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Is ‘social cooperation’ for traditional irrigation what ‘technology’ is for motor pump irrigation?

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Abstract: This paper calls attention to the importance of social cooperation in irrigation farming. It argues that a mere focus on the technical aspect of irrigation, disregarding its social aspects undermines the long-term benefits of irrigation to rural livelihoods. This assertion draws on lessons from small-irrigation practices in Fogera, in the Blue Nile Basin of Ethiopia, where I conducted fieldwork-based qualitative research. In recent years irrigation farming has drawn a growing interest among farmers in rural Fogera. Farmers practise small-scale irrigation that includes traditional irrigation and motor pump irrigation. Farmers assert that irrigation has brought farming benefits through cultivation of more crops as well as new crops that serve food and cash purposes. Such benefits have particularly spurred the enthusiasm for motor pump irrigation. However, the practice of motor pump irrigation largely relies on the motor-pump technology, overlooking the social scheme of irrigation. While traditional irrigation involves more social cooperation involving joint activities, water allocations and irrigation schedules, lack of social cooperation and such institutional conditions is widespread in motor pump irrigation. Local classification of irrigation practices also associate the mechanism of irrigation use and management including water use regulations and water use turns with traditional irrigation in contrast to motor pump irrigation. The neglect of social cooperation within current practices of motor pump irrigation will have significant adverse implications on long-term practices. Farmers have been already concerned about how competitions for water are growing, limiting the duration of water availability and creating water shortage. The study suggests that while farmers’ willingness to practise motor pump irrigation in Fogera has been stimulated by its livelihood benefits, sustained benefits of this irrigation scheme require social cooperation and feasible institutional conditions that can mediate water usage across user villages.

Key words: Social cooperation, technology, traditional irrigation, motor pump irrigation, Fogera, livelihood

Media grab: Sustained benefits of irrigation depend on pertinent social cooperation including institutional arrangements that guide water use and management.

Introduction

Smallholder farmers in Ethiopia essentially depend on rainfed farming for their livelihood. The reliance on rainfed farming has been problematic, as rainfall is often unpredictable and highly variable. This calls for alternative water access, particularly irrigation so that small-scale farming can be viable in the face of rainfall uncertainties.

Irrigation has become an important government agenda for agricultural development. Its importance for agricultural productivity and food security has been alluded in key government policy documents (MoFED 2006; MoFED 2010). It has also been promoted by development organizations (FAO 1999; IFAD 2012). Thus, there has been increased attention paid to the importance of irrigation. In this regard, assessing the role and performance of irrigation will be instrumental in guiding policy and development orientations pertaining to irrigation practices.

Several studies highlighted the role of irrigation for increased productivity, poverty reduction and improved economy (FAO 1999; Fitsum et al. 2010; You et al. 2010; Tilahun et al. 2011). However, what makes irrigation farming, its productivity and benefits enduring and sustainable is still a crucial issue that requires thorough and holistic investigations. Studies which reflected on the issue of how to ensure irrigation productivity and its contributions emphasized on technological efficiency and complementary agricultural inputs. They indicated that ensuring irrigation productivity and its contributions depends on the right choice of irrigation technology and how irrigation investment is accompanied by complementary agricultural inputs such as fertilizer, improved seed and high value crops (FAO 1999; Fitsum, et al. 2010; You et al. 2010; Tilahun et al. 2011).

There seems to be little attention paid to the social aspect of irrigation, how the presence or absence of pertinent social conditions can hinder or facilitate irrigation. This paper argues that sustained benefits of irrigation depend on pertinent social cooperation including institutional arrangements that guide water use and management. It examines the practices and implications of disengaging the social aspect of irrigation from the technology. Focusing on small-scale irrigation in Fogera, the paper examines differing practices of traditional and motor pump irrigation, involving differential focus on social cooperation and technology, thereby analysing the implications of social cooperation including the lack of it for sustained benefits of irrigation for rural livelihood.

Methods

This paper is based on a wider local study on livelihoods and rain water management in Fogera, in the Blue Nile Basin of Ethiopia, where I conducted fieldwork-based research in three *kebeles*: Dibasifatira, Alember and Kokit in 2012. The study employed qualitative and participatory methods of data collection including in-depth individual interviews, key informant interviews, group interviews, observations, focus group discussions, trend analysis, participatory mapping, participatory problem identification and priority rankings. Data analysis involved pertinent forms of qualitative coding and analysis which proceeded through building categories, themes and patterns.

