

**Community-based irrigation management in Ethiopia:  
*Strategies to enhance human health, livestock and crop production, and  
natural resource management***

**SUMMARY**

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- **Mekele University** – is the primary university in northern Ethiopia and is central to the Tekeze Basin targeted by this study. Mekele supports teaching, extension and applied research in water and land management and plays a vital advisory role to the regional government in land and water management. It has increasing competence in its research on the effectiveness and efficiency of micro dams in the region.
- **Ethiopian Agricultural Research Organization (EARO)** – is the national research body responsible for enhancing agriculture, the natural resource base, and the production of high quality and safe food. It promotes increased self-reliance of farm communities and conducts research on crop-livestock systems as well as water management. EARO has familiarity with community focused agro-ecosystem-based approaches to conduct research. EARO maintains a regional facility in the Awash basin targeted by this project and will be involved in most aspects of research.
- **World Health Organization (WHO)** – with a view to investing in health for equitable economic development, WHO's Ethiopia program, aims to reduce poverty-related diseases, develop the health sector and address public health issues which include access to safe drinking water, food safety, sanitation and hygiene and control of water-borne diseases. WHO-Ethiopia wishes to form partnerships with the agriculture sector, and its emphasis on water quality and environmental health makes it a natural partner in the project. WHO will draw on its close ties to the Ministry of Health and be responsible for any medical

diagnostics and treatment and for full compliance with national and international standards of medical ethics.

## **ABSTRACT**

Widespread poverty, poor health, low farm productivity and degraded natural resources are major problems in Ethiopia. Although Ethiopia has abundant water, lack of water in certain parts of the country and certain seasons limit crop-livestock production. Water development for agriculture is a priority, but poorly designed and planned irrigation undermines efforts to improve livelihoods and exposes people and environment to risks. Little irrigation has been developed, but the potential for it is high, and what has been developed is often non-functional. Farmers increasingly abandon irrigation systems because of faulty construction, declining water quality, water borne diseases and conflict over access to water. Systematic and holistic evaluation of the impacts of irrigation development on rural livelihoods, poverty, production and the natural resource base is lacking.

The purpose of this study is to identify socially desirable gender-appropriate strategies to reduce poverty through effective development and management of irrigation systems in Ethiopia that improve human health, livestock and crop production, and the conservation of the natural resource base. The work will be done in two key areas, the Awash and Tekeze river basins. Researchers will use participatory methods to assess the impact of past and present irrigation on the well being of dependent rural communities and on the natural resource base that sustains them. Through community level facilitation, communities will better understand their livelihood options. The team will develop a set of project publications and materials describing the lessons learned and provide feedback to participating communities and to government extension workers, non-governmental organizations (NGOs) and others interested in rural development.

The development of methods for engaging communities in problem identification and community action is novel, particularly in Ethiopia and in the context of linking better livestock and water management at the community level. This will enable a richer understanding of interactions between public health, crop-livestock production, and soil and water management. And have application beyond the Ethiopian borders. Participating communities, regional governments, local NGOs, National Agriculture Research and Extension Systems (NARES), and ILRI will be involved in workshops, planning, implementation, analyses and researcher feedback to stakeholders.

**TOTAL COST OF PROJECT – \$315,700 (\$185,700 requested from Comprehensive Assessment)**

**DURATION OF PROJECT – 2 years**

## **LOCATION OF PROJECT**

The project will be carried out in the Awash and Tekeze basins located in central and northern Ethiopia.

## **BACKGROUND**

To feed itself, Ethiopia currently depends on rain-fed agriculture with limited use of irrigation. Highly variable rainfall, frequent floods and drought, and lack of means to store water in times of plenty place Ethiopia at risk of drought and chronic food shortages (CARE 1998). Rapid population growth and the consequent encroachment of food crop farming on environmentally sensitive areas (forest and grazing reserves and steep lands) has set in motion a vicious cycle of declining fuel wood supplies, increasing use of dung and crop residues for fuel instead of

replenishing soil fertility, erosion, low crop yields, feed shortages, progressive land degradation, reduction of areas under fallow and greater exploitation of marginal areas. With declining productivity in rain fed agriculture and the need to double food production over the next two decades, effective and efficient irrigation will be needed. In the highlands that comprise about half of the land area, excess flooding causes severe soil erosion resulting in annual soil losses amounting to 40 t/ha. Water lost is not available for irrigation in places and during times of water scarcity. The potential for irrigation is high, but its potential for negative impact, if mismanaged, is also apparent.

