Flood-based/Spate Farming, a Practical Move Towards Ensuring Food Security in the Jarso Community, Konso Woreda, Southern Nations, Nationalities, and People's Regional State

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Abstract

The study has focused on the assessment of inputs, outputs and the outcomes of the project in terms of food production (availability) and access to food indicators at community and household (HH) levels. The question of project sustainability on outputs and outcomes is also a key issue addressed in this research. The key dependent variables explained are improvement in HH food production and access to food and the sustainability of project outputs. Endowments (availability, quality and size of farmland), rainfall, spate irrigation schemes and their management, supply of modern agricultural inputs, and asset building (livestock, income, food crop) were assessed as factors affecting the key variables. The study found that the spate irrigation beneficiaries of Jarso kebele experienced improvement of HH and community-level food security through modern spate irrigation structures and capacity building activities. Making the current food security status sustainable is identified as a challenge ahead. The chapter concludes with recommendations based on lessons learned from the case study.

Key words: *Food security, spate irrigation, food aid*

1. Introduction

1.1 Background

1.1.1 Woreda context

Konso Special Woreda is located in the Southern Nations, Nationalities, and People's Regional State (SNNPRS) of Ethiopia. According to FDRE Census Commission (2008:79), population is 234,987 out of which 95% dwell in rural areas and survive by subsistence farming. According to a baseline survey conducted by a consultant in 2006, the average family size was estimated at 6.5, higher than the national average (4.8). The special woreda consists of 48 rural and two town 'kebeles'[1] (Nuri Kedir and Associates, 2006: viii & ix).[2]

[1] 'Kebele' denotes lowest administrative unit (Constitution of Tigray, article 83).

[2] Nuri Kedir and Associates is a private development consultant firm commissioned by Norwegian Church Aid to conduct a base line survey in Konso Special Woreda.

Konso lies within the semiarid belt of Southern Ethiopia. An attempt has been made to collect medium-term (18 years) rainfall data from the National Meteorology Agency (NMA). The rainfall in Konso area is bimodal; the main rainy season falls in the months of March, April and May, with short rains occurring from September to November. The higher altitudes (Karat area), usually receive an amount of annual rainfall that ranges from 450 to 1,050 mm. Though reliable information is not obtained for lowland areas, it would be assumed that the lowlands receive below 450 mm of rainfall. The rains are erratic, with heavy and short rains followed by long dry seasons. The rainfall distribution across the years under consideration was highly variable. The average maximum and minimum temperatures for the last ten years (1998-2007) were 28.3 and 17.4 °C, respectively. The main economic base of the community is subsistence agriculture and the coverage of basic services such as health, potable water supply and primary education is low at 27, 34 and 35%, respectively (EECMY/SWS/DASSC[3] 2006: 8 and 9).

The average landholding for the households included in the sample is less than the national average of 1 - 1.5 ha. About 82% of the households experience food shortages even in a normal production year; food shortage appears to be prevalent in Konso Special Woreda. Continuous losses in the productivity of soil, erratic rainfall and low productivity, coupled with rising population growth have been continuously accelerating the deterioration in the food security status of the community (Nuri Kedir and Associates 2006: viii, ix).

Konso Special Woreda can be categorized among the woredas of Ethiopia that encounter persistent drought in combination with other factors resulting in chronic food insecurity.

The Ethiopian Evangelical Church Mekane Yesus (EECMY), the implementer of YFSSIFSP [4] has been actively engaged in food aid support for the drought-affected population of the woreda. Prior to the current project, the food aid support had rescued the lives of several thousands of people.

1.1.2 Project intervention area background

Jarso is the largest and most populous kebele in the woreda composed of 16 villages. Concerning the households and population, consistent and reliable information was not obtained. All the assessed secondary sources have presented different figures. Due to such controversies, this chapter used figures reported by the project office for this study. Accordingly, the total numbers of households and population are 5,000 and 32,500, respectively. According to the HH survey conducted for this research, only 35.5% of the respondents reported that they read and write; the majority (64.5%) are illiterate. The average HH size is 6.9, slightly higher than the woreda average (6.5). Out of the total population of sample HHs, 49.8% are found in the age category of 1-14 years, 47.2% in the age category of 15-64 years and 3% in the category of 65 years and above. This reflects the typical demographic structure of developing countries where the old age population size is very limited and the young (child) age population is higher.

