

Working Papers series

4. FARM-Africa Ethiopia: Planning for Small-Scale Irrigation Intervention

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FARM-AFRICA WORKING PAPERS

No. 4

FARM-Africa Ethiopia: Planning for Small-Scale Irrigation
Intervention

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April 2006



FARM-Africa Working Papers

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Abbreviations and acronyms

ADB	African Development Bank
AfD	Association Francaise pour Développement
CIAT	International Centre for Tropical Agriculture
CRDA	Christian Relief and Development Association
DFID	(UK) Department for International Development
FAO	(United Nations) Food and Agriculture Organisation
FDRE	Federal Democratic Republic of Ethiopia
GoE	Government of Ethiopia
GTZ	Gesellschaft für Technische Zusammenarbeit
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
IWMI	International Water Management Institute
LWF	Lutheran World Federation
MoARD	Ministry of Agriculture and Rural Development
MoFED	Ministry of Finance and Economic Development
MoWR	Ministry of Water Resources
PRSP	Poverty Reduction Strategy Paper
SCP I & II	(IFAD/GoE) Special Country Programme Phase I & II
SSI	Small-Scale Irrigation

Exchange rates (July 2005)

£1 = Eth Birr 15.20

US\$1 = Eth Birr 8.50

FARM-Africa

“FARM-Africa’s goal is to reduce poverty by enabling marginal African farmers and herders to make sustainable improvements to their well being through more effective management of their renewable natural resources.”¹

An integral part of FARM-Africa’s work has been farmer led research and on-farm testing of new agricultural techniques or crop varieties. This has enabled farmers to identify, test and judge new agricultural technologies for themselves.

FARM-Africa has recognised that although grassroots action is essential, it needs to be linked to action at a higher level in order to influence and improve relevant policies and practices. In view of this, FARM-Africa aims to become an internationally-recognised source of best practice in the improvement of agricultural productivity and natural resource management in Africa. FARM-Africa intends to achieve this through continuing to build on its base of grassroots experience and expertise, effective dissemination of what it has learned, and efforts to influence and improve policies which affect smallholder farmers and herders. FARM-Africa has identified three priority areas of intervention to improve or enhance livelihoods:

- Pastoral Development
- Community Forest Management
- Smallholder Development and Land Reform

What is small-scale irrigation?

In this document, the term small-scale irrigation (SSI) refers to a wide range of approaches by which soil-water can be increased and soil-water management improved. These approaches include techniques for catching, storing and using rainfall at or near the place where it falls (usually called rainwater harvesting); diverting flowing water by gravity; using stone/earth/brushwood or concrete structures (run-of-river or spate irrigation systems); lifting water by human or motor power (lift irrigation); conveying water by canal or pipe; and applying water to land by controlled or uncontrolled flooding (gravity), overhead sprinklers (pressurised), or drip irrigation (in the present context, usually at very low pressure). Our

¹ FARM-Africa (2003) Reaching the Poor: A call to action. Investment in smallholder agriculture in sub-Saharan Africa.

definition of irrigation is broad, encompassing all approaches to improved management of soil-water for enhanced crop production.

Irrigation in this sense is carried out by farming households on their land holdings. Those land holdings may or may not form part of an organised irrigation system or scheme, developed by farmers themselves (traditional systems), or by NGOs or Government (introduced or modern irrigation).

The description “small-scale” refers not so much to the physical size of the farm plot or the irrigation scheme or system (although these are usually small), but rather to the fact that the plots and the irrigation schemes (where a scheme is present) are managed and owned by the farmers themselves. It is this which distinguishes SSI from medium and large-scale irrigation, and from commercial irrigation, in which a public or private entity is responsible for the management of the irrigation scheme, even if smallholder farmers are the irrigators and producers.

I. Background

The FARM-Africa SSI study

In 2003 FARM-Africa commissioned the authors of this document² to conduct a study of community-based small-scale irrigation (SSI) in Ethiopia. The aim of the work was to develop FARM-Africa's strategy for support to farming communities through intervention in small-scale irrigation. The study was carried out between December 2003 and August 2004, concluding with a workshop in Addis Ababa in July 2005. Two study reports have been issued to date prior to this working paper.³

The IFAD SSI study

During the study the consultants carried out an evaluation of IFAD's Special Country Programme (SCP Phase II) in Ethiopia. The SCP started in 1988 and has continued, with some breaks, to the present day. The greater part of its activity is focused on SSI development in Tigray, Amhara, Oromia and Southern Regions of Ethiopia. The main field mission for that evaluation took place during September-October 2004, and the final report was published by IFAD in April 2005.⁴ The experience of the SCP II evaluation has added considerably to the insights which the consultants now have into the sector and these insights, together with the experiences of FARM-Africa staff, other NGOs and Government, are reflected in this paper. The documents just mentioned, and the July 2005 workshop contributions, form the evidence on which this paper is based. The documents referred to, and others are available on an accompanying CD-ROM.

Readership

This paper is written for three groups of users: (i) FARM-Africa Ethiopia staff who (either now or in the future) may become involved in small-scale irrigation; (ii) Staff of other Ethiopian Non-Governmental and Governmental organisations who may wish to benefit from FARM-Africa's reflections on this subject; and (iii) Organisations elsewhere in sub-Saharan Africa which may be contemplating interventions in small-scale irrigation. For readers in the third category, or those new to Ethiopia, the next section is intended to

² Prof Richard Carter (Cranfield University, UK – r.c.carter@cranfield.ac.uk) and Dr Kerstin Danert (Independent Research and Consulting, Kampala, Uganda – kerstin@danert.com).