Results and discussion

This section presents results and discussions of the study which are organized under different topics and subtopics with interrelated themes. These include: small-scale irrigation and livelihood, traditional irrigation: history, expansion and collective action; motor pump irrigation: history, expansion and pumping water.

Small-scale irrigation and livelihood

Agriculture is the main livelihood of people in rural Fogera. Farmers practise plough-based farming with the help of oxen as the main draught power. They have long relied on rainfed farming for their livelihood. In recent years, irrigation farming has drawn growing interest among such farmers. They now practise small-scale irrigation which largely includes traditional irrigation, locally referred to as *mesno* and motor pump irrigation. Rivers and streams including Rib, Mizwa, Narza, Alemayehu and Kechin have facilitated farmers' small-scale irrigation practices. Irrigation is being incorporated into local farming practices, with a total of 4682 hectares of land that has been cultivated through irrigation in the three *kebeles* of Kokit, Dibasifatira and Alember (see Table 1 below).

Table 1. Irrigation cultivation in selected kebeles of Fogera

Kebele	Cultivated land (ha)	Cultivated with irrigation (ha)
Kokit	2635	2413
Dibasifatira	2614	2153
Alembor	2882	116

Source: Kebele agriculture offices (Fieldwork in Fogera 2012).

Irrigation has brought changes in local land use practices. In particular, it has stimulated intensive cultivation. Farmers have been able to practise multiple cropping through improved land uses. Many people in rural Fogera assert that irrigation has significantly contributed to improve the livelihoods of farmers who have been involved in irrigation farming. Being able to produce a variety of crops as well as new crops is an important aspect of the improvement mentioned by many farmers. Such farmers emphasized that they used to cultivate mainly rainfed crops such as teff and millet, while they now have been able to shift from producing such one season crops into two season crops. Thus, irrigation has enabled them to produce a variety of crops including onion, emmer wheat, chickpea, grass pea, tomato, lentils and fenugreek.

Irrigation users described improved livelihood in terms of acquiring more food, cash and assets. Overall, local users appreciate the contributions of irrigation for their livelihoods. In describing such appreciations, a farmer in Dibasifatira said, '*A farmer who now uses water is a flower.*' He was referring to how farmers with irrigation do well in making a living. However, the benefits of irrigation are not equally distributed among members of the rural community. There have been differential impacts of irrigation, partly depending on ecological factors which can facilitate or hinder irrigation practices. There are variations in irrigation infrastructure which relate to the topographical heterogeneity of the area (Eguavoen et al. 2012). The gains and losses of intensification have also involved differential impacts on local land use practices. While irrigation has facilitated intensive cultivation, in some instances this has been practised at the expense of other land uses, particularly grazing fields.

Traditional irrigation: history and expansion

In Fogera traditional irrigation is practised through river/stream diversions and the construction of a small dam. The history of traditional irrigation dates back to the Imperial regime. A key informant in Fogera recalled that *mesno* was practised during the Imperial regime of Haileselassie and it was administered by *dagna* (judge). Studies conducted in another northern part of the country, namely South Wello, revealed that irrigation during the Imperial regime was limited, largely controlled by landlords, while it increased during the Derg and further expanded during the present regime (Mengistu 2001; Pankhurst 2002).

In Fogera, although traditional irrigation was practised in the past, its expansion is a recent phenomenon. Local people largely indicated that the wider practice of *mesno* has emerged since the turn of this century. A combination of factors including increased rainfall uncertainty, growing realization of the importance of irrigation and extension support has reinvigorated local interest in experimenting traditional irrigation. While farmers would often perform agriculture following the rains, they now seem to have opted for irrigation as an alternative option. In explaining about this shifting endeavour, a key informant in Dibasifatira said that '*When the rain stopped in September, we would also stop cultivation. The canal came about 11 years ago. When the rain decreased, we tried the canal. We learned to use it thereafter.*'

There has been heightened interest to practise traditional irrigation. Farmers are eager to take advantage of streams and rivers that pass through their villages. During interviews, such farmers passionately reported about their recent experiences and accomplishments by emphasizing how they have managed to make use of hitherto 'idle' water sources. This situation reflects how local perceptions of irrigation have changed recently, farmers attaching more value to its importance. This was also captured during focus group discussions with farmers. For instance, during a focus group discussion in Dibasifatira, participating farmers strongly shared the view of their colleague who emphasized that '*In the past, the water would just go through cutting the land. Today, we are questioning her where it is going.*' While discussing how they are now determined to utilize available water, focus group discussion participants in Alembor also underlined that '*Today there is no water that freely goes around the field. If found, it will be diverted.*'