[3] EECMY is a faith-based organization with a Development and Social Service (DASSC) wing in its organizational structure, commissioned for development work in the country.

[4] YFSSIFS stands for Yanda Faro Segen Sewate Integrated Food Security Project, which is the title of the project studied.

The main means of livelihood of the Jarso community is mixed farming through subsistence agriculture. Off-farm activities such as traditional beekeeping and weaving have been carried out to augment HH income. The latter is more common in Etikle, Geldime and Kube villages. Prior to the project, the community had suffered serious food stress and survived mainly by external food aid. In spite of the food insecurity problems in the area, Jarso is endowed with a huge potential of irrigable fertile land in the Yanda-Segen Valley and two seasonal flooding rivers crossing the land. As common to other inhabitants of the woreda, the Jarso community dwells in highland villages and is used to walking over 30 km to work on their farm plots in the lowland plain.

YFSSIFSP implementation was commenced in 2001 at a pilot level with the financial backing from the international NGO, 'Bread for the World' (BftW). The pilot phase was successfully implemented and achieved promising results that motivated the donor to extend its support for the next phase.

The title of the project is 'Integrated Food Security Project' as it is composed of diverse components. The main activities include irrigation scheme development, potable water supply, on-farm and off-farm income-generation activities, preventive health services, training in capacity-building, and maintenance and management of natural resources. The interventions aimed at promoting sustainable agricultural production, generation of income, access to markets and basic social services, as well as the improvement of nutrition. The number of the total spate irrigation beneficiary HHs is 2,200. Though the main focus is on spate irrigation, infrastructure development and agricultural extension, other activities stated above also have vital importance towards the intended outputs and outcomes.

Problem statement

Poverty alleviation and food security have been worsening over time; these are located among the ongoing development challenges of the government (Diao and Nin Pratt 2007: 206). Three decades back, droughts occurred at an interval of nearly ten years, but since the early 1980s, the country has experienced seven major droughts, five of which resulted in famine in which thousands of people perished. Recently, drought incidences have occurred at short intervals of time and are becoming common in many localities.

'Chronic food insecurity' (continuous inadequacy of diet resulting from lack of resources to produce or acquire food) and 'transitory food insecurity' (a temporary decline in a household's access to enough food) were mainly prevalent in northern and eastern parts of the country. But recently, food insecurity has expanded to other parts related to drought and contribute to increased frequency of famines, and intensity and numbers of the affected population. The factors that have contributed to such a deteriorating situation may vary from region to region or from one locality to another. Lack of rainfall, fragmented landholdings, dominance of subsistence production units, low adoption of improved production inputs and techniques, incidence of pests and diseases, dependence on rainfall (low irrigation development) and inappropriate policies are among the major threats to the country's agricultural development and food security at both national and local levels (Webb and Von Braun 1994; Adnew 2003: 14;).

The current economic policy of Ethiopia has aimed at two main issues: rapid and sustainable development and fair distribution of development benefits among citizens. The main strategy adopted to realize this policy is the Agriculture Development Led Industrialization (ADLI). Agricultural growth is accepted as a guarantee against food insecurity in the country. Food security strategy is also in place focusing on three important aspects: increasing food and agricultural production, improving food entitlement and strengthening the capacity to manage risks (Ramakrishna and Demeke 2002: 128).

As Morss and Gow (1985: 217) argued, "the principal objective of development initiatives is to generate self-sustaining improvements in human well-being". Despite the fact that a number of NGOs were involved in humanitarian aid and development activities in the Konso special woreda, the livelihood situation of the residents did not show any improvement. Lack of rainfall for a season may result in a profound disorder of people's way of life. The Ethiopian Evangelical Church Mekane Yesus has implemented an Integrated Food Security Project in Jarso kebele (one of the badly drought-hit 'kebeles' of the woreda) for the last 7 years. The money invested by the project was very significant at over Eth. Birr 12 million (US$1.2 million). The project performance reports indicate progressive and remarkable achievements of the implementation. The question is has the project intervention really brought change in breaking up the deep-rooted food insecurity? Is it worth being scaled up as 'a success story'? Are the improvements brought by the project intervention in Jarso area sustainable? What is needed to reverse the structural food deficit of the community and the persistent drought effects on the Jarso community?