³ Carter, R. C. (2004) Small-Scale Irrigation in Ethiopia Part I – desk study, FARM-Africa, 26pp.
Carter, R. C. and Danert, K. (2004) Small-Scale Irrigation in Ethiopia: Experiences, issues, guidelines and strategic options for FARM-Africa, 86pp.

⁴ IFAD (2005) Federal Democratic Republic of Ethiopia, Special Country Programme Phase II, Interim Evaluation, April 2005. Report No 1643-ET, IFAD, Rome, 111pp.

explain some of the factors particular to this country, which determine what forms of intervention are most likely to succeed.

2. Ethiopian context

Ethiopia's wealth

Ethiopia is a vast and diverse country, generously endowed with natural resources.⁵ Its people are resilient, inventive, hardworking, with a long and rich history and a great multiplicity of languages and cultures. Yet despite its wealth of social and natural capital, Ethiopia has particularly poorly developed infrastructure, is experiencing unreliable (and perhaps increasingly unpredictable) rainfall⁶ and suffers from deteriorating and fragmenting land and soil resources.⁷ HIV rates are significant and growing.⁸ Population growth is rapid (Ethiopia's population is projected to be among the top 10 in the world by 2050), pressure on land and natural resources is growing, and landlessness is increasing. Food aid is needed for about 6 million of Ethiopia's 71 million people each year, and that number increases to as many as 15 million in drought years. Many farming households can only produce enough food for 6-9 months of the year. Ethiopia's poverty is extreme, even in the context of sub-Saharan Africa.⁹

Politics and power

Ethiopia's past and present political regimes have been summed up in the following quotation. "...A culture of centralised, unrepresentative government is deeply rooted in Ethiopian history and has been too often accompanied by systematic abuse of human rights at all levels of government and society...worrying incidents of abuse of human rights continue to occur including violent handling of political protest."¹⁰

⁵ Ethiopia's land area is about 1.1 million km², of which 29 per cent is agricultural land. The mean annual national fresh water resource is estimated as about 100mm. This compares with the corresponding figures of 35mm for Kenya, 36mm for Israel, 64mm for Australia, 87mm for Tanzania and nearly 600mm for UK (Source: FAO Aquastat database).

⁶ www.fews.net/risk/report/?gc_id=1000293&f=al&d=0&i=1020 visited 21st July 2004.

⁷ DFID (2003) Ethiopia Country Assistance Plan. London.

⁸ According to UNAIDS (www.unaids.org/en/geographical+area/by+country/ethiopia.asp#), nearly 3 million Ethiopians (four per cent) are HIV positive. Most of these will die within the next 10 years. It is possible that this number will increase to 7-10 million by 2010.

⁹ Ethiopia's average per capita income, at US\$121, is about one quarter of that for sub-Saharan Africa as a whole.

¹⁰ DFID (2003) Ethiopia Country Assistance Plan. London.

Policy context

Government policies relevant to small-scale irrigation include the Water Resources Management Policy,¹¹ the Water Sector Strategy,¹² the Water Sector Development Programme,¹³ the Food Security Strategy,¹⁴ and the PRSP.¹⁵ The thrust of these publications is to emphasise the GoE's commitment to (a) small-scale irrigation, (b) enhanced food security for the majority rural population (84%), (c) environmental rehabilitation, and (d) gender mainstreaming. The GoE plans to increase the estimated existing 98,625 hectares of modern SSI to about 180,000 hectares by 2016, although the realisation of this ambitious target will depend strongly on external funding. While the stated support for SSI is encouraging, there is a concern that the GoE and others may think of SSI as a panacea. Experience within and beyond Ethiopia clearly demonstrates that this is rarely, if ever, the case. The remaining sections of this document elaborate this theme.

Gaps in policy and practice

Despite the proliferation of policy documents, the issue of land tenure has yet to be fully resolved in a manner which can give a strong perception of security to smallholder farmers.¹⁶ This area of national policy is in a state of flux however, and the GoE recently announced that there would be no further redistribution of land.

The gulf between stated policy and actual practice is often deep. One notable example is that despite the existence of federal legislation on the subject of water resources management (the Ethiopian Water Resources Management Proclamation No. 197/2000), water abstraction is not tightly controlled or enforced. There would appear to be a lack of political will and/or insufficient resources at both federal and regional levels to enforce a law which requires "the Supervising body" (defined as the Ministry of Water Resources or any other "appropriate body") to keep an inventory of water resources and register of actions with respect to applications for water abstraction, issue permits for this and other purposes, and collect water charges from users.

¹¹ Ethiopian Water Resources Management Policy. FDRE, Ministry of Water Resources. Undated.

¹² Ethiopian Water Sector Strategy. FDRE, Ministry of Water Resources. (2001).

¹³ Water Sector Development Programme 2002-2016. FDRE, Ministry of Water Resources. (2002).

¹⁴ Food Security Strategy 2002. FDRE.

¹⁵ Ethiopia: Sustainable Development and Poverty Reduction Program. FDRE, MOFED. (July 2002).

¹⁶ Ethiopian Economic Association/Ethiopian Economic Policy Research Institute (2002) A Research Report on Land Tenure and Agricultural Development in Ethiopia.