Ethiopia depends on its livestock that serve as a store of wealth for the poor and as an essential means for traction particularly in ploughing heavy and widespread vertisols. Meat and dairy products are important for nutrition and provide opportunities for market-oriented agriculture (King 1983). Development of water harvesting, storage and irrigation is intended to meet multiple needs and livestock keeping is one of them (CRS 1999). Yet when mismanaged, livestock contribute to the degradation of land and water resources including irrigation infrastructure. Stakeholders have little systematic and holistic understanding of the factors that contribute to the success and failure of irrigation systems and particularly of the benefits and harm caused by current livestock management practices.

Four categories of irrigation are common in Ethiopia including traditional schemes, modern-communal schemes, public schemes, and agro-industrial estate owned and private commercial schemes (Dessalegn Rahmato 1986; IFAD 1987; WAPCOS 1990; Estifanos Zerai 1996). Only the agro-industrial state owned schemes of sugar plantations are well managed. The Awash and Tekeze river basins are two important basins for irrigation in Ethiopia. The Awash is the most developed with large-scale and small-scale irrigation located along its banks. Mixed livestock cropping is practised in the upper Awash basin, but in the middle and lower part, pastoralism is more common. In the Tekeze, recently built small micro earth dams and ponds provide supplementary irrigation and supply water for both livestock and people. In the Tekeze and Awash areas, hundreds of micro dams have been constructed to provide domestic water; water for livestock and water for food crop and animal feed production. However, many problems are associated with irrigation in these basins. They include soil salinization, sedimentation of dams, up-slope erosion, water contamination and increased water-borne diseases, and poor design leading to water loss through leakage and evaporation. Increased malaria and schistosomiasis, are all too common. Expanding irrigation threatens wetlands, and conflicts over access to water constrain smallholder farmers. Because communities lack skills and institutions to manage common property resources, irrigation infrastructure quickly falls into a state of disrepair. There are many cases where micro-dams completely fill with sediments during the first rainy season after construction so they cannot even be used for one subsequent dry season. Abandonment of micro dams is on the rise. Inappropriate grazing and livestock watering contribute to their degradation - an ironic situation since many were constructed to enhance livestock production, an important potential source of livelihood for Ethiopia's rural poor. Previous efforts to develop irrigation have in many cases failed to meet their objectives. For example, an evaluation of United Nations (UN)-sponsored small-scale irrigation in 1993 concluded "*It is unlikely that the projects will show a positive economic rate of return and as yet there are few social, environmental or other benefits to justify the expenditure.*" The report further notes that "*the irrigation schemes evaluated had pre-existing extensive and successful traditional irrigation systems (so that) the technical and economic basis for their development, as presently planned, is questionable.*" The report argues for greater involvement of farmers.

EARO, Mekele and ILRI have been expanding their vision from a sectoral approach to agricultural development to one of taking a more holistic "watershed" or "ecosystems" approach

that recognizes the interdependence of poverty, livelihoods, and human health along with water, soil, and crop and livestock management. ILRI and EARO will draw on the watershed experience of the African Highlands Initiative and three Agroecosystem Health Assessment projects carried out recently in Ethiopia, Kenya and Uganda. Contact with other partners (e.g. German Agency for Technical Cooperation (GTZ)-Ethiopia, the African Medical and Research Foundation–AMREF, the International Development Research Centre–IDRC and the International Union for Conservation of Nature–IUCN) will enable adoption of methods for community self-assessment and community-based natural resource management such as controlling livestock in community grazing areas. A key element is increasing emphasis on community-based and participatory R&D but balanced with appropriate external expertise.

In its recently defined corporate strategy, ILRI has explicitly identified integrated natural resource management (INRM) including watershed management as a key future research theme. To this end, it has identified 30,000 USD to enable the Ministry of Water Resources, Ministry of Agriculture, EARO, IWMI and ILRI to host a national priority-setting workshop, and this project will be complementary to this process. ILRI expects to host an IWMI scientist on campus in the next few months that will embark on complementary Horn of Africa wide assessment of large-scale irrigation systems. ILRI is currently investing significant core resources into encouraging integrated water, livestock and crop R&D within a watershed context. A rough estimate of the 2002 and 2003 contributions to this and related projects amounts to about 100,000 USD. Requests exceeding 5 million USD have been submitted to or are being prepared for investors requesting support for related research on watershed management in Ethiopia.

While water development in the two basins differs, neither region realizes its full potential to enhance food security and reduce poverty in the county. This study will initiate an assessment process to help understand the potential and risks associated with further water collection, storage and irrigation practices. It will consider health and environmental risks and consider the need for integrated management of water, crop and livestock resources.

### **Specific research objectives and underlying hypothesis include**

1. Assess the benefits, costs and impacts of different types of small-scale irrigation schemes and their requisite water sourcing technologies (e.g. water harvesting) for livestock and crop production, on the potential for poverty reduction and environmental health in the Tekeze and Awash basins.

