

Integrating Agro Enterprise Approach and Small-Scale Irrigation: Experiences of CRS/Ethiopia in Water Development and Management

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Abstract

This paper highlights CRS/Ethiopia's experiences in small-scale irrigation development and management and how an agro enterprise approach is integrated to small scale irrigation to make irrigation schemes profitable and sustainable. CRS/Ethiopia implements its development interventions in an integrated manner and small scale irrigation is one of the components of the integrated watershed management approach. The type of small-scale irrigation developed or to be developed depends on availability and type of water sources, topography of an area and investment required. CRS/Ethiopia and its partners developed and promoted shallow well lift irrigation, river diversion and direct motorized pumping from rivers. In areas where rivers, springs and under ground water is not accessible, water harvesting structures were developed to serve as sources of irrigation. Motorized water pumps and treadle pumps are used to lift water from shallow wells and rivers. In areas where volume of water is limited and spring and streams flow at bottom of a valley, storage structures are built on high elevation places. Water is pumped to the storage structure using motorized water pumps and then transported to irrigation fields by gravity flow. Spate irrigation system is also practiced in Dire Dawa areas. Beneficiaries participate in identification, construction and maintenance of small scale irrigation scheme through contribution of labor and provision of locally available materials such as stone, sand and gravels. It is believed that such participation enhance empowerment of the community and sustainability of the irrigation scheme. One of the possible reasons why some small scale irrigation schemes are not successful is that production on this scheme may not respond to market needs. CRS/Ethiopia and its partners are

making an effort to address this problem through supporting farmers respond to market demand. In areas where small-scale irrigations were developed, market opportunity identifications were carried out and based on the results of market study tomato, potato and onions were selected and promoted on irrigation schemes. Relevant government institutions were involved in market opportunity identification. CRS/Ethiopia and its partners encourage farmers to get organized into agro enterprise groups and play facilitation role in connecting farmer groups to market actors. Water user associations were organized and assumed responsibility to manage the irrigation water. Water user associations perform water management functions and may also engaged in purchase of inputs and marketing of outputs.

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Introduction

Among many other factors availability and access to water is a crucial constraint limiting agricultural productivity and growth in the semi-arid and arid parts of the country. The semi-arid and arid areas account for more than 63% of the country and expanding because of climatic changes. Recurring drought is one of the root causes of the food insecurity situation in the country. A number of climatic induced shocks occurred in the past has eroded the meager assets of rural population and exposed them to malnutrition, hunger, food insecurity and in some cases for migration. As a result of recurring drought, on average, 6.2 million people required external support during the period from 1995 to 2000. A host of factors contributed to the growing problem of drought, vulnerability and food insecurity. A major challenge in moisture stress areas is how to reverse the effect of drought and ensure adequate food supply for the rapidly growing population without degrading the limited natural resources.

Ethiopia's agriculture is characterized by smallholder farming and production exclusively depends on rainfall and productivity on smallholder farm is low. Development of the agricultural sector is central to combating hunger, food insecurity, reducing poverty and generating growth (Mekuria, 2003). The low input agriculture widely practiced by millions of smallholders in the country hinder the agricultural sector to meet desired objectives. The amount of rainfall received in semi-arid part of the country is insufficient and erratic in nature. This put agriculture production and the life of people depending on agriculture at risk.

Despite large water potential and irrigable land, irrigation technologies have not been exploited. Very insignificant number of smallholder practice irrigated agriculture. Among ranges of options for increasing agricultural production in Ethiopia, particularly in semi-arid and arid areas, application of irrigation and efficient use of water resource deserve great attention. Smallholder farmers have limited access to irrigation technologies due to lack of awareness, know-how and access to capital for irrigation development.

Catholic Relief Service/Ethiopia has adopted small-scale irrigation as one of its strategies in supporting the poor and disadvantaged groups to support themselves. This strategy goes with Ethiopia's food security strategy and water sector strategy in tackling drought through use of small-scale irrigation. The strategy emphasizes efficient allocation, transfer, storage and efficient use of water resources (SDPRP, 2002).

CRS approach in rural long term development interventions

CRS/Ethiopia is a faith based humanitarian organization. It was established in 1943 after the Second World War. It started its operation in Ethiopia in 1958 and assists persons on the basis of need, not creed, race or nationality. The organization's strategic goal is to reduce the overwhelming poverty in Ethiopia by promoting food security and strengthening civil society (APSA, 2004). CRS/Ethiopia works with eight local church, partners as well as three secular partners, other NGOs, different government offices and donors. CRS/Ethiopia developed expertise in managing large food aid dating back to the 1984 drought. It also developed expertise in agricultural recovery from disaster and long term development programs particularly in agriculture, natural resources management, water and sanitation and health.