Institutional context

Until 2004 the Federal Ministry responsible for irrigation at all scales was the Ministry of Water Resources (MoWR). This responsibility has now been handed over to the Ministry of Agriculture and Rural Development (MoARD). At regional level, Irrigation Development Authorities or Bureaux of Water Resources are responsible, although these structures are in the process of re-organisation at the time of writing this report. Decentralisation of many services to woreda level has exposed a wide range of issues of under-resourcing, staff turnover and limited technical capacity, which will take time to resolve.¹⁷

3. SSI versus alternative interventions

SSI benefits and beneficiaries

SSI interventions which have integrated the multi-disciplinary constituent parts (as explained in section 6), and have resulted in systems which are owned and managed by the users can provide significant, or even spectacular benefits to irrigation farmers and the wider economy. However, the value of SSI needs to be considered alongside that of other development interventions. Irrigation can be a capital intensive and lengthy development intervention, if properly undertaken. It may not represent the most cost-effective, or sustainable way of improving livelihoods or food security for the majority.

The value of SSI

The value of SSI to a particular community needs to be considered in detail on a case by case basis. There are considerable improvements that can be made to rainfed crop production, post-harvest practices, market linkages, pastoral traditions and other aspects of rural livelihoods, which may provide wider benefits than an SSI intervention. This said, SSI can enable farmers to increase production through intensification (by increasing to two or three harvests a year); improve nutrition and livelihoods through diversification, and raise income through commercialisation (by growing and selling cash crops). In some cases SSI has enabled farmers to become self sufficient year round from a previous dependence on food aid for three to six months of the year.

¹⁷ See IFAD's 2004 thematic study of decentralisation in Africa, in which Ethiopia was one case study country.

SSI and the environment

SSI in its broadest definition can provide short term benefits which can enable long term environmental gains. This can ultimately lead to improved natural resource use on gullies, hillsides and farmlands.¹⁸ The stimulation of soil and water conservation practices can even enable the reclamation of degraded land.

SSI and the landless

As SSI requires access to land, it is an intervention which does not directly benefit the landless. They may in fact become even more marginalised as household incomes of direct beneficiaries (those with improved access to water and land) rise. However, the labour-intensive nature of irrigation gives opportunities for paid labouring and share-cropping, and increased local production may lead to reductions in the market price of produce, thus extending benefits more widely.

4. Lessons of experience

Abundant examples of failed and failing SSI exist throughout Ethiopia. The causes are numerous and involvement in SSI is not something to be taken lightly, nor carried out because of external pressures on the organisation. However, when SSI is undertaken in the right circumstances, and done well, the benefits can be significant. This section summarises the key lessons regarding SSI that have been, or are being learnt by Government and NGOs in Ethiopia.

Nature and use of SSI interventions

Irrigation potential

This is often simplistically considered as the proximity of suitable water resources to suitable land. Other equally important issues, such as farmer demand, social organisation, access to and size of input and output markets, and sustainability are often neglected, resulting in SSI systems which fail outright, or are not viable without considerable long term external support.

SSI as an emergency relief intervention

¹⁸ See Box 1 of this paper, and GTZ presentation by Chris Annen on accompanying CD-ROM.

There are cases in which SSI interventions have been approached as a short term measure to alleviate food shortages during a drought. Inadequate long term considerations were made from the outset leading to considerable dependence of the community on the external agency for maintenance.

SSI for settling pastoralists

SSI has been used as a tool to encourage pastoralists to adopt a sedentary farming lifestyle. This can be damaging to their traditional way of life, and can exacerbate conflict, especially if the introduced technologies prove to be unmanageable and unsustainable.

Engineering

Over-emphasis on engineering and physical infrastructure

SSI interventions have tended to focus more on the construction of physical infrastructure than on a more integrated approach to the enhancement of livelihoods through or by means of SSI. SSI interventions have tended to be dominated by one discipline, usually engineering. Many NGOs have undertaken SSI work without adequate personnel, which has often resulted in little more than SSI hardware, rather than improvements to farmer livelihoods through SSI.

Poor engineering design

Despite the emphasis on engineering in many SSI interventions, sometimes the quality of such design has been constrained by inadequacy of data, limited experience, or dogmatic attitudes to farmers by professional staff.

Engineering structures

So-called durable structures (weirs, intakes, dams, canals) do not always last as long as their design life. Failure of such structures (because of poor construction quality, inadequate design, earth tremors, floods) can have severe implications for sustainability as repair can be beyond the means of the community. In contrast, structures built from local materials, although also regularly damaged, and so requiring significant labour inputs for maintenance, can often be repaired by communities themselves. The relative merits and ease of maintenance of structures, 'modern' or 'traditional', need to be assessed on a case-by-case basis. Continued soil erosion and poor catchment management prevalent in Ethiopia are likely to increase the incidence of failure of structures, both 'durable' and locally made.

Socio-economic aspects

Farmer participation

There are many circumstances in which professionals have undertaken inadequate consultation with farmers regarding SSI interventions, or have not listened to their concerns regarding a particular design. Some of these have resulted in making things worse for the farmer.

Benefits of SSI take time to be adopted

In cases where SSI is completely new to farmers, it can take a very long time for farmer learning and experimentation to take place, new practices to be adopted and benefits to be felt. There are numerous cases of SSI which have failed because of lack of recognition of this reality by external agencies.

Markets

Internal markets for purchase of inputs and sale of produce are severely lacking in Ethiopia and infrastructure is generally poor. Even in cases where markets are available now, if too many producers grow the same cash crops, these eventually or quickly become saturated. The absorption of produce and market access have been major challenges in many areas for farmers. Export markets for produce may exist in some locations and with some crops.

Labour

Labour is sometimes neglected when considering the costs and benefits of SSI. Rural farmers do face considerable labour demands and the intensification of agriculture associated with SSI can add to that burden. HIV/AIDs will continue to cause more illness and death and have a major impact on labour and demographics (more child-headed and elderly-headed households).