**Hypothesis 1:** Traditional small-scale irrigation schemes are more cost-effective and sustainable than imported technology intensive alternatives and that integration of local knowledge and practice will make new irrigation development more successful particularly where market opportunities for produce are limited.

**Hypothesis 2:** Small-scale irrigation development that involves effective community participation including gender roles and responsibilities are likely to be more cost-effective in contributing to poverty reduction by increasing the communities' asset base, increase farmers' productivity, and provide limited increased market opportunity particularly for dairy products and high valued non-perishable crops in locations where the farms are close to potential markets.

**Hypothesis 3:** The distribution of benefits and costs associated with irrigation development varies according to gender, levels of poverty, effectiveness of the

governance of common property resources, and people's access to markets, resources, services, and centers of power.

2. Assess the potential of improving integrated water, livestock and crop management to reduce poverty (paying particular attention to gender-specific characteristics of men and women) and to enhance environmental health in the Tekeze and Awash basins.

**Hypothesis 4:** Irrigation schemes that take an integrated approach to deal with crop, livestock, human health and the environment are likely to be more effective in improving human welfare than those taking a partial objective.

3. Strengthen Ethiopian capacity for research on integrated water, livestock and crop management to impact poverty reduction.

### **Process followed in project design**

Over the past ten months, ILRI, Mekele and EARO held consultations to elucidate the irrigation and water management challenges in Ethiopia and pinpoint opportunities for collaborative intervention. A draft outline of the proposed project was developed and followed by an iterative process of input. Project design was facilitated by strong ongoing collaboration with NARS partners and leadership of ILRI Ethiopian staff with strong practical knowledge of the research and development needs for improved water management.

Water management options must consider public health issues related not only to water-borne contaminants but also to quality and quantity of water for food processing and basic hygiene. WHO's Ethiopian Program deals with these public health challenges and works through the Ministry of Health. Over the past year, WHO and ILRI have agreed to collaborate in finding solutions to a number of health problems. Among these, malaria is the number one killer in Ethiopia and it is increasing with the expansion of micro dams built to increase food production.

A detailed project design, bringing together all stakeholders, will be the first step to implement this project.

### **Linkages and mechanisms for creating synergies with other projects within the comprehensive assessment project**

IMWI is embarking on an irrigation assessment for the Horn of Africa and will base its regional office at ILRI-Addis. IMWI has indicated that Ethiopia and livestock will be a priority in this assessment. This project will make key contributions in 5 major areas – 1) assessing the benefits and costs of irrigation for livelihoods (based on crop-livestock production), public health, and the environment; 2) assessing the impact of irrigation on poverty alleviation, and income distribution by gender, through its effect on employment and productivity; 3) establishing present status of irrigation systems and their management; 4) describing community-based water management options; and 5) providing methodology which enables community self-assessment of poverty, health and water management. It is therefore timely that this project be carried out before the IMWI assessment.

The information and knowledgebase generated by this project will be made available via ILRI's website. This will enable access by other CA projects and also lead to future collaborative arrangements. Further, the fact that IWMI's regional office will be hosted by ILRI, will provide unique opportunities for synergies to be exploited.

The project will establish the relationship of irrigation water use on human welfare, land degradation and environmental degradation. Small-scale irrigation gardening supports household income and enables female farmers to access irrigation.

**GOAL** – To improve the livelihoods of the poor in Ethiopia through better management of irrigation systems to improve human health, reduce poverty and better manage natural resources.

**PROJECT PURPOSE** – To identify socially desirable strategies to manage irrigation systems in Ethiopia to improve human health, livestock and crop production, and natural resources.

**OUTPUTS (milestone indicated in parenthesis)**

1. Impact assessment of alternative irrigation technologies on different production systems. (end of 18 months)
2. Recommendations (including policy) for institutional (collective action and external actors) linkages among stakeholders for better water management. (end of year 2)
3. Options identified for water, soil, livestock and crop management. (end of year 2)
4. Methodology for engaging communities for problem identification and community action. (end of 21 months)
5. Graduate students trained at the MSc level in integrated water management with emphasis given to training female students (end of year 2).
6. Counterpart training of NARS collaborators in integrated water, crop and livestock management. (end of 2 years)
7. Workshops for stakeholders. (at end of 2 years).