This led to research with sound facts from the ground to answer the questions. The study has focused on the assessment of inputs, outputs and the outcomes of the project in terms of food production (availability) and access to food indicators at community and HH levels. The question of project sustainability on outputs and outcomes is also a key issue addressed in this research. The key *dependent variables* explained are *improvement* in *HH food production* and *access to food and the sustainability of project outputs.* Endowments (availability, quality and size of farm land), rainfall, spate irrigation schemes and their management, supply of modern agricultural inputs, and asset building (livestock, income, food crop) were assessed as factors affecting the key variables. Figure 10.1 shows a schematic representation of analytical framework.

Figure 10.1. Schematic representation of analytical framework.

Source: Author's own work.

2. Research Methodology

Konso woreda in general and Jarso kebele in particular, which hosted the project under consideration, were purposively selected as the study area. The issues considered for purposive selection were the following. First, Konso woreda is among the woredas severely affected by food insecurity in the country, whereas, Jarso is among four of the worst affected kebeles (Jarso, Aba roba, Gasargeo and Doha) by food shortage in the Konso woreda. Second, there were time and financial constraints to consider more areas. In fact, several factors might have affected the realization of food security in the project area such as availability, size and quality of land, dependence on rainfall, human capital, infrastructure, supply of agricultural inputs, agricultural extension services and stock/asset building including money. Nevertheless, certain explanatory variables such as farmland, rainfall, irrigation scheme development, irrigation scheme management, agricultural inputs and extension services and stock/asset building were selected due to time and resource constraints. I believe the data and the analysis from these data served the objective and answered the research questions.

2.1 Sampling procedure

HH was designed as an important unit of analysis so that an HH survey was employed to collect data before and after project intervention. The information was collected on the amount of production, landholding size, and assets such as livestock. As indicated earlier, Jarso kebele is composed of 16 villages out of which eight are direct beneficiaries of spate irrigation. The total number of HHs directly benefiting from spate irrigation is 2,200. Out of eight spate irrigation beneficiary villages, one is located very far from others so that only seven villages were considered and the total number of the HHs of these villages (1,459) was taken as a sampling frame. The researcher determined the sample size of only 93 households with a confidence level of 95% and a confidence interval of 10 due to time and resource constraints. Out of the seven villages, the samples were drawn from each village depending on the proportion of HHs each village had in relation to total HHs. Finally, a systematic random sampling method was used to select HHs for a semi-structured questionnaire.

In this survey, a two-stage sampling was used. First, purposive sampling was applied to select the study woreda and kebele, as well as villages. Second, systematic sampling was applied to pick up the 93 sample HHs.

2.2 Methods and tools employed for data collection

To minimize the problem of the lack and reliability of information, different methods (triangulation) of data collection were employed. Accordingly, a semi-structured questionnaire was designed and implemented to collect HH information on food production, stock/asset building, farmland size, irrigation water use, supply of improved agricultural inputs and agricultural extension services. Two focus group discussions, one at community level and the other at woreda level were organized. At community level, 16 HH heads participated. At woreda level, nine experts representing different woreda government and project offices participated. Key informants were selected from the community (12 persons), project staff (3 persons) and woreda government staff (3 persons) for in-depth interview regarding the “before” and “after” project food security situation, project results and sustainability. Observation was also an

integral part of data collection particularly for irrigation schemes, and how they are managed for their sustainable function. I also observed farm plots and demonstration/nursery stations.

Secondary data on quantity of food production and rainfall (time series) and agricultural inputs supply were collected. Literature on food security is numerous, so this study is adequately supported by a literature review. Different books and academic journals related to this research from the International Institute of Social Studies (ISS) library and others sources were reviewed.

2.3 Data analysis

The information collected through the HH survey was coded and entered into a computer for analysis using SPSS and Microsoft Excel 2007 windows. The research focused on community and HHs as units of analysis and both quantitative and qualitative approaches were broadly used in the analysis. Data obtained from secondary sources like rainfall, construction-related and those data generated from HHs' survey were quantitatively analyzed using simple statistical tools such as tables and charts. As the main focus of the research was to identify the contribution made by the project towards the improvement of food security of HHs, certain categories like 'before' and 'after' project intervention, location, education status and sex of HH heads were established and analyzed.