Conflicts

Conflicts between use of land for SSI and grazing are not uncommon. This is the case in areas which are predominantly arable, as well as those dominated by pastoralists. SSI has been used as part of a strategy to forcibly settle pastoralists. However this approach threatens to undermine their traditional ways of life, with potential long-term damaging implications for social cohesion.

Gender

Irrigation is a labour-intensive form of agriculture, often involving significant access to increased income. From a gender point of view, SSI can therefore have negative impacts on women (if men capture an unfair share of farm profits, or if women's labour burden increases without adequate compensation), or it can have positive impacts (by enabling women to increase their cash incomes and diversify family nutrition). The issue of access to land and water by women, including those who are household heads, needs to be considered, as does the participation of women in Water Users' Associations.

SSI, environment and environmental health

Soil conservation and catchment management

In the case of river diversion schemes, soil conservation works have often only been undertaken around the headworks. However, the catchment area is usually considerably greater in extent. Flash floods, silt-laden soils and debris are all consequences of environmental degradation and poor catchment management. These have caused severe scouring and major damage to concrete river diversion structures, as well as siltation.

Competition for water

New or improved SSI can introduce or increase competition for water resources and thus create or exacerbate conflict between upstream and downstream users. Policies regarding abstraction rights exist on paper but there is little experience of putting them into practice. As a consequence the legal or regulatory framework for resolving issues over water rights is absent in practice. Although communities tend to start off trying to resolve such conflicts peacefully, these attempts are not always successful.

Soil degradation under irrigation

Soil salinisation, water logging, erosion and soil nutrient mining are common problems of irrigation systems.

Public health

Year-round impoundment of water may lead to a significantly increased risk of malaria and schistosomiasis, especially at elevations below about 2000m.

Institutional issues

Social structures

The introduction of SSI may require significant changes in community organisation and management, or it may be possible to integrate new technology into existing social structures. When new community management mechanisms are introduced by external agencies undertaking modern irrigation, traditional community structures are often ignored. This has led to considerable overlap, confusion and even exclusion within communities as they try to manage new SSI schemes, or those which are larger than, or more culturally diverse than before. Furthermore, prior to the introduction of SSI, political power may be concentrated in the hands of a few members of a community, and the introduction of new technology may initiate power struggles as new status and wealth are at stake.

Water Users' Associations

The lack of legal status for Water Users' Associations (WUAs) can present a challenge to farmers. Unlike cooperatives, which are legal entities, WUAs cannot access credit or hold bank accounts. There are numerous cases where not all water users consider themselves to be members of the WUA, and where irrigation cooperatives have been set up which do not include all water users.

Regional and woreda governments

Governments are generally aware of traditional and modern irrigation being practised in their localities they have SSI targets and plans. In some cases technical designs for particular communities already exist and are simply waiting for funds. Liaison between NGOs and Government is essential for approval of interventions which are over about Birr 2 million, but partnership is also required to ensure that these organisations complement and learn from each other in terms of geographic focus and approach.

5. FARM-Africa Ethiopia and SSI

FARM-Africa Ethiopia's comparative advantage

Given the importance for the success of SSI of community management and building on indigenous knowledge, FARM-Africa Ethiopia has much to offer this development intervention. In addition, FARM-Africa Ethiopia has considerable experience of soil conservation and environmental rehabilitation, both of which underpin and can be supported by SSI. The continuing success of the soil conservation and SSI interventions in Sero, near Enticchio (Tigray), made several years ago provides a living monument to encourage FARM-Africa Ethiopia to involve itself more extensively in SSI (see Box 1).

Box I. FARM-Africa Ethiopia improves lives of community in Sero, Tigray

In the dry season, viewed from above, Sero Valley stands out as a green oasis among the brown and bare fields. According to local farmers and ex-FARM-Africa Ethiopia employees, gully plugging raised the level of the gully considerably. One farmer who worked as a technician on the project claims that it has been raised by seven meters at one point. Initial stone plugging of the gully was washed away in the first year, but subsequent stone gabions built in phases over a three-year period succeeded in raising the level of the river. The gully plugging was undertaken in conjunction with the construction of an SSI scheme, establishment of women's goat groups, the provision of seeds for leguminous forage plants and a nursery for seedlings.

When we visited Sero in May 2004 community members were fetching water from a spring in the gully to water in elephant grass along the bank further up the gully. Ato Bero, a local farmer, informed us that what used to be a big river now forms a lake in the rainy season, thanks to the trapping of soil by the gabions. Dense vegetation now grows in large sections of the river bed, which is used for grazing cattle, sheep and goats.

People have been planting trees, and vegetables are cultivated with irrigation water, raised by motorised pump from a pond in the gully. Farmers informed us that the pond was only able to be constructed thanks to the soil trapped by the gabions. Although the pump has not broken down over the three years they have operated it, we were informed that there are four people in the community who have been trained in pump maintenance, and that spare parts can be found in Mekelle. The communal pump is used to water the fields of 42 farmers, who each contribute for fuel according to the size of their plot. The Sero farmers readily sell their produce (tomatoes, onion, green pepper, chilli, maize, oranges and papaya) in nearby Enticcio.

SSI and FARM-Africa Ethiopia's traditional areas of intervention

SSI differs from other aspects of FARM-Africa's work in Ethiopia in two important respects: first, it can involve costly physical infrastructure which needs continuing maintenance;¹⁹ and second, SSI using modern technologies involves multiple simultaneous changes²⁰ to farming practice, as agriculture intensifies and becomes more market-focused.