**ACTIVITIES [outputs to which activities relate](partners involved)**

1. 2 regional planning workshops (one each in Tekeze and the Awash basins) involving collaborators, NGOs, Ministries of Water Resources, Agriculture and Health to develop the detailed project work plan for each site [output 1-7] (*Mekele, EARO with representatives from each partner at both workshops*)
2. Determine expert and community-based indicators of poverty and environmental health. This will include community-based characterization of poverty. [output 1 & 2] (*ILRI, Mekele, EARO, WHO*)
3. Develop the survey to identify the costs and benefits of irrigation systems. [output 1 & 2] (*Mekele, ILRI*)
4. Test the survey and recruit and train the enumerators [output 1, 2 & 3] (*EARO, Mekele, ILRI*)
5. Conduct the survey at the household level and carry out key informant survey at the community level. [output 1, 2 & 3] (*EARO, Mekele, ILRI, WHO*)
6. Analysis of the survey results. [output 1, 2 & 3] (*ILRI*)
7. Synthesis of survey results into an integrated systems-based format. [output 1, 2 & 3] (*ILRI with EARO and Mekele*).
8. Community-focused workshops to present outcome of impact assessment to provide feedback on current INRM practices and their probable impact on poverty and environmental health [output 1, 2 & 3] (*ILRI, Mekele, EARO, WHO*)
9. Survey of key informants at the community level to identify issues and policy and other options for community action focused on natural resource management. [output 2 & 3] (*ILRI, EARO, Mekele*)
10. Community action plan for engagement of communities. [output 2] (*ILRI, EARO, Mekele, WHO*)
11. Compile data from community-level survey. [output 3] (*ILRI, Mekele, EARO*)

12. Development of suitable communications material. (pictorial illustrations of main findings, and print material) to present results to communities. [output 3] (*ILRI*)
13. Adapt IUCN and AEH approaches to enable self-assessment of poverty, health and natural resources for water, soil, livestock and crop production. [output 4] (*ILRI*)
14. Test the methodology within the communities. [output 4] (*ILRI, EARO, Mekele*)
15. Modify the methodology based on experience in the community. [output 4] (*ILRI, EARO, Mekele*)
16. Graduate students will be jointly supervised by ILRI and Mekele University or ILRI and EARO. They will carry out thesis research focused on addressing one of the project objectives. [output 5] (*ILRI, Mekele, EARO*)
17. Mekele and EARO staff will be involved in all aspects of the project implementation and will benefit from counterpart training throughout the project. ILRI will benefit from training in water management. [output 6] (*ILRI, Mekele, EARO*)
18. A stakeholder workshop involving farmers, NARS collaborators and government policy makers will be held at end of project to communicate outputs and recommendations. [output 7] (*ILRI, Mekele, EARO, WHO*)

## **METHODOLOGY**

The project targets two geographical areas in Ethiopia – the Awash Basin in central Ethiopia and the Tekeze Basin in the north of the country. The two regions were selected based on diversity of irrigation systems, not only ‘modern’ but also traditional systems. The Awash Basin has the distinction of being the breadbasket of Ethiopia. Irrigation in this area is river-fed and poor management of irrigation systems are compounded by competition for water access by crop-livestock smallholders and larger commercial farm enterprises, such as sugar plantations. Micro-dams were introduced in the Tekeze region within the last eight years with limited success. It is anticipated that 30 irrigation systems in each region will be targeted, but the actual number will depend on their size and the size of the community that they support. They will be selected in consultation with stakeholders and stratified according to factors such as size, type of system, source of water, access to markets, and other socio-economic criteria. Community self-assessment of alternative irrigation technologies will be undertaken using a variety of participatory tools drawing on IUCN and agro-ecosystem health assessment methodologies that include household and community mapping and surveys of gender disaggregated social, economic and biophysical indicators. Management recommendation based on a blend of community values and priorities and of expert opinion will be generated. Key informant interviews will include individuals such as government officers, teachers, community leaders and representatives of NGOs and development agencies. Based on water accounting methodologies and participatory interaction with households and communities, an economic evaluation of water use practices will be made with emphasis on the impact on livestock and crop production.

The following analytical approaches will be used:

1. Analysis of key informant survey data to identify regularities in irrigation management and priorities.
2. Partial and whole farm budgeting will be used to assess the impact of irrigation on farm profitability.
3. Programming models of crop-livestock systems will be developed to assess the optimal mix of enterprises and the effect of irrigation on production risk.
4. Crop water requirement in the irrigated areas assessed using FAOCR PWAT-model. Integrated water resources management will be assessed using 'Water Accounting tools and concepts for Improved Water Management' developed by IWMI.
5. Soil loss and sedimentation will be assessed using the 'Universal Soil Loss Equation' (USLE).

6. The water and food security planning tool developed by IMWI – PODIUM (Policy Dialogue Model) will be used to map complex relationships between the numerous factors that affect water and food security.
7. Ecosystem health will be assessed by modifying IUCN model for ecosystems accounting and the University of Guelph’s agroecosystem health model.