Traditional irrigation and collective action

In rural Fogera, social cooperation is an important defining feature of traditional irrigation against motor pump irrigation. Traditional irrigation involves social cooperation from the onset of the scheme through water use and irrigation schedule. Local users pool their labour, ideas and commitment together to work on *mesno* facilities that involve river diversion, dam construction and preparation of water channels. The social cooperation and coordination that such activities entail are more appreciated when considering that this is not a onetime activity. It is a work that requires continuity, in some cases involving the doing and dismantling of traditional dams. Users build a small dam from soil by digging the earth. Key informants indicated that they are often cautious about the potential adverse impact of this small dam, particularly during the rainy season in that it may overflow and inundate the surrounding area. They have carefully managed to practise this irrigation scheme by dismantling the dam once the period of irrigation (October to January) is over and rebuilding it after the rain stops.

In many respects, the users' readiness to forge social cooperation reflects their understanding of traditional irrigation as a social undertaking. The social trust embedded in their joint efforts also has a significant implication for collective action in irrigation use and management. This was evident during fieldwork from farmers' remarks regarding water use norms and practices. For instance, in response to whether users adhere to norms of shared water use or tend to be self-centred, disregarding others, a farmer in Aember emphatically stated that '*We have equally worked together to bring the water and we all have to use it equally.*' Thus, water usage is regulated involving water use turns and irrigation schedules depending on water availability.

Key informants explained that people who worked together during initial preparations jointly discuss and arrange irrigation schedules and water use turns. Then, individuals use water based on turns and specified schedules. The system of usage is coordinated by water judges. Several water judges from each user village constitute a water committee which includes 5–6 members. Such collective arrangements have greatly facilitated the viability of traditional irrigation, involving significant contributions for long-term practices. The practice of irrigation schedule along water use turns is instrumental in avoiding destructive competitions and ensuing conflicts over water use. Local users also seem to be aware of the negative implications of uncoordinated water use practices. For instance, a key informant in Kokit stressed that '*irrigation has to be used on the basis of turns so that people should not fight.*'

However, this does not necessarily suggest that irrigation water use will involve no competitions and conflicts in the presence of such water use arrangements. But, they can be mediated by the local arrangements in place. Traditional irrigation users in Fogera indicated that competitions and conflicts can arise between users over scheduled water turns. Individuals may violate the turn system to pursue their own advantages at the expense of other users. Yet the water committee will intervene and address such situations.

Scholars maintain that the rule of exclusion/inclusion is an important principle that guides collective use and management of natural resources (McCay and Acheson 1987; Ostrom et al. 1999). This is fairly reflected in traditional irrigation practices in Fogera. However, the local notion of inclusion/exclusion does not focus on restricting or denying access to water. It intends to facilitate social cooperation that enables irrigation use. In the local context, who should be included for water access in irrigation schedules depends on whether they have participated in joint activities during the preparation of the traditional irrigation scheme. In principle, those who have failed to participate in such joint activities will be excluded. However, this customary principle is flexible in that such individuals can be included later if they pay some fines. The fine represents a form of punishment for failing to take part in the social cooperation required for irrigation usage, while the individual will ultimately get access to irrigation water.

Motor pump irrigation: history and expansion

The history of motor pump irrigation in Fogera dates back to the period of cooperative farming during the previous socialist regime of Ethiopia. The initial experience of motor pump irrigation in the area can be traced to a cooperative farm which operated in the area over two decades ago. A key informant in Kokit recalled that '*During the Derg in 1979/80, they organized us under a cooperative farm in Shega Kebele and gave us Motor. We used the motor to cultivate*

rice and we got good harvest.' Nevertheless, several key informants indicated that the recent practice of motor pump irrigation was introduced less than 10 years ago. It was introduced through 'investors' who collaborated with local farmers in share-cropping arrangements. A key informant explained:

'Initially, traders were coming from Wereta town with motors to work with farmers here. The farmers would contribute labour and land, while the others would contribute motor, seed and fuel. Later they would share the harvest equally. After two years, the farmers became free from dependence. They were able to buy their own motors and became self-sufficient.'