Opportunity cost of intervention in SSI

The opportunity cost of investment in SSI needs to be considered. If investment in a "green island" of wealth creation means foregoing more widespread but more modest benefits to

¹⁹ In FARM-Africa's pumped schemes in Afar for example, as much as 25 per cent of the budget could be invested in SSI.

²⁰ Changes may include new crops, new technology, new inputs, new water management techniques, new maintenance requirements, new markets, new income and new social organisation.

farmers operating under rainfed conditions, then the implications need to be taken into account.

6. Implementing SSI – principles

Depending on the technology used, SSI is a more or less complex and risky intervention, sometimes requiring a long-term commitment of support to institutions at community and woreda level. Nevertheless it can result in spectacular gains, if pursued with awareness, professionalism and commitment.

Based on the lessons from section 4, this section sets out key principles which must be considered when undertaking SSI.

SSI is multi-disciplinary

SSI improvement or development is an intervention in which the integration of social, institutional, policy, engineering, agricultural, economic and environmental issues is paramount.

Sustainability

In order to achieve sustainability, all interventions in SSI must consider the long term from the outset. Ideally, 'handover' should not be something which happens when the organisation leaves the area, but rather be an ongoing process which ensures ownership by the community and other stakeholder institutions.

Community ownership and management

These are brought about by building on existing farmer knowledge and demand. In order to pay more than lip service to farmer participation, there may also be a need to examine the assumptions and attitudes of professional staff and, where necessary, re-orient them to design upward from farmer knowledge and practice rather than downwards from their professional norms.

Catchment management

Adequate catchment management (soil and water conservation using physical and biological measures) which extends beyond the immediate area around the headworks is essential. However, this presents a major problem in large catchments, as the work required may extend well beyond the means of the implementing organisation. Careful consideration of catchment management requirements and their financial implications (and the implications of their omission) is essential. In many cases, catchment management needs to be undertaken before new SSI construction takes place.

Need for cash income

SSI interventions fall into two broad categories, depending on their need or otherwise for cash income for maintenance and agricultural inputs. Cases in which SSI systems require cash for operation and maintenance include pumped schemes, river diversion using concrete structures, or any intervention using materials which are foreign to the community.²¹ Where double or triple cropping is practised, fertiliser and pesticides may be needed, if organic manures and composts, and integrated pest management practices, are insufficient on their own. In such cases, the production of cash crops and access to input and output markets is essential. However, where SSI interventions improve traditional irrigation with little or no use of foreign materials, growing subsistence crops only may be viable. The balance required between crops for cash and home consumption will vary considerably depending on the type of technology adopted.

Short term gains with long term benefits

Without significant short-term (6-12 months) production and/or income gains, farmers may not consider their involvement in irrigation development to be worthwhile. Without long-term benefits, sustainability will be compromised.

When communities or woredas are new to irrigation

If irrigation is both a new activity and the intervention is of considerable scale or complexity, FARM-Africa should expect to be engaged with the stakeholders for a long period, in some cases as much as 10-12 years. Support to farming communities and local government institutions after scheme construction and during the many years needed for the full adoption of new practices, is probably the most important measure which can be taken to achieve sustainability.

²¹ Including cement, steel, plastics, pumps, fuel and spare parts.

Engineering structures

So-called durable structures are not always the best for SSI in terms of community maintenance without long term external assistance. A site specific analysis, taking the broader issues into account is required in SSI design. However, the unpredictable and deteriorating nature of the environment mean that there are risks whichever choices are made.

Land

Tenure and concerns over land redistribution will continue to affect farmer attitudes to SSI. As an issue which has been subject to changes in policy and practice for a considerable time, it is a matter which needs to be well understood and considered for any SSI intervention.

Government involvement

Regions and woredas need to be involved from the beginning of project planning. However, it should not be assumed that the government will be effective in post-construction support, repair, or maintenance of physical infrastructure.

Labour

The increased demands on labour associated with agricultural intensification need to be considered as well as the labour saving that improved physical structures or pumps can provide. Ill health and death as a result of HIV/AIDS need to be considered at all stages of SSI interventions.

Economics

The economic analysis of proposed SSI interventions and comparative analysis of alternatives, needs to be clear and explicit about (i) acceptable levels of capital investments (per scheme, per community, and per capita); (ii) the requirement or otherwise for capital cost recovery; (iii) maintenance and input costs (in cash and kind); and (iv) the source of maintenance and input costs.

7. Implications for FARM-Africa Ethiopia

Introduction

The development of SSI interventions is often broken down into six stages corresponding to the normal project cycle. **Pre-feasibility** investigations consist of reconnaissance level studies to identify the likely viability of an intervention. The decision may be taken after such

investigations not to pursue SSI further at the particular location in question. **Feasibility** studies are more detailed investigations leading to outline project designs and economic analyses, and again concluding with a decision as to whether or not to move to the next stage. **Full project designs**²² and economic analyses then follow, often forming the basis for funding applications. The fourth stage is that of **implementation** (facilitation of social and institutional arrangements and construction of or improvements to physical infrastructure). The fifth stage concerns **operation and maintenance**, in other words all that is necessary for the continued functioning and effective delivery of benefits of SSI for the foreseeable future. Finally, **monitoring** of project impacts and periodic **evaluation** need to be undertaken, as with any intervention. These stages are each considered below, in particular in terms of their implications for FARM-Africa Ethiopia.