## **BENEFICIARIES AND IMPACT**

The ultimate beneficiaries of project outputs are the poor smallholders. In the first instance, the project directly targets the smallholder families associated with the approximately 30 irrigation development activities already mentioned. Identification of management options for water, soil, livestock and crop production will have application to already irrigated and to irrigable land areas in the Horn of Africa. In light of the fact that irrigated land currently supports only a very small fraction of agriculture production in the country, there is doubtless need for irrigation to increase and this project will provide critical input into the design of future irrigation supporting smallholders. This project will particularly benefit women. Traditionally, women have been largely excluded from decision-making regarding natural resource use, female headed households are often excluded from access to irrigation systems and women and children are burdened with hauling water over long distances to meet domestic water needs.

Project outputs will help shape water policies impacting public health and poverty. The project will directly strengthen the capacity of Mekele, EARO and WHO to take an integrated natural resource management approach to assess community and environmental health issues. Important will be the development of methods for engaging communities in problem identification and community action. Enabling policy recommendations are envisioned. The project will foster a richer understanding of interactions between public health, crop-livestock production, and soil and water management. This approach will have application to broad areas of natural resource management, agriculture production and public health and will have application beyond the Ethiopian borders to the Horn of Africa region and beyond. The project will be of particular benefit to the Comprehensive Assessment and the potential contributions are outlined in section 1. In addition to the above, the project has the potential to deliver the following impacts:

- ✓ Increased food security for those living in the study communities
- ✓ Improved environmental integrity
- ✓ Secure access to water by the target communities
- ✓ Increased crop production through improved nutrient cycling by better manure management
- ✓ Increased livestock productivity through increased fodder production
- ✓ Decrease in sedimentation and groundwater decline
- ✓ Improved water-dependent health

## **IMPLEMENTATION AND MANAGEMENT**

ILRI will be the lead coordinating agency and will be responsible for overall project management. A project steering committee will be formed comprising ILRI, Mekele, EARO and WHO to promote communication and facilitate project implementation.

### **Comparative advantage and respective roles of all collaborating institutions**

Over the past few years, Mekele, EARO and WHO have formed strong collaborative links with ILRI. This project will build on existing partnerships and involve each partner in project implementation as indicated in section – ‘ACTIVITIES’ and further details are presented below:



- **ILRI** brings to this project unique expertise in integrated natural resource management approaches to research and development and how to engage communities for problem identification and community action. ILRI's expertise in crop-livestock production systems analysis and impact assessment, and policy analysis will also be vital for this project. In addition to its research program, ILRI has a capacity-building focus and will provide counterpart training to NARS collaborators and will also train graduate students.
- **Mekele** is strategically located in the Tekeze Basin region and has been working with the regional government to advise on water management issues. Specifically, Mekele have experience with micro-dam type water management systems. Mekele has strong links with the communities and will be key in the conduct of household-level surveys. Mekele will continue to work with communities beyond the project and this will be important for sustainability of community-based action to manage water resources. In addition to counterpart training of staff in all aspects of the project, a Mekele staff member will benefit from graduate training.
- **EARO** – A priority area for EARO is the Awash region. EARO is an important advisor to The Government of Ethiopia that has recently developed a strategy for poverty alleviation that focuses on agriculture and which identifies livestock and water as important components to development. As such, EARO, will be pivotal to large-scale benefits from this project through adoption of policies for water management. During project implementation period, EARO will have a key role in the conduct of household-level surveys. Similar to the role of Mekele, EARO will also ensure sustainability of the project by continuing to work with communities beyond completion of the project. In addition to counterpart training of staff in all aspects of the project, an EARO staff member will benefit from graduate training.
- **WHO** has unique capability in all project aspects related to public health. WHO will play a key role in problem identification (i.e. water quality, characterization of water-borne pathogens and related diseases) and assisting communities interpret their health and that of their environment.

#### **Location of different components of the work**

- **Field work & surveys** – will be carried out in selected communities in the Awash and Tekeze basins.
- **Analysis of survey outputs** – will be conducted at ILRI-Ethiopia, EARO and Mekele.
- **Interpretation of analysis** – will be carried out with the participating communities in the Awash and Tekeze Basins.
- **Synthesis of results** – will be conducted at ILRI-Ethiopia, EARO and Mekele.
- **Capacity building** – counterpart training of NARS colleagues and graduates students involving surveying and interaction with target beneficiaries will be carried out in the selected communities; analysis and synthesis activities will be conducted at ILRI-Ethiopia, EARO and Mekele.

**Policy and institutional environment within which project will operate** (*demand for the proposed research and the ability and willingness of partners to adopt research findings*). The project responds to requests from NARS partners for assistance to identify options to better manage irrigation to improve the livelihoods of the poor who are dependent on these systems for water, crop and livestock production. Through these partners, recommendations will inform water management policy at the regional and national levels. As such, the timing of this project is critical. Additionally, EARO has requested support to expand their information and knowledge base to improve productivity of crop-livestock systems and decrease soil degradation through improved water management. Further, EARO seeks support to better engage poor smallholders in problem identification and community action. This project has high probability of success. Over

the past few years, EARO and Mekele have actively collaborated with ILRI building trust and mutual respect. Active projects include the Mount Yerer Watershed project in the Awash Basin, the African Highlands Initiative and surveys to assess policies for sustainable land management. WHO will be an important ally in the sustainability of this project because of its focus on public health aspects of water quality and its desire to form partnerships with the agriculture sector to address public health issues within an environmental health perspective.