Basically CRS/Ethiopia's agriculture, natural resources management, water and sanitation interventions build on four pillars and implemented in integrated manner in a way to reinforce each other in addressing poverty and food insecurity problem. The overall approach is based on an integrated watershed management (IWM) framework, which looks to integrate sectoral activities (agriculture, natural resource management, health & nutrition, water and sanitation) within a given watershed in order to maximize impact on household food security of rural families living in extreme poverty (DAP document 2003).

CRS/Ethiopia long term rural development interventions are aimed at increased crop production and productivity, improved soil and

water conservation, improved livestock feed management, sustainable and productive land-use planning, improved potable water resource development, improved family health, increased and diversified household income and strengthened stakeholder partnerships.

Types Irrigation Schemes Promoted by CRS

CRS/Ethiopia and its partners develop and promote different types of small scale irrigation. Type of small scale irrigation schemes developed and promoted depends on sources of available water, topography of the area and investment required to establish the scheme. The range of irrigation developed by CRS includes:

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Shallow well lift irrigation scheme

Ground water is widely used for irrigation in India, Pakistan, Sri Lanka and other Asian countries (Merry, 1997). This is rarely practiced in Ethiopia because of weak infrastructure development, limited capital and lack of awareness. More recently CRS/Ethiopia and its implementing partners started developing and promoting use of ground water in areas where this is technically possible and financially feasible. These types of schemes were developed in areas where ground water is found close to surface (within a shallow depth of 3-8 meters) and water is lifted to surface either with treadle or motorized pumps. Once the water is lifted to surfaces it may directly transported through canal and crops irrigated using furrow irrigation. The second option is that water is pumped to water storage structure and transported to different fields by gravity flow and water application is done using furrow irrigation method. More recently use of sprinklers demonstrated to farmers and its

technical feasibility and cost comparison with other methods is being tested.



Figure 1. Water storage constructed at high elevation at Goro Gutu woreda, East Haraghe Zone

River diversion

This is a system applied in areas where streams/rivers flow on a surface and costs for partly blocking and raising the stream bed level for easy conveyance of the water through intake structure is reasonable and affordable. Water is transported to irrigated field through gravity flow.

Direct pumping from rivers

Such practice is put in use along rivers/stream flowing on surface and suitable for pumping.

Spring development

In most cases springs are found at the foot of a hill. In such case water is pumped to storage structures constructed at high elevation areas. From storage structure water is transported to irrigation fields by gravity flow. In cases where command area is below the spring points water is transported to irrigation field by gravity flow and furrow or basin irrigation methods are used for irrigating crop.

Spate irrigation system

This is a system where flood-water is diverted to crop field and used for irrigation. The method is applied in cases where irrigated fields

are located at lower part of watershed and rainfall is received at upper part of a watershed. Such system is practiced in Dire Dawa Administration Council. Under this system farmers have limited control over the water. They only make use of opportunity of using passing by water



Figure 2. Construction of diversion weir and main canal at Harbu small-scale irrigation

Drip irrigation

In areas where rivers, springs and under ground water is not accessible, rain water harvesting structures were developed to serve as sources of irrigation. Drip irrigation was promoted along with the development of water harvesting structures. CRS/Ethiopia supports farmers to access drip irrigation kits and train them on how to use drip irrigation kits.

Multiple use of water

CRS/Ethiopia promotes multiple use of water, where productive use of water is an important component of water development schemes. Spill over water from drinking water points and water from wells are used for vegetable garden production. Under this intervention, women, children other disadvantage group who efficiently manage and make efficient use of limited water are supported.



Figure 3. Canal reinforced by cemented wall to reduce water loss, at Metta woreda, East Haraghe Zone

Beneficiaries' participation in small-scale irrigation development

CRS/Ethiopia, beneficiaries participate in the construction of scheme through contribution of labor and locally available materials such as stone, sand and gravels. Maintenance of small-scale irrigation scheme is a routine work, which must be done to keep an irrigation scheme working properly.



Figure 4. Community sensitization before project Implementation

Beneficiaries are responsible for undertaking maintenance works such as canal and drain clearing, repairing farm structures and lubricating pumps and pump accessories. Once construction is completed farmers started using the scheme, CRS/Ethiopia handover the scheme to the community to allow them fully manage it by their own.

Irrigation water management

The major bottlenecks for sustainability of small-scale irrigation project are profitability, water management and infrastructure maintenance. CRS/Ethiopia and its implementing partners organize and involve beneficiaries in management of schemes from the initiation of small-scale irrigation development. It also engages relevant authorities who oversee and provide technical support after the project is terminated and a scheme is handed over to the community. The whole responsibility of managing small-scale irrigation lay with beneficiaries.