Stage I Pre-feasibility

Pre-feasibility and feasibility level studies only differ in the depth, but not the scope, of the investigations undertaken. Each needs to consider a wide range of social, institutional, technical, environmental and economic issues. The focus of attention at this and all stages needs to be simultaneously on **impact**, on the target farmers and wider communities, and on the **sustainability** of the intervention.

A “filter”

At pre-feasibility stage, certain circumstances will rule out FARM-Africa Ethiopia’s further involvement in the particular intervention under consideration. Box 2 sets out some of the main situations in which FARM-Africa Ethiopia will engage with, or alternatively, will hold back from direct intervention in SSI – either because the costs or risks are too great, or because other organisations are better placed to undertake such work (and may be able to be mobilised to do so). This box will be used as a “filter” to define the pre-conditions for FARM-Africa Ethiopia’s involvement or otherwise in SSI in a particular situation.

Box 2. FARM-Africa Ethiopia: areas for intervention and non-intervention in SSI

Technology: FARM-Africa Ethiopia will not yet²³ get involved in concrete diversion structures for run-of-river and spate irrigation systems; small dam construction; or large irrigation pumps for communal irrigation. Appropriate technologies for FARM-Africa Ethiopia’s interventions include on-farm soil and water conservation/management structures; river diversion works primarily using local materials (stone, including gabions, brushwood, soil) for run-of-river and spate irrigation systems; rainwater harvesting technologies;

²² By “design”, we mean here the integrated design of the entire intervention, not simply the engineering.

²³ In future, as FARM-Africa Ethiopia’s expertise and experience in SSI grows, these pre-conditions should be revisited.

human-powered and small motor pumps; low-cost drip irrigation systems.

Capital costs: Capital costs of SSI technologies vary from a few hundred Ethiopian Birr per hectare (for water conservation, rainwater harvesting, and traditional irrigation systems) to Birr 7000/ha for micro-dams and pumped drip irrigation systems. However, capital cost per ha will be considered in the context of the plot size necessary to make a significant contribution to a farming household. For example a 20m² drip kit with treadle pump costs around Birr 1000 (equivalent to about Birr 3500/ha). Capital cost per hectare, and per household, will be considered alongside the anticipated benefits of SSI.

Maintenance costs: These vary from negligible for traditional systems (in cash terms, although significant in labour) to several hundred Birr/ha (e.g. for pumped and drip irrigation systems). The linkage of technology choice, cash maintenance requirements and access to markets will be a determinant of how FARM-Africa Ethiopia intervenes in a particular situation.

Catchment size, scheme size, and plot size: FARM-Africa Ethiopia will emphasise intervention in small catchments, in which it is realistic to engage in integrated catchment management; small schemes (with low capital costs) which can be replicated by communities with or without external assistance; and small plots, forming part of wider (rainfed/pastoralist) farming systems, in which SSI is a contributor to food production, but not necessarily the sole source of production.

Proposed land use and crop choice: Careful consideration will be given to the correct balance between subsistence food crops, high-value market crops, fodder production, the needs of pastoralists for access to grazing land, requirements for trees and other land uses, on a case-by-case basis. None of these land uses will be ruled out in advance, but land-use planning will be based on the needs of the communities and the maintenance demands of the chosen technologies.

Agro-ecological zone: FARM-Africa Ethiopia will focus on marginal, drought-prone areas of Ethiopia and areas of degraded or degrading land in which intervention in SSI can stimulate improved environmental management.

Social or cultural factors: FARM-Africa Ethiopia **will not** use SSI as a means of settling pastoralists against their will but if pastoralist communities express genuine demand for such technologies, and they are feasible and sustainable, that demand will receive a considered response. Where SSI schemes require a significant level of farmer organisation and communal management, e.g. of water distribution and of maintenance, the communities involved should be homogeneous in terms of culture and aspirations.

Actual or potential conflict over natural resources: Given the inevitable increase in competition and conflict over land and natural resources, engagement in this aspect is unavoidable. However, a judgment needs to be made on a case-by-case basis as to whether such actual or potential conflict is manageable and what role FARM-Africa Ethiopia can have in the resolution of conflict.

Possibilities for replication and scaling-up: FARM-Africa Ethiopia should always seek to intervene in ways which offer possibilities for widespread uptake of technology. Capacity-building to enable this to take place must be a necessary part of all interventions.

Stage 2 Feasibility

Before commencing an SSI intervention, a **comprehensive and site-specific feasibility study** is required, which includes integrated consideration of all the issues mentioned in section 6. Due to the complexity of SSI and the range of agro-ecological zones and indigenous practices in Ethiopia, simple replication of SSI interventions is not an option. This is the case not just between regions, but may be so in adjacent communities. FARM-Africa Ethiopia needs to develop its own procedure for carrying out feasibility studies (see section 8), but this can be readily adapted from existing procedures used in Ethiopia and elsewhere.²⁴ The **economic basis** for design in each particular case needs to be clear and unambiguous. Box 3 contains a checklist setting out the minimum scope of topics to be addressed in a feasibility study for SSI.

²⁴ For example: Field, W. P. and Collier, F. W. (1998) ICID Checklist to Assist in the Preparation of Small-scale Irrigation Projects in Sub-Saharan Africa. DFID Project R6518, HR Wallingford/Institute of Hydrology.

Box 3. SSI pre-feasibility and feasibility study outline checklist

The following aspects need to be considered in an integrated way, and with full attention being paid to engineering, agronomic, economic, social and institutional design issues.