3. Findings and Discussion

During the pre-project period (20-30 years), Jarso people lived with the worst food shortage known to them. Landholding size was small and fertility deteriorated. Land had less value towards social and economic security. Drought was a frequently occurring natural hazard along with erratic rainfall. Production was meager and hardly sustained the HHs until the next harvest season. Assets were continuously depleted as there was no chance for recovery. As a result, a vicious circle of food insecurity was the feature of pre-project Jarso community in general and the majority of HHs in particular.

Since the project intervention, the farmers have managed to grow and harvest twice a year. About 93.5% of the respondents confirmed that their average production obtained over the years (2006 –2008) had increased. Despite certain differences between male- and female-headed HHs, land productivity compared to the pre-project period in general has shown significant improvement (fourfold). Though the total size of land possession of sample HHs increased since the project intervention, the land under cultivation was only the newly acquired land in the lowland. The volume of production has considerably increased; the majority of the HHs started sufficient production at least for home consumption and the number of HHs that escaped from food insecurity through own food production is incredibly high. The spate irrigation beneficiaries not only escaped from chronic food insecurity, but also from chronic dependency on food aid experienced for the last several years. No one out of the sample HHs reported severe crop failure since they started practicing spate irrigation. According to EECMY/SWS/DASSC summary annual performance project reports (2006-2008), the cultivated area revealed a dramatic increase from 500 ha in 2005 to 3,250 ha in 2008. Likewise, community-level production (maize and sorghum) substantially increased from 20,000 quintals in 2005 to 130,000 quintals in 2008. The

most recent reports of the project reveal that the spate irrigated land size increased to 4,950 ha. And the total amount of production increased to 247,500 quintals.

It was expected that land size and its level of fertility, irrigation schemes, and agricultural extension support activities could impact the HH food production. The project has developed modern irrigation schemes which enabled the farmers to access fertile land of the valley. Therefore, these two resources (land and spate irrigation schemes) are the main input factors that enabled the HHs to achieve higher food production (project output).

The irrigation component of the project also enabled the farmers to build and possess assets, such as livestock, improved houses with corrugated iron sheet roofing, radios and mobile phones. The survey result conducted four years ago indicated that a significant number of livestock was added to the existing flock through purchases. It found that the main income source of the households is crop production, specifically maize.

The establishment of irrigation schemes in general and spate irrigation schemes in particular at the appropriate standard and levels of management is not a simple task. With the exception of a few, many schemes of such kind constructed at different localities in Konso woreda were either terminated without proper completion or functioned only for a very short period of time. There are a number of factors contributing to such failure among which the lack of adequate plan and design is crucial. It happens that experts in the field used to produce irrigation development projects without a careful feasibility study and consideration of the local reality. Most often, these people come from big towns and have hardly any time or are less committed to sacrifice in the harsh local environment. Chambers' (1983: 10) expression of 'rural development tourism' may better explain such reality. However, YFSSIFSP managed to construct all the planned schemes, with the exception of one that was intended to be built on Yanda River, within the scheduled timeframe with only a minor delay. Therefore, the construction work was efficient and effective. Major factors that contributed to project success included the demand-driven nature of the project, ensuring of community participation to the maximum level and the 'community first, project second' intervention approach. In the course of implementation, the project was aware of the importance of involving the traditional leaders known as 'Kanta' in Konso. The traditional leaders were actively involved in the community coordination and mobilization.

The research also identified under-achievements and failures of the project. Initially, it was expected that different types of inputs like local capacity-building trainings, demonstration and introduction of improved varieties of seeds and provision of modern beehives and small ruminants would result in diversification of income and the asset base towards adequate access to food, and thereby contribute to sustainable food security. Despite the fact that the project exerted effort to diversify crop production (more focusing on cash crops) and HH income through the introduction of improved seeds (vegetables and fruit), the outcome was found to be below expectations. Over 30 volunteer farmers accepted and practiced modern beekeeping, but gained nothing and lost even the benefit they usually got from traditional beekeeping. In this regard the project faced a big challenge to convince other farmers to step forward for the modern beekeeping package. The project missed to apply a systematic approach and intensive follow-up that is needed for the adoption of new technological practices among uneducated or less-educated farmers, which requires patience. Concerning fruit trees, the main problem was the absence of markets. As demonstrated by the project and some farmers, Yanda-Segen Valley is conducive for fruit trees, like mango, orange and banana; these fruits are highly demanded at central markets of the country. The missing element in this package was market linkages.

