has designed a trial to identify improved maize varieties with

good potential for adaptation and yield. The results of the trials have emphasised the need for locally adaptable early maturing varieties.

2.2.2 Selection of Sites and Farmers

The choice of *tabias* or *kebelles* (small administrative units) for this trial was made together with the Zonal and *Wereda* Bureau of Agriculture. Many farmers were willing to participate in the package because they witnessed the performance of the maize varieties in the project demonstration site. However, the Bureau of Agriculture insisted that the trial should be made together with the regional package, fearing a small number of willing farmers for their own package. This reduced the number of volunteer farmers to only seven.

2.2.3 Approaches

Participatory Rural Appraisal (PRA), focused group discussion, informal discussion and farm visit at the vegetative and reproductive stages of the plant were used to collect data. A workshop on participatory varietal selection was organised for participant farmers where the objectives, methodologies and importance of the trial were discussed in detail in terms of the physical, biological and socio-economic environment.

To compare all the varieties through discussions, a cross visit to each other's plots at the vegetative and reproductive stages were made. Some important pre-harvest traits were taken as data to evaluate the test varieties. For some selected pre-harvest and yield traits (number of cobs per plant, cob length and size) of the test varieties were scored as better, the same or worse by the farmers. Yield per unit area was also assessed to test the agreement between farmers' perception of yield and quantitative data.

2.2.4 Capacity Building

Training was given for 12 Afar women for 10 days on credit service to generate income, care for mother and child, and family planning, as part of strengthening the extension services. The training also aimed at raising the women's awareness on how to organize themselves and participate in development activities.

2.2.5 Paravet Training

As a contribution towards improving animal health services for the agro-pastoral/pastoral communities, paravet (community animal health workers) training was introduced by the project. The trained paravets are currently giving primary

animal health services and they are fully accepted by the community. The community strongly requested for additional paravets to be trained by the project. A refresher course was also given for all previously trained paravets to upgrade their skills. It was also intended to create smooth relationship with the Bureau of Agriculture and Natural Resources (BoANR) by involving the Zonal Animal Health experts as trainers. Discussion was made with the paravets and the Bureau of Agriculture and Natural Resources (BoANR) on how to handle the problems the paravets faced (i.e., shortage of drug supply, lack of credit facilities and lack of good relationship and supervision with the BoANR) during the refresher course.

2.2.6 Water Harvesting

As part of the extension activity, the project assisted local communities in constructing a river diversion dike at Mayshugala River in 1997 to improve flood recession agriculture. Diversion work was also conducted in three rivers (Mayshugala, Aba'ala and Murga) with the help of the community. Beneficiaries in these diversion works are recorded to more than 1,500 households.

3. IMPACT ASSESSMENT OF RIVER DIVERSION PRACTICES

3.1 Background

To improve flood recession agriculture, DHP-Ethiopia has assisted local communities of Aba'ala in constructing river diversion dikes and in strengthening traditional diversion canals. The project together with the community has built a river diversion dike at Mayshugala River.

A study was made to assess the impact of this diversion and other water harvesting practices through discussions with individuals and groups of people who might be affected by the diversion. Contacts were also made with zonal and wereda councils. In addition, personal observation was also made on the diversion site and its flow.

3.2 Farmers' Water Use Management

Although the frequency of irrigation depends on the occurrence of floods in the rivers, the farmers in the area have water use rules. Those who participated in the construction of the diversion dike and in the making of small canals that are re-branched from the main diversion canals have the right to use flood irrigation. Farmers are organised in groups to make sub-water line canals that extend from the main diversion dike and stretched up to the individual farms. Every user opens his canal at the top end to share the available flood. Depending on the amount of

floodwater, upstream users have more access to flood water than down stream users.

If an individual attempts to close the canal of another individual and use the water for himself, he will be fined by the local water use committee up to 50Birr (about US Dollars Six). Women headed households are allowed to irrigate their farmland using the nearest canals. However, they are supposed to co-operate in the making of water canals.

3.3 Advantages and Disadvantages of Flood Irrigation

As the amount and distribution of rainfall over the growing period of long season crops is very low, the crops planted in the lowland areas of Aba'ala Valley, particularly sorghum and maize suffer from moisture stress during the later stages of growth (from seed filling to full maturity). To overcome this problem, people traditionally divert floodwater as supplementary irrigation.

Surface flood irrigation plays a key role in alleviating the existing moisture stress problem in the area. The frequency of irrigation depends on the occurrence of flood in the river. The floodwater is not held in reservoirs; rather it is diverted and used immediately during the rainy season. The effects of surface flood irrigation are given in table 17.

Table 17. Positive and negative aspects of flood irrigation

Positive aspects	Negative aspects
Moisture deficit problem is alleviated	Soil nutrients are leached due to excessive flood water
Enough flood water enables farmers to cultivate previously uncultivated land	Uncontrolled excess floodwater causes soil erosion
Alluvial soil from highlands is deposited and fertility of the soil may be increased	There is an increase in the population of annual, biennial, and perennial weeds whose seeds are brought by floodwater
	The top soils of the area may be buried by sand and gravel
<i>Cynodon dactylon</i> and other grasses are grown in the grass strips and around the fields, which are used for livestock feed	Due to lack of drainage system, excess flood water creates water logging and may reduce growth of crops

3.4 Farmers' Attitude

Generally, yield is a function of many factors, such as soil fertility, rainfall (amount and distribution), resource management practices, quality of seeds, weeds and insect pests. Although the soils of the area are fertile, there are serious moisture stress problems; thus, water is considered a priority. Those farmers who use floodwater from the Myshugala river diversion dike indicated that their crops were in good condition and that the yield has increased dramatically. The crops supplemented with floodwater in the area are mainly sorghum, maize, *teff* and barley.

Beneficiaries indicated that there is significant change in yield since the intervention. In addition to this, abandoned cropping fields were cultivated because of enough supply of floods. As a result, the farmers have now a positive attitude in this regard. There has been no negative effect on human health. Moreover, the surrounding environment has improved, such as increase of grazing land.

3.5 Constraints

There was a problem of sedimentation in the upper part of the river diversion dike, which is filled by sands and stones. This is due to high floodwater coming from the highlands of Tigray during the rainy season. The river diversion dike was partly broken in July 1998.

The sustainability of the diversion dike is under question due to the high floodwater, which results in sedimentation. The farmers, DHP and the Wereda administration need to cooperate for its maintenance. Some of the crop production constraints in the area can be minimized through development interventions such as water harvesting practices by both governmental and non-governmental organisations with full participation of the community.

4. CONCLUSION

Extension service in Aba'ala is weak. There are many reasons to encourage farmers'/pastoralists' participation in the process of agricultural research and technology development. Solution oriented approaches towards the farmers' felt needs have a greater potential for adoption and for achieving desirable changes in the farming system. However, these require a joint effort among researchers, extension workers and farmers/pastoralists. Many pastoral development projects fail due to the way in which pastoral problems are identified and due to the lack of appropriate institutions to address the problems. Pastoral/agropastoral extension should aim,

therefore, at the provision of health, education, veterinary services, water harvesting, and other services to improve production in the pastoral areas.

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