Social	Cultural norms and practices, farmer demand and motivation, previous experience of SSI, skills and labour availability, conflict and conflict resolution, risk, existing community structures, Water User Associations, health risks (malaria, schistosomiasis and HIV/AIDS).
Water Users' Associations	The objectives, structures, capacities and rules applicable to WUAs. The integration of 'modern' technologies with existing social structures.
Institutional	Community and local government institutional capacity, existing and potential partnerships with government and NGOs, practicality of on-going support, extension services, competition with other existing and planned SSI interventions, management of existing soil-water and SSI.
Policy & politics	Land tenure security, water rights, food aid/food for work/cash for work policies.
Engineering	Technology options and their implications, ensuring construction quality, realistic design life.
Agriculture	Farming systems, agronomic practices and cropping patterns, livestock practices, extension requirements.
Economic	Assumed basis for economic analysis, source of finance, capital and maintenance costs, markets and market access, input and output availability and prices.
Environmental	Water resources (surface, groundwater, rainfall, evapotranspiration) and water quality. Land form and topography, geology, soils, erosion and erosion risk, soil conservation requirements. Water demands in the catchment (for irrigation and other uses). Current ecosystems and ecosystem services, likely environmental impact, risks of water logging, salinity, erosion and nutrient mining.

Stage 3 Design

Attitudes and ethos

Above all, the attitudes and ethos of those (engineers, sociologists, agronomists, economists and others) undertaking the design of interventions must be farmer-focused and with a strong emphasis on listening to and learning from farmer knowledge.

Indigenous knowledge

This is fundamental, but farmer training needs and knowledge gaps, especially in relation to the management of new technology, must be identified.

Skills within FARM-Africa Ethiopia

FARM-Africa Ethiopia will acquire specialist SSI expertise, to support programmes having or intending to have an SSI component, and will build wider awareness among all staff as to the values of, and challenges posed by, SSI.

Linkages and networking

FARM-Africa Ethiopia will develop the capacity in-house to know when it lacks specialised design skills and to know where to locate these in Ethiopia.

Informed choice and participatory design

The design process will expose farmers to the technical options from which they may be able to choose.

Stage 4 Implementation

Indigenous knowledge

Throughout the implementation stage, FARM-Africa Ethiopia and other external agents will continue to draw out and build on indigenous knowledge. New insights are likely to come to light as relationships and trust between farmers and external agents grow. FARM-Africa Ethiopia and partners will take a flexible approach to the original project design to enable such new knowledge to be incorporated. Design and implementation are thus to be interlinked in an iterative process.

Risk

Beneficiaries will already have some ownership of the changes that they are about to make to their farming practices. However, there may still be concerns about new risks that they are being encouraged to take (with regards to crops, cropping patterns, soil management,

new institutional arrangements). FARM-Africa Ethiopia will enable farmers to take the necessary risks and learn through their experiences without undermining their livelihoods.

Stage 5 Operation and maintenance

On-going support

Improvements to traditional SSI systems and the introduction of new technologies, crops, market linkages and management mechanisms provide communities with multiple, simultaneous changes to their previous ways of life. Considerable adaptation is required, which calls for on-going support by the external agents.

Duration of partnership

As stated in section 6, in cases where communities are new to SSI and the intervention is considerably complex, an external organisation can expect to be engaged with stakeholders for as much as 10-12 years. However, even when SSI intervention is more limited in size and complexity and brings about less change, it is not a development whereby the external agent can simply walk away after the implementation stage. FARM-Africa Ethiopia will encourage communities to continue to learn how to improve their practices and undertake adequate maintenance.

Support and dependence

It is very important to strike the right balance between providing the necessary support without creating dependence on the external organisation by the community. Particular difficulties can occur if market opportunities for cash crops suddenly reduce once an SSI scheme which is dependent on cash for operation and maintenance has been established, or if improved irrigation structures are damaged beyond the means of the community. In such cases, FARM-Africa Ethiopia will ensure that it is in a position to be able to carefully consider further support and dependence. There are no blanket solutions but analysis will be carried out on a case-by-case basis. FARM-Africa Ethiopia does not assume that government agencies will be able to support communities undertaking SSI in the immediate or long term.

Stage 6 Monitoring and evaluation

Monitoring

Simple indicators for measuring social, economic and environmental impact, as well as condition of technology and performance of community-level and support organisations need to be developed for each specific intervention. These should be designed to be used by the water users themselves, with limited external support.

Evaluation

As with any intervention, periodic external and internal evaluations should be undertaken, in order to measure relevance, impact, effectiveness, efficiency and sustainability.

8. Research, learning partnerships and policy dialogue

FARM-Africa's credibility has been built on its professionalism and track record in implementing farmer-based development programmes. It is this standing in the NGO and international development community which makes it possible for FARM-Africa Ethiopia to influence policies of NGOs, governments and donors – while continuing its own 'learning through doing'. This section indicates some of the areas and ways in which FARM-Africa Ethiopia will engage in research, joint learning and policy dialogue.

Four broad areas of field-based research²⁵ stand out as priorities. The first is the area of **farmer knowledge and practice in water management** (ranging from soil-water conservation through to technical aspects and social organisation of traditional irrigation schemes). Much indigenous knowledge and practice exists,²⁶ and very little research has been carried out to date to understand and document this in depth. In-depth research in specific woredas, kebeles, farming systems and irrigation schemes will be carried out in order to complement the macro-level inventories and studies being undertaken by IWMI and other international agencies (such as ILRI, CIAT, and IFPRI).