Interviews conducted with farmers suggest that use of the motor pump technology has expanded in the past three years. Eguavoen et al. (2012) also noted the recent increase in the use of pumps. My study found that the recent expansion and wider practice of the technology is largely attributed to enabling institutional factors, shading light on the importance of such factors for the dissemination and adoption of agricultural technologies. Access to credit to buy the motor pump has been available through the Amhara credit and saving institution in conjunction with the agricultural office. The latter delivers the motor pumps, while the former supplies the credit to buy the motor pump. This inter-institutional coordination along with access to credit forged an enabling institutional factor in terms of facilitating access to the motor pump technology and its wider practice.

Sharecropping has been another important social factor in terms of enabling farmers to have access to motor pumps and pursue irrigation. Farmers have figured out how to draw experiences from their traditional sharing and exchange arrangements pertaining to farming practices. Farmers have long engaged in sharecropping arrangements, involving those without plough-oxen and others with oxen and landless and land owners. This relationship has been extended to motor pump irrigation in that farmers who have no motor pump engage in sharecropping arrangements with motor pump owners. In this arrangement, the former contribute land and labour, while the latter provide the motor with fuel and seed and they share the harvest equally.

Pumping water

Current practices of motor pump irrigation in Fogera suggest that the conception of this irrigation scheme is reduced to pumping water, disregarding pertinent forms of social cooperation required for successful irrigation practices. A household often relies on the household labour force to transport the motor pump and the pipe to a convenient water point where it arranges the implement to pump out water and irrigate a farming field. For instance, farmers in Kokit draw water from Rib River and irrigate their plots around the river path. Motor pump users in Dibasifatira pump up water from Mizawa and Narza rivers and irrigate their lands in the vicinity of these rivers.

A household may constitute a self-sufficient production unit, depending on labour and economic capacity, to work on a non-irrigated farm field. This situation differs in the case of irrigation farming in that irrigation essentially requires social cooperation beyond the household level. However, in Fogera, irrigation with the motorized implement is largely practised on individualized household basis, lacking coordination and restrictions. What I have learned about motor pump irrigation during my fieldwork in rural Fogera suggests that more importance is given to acquiring the technology, the motor pump, disregarding the social cooperation and institutional conditions that facilitate irrigation use across households and cross-cutting village and kebele boundaries.

Lack of institutional conditions that guide motor pump irrigation is widespread among motor pump users. Local people associate the presence of a system that coordinates water use and irrigation schedules with traditional irrigation in contrast to motor pump irrigation. They link the latter with a situation of uninhibited usage. Interviews conducted with different farmers indicated that current motor pump irrigation usage lacks any mechanism of water allocations and irrigation schedules. For instance, a farmer in Dibasifatira pointed out that *'There is no water use turn*

with motor irrigation. Water is used as one wants to use. People stop when the water stops.' Similarly, a farmer in Kokit indicated that 'Motor irrigation has no water committee. It has no turn. It is possible for everyone to irrigate as he wants to do.' This was also revealed through focus group discussions where farmers indicated that motor pump irrigation usage is devoid of water use turns and irrigation schedules.

Besides, motor pump users pumping water from the lower part of a river insist that users in the upper village use the water as they want and complain about the lack of mechanism to check and deal with water blocking. In describing such problems of irrigation use, a development agent at the kebele level said, 'There are too many motors now. Everybody has motor pump and it is difficult to follow up. If we try to follow up our kebele, it will be difficult for us to follow up things in another kebele.' This situation reveals the lack of inter-village coordination for water use. This gap in social cooperation goes beyond inter-village relations in that irrigation use cross cuts kebele boundaries, thereby requiring social coordination among inter-kebele water users.

Farmers have been already experiencing the consequences of lack of social coordination in current motor pump irrigation practices. Motor pump users have been concerned about how competitions for water use are growing, limiting the duration of water availability and creating water shortage. While describing this frustrating situation, a middle-aged woman in Kokit emphatically stated: 'Now the motors are randomly placed in every direction that there is shortage of water.' During interviews as well as focus group discussions, farmers largely identified shortage of water as a growing problem. They indicated that the amount of water available for irrigation is decreasing from time to time. Rivers are also getting weaker and drying before their regular seasonal period. For instance, during a group discussion, farmers in Dibasifatira indicated that 'There are so many motors now that the Narza River we use for motor irrigation has dried. Before the presence of many motors we could use it from October to February. Now it stopped at the start of January. As a result, the crop we planted, wheat, failed.'