Implementation schedule and specific milestones are provided in Annex 1.

### **DISSEMINATION STRATEGY**

The project will deliver descriptive information at different levels. The assessment will deliver new understanding about the impact of past and present irrigation on poverty reduction, food security and environmental health. This information will be published and presented to the Comprehensive Assessment and to key development, research and government institutions in Ethiopia and the region. The material will be printed in a pictorial form with local language captions for local NGOs, farmers, schools, etc. Subject to funding (not requested in this proposal), the team, in collaboration with appropriate development partners (e.g. CARE) will use the knowledge in facilitated workshops to assist communities to undertake their own interventions to improve water and land management. The knowledge and materials will be made available to the extension programmes of the Ministry of Agriculture with whom ILRI is collaborating as the lead agency to bring best-bet technologies from the CGIAR to benefit Ethiopian farmers.

The information and data generated will be used in other semi-arid agro-ecosystems where water scarcity and management is a critical constraint to agricultural productivity. Other East African countries such as Eritrea and Tanzania will be able to use the data. The data and information can also be useful in semi-arid environments in Asia such as in India, Bangladesh and Pakistan.

### **MONITORING**

The project will be monitored and evaluated based on attainment of milestones outlined in the log frame (Annex 2). The surveys and focus on data collection at the project outset will support establishment of baseline from progress, in particular related to public health issues related to water quality, may be established. At the community level, community based self-assessment will be used to enable grassroots participants to improve their capacity and to monitor their progress in implementing community-based and household natural resource management.

**BUDGET** (detailed budget provided in Annex 3)

<b>Source of funding</b>	<b>Amount (USD)</b>
Request from the CA for this proposal	<b>185,700</b>
Estimated funds to be contributed by ILRI for the general purpose of developing an integrated research program linking water, soil, livestock, crop and health management.	100,000
Contribution from IDRC and the Global Mechanism of the CCD for the national conference on water and land management	30,000
<b>TOTAL</b>	<b>315,700</b>

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**Annex 1 – Workplan and milestones (to be confirmed during 1st stakeholders’ workshop)**

Activities and major milestones (indicated by X)	Year 1				Year 2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b><i>Milestones</i></b>								
Impact assessment of alternative irrigation technologies						X		
Recommendations for institutional linkages								X
Options identified for water, soil, livestock & crop management								X
Methodology for engaging communities								X
Graduate students trained								X
Counterpart training of NARS collaborators								X
Workshops for stakeholders	X							X
Annual progress report and final report				X				X
<b><i>Activities</i></b>								
Steering committee meetings	X	X		X		X		X
Collect existing secondary data	X							
Regional planning workshop involving collaborators	X							
Determine indicators of poverty and environmental health	X							
Develop the survey to identify the costs and benefits of irrigation systems	X	X						
Test the survey and recruit and train the enumerators		X						
Conduct surveys of households and community key informants			X	X				
Analyses and synthesis of survey results into holistic systems format					X			
Community workshops to present outcome of impact assessment					X			
Survey community informants to identify options for community action						X		
Community action plan for engagement of communities						X	X	
Compile data from community-level survey							X	
Development of communications material						X	X	X
Graduate student and NARS training	X	X	X	X	X	X	X	X
Testing and evaluation methodology for community engagement	X	X	X	X	X	X	X	X

**Annex 2 – PROJECT LOGICAL FRAMEWORK – Community-based irrigation management in Ethiopia: Strategies to enhance human health, livestock and crop production, and natural resource management. September 2002. International Livestock Research Institute, page 13 of 18**