Another important finding is that the project benefits were not fairly distributed between female-headed and male-headed HHs and between village 1 and village 2 inhabitants. The survey result indicates that male HH heads benefited more in terms of total harvest and land productivity. However, given the multifaceted problems of Konso women, and the failure of the research guide questions to sufficiently capture and disclose the extent of benefit for women in general and female-headed households in particular, further research is recommended.

The research has also found resource-based conflict as a crucial issue that, if not handled and resolved in a sustainable way, may very likely trigger the project outputs to perish. The survey has indicated that 26.9 HHs reported conflict as a major problem during the last 3 years (2006-2008). The response on conflict is the highest among the responses for various expected problems (Appendix Table A11).

4. Conclusion

This chapter entirely focused on two broad aspects of food security: availability of food and access to food. Increasing food production is a necessary step towards food security. The additional burden of agriculture on soil and water loss, together with a changing climate, urges us to think about the uncertainties of the future. While HH income affects food security directly by providing sources to meet HH food requirements, empirical studies indicated that HH income is inadequate (Chen 1994).

On 5th July 2004, during the seminar on "Innovative Approaches to Meeting the Millennium Development Goals in Africa" in Addis Ababa, the Ethiopian Prime Minister declared that Ethiopia would attain its objective of achieving food security within 5 years starting in 2004 by allocating more than 40% of its revenue towards this goal (Ethiopia 7 Days Update, 2004:9). However, the Millennium Development Goals report disclosed by FAO (2005:6) indicates that in sub-Saharan Africa including Ethiopia the situation on poverty and famine has been deteriorating further. During the focus group discussion held at woreda level, the discussants stated that despite huge government and NGO investments in Konso Special Woreda, the food security situation of the people has been profoundly deteriorating. Basically, escaping from food insecurity in woredas, like Konso, which have a structural food deficit and are prone to drought, is not as easy as general speeches made by politicians at conferences and at political centers would prophesy. It is also equally important to note that the country's gross economic growth is moving forward despite ongoing challenges to secure food at community, household and individual levels.

However, the spate irrigation beneficiaries of Jarso kebele have experienced a difference through the project intervention. The project has significantly contributed to the improvement of HH and community-level food security through constructing nine modern spate irrigation structures and capacity-building activities. About 2,200 HHs are currently food-secure after the project intervention. Apart from production, about 65.6% of the surveyed HHs benefited from temporary employment opportunities created by the project during construction. The project's output spillover effect has traversed into the neighboring kebeles and Karate town by stabilizing the local market prices of food crops.

Making the current food security status sustainable is a challenge ahead. Income diversification has been well initiated, but is not yet adequately flourishing. Food storage, the important food availability pillar, is not only lacking, but stakeholders do not conceive of its

importance. Therefore, an integrated effort of all development actors is crucially needed to ensure sustainability of HH food security.

5. Lessons for Learning

A variety of literature stresses that farm size is an important factor in impeding or promoting production and even in access to food. This proposition is true in principle, but in the case of pre-project Jarso community, the social and economic value of land was less compared to the "after the project" value. What matters most is the productivity of land and the inputs that increase its productivity. Based on the research findings, the following recommendations are put forward as lessons for learning:

a) Local capacity-building through training was found to be one of the most important activities carried out during the first, second and third phases of the project. Nonetheless, the spillover effect is found not sturdy. The all-encompassing observation shows 'formal and non-formal education programs' as a missing link that the project failed to consider. Without educating the people, it may be possible to achieve remarkable results from an intervention, but sustainable improvement requires an educational backing. In this respect, the current low level in the enrolment of children in formal schooling should be improved. Non-formal education on farming, storage, nutrition, environment (watershed management and riverbank protection) and social security mechanisms should also be thought of and considered. To this end, appropriate strategies may require to be designed by pertinent stakeholders that fit the children and adults.