For effective water management water user associations (WUA) consisting of all farmers owning land within command area are established. WUAs formulate and apply rule and regulations (by-law) in managing irrigation scheme. A general assembly of WUA elects committee members responsible for allocation of time when each individual member irrigates his fields. The WUA engage in avoiding disputes among the beneficiaries that may arise due to inappropriate water utilization. The association is also responsible for coordinating maintenance, facilitation of extension activities, collection of maintenance fee¹ and manage savings for future investment and replacement tools. They may facilitate land exchange/lease/sharecropping² among members or other interested household who have insufficient or no labor to manage irrigated land. Committee members serve the

association on voluntarily basis and there is no extra allocation of time or payment for the service rendered. In case of schemes where traditional irrigation is rehabilitated and upgraded, irrigation water management builds on indigenous water management practice of the area.

In schemes where pumps are used to lift water, pump care takers are identified and trained. Pump care takers are responsible for operating and undertaking simple maintenance works. Such individuals are compensated by WUA for their extra services they provide for WUA members.

A supportive policy and legal environment is crucial for the sustainability WUA (Merrey, 1997). Most of the WUAs established are legally registered with respective Cooperative Promotion Offices and they have legal status. They are in position to sue or sued for disputes may occur during the business interaction with other market actors. Some WUA joined farmer cooperative unions and are able to access inputs or output markets through the farmer cooperative unions.

CRS/Ethiopia and its implementing partners train WUA members in irrigation water management and conservation, roles and responsibility of groups, how to apply by-laws, vegetables production and seedling raising techniques, record keeping, financial management and marketing aspect. It arranges exchange visits to share experiences and learn from successes and failures of others. CRS/Ethiopia also facilitates and provides technical supports to WUA to enable them access inputs and new technologies.

Sustainability of small-scale irrigation scheme

Community participation is critical all along the way from project identification to implementation for sustainability of small-scale irrigation scheme. Small-scale irrigation is sustainable if voices of beneficiaries are heard and their interests incorporated in the design, and they participate in construction,

¹ A case was observed where beneficiaries pay water fee at Harbu, South Wollo

² At Harbu, South Wollo Zone, small-scale irrigation scheme, 26 farmers have plots in the command area. These farmers have leased out part of their irrigated land and the number of beneficiaries increased to 73.

management and operation of the scheme. Contribution for operating cost and setting aside for expansion and replacement costs show beneficiaries commitment. In kind- labor, stone, gravel- contribution by beneficiaries also reflects commitment. Such participation and commitments are important in enhancing sustainability of the scheme beyond the project life as it creates more interest and empower them in deciding on their future better life.

One of the possible reasons why some small-scale irrigation schemes are not successful is that farmers may lack know-how of management of irrigated production; and production on this scheme may not respond to market needs. CRS/Ethiopia and its partners are making an effort to overcome this problem through training farmers on technical aspects of irrigated agriculture and advising and supporting farmers respond to what market demands.

This is to underline that CRS/Ethiopia and its implementing partners do not focus only on production aspects. They give due attention to where, how product produced on irrigation schemes are marketed. Efforts are made to link production with market in order to increase income of beneficiaries. It is our conviction that such effort has great impact on sustainability of irrigation scheme.

Agro-enterprise development

The agro enterprise development strategy is developed by CIAT to address the entrepreneurial development needs of institutions that support rural communities. The approach is aimed at developing and strengthening mechanisms that link small-scale farmers to local, regional, national and global markets. The concept of agro enterprise development entails the process of working with smallholder producer to design and set up new income generating opportunity that take into account the process from production to consumption. The approach provides a means of developing new business opportunities for rural communities and integrating subsistence farmers into market led agriculture. This approach advocates production decision

governed by the market. It provides method of addressing poverty and opportunity to find ways of stimulating demand for technical and social innovations and helps to identify areas that require support from research, finance and local policy (CIAT undated).

CRS/Ethiopia entered into an innovative Agro enterprise Learning Alliance in 2002 with International Center for Tropical Agriculture (CIAT) to strengthen its market-led agriculture interventions. It also established learning alliance with the national agricultural research system particularly with Malkassa Agricultural Research Center and Haramaya University. CRS/Ethiopia implements the agro enterprise development approach in all of its development interventions to improve income of its beneficiaries. Territories, market opportunities and market chains were identified. High value vegetables such as potato, onion, tomato and cabbage were identified to be produced on irrigated fields.

CRS/Ethiopia and its implementing partners are helping smallholder producers organized into self help groups to access and evaluate new



Figure 5. Types of vegetables and fruits produced on irrigation scheme and vegetable garden

technologies, acquire or produce needed inputs such as seed and engage in collective marketing. In all small-scale irrigation made operational interested self help groups were organized and started producing for the market.