NARRATIVE SUMMARY	MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>GOAL:</b> Livelihoods of the poor in Ethiopia improved through better management of irrigation systems to improve human health, reduce poverty and better manage natural resources.</p>	<ul style="list-style-type: none"> <li>• Reduced poverty, increased crop and livestock production in irrigated areas of Ethiopia by year 2015.</li> <li>• Improved public health resulting from decrease in water borne diseases in irrigated areas of Ethiopia by year 2015</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring and evaluation data.</li> <li>• Summary papers and articles with results of community and household interviews.</li> <li>• WHO public health reports</li> <li>• Survey of institutional activities.</li> <li>• Government reports</li> </ul>	
<p><b>PURPOSE:</b> Socially desirable strategies identified to manage irrigation systems in Ethiopia to improve human health, livestock and crop production, and natural resources.</p>	<ul style="list-style-type: none"> <li>• Improved crop and livestock production in irrigated areas of target regions (Awash and Tekeze Basins) by year 3 after project end.</li> <li>• Reduced public health problems due to water borne diseases in irrigated areas of target regions by end of project.</li> <li>• Sedimentation problems of micro-dams significantly reduced in targeted communities by end of project</li> <li>• Soil fertility on farms in communities targeted improved by end of project</li> <li>• Community groups formed to enable problem identification and collective action by end of project</li> </ul>	<ul style="list-style-type: none"> <li>• Results of analysis of monitoring and evaluation data (summary reports, publications).</li> <li>• Reports by partners</li> <li>• Results of analysis of community and household surveys (publications).</li> <li>• Publications in conference proceedings and journal articles.</li> <li>• Project recommendations on water management incorporated government strategy documents</li> </ul>	<ul style="list-style-type: none"> <li>• No prolonged adverse weather conditions across research areas.</li> <li>• Communities respond to opportunities and constraints in a sustained manner</li> </ul>
<p><b>OUTPUTS:</b></p> <ol style="list-style-type: none"> <li>1. Impact assessment of alternative irrigation technologies on different production systems.</li> <li>2. Recommendations for institutional (collective action and external actors) linkages between stakeholders in water management for better water management.</li> <li>3. Management options identified for water, soil, livestock and crop management</li> <li>4. Methodology for engaging communities for problem identification and community-action</li> <li>5. Graduate students trained at the MSc level in irrigation agronomy.</li> <li>6. Counterpart training of NARs collaborators in integrated water, crop and livestock management.</li> <li>7. Workshops for stakeholders</li> </ol>	<ol style="list-style-type: none"> <li>1. Impact assessment of alternative irrigation technologies (at end of 18 months)</li> <li>2. Recommendations for institutional linkages (at end of 2 years)</li> <li>3. Options identified for water, soil, livestock &amp; crop management (at end of 2 years)</li> <li>4. Methodology for engaging communities (at end of 2 years)</li> <li>5.2 Graduate students trained at the Masters level (at end of 2 years)</li> <li>6.1 NARs collaborators take over management of project components</li> <li>6.2 NARs collaborators lead stakeholder workshop</li> <li>7.1 Project planning meeting held involving all stakeholders (end of month one)</li> <li>7.2 End of project workshop to present project outcomes to stakeholders (end of 2 years)</li> </ol>	<ul style="list-style-type: none"> <li>• Project reports.</li> <li>• Publications of journal articles and conference proceedings.</li> <li>• Workshop proceedings</li> <li>• 2 graduate theses completed by end of project.</li> </ul>	<ul style="list-style-type: none"> <li>• Feasible, cost effective technologies and strategies exist for improving productivity in these systems</li> <li>• Benefits from community initiatives can be realized despite policy and infrastructural constraints</li> <li>• Technologies are transferable across communities</li> </ul>

ACTIVITIES	Budget requested from investor		<ul style="list-style-type: none"> <li>• Project reports.</li> <li>• Publications of journal articles and conference proceedings</li> <li>• ILRI annual report</li> <li>• Partner annual report</li> <li>• Workshop proceedings</li> <li>• Survey results</li> </ul>	<ul style="list-style-type: none"> <li>• Communities effectively engaged in problem identification</li> </ul>
	Year 1	Year 2		
1. Collect existing secondary data)				
2. 2 regional planning workshops to develop the detailed project work plan)				
3. Determine expert and community-based indicators of poverty and environmental health.				
4. Develop the survey to identify the costs and benefits of irrigation	Researchers:	27900	27900	
5. Test the survey and recruit and train the enumerators	Consultants	3000	3000	
6. Conduct the survey at the household level and carryout key informant survey	Nat'l Staff Salaries & Benefits	12500	12500	
7. Analysis of the survey	Office, Research Supplies, & communications	3000	3000	
8. Synthesis of survey results into an integrated systems-based format	International Travel	0	0	
9. Community-focused workshops to present outcome of impact assessment	Workshops	4400	8400	
10. Survey of key informants at the community level	Fellowships for support for MSc Research	20000	20000	
11. Community action plan for engagement of communities	Publications & Disseminations	0	3000	
12. Compile data from community-level survey	Contract Research	4800	4800	
13. Development of suitable communications material.	Contingency	0	0	
14. Adapt IUCN and AEH approaches to enable self-assessment	Vehicles & Equipment	17500	10000	
15. Test the methodology within the communities				
16. Modify the methodology based on experience in the community				
17. Graduate students carryout thesis research.	<b>Total requested</b>	<b>93100</b>	<b>92600</b>	
18. A stakeholder workshop.				