The second area for research is into **soil-water management needs**. It is essential to define in any given location exactly what is the nature of the perceived problem of insufficient soil-water – for instance poor soil and water conservation and cultivation practices (leading to excessive run-off); poor water-holding capacities of soils (which may be improved by incorporating organic matter); or increasingly unseasonal or unpredictable rainfall and run-off patterns.

The third area for research is that of **response**. Much experience of good irrigation and soil and water management practice exists in Ethiopia. The collation and documentation of that experience could contribute greatly to future interventions in this area. Appropriate

²⁵ By this we mean research which is led by empirical evidence from the field in FARM-Africa's working areas and those of other organisations, and documented experience from Ethiopia and elsewhere.

²⁶ According to IWMI, the estimated 138,000ha of traditional irrigation represents more than half of all irrigation in Ethiopia.

procedures for the conduct of pre-feasibility and feasibility studies for SSI will be developed from existing best practice.

The specific issue of the contribution which SSI could make to the livelihoods of **pastoralist** communities, and its impact upon them will be investigated in depth.

In the area of joint learning and policy dialogue, there is a large number of organisations in Ethiopia (NGOs, government organisations, donors and international agencies) which already have a significant track-record in SSI.²⁷ Furthermore there are now several existing networks of organisations undertaking water development in Ethiopia.²⁸ FARM-Africa Ethiopia will be part of these networks, both to further its own learning and to contribute to joint policy dialogue.

9. Proposed actions

In order for FARM-Africa Ethiopia to implement a comprehensive approach to SSI, a number of actions will be undertaken.

Develop SSI pre-feasibility and feasibility procedures for FARM-Africa Ethiopia

Considerable literature on the feasibility of SSI interventions already exists and is summarised in the checklist in Box 2. This material will be developed into a feasibility procedure which fits with FARM-Africa Ethiopia's approach, emphasising farmer knowledge and bottom-up planning process and builds in the existing project approval mechanisms within the organisation. The feasibility procedure needs to be suitable for use in existing projects and programmes, as well as for completely new interventions.

Increase awareness of SSI among existing FARM-Africa Ethiopia staff

Demand for SSI has been expressed through the participatory planning process for pastoralists and farmers in the Woreda Capacity Building Programme. Wider exposure of FARM-Africa Ethiopia staff to SSI is essential to provide them with an improved awareness of the possibilities, field realities and potential for SSI. The emphasis here will be on awareness

²⁷ For instance Lutheran World Federation, SOS Sahel, Action for Development and Water Action among the NGOs; Ministry of Water Resources at federal level; all the Regional Irrigation Authorities; GTZ, Irish Aid, and AfD among the bilateral donors; and IFAD, IWMI, World Bank, ADB and EU among the international agencies and multilateral agencies.

²⁸ Including the Ethiopia Country Water Partnership (ECWP) coordinated by WaterAid; and a revived Water Working Group under CRDA.

raising, without attempting to turn all FARM-Africa Ethiopia project coordinators into irrigation specialists.

Develop mechanisms to incorporate SSI into some of FARM-Africa Ethiopia's existing projects

Although FARM-Africa Ethiopia already has some experience of SSI and is receiving more demands for SSI from the communities with which it works, the required multi-disciplinary expertise required for SSI interventions does not currently exist within the organisation. FARM-Africa Ethiopia will bring in additional expertise, ideally in the form of one or more “champions” who have a sufficiently broad overview of SSI to be able to provide support to project staff, draw in additional expertise when required and establish partnerships with other organisations undertaking SSI. SSI will be introduced into FARM-Africa Ethiopia's existing programmes in a gradual manner.

Undertake key research in relation to SSI

FARM-Africa Ethiopia will undertake research in four broad areas, as set out in section 8 of this paper: (i) indigenous knowledge and practice in water management; (ii) soil-water management needs; (iii) collation of good practices in SSI and soil and water management projects by other organisations; and (iv) issues relating to SSI and pastoralism.

Networking

FARM-Africa Ethiopia will enable increased networking within the organisation and join professional networks which consider SSI and soil-water management in order to further its own learning and contribute to joint policy dialogue. An annual gathering of SSI practitioners in Ethiopia will be initiated under one of the existing water networks. One function of an Ethiopian network (partly) devoted to SSI should be to document existing SSI practice and experience.

10. Strategy review process

A strategy review process will be undertaken in order to ensure that FARM-Africa Ethiopia's work in SSI continues to improve over time. The overall review process comprises a number of components which explicitly contribute to FARM-Africa Ethiopia's learning in the area of SSI intervention, followed by a revision of the SSI strategy in 2010.

In order to contribute to FARM-Africa Ethiopia's on going learning about SSI, the following will be undertaken:

- (i) Thorough documentation of pre-intervention and monitoring data;
- (ii) Internal reporting of project progress including lessons learned, experiences and challenges of SSI implementation;
- (iii) Annual multi-stakeholder experience sharing in the form of workshops involving considerable dialogue. They may include field visits. By involving a wide range of stakeholders from the start, FARM-Africa Ethiopia will facilitate much needed stakeholder dialogue on the subject, build relationships to influence policy and practice, and learn from other organisations working in SSI.

Revision of the SSI strategy will be undertaken through a joint external-FARM-Africa Ethiopia review of FARM-Africa's SSI interventions in Ethiopia. The review will draw extensively from the documentation, internal reporting and experience sharing set out above, as well as field visits and wider stakeholder consultation. The review will lead to the development of a modified SSI strategy for FARM-Africa Ethiopia in five years time.

For further information on Ethiopia's SSI strategy please contact Sally Crafter, Country Director.

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NOTES

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