b) To reinforce the supply side, the government has a clear national strategy of maintaining sufficient food reserves. The larger stores found mostly in central zones and remote areas like Konso may benefit less at the onset of crop failure. It would be recommended to establish and strengthen local/community-based institutions to ensure local food storage, and thereby enhance the availability of an adequate food supply. This end could be achieved by strengthening the cooperatives (irrigation water user cooperatives and/or women's saving and credit cooperatives). The realization of such an objective needs joint effort of the project and pertinent government bodies.

c) The research has placed resource-based conflict among the major problems that the community has encountered during the last 3 to 4 years. The conflicts occurred were very complicated due to the alliances established in supporting the frontiers. The efforts exerted so far by government and traditional leaders have not brought a sustainable solution. The Dara people are still in need of access to irrigable land in the valley. People who had migrated have been returning home and they also need land. Non-spate irrigation beneficiary villagers of Jarso also expect the same thing. The project may address some of the practical needs of the people, but the main issue is how to access the irrigable land along Yanda and Segen valleys, which are located in the boundaries of Birbirsa and Jarso kebeles. For the woreda administration, it is the right time to assess the available potential land, devise an appropriate strategy for discussion and ensure the active participation of traditional village leaders (Kanta) and church elders to realize long-lasting solutions. The number of spate irrigation beneficiaries

compared to the Jarso community at large is 44%, compared to the woreda population that is only 6.1%. Since the flood irrigation of the two rivers and land potentiality in the valley are high, it is imperative to think of how to exploit these resources to tackle the structural problem of food in the woreda.

d) As discussed earlier, though the irrigation schemes are permanent structures built using an appropriate design, the farmers still practice flood irrigation in basins. This may eventually cause a salinity problem and force the beneficiaries to abandon their farms. The farming system is also traditional, demanding extensive labor. In line with growing income, it is likely to think beyond and plan for modern agriculture using machines like tractors. A tractor supplied by the project has started serving the farmers on a payment basis, which is promising. However, it needs proper handling and management. In this regard, the irrigation water user cooperatives may play substantial roles like providing tractors and linking producers to central markets. Therefore, they should be capacitated to the level to shoulder this responsibility.

e) The spate irrigation structures constructed by the project are well designed and properly built. The management and proper use of these schemes are not equally well done from the beginning. Riverbanks are not well maintained and the bylaws formulated and endorsed by the community on river bank management are toothless without formal legal backing from the government side. Unless serious attention is given, with all these constraints, it is fallacious to think of the schemes as long-lasting.

f) As already stated, the project is highly relevant and brought remarkable changes in the lives of the spate irrigation beneficiary HHs. This may represent the best exemplary practice not only in Konso woreda, but also in the other parts of the country with similar geographic settings. The 'community first, project second' intervention approach designed and implemented by the project has made a profound contribution towards effective community mobilization, in general and mobilization of traditional village leaders, in particular. The project holder EECMY/SWS and government counterparts would take this opportunity to advocate and replicate these valuable experiences in other intervention areas. 'Community first, project second' intervention approach has worked well, but the third key development actor has not played an active role. This is a potential treat for the project in general and the spate irrigation schemes in particular.

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References

Adnew, B. 2003. The food security role of agriculture in Ethiopia. Paper prepared for the Roles of Agriculture International Conference 20-22 October, Rome, Italy. FAO.

Chambers, R. 1983. *Rural development: Putting the last first.* London: Longman.

Chen, R. S. 1994. World food security: Prospects and trends. *Food Policy* 19(2): 192-208.

EECMY/SWS/DASSC. 2006. Yanda Faro Segen Sawate Integrated Food Security Project Document (2006-2008). Arbaminch.

Ethiopia 'Ethiopia 7 Days Update'. 2004. WAAG Vol. Xi No. 18. July 12, 2004 www.whitehouse-gov/news/releases/2004/06/20040610- 40...7/18/2004.

FAO (Food and Agriculture Organization of the United Nations). 2005. The Millennium Dvelopment Goals Report http://millenniumindicators.un.org/unsd/mi/pdf/MDG%20Book.pdf (last accessed 22 October 2009).

FDRE Population Census Commission. 2008. Summary and Statistical Report of the 2007 Population and Housing Census. Addis Ababa. http://www.csa.gov.et/pdf/Cen2007_firstdraft.pdf (last accessed 22 October 2009).