Conclusion and recommendations

In recent years farmers in rural Fogera have been more involved in small-scale irrigation practices that include traditional *mesno* irrigation and motor pump irrigation. Farmers assert the importance of irrigation for their livelihood. This has spurred the enthusiasm for motor pump irrigation. Farmers have even drawn lessons from their traditional sharing and exchange practices and incorporated the use of the motor pump into local share-cropping arrangements. This shows farmers' willingness to utilize existing local practices so that they can adopt the use of a new technology they consider worth embracing. Indeed, motor pump irrigation has contributed to improve the livelihoods of farmers who have been able to use this technology. However, the study indicates that current motor pump irrigation practices undermine the sustainability of its benefits. Motor pump irrigation, unlike traditional irrigation, involves little social cooperation. While traditional irrigation is perceived as a social undertaking, this notion is undermined in motor pump irrigation by the undue focus on the motor pump technology and individualized activities of water pumping. Thus, current motor pump irrigation practices lack pertinent forms of social cooperation including mechanisms of water allocations and irrigation schedules. Consequently, farmers have been experiencing water shortage and increased competitions, threatening the livelihood benefits they seek from the enterprising of motor pump irrigation.

The study suggests that sustained benefits of this irrigation scheme as well as its long-term practice require pertinent forms of social cooperation and institutional mechanisms that coordinate and mediate water use and irrigation management across users' villages, cross-cutting kebele boundaries. This calls for collective action and feasible institutional arrangements to guide motor pump irrigation use and management. Traditional irrigation practices also need to be encouraged and supported. In particular, they require support to strengthen their institutional capacity for irrigation use and management. It is important to conduct more research regarding the performance of small-scale irrigation practices, with a holistic approach to understanding the multi-contextual factors that influence long-term benefits and how institutions can shape water use and improve irrigation performance.

References

- Eguavoen, I., Sisay Demekku Derib, Tilaye Teklewold Deneke, McCartney, M., Otto, B.A. and Billa, S.S. 2012. Digging, damming or diverting: Small-scale irrigation in the Blue Nile Basin, Ethiopia. *Water Alternatives* 5(3):678–699.
- FAO (Food and Agricultural Organization of the United Nations). 1999. Poverty reduction and irrigated agriculture. International Programme for Technology and Research in Irrigation and Drainage (IPTRID), Issues Paper No. 1. Rome: FAO.
- Fitsum Hagos, Makombe, G., Regassa E. Namara and Seleshi Bekele Awulachew. 2010. Importance of irrigated agriculture to the Ethiopian economy. *Ethiopian Journal of Development Research* 32(1).
- IFAD (International Fund for Agricultural Development). 2012. Participatory small-scale irrigation development programme.
- McCay, B. and Acheson, M. 1987. Human ecology of the Commons. In: McCay, B. and Acheson, J. (eds), *The question of the commons: The culture and ecology of communal resources*. Tucson: The University of Arizona Press.
- Mengistu Dessalegn. 2012. Local study on livelihoods in the Nile Basin: Consultancy report. CPWF Nile Basin Development Challenge, International Water Management Institute (IWMI).
- Mengistu Dessalegn. 2001. Case studies of natural resource management: Forest, pasture and irrigation resources in South Wello, Ethiopia. Field-Based Research Report for the USAID-funded Natural Resource Management Institutions Project (NRMI), Ethiopia.
- MoFED. 2006. Ethiopia: Building on progress: A plan for Accelerated and Sustained Development to End Poverty (PASDEP), Vol. I. Ministry of Finance and Economic Development, Addis Ababa.
- MoFED. 2010. Federal Democratic Republic of Ethiopia Growth and Transformation Plan, Vol. I. Ministry of Finance and Economic Development, Addis Ababa.
- Ostrom, E., Burger, J., Field, C.B., Norgaard, R.B. and Policansky, D. 1999. Revisiting the commons: Local lessons, global challenges. *Science* 284:278–282.
- Pankhurst, A. 2002. The influence of the state and market on local level management of natural resources: Case studies of forests, irrigation and pasture sites in South Wello, Ethiopia. BASIS CRSP, Wisconsin-Madison.
- Tilahun, H., Teklu, E., Michael, M., Fitsum, H. and Awulachew, S.B. 2011. Comparative performance of irrigated and rainfed agriculture in Ethiopia. *World Applied Sciences* 14(2):235–244.
- You, L., Ringler, C., Nelson, G., Wood-Sichra, U., Robertson, R., Wood, S., Guo, Z., Zhu, T. and Sun, Y. 2010. What is the irrigation potential for Africa? A combined biophysical and socio-economic approach. IFPRI Discussion Paper 00993.