In all small-scale irrigation developed by CRS/Ethiopia WUAs have multiple functions. As their names implies they are responsible for irrigation water management: allocation, handling of disputes, management of and collection of maintenance fees. They are also agro-enterprise groups who make joint decisions to produce and market an enterprise that has market demand. The association facilitates access to different business development services (extension, research-technologies, credit etc.). The association also identifies and facilitating linkage with buyers arranges transport facilities. The last function of the association is not well developed yet. At present, few WUAs engaged in procurement of agriculture inputs like seed fertilizer pesticide and marketing of agricultural products

One possible way to make small-scale irrigation profitable and sustainable is through connecting users to market. CRS/Ethiopia took an initiative to link farmers with different market actors and business service providers. CRS/Ethiopia and its implementing partners play facilitation role in linking farmers to market. To date linkage has been created with private traders, cooperative unions and exporters for onion, tomato, and potato producers. These producers are supplying products to domestic and international markets. For instances potato and onion producing irrigation water user groups in East Haraghe supply their produce through cooperatives and private traders to exporter who export these commodities to Djibouti market. There are areas where potato and onion production target domestic market. CRS/Ethiopia and its partners undertake market study and identify market opportunities and constraints in the market chain. In collaboration with national and international institutions CRS/Ethiopia and its partners train and advise farmers to produce quality product that market needs.



Figure 6. Sorting and packaging of potato for market Karsa wored , East Haraghe Zone

Impact small-scale irrigation scheme coupled with AE approach

Despite a number of constraints, there are evidences that underscore improvement in the income of farmers who practice irrigated agriculture. Small-scale irrigation beneficiaries participated in agro enterprise development has raised their income. For instance, in kersa wereda, East Hararge zone 80 farmers were organized into four sub-groups and produced potatoes and onions using irrigation scheme developed through financial and technical supports of CRS/Ethiopia. Members of this group earned an income ranging from 3,000 to 11,525 birr/household. The farmer who earned a gross benefit of 11,525 had spent about 2500 birr for fuel. Similarly, in Dugda Bora woreda, East Shewa Zone, beneficiaries who produced tomatoes and onions, using irrigation, obtained income ranging from 3000-7000 Birr/household. In Adama woredas of East Shewa zone, 40 farmers organized into group are able to generated income of 600 to 5300 birr per household per one production season. As shown in Table 2 irrigation user have obtained gross income ranging from 250 to 7486 birr per household per one production season.

Some of the beneficiaries constructed a corrugated roofed house, and invested on productive assets such as farm tools, inputs and

livestock (oxen, cows and goats). They claim that their life have changed and able to feed their family and afford to send their children to school.

Conclusions

Application of irrigation technology depends on access to water resource from surface (rivers, dams, ponds etc.) and ground water. Moreover, irrigation technologies require large investment that can not be readily made available by individual household or group of household unless the groups get access to financial sources. Irrigation schemes also require group action and formation of group call for dedication and commitment from the side of members.

CRS/Ethiopia experience shows that coupled with agro-enterprise development, small-scale irrigation based production have great impact

on changing, for good, the lives of the poor and disadvantaged groups. Involving beneficiaries in the design and implementation of small scale irrigation scheme contributes towards sustainability of those schemes.

Small-scale irrigations contribute a lot in changing the life of people practice them. This has been documented by humanitarian and government institutions. Given the size and growing rural population this will not take us no where, if we operate at the current pace. A way forward away from food crisis in Ethiopia lay with increased use of irrigation. We should examine scope of our interventions also look far beyond the small-scale irrigation which is more suitable on the highland to large scale schemes in vast and under exploited land and water in the lowland areas.

Table 2. Income obtained from harvest of vegetable and others for a single season (Water Action progress report, 2005)

| <i>Crop</i> | <i>No. of beneficiaries</i> | <i>Area (ha)</i> | <i>Yield/ha (qt)</i> | <i>Average income/hh (birr)</i> | <i>Total income (birr)</i> |
|-------------|-----------------------------|------------------|----------------------|---------------------------------|----------------------------|
| Tomato | 29 | 3.5 | 150 | 2716 | 78,750 |
| Onion | 7 | 3.5 | 75 | 7486 | 52,400 |
| Pepper | 43 | 2.0 | 10 | 465 | 20,000 |
| Cabbage | 2 | .683 | 120 | 250 | 500 |

Possible ways of expanding small scale irrigation

- Focus on simple and low cost small scale irrigation type (mainly on drip and sprinkler)
- Encourage and promote group action
- Availability of credit and ease of access
- Sustained extension support
- Institutional capacity building- training for farmers and other market actors
- Commitment of government in providing technical and financial support

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