Morss, E. R.; Gow, D.D. 1985. *Implementing rural development projects: Lessons from AID and World Bank experience.* Colorado: Westview Press.

Nuri Kedir and Associates Development Consultants. 2006. Baseline Survey Report of Konso Woreda. Unpublished. Addis Ababa.

Ramakrishna, G.; Demeke, A. 2002. An empirical analysis of food insecurity in Ethiopia: The case of North Wollo. *African Development* XXVII (1&2): 127-143.

Webb, P.; von Braun, J. 1994. *Famine and food security in Ethiopia: Lessons for Africa.* England: John Wiley & Sons Ltd.

Appendix

Table A1. Level of community participation at different project stages.

Project stage/cycle	No. of HHs that participated	Percent. of HHs that participated
Planning and implementation	8	8.6
Planning and evaluation	3	3.2
Implementation	23	24.7
Implementation and evaluation	20	21.5
Evaluation	5	5.4
At all stages	34	36.6
Total	93	100

Source: Computed from household survey 2009.

Table A2. Irrigation schemes, command area and number of beneficiaries.

Scheme site	Year of construc-tion	Type of weir	Canal length (km)		Command area (ha)	No. of benefi-ciaries
			Main	Secondary		
Geldeha	2005	Broad- crested	2.6	3.3	600	500
Orshale	2006	Full barrage	2.6	2.0	400	250
Itikle	2006/07	Weir + barrage	2.9	1.5	300	300
Kondo	2007/08	Weir + barrage	3.4	2.0	650	650
Mette	2007/08	Riverbed protection	3.0	5.3	900	650
Macha	2009	Full barrage	6.1	9.6	500	500
Total			20.6	27.7	3,350	2,850[6]

[6] This number includes individuals who possessed land and paying land use tax in addition to HHs benefiting from modern spate irrigation.

Table A3. Average landholding size (ha) before and after project.

HH head Sex	Before project	After project	Total
Female	0.4	0.4	0.8
Male	0.9	0.7	1.5
Total	0.8	0.7	1.5

Source: Computed from HH survey 2009.

Table A4. Factors for harvesting twice.

Factors enabling for twice growing/harvest	HHs responded	Percent of HHs responded
Use of spate irrigation	51	54.8
Sufficient rain and use of spate irrigation	22	23.6
Use of spate irrigation and malaria control	10	10.8
Use of spate irrigation and agricultural extension services	10	10.8
Total	93	100

Source: Computed from field survey 2009.

Table A5. Annual production before and after project intervention for sample households.[7]

Type of crop	Production before project	Production after project (kg)			
		Location 1 (3)	Location 2 (4)	Total (5)	Difference (5)-(2)
Maize	28,350	127,825	38,210	166,035	137,685
Sorghum	28,210	16,960	2,125	19,085	(-)9,125
Beans	965	75	55	130	(-)835
Total	57,525	144,860	40,390	185,250	127,725

[7] Annual production for before project period is estimated by respondents on average basis irrespective of any specific year whereas for after project period, specific year has been indicated (2007/2008).

Source: Computed from field survey 2009.

Table A6. Percent of HHs responded to the type of crop they grew before and after project.

Type of crop	Before project	After project
Sorghum	25.8	0.0
Maize	9.7	63.4
Sorghum and Maize	64.5	36.6
Total	100	100

Source: Computed from HH survey 2009.

Table A7. Land productivity before and after project.

	Before project			After project		
HH head sex	Land size (ha)	Production (kg)	Productivity (kg)	Land size (ha)	Production (kg)	Productivity (kg)
Female	1.8	1,235	686.1	1.5	3,620	2,413.3
Male	76	56,290	740.7	59.8	181,630	3,037.3
Total	77.8	57,525	739.4	61.3	185,250	3.022

Source: Computed from household survey 2009.

Table A8. Percent of HHs responded to average annual production (before and after project).

Average amount of harvest	Before project intervention	After project intervention	
		Location 1	Location 2
Below 1,000 kg	78.5	11.4	26.1
1,000-2,000 kg	15.1	55.7	52.2
2,000-3,000 kg	3.2	18.6	8.7
3,000-4,000 kg	1.1	7.1	13.0
4,000 kg +	2.2	7.1	0.0
Total	100	100	100

Source: Computed from HHs survey 2009.

Table A9. Problem encountered as irrigation user (% of respondents).

Type of problem	Villages		Total
	Location 1	Location 2	
Waterlogging on farmlands	44.3	30.3	40.9
Unfair land distribution	21.4	13.0	19.4
Lack of participation in canal management	11.4	13.0	11.8
Waterlogging and unfair land distribution	4.3	17.4	7.5
Inadequate access to irrigation water	17.1	21.7	18.3
No response	1.4	4.3	2.2
Total	100	100	100

Source: Computed from household survey 2009.

Table A10. Livestock possession before and after project.

Type	Villages		After project	
	Number	Percent	Number	Percent
Oxen	36	6.1	69	6.4
Cows	108	18.4	199	18.5
Sheep	134	22.8	216	20.1
Goats	290	49.3	466	43.3
Heifers	4	0.7	45	4.2
Calves	0	0.0	71	6.6
Bulls	0	0.0	10	0.9
Donkeys	16	2.7	0	0.0
Total	588	100	1076[8]	100

[8] Total number indicated is only those purchased/obtained through other means during project intervention.

Source: Computed from household survey 2009.

Table A11. HH responses towards major problems encountered (2006-2008).

Type of problem	Frequency	Percent
No response	3	3.2
Lack of farm implements	4	4.3
Lack of land and money constraint	7	7.5
Lack of land and less access to irrigation water	14	15.1
Labor constraints	6	6.5
Lack of credit facilities	8	8.6
Money constraints	11	11.8
Lack of oxen	12	12.9
Epidemics of human and livestock	3	3.2
Conflicts	25	26.9
Total	93	100.0

Table A12. Konso area annual and monthly rainfall distribution.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1989	38.6	94.6	121.1	158.7	218.0	22.7	34.6	32.9	105.8	108.1	17.5	96.2	1,048.8
1990	11.5	150.9	178.4	197.9	64.8	10.4	10.0	11.9	41.1	50.8	28.2	16.9	772.8
1991	35.5	37.4	148.6	95.1	166.6	46.3	0.0	0.0	24.3	72.3	67.9	37.4	731.4
1992	0.2	23.3	59.7	159.5	138.3	67.4	42.6	4.9	92.4	112.4	39.0	35.4	775.1
1993	107.5	169.9	1.8	0.0	98.5	0.0	1.0	1.6	14.9	90.1	29.6	24.7	539.6
1994	2.5	4.2	81.8	171.1	137.0	16.7	29.7	69.3	15.7	109.3	64.6	16.7	718.6
1995	10.2	7.1	31.1	171.7	31.8	87.7	22.8	1.4	44.1	55.8	0.0	3.2	466.9
1996	32.7	24.0	161.1	205.4	74.0	76.7	19.8	35.8	94.9	80.6	10.1	0.0	815.1
1997	5.8	0.0	52.6	259.1	74.8	22.3	79.3	28.2	15.0	193.4	229.7	64.2	1,024.4
1998	122.9	125.5	45.1	118.3	123.9	53.9	1.5	23.0	40.1	120.7	32.2	0.0	807.1
1999	7.6	3.5	148.5	106.0	4.9	12.4	31.5	41.8	38.3	68.3	11.6	66.9	541.3
2000	0.0	0.0	28.3	87.1	98.2	5.0	10.3	18.3	17.9	76.8	37.5	68.1	447.5
2001	33.2	4.1	98.4	352.0	0.0	0.0	19.8	63.1	50.3	137.8	81.2	1.9	841.8
2002	43.0	15.7	86.9	112.0	77.9	14.0	0.0	3.4	43.1	92.9	28.2	228.7	745.8
2003	3.8	14.2	80.2	231.6	210.4	25.7	27.2	85.0	30.1	41.4	44.0	35.3	828.9
2004	33.4	13.0	54.2	112.6	123.3	4.9	6.2	0.3	56.3	42.1	83.5	33.2	563.0
2005	25.0	2.4	81.8	145.0	273.4	9.5	19.4	16.2	61.8	109.9	57.6	0.0	802.0
2006	0.0	65.9	142.2	x	41.9	32.0	5.0	100.3	14.6	141.2	181.8	75.4	800.3
												Average	740.2

Source: NMA.