### Annex 3 – BUDGET SHEET (US\$)

Name of Project	Community-based solutions to improve irrigation management in Ethiopia	
Project Leader	Dr. Don Peden	
Themes	<ul style="list-style-type: none"> <li>• Impacts of irrigation</li> <li>• Options for better management of rain water</li> <li>• Options for improving water productivity</li> <li>• Capacity building</li> </ul>	
<b>Line Item (in US\$)</b>	<b>Year 1</b>	<b>Year 2</b>
<b>Researchers:</b>		
International		
- ILRI (1 month/year @ 12,000/month)	12000	12000
National		
- ILRI (6 months/year @ 2650/month)	15900	15900
<b>Consultants</b>	3000	3000
<b>National Staff Salaries &amp; Benefits</b>		
- ILRI: 50 days local travel per year at \$50/day	2500	2500
- Mekele: 60 days local travel per year at \$50/day	3000	3000
- EARO: 60 days local travel per year at \$50/day	3000	3000
- WHO: 20 days local travel per year at \$50/day	4000	4000
<b>Office, Research Supplies, &amp; communications</b>		
- ILRI	1000	1000
- Mekele	1000	1000
- EARO	1000	1000
<b>International Travel</b>	0	0
<b>Workshops</b>		
- 2 planning/startup workshop - one at each site	4000	0
- Workshops to engage communities and present results	400	400
- Wrap-up stakeholders workshop	0	8000
<b>Fellowships for support for MSc Research</b>		
- Mekele/ILRI - 2 at 5000/year	10000	10000
- EARO/ILRI with university to be selected	10000	10000
<b>Publications &amp; Disseminations</b>	0	3000
<b>Contract Research</b>		
- ILRI - 10 days per year at \$30/day	300	300
- Mekele - 60 days per year at 30 USD/day	1800	1800
- EARO - 60 days per year at 30 USD/day	1800	1800
- WHO - 30 days per year at 30 USD/day	900	900
<b>Contingency</b>	0	0
<b>Vehicles &amp; Equipment</b>		
- Mekele & ILRI 15,000 km @ .30USD/km	4500	4500
- EARO & ILRI 15,000 km @ .30USD/km	4500	4500
- Field equipment @500 USD/site/year	1000	1000
- 3 Computers @ 2500 USD/	7500	0
<b>Total requested</b>	<b>93100</b>	<b>92600</b>
	<b>TWO YEAR TOTAL</b>	<b>185,700</b>
Requested by		

**Other contributions:** ILRI is contributing approximately 100,000 USD during 2002 and 2003 in human and financial resources from un-restricted funds to advance the concept of integrating livestock, crop and water management. It has now received additional commitments of 30,000 USD to support a national workshop on Land and Water management. Requests exceeding 5 million USD have been or are being submitted to investors. Support from the CA will be most helpful in enabling ILRI to continue its efforts to build an effective program in INRM that place water, people and livestock at the core of its R&D.

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Ethiopian Agricultural Research organization  
Soil & Water Research Directorate

Handwritten: 144/1/1308/94

**Dr. Don Peden**  
ILRI, Country Director  
Addis Ababa

30 AUG 2002

**Subject:- Comprehensive Assessment of Water Management in Ethiopian Agriculture**

It is recalled that the International Water Management Institute (IWMI) has proposed a collaborative research on Water and Land Management in Ethiopia. Based on our previous correspondence with IWMI and ILRI and that ILRI represents IARCs in Ethiopia we decided to work with ILRI and IWMI on the above subject. I have gone through the proposed content of the project in detail and on behalf of the Ethiopian Agricultural Research Organization, particularly the Soil & Water Research Sector I have agreed to work together with the other partner institutions mentioned in the document.

My only additional comment is on the section of "Impact and Beneficiaries" where many institutions can be mentioned but EARO, Ministry of Agriculture and Universities are also direct beneficiaries and should be mentioned by name. Hoping to see the success of the project and thank you for all your cooperation.

Sincerely,

*Handwritten signature of Moses Dubale*

**Moses Dubale (Dr.)**  
Director of Soil and Water  
Management Research



FAX/E-MAIL/TLX  
ILRI-ETHIOPIA  
30 AUG 2002  
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**ጠቅላይ ዲሬክቶሪት**  
**Mekelle University**  
**OFFICE OF THE VICE PRESIDENT FOR ACADEMICS AND RESEARCH**

P.O.Box 231 Addis Ababa Tel: 04-409014, 407900-02	Addis Ababa Fax 251-04-409304 009 21007 Mekelle, Ethiopia E-mail: <a href="mailto:naac.rug@telecom.net.et">naac.rug@telecom.net.et</a> or <a href="mailto:mekelle.university@telecom.net.et">mekelle.university@telecom.net.et</a>	Ref No. <i>106/DAF/J.14</i> Date <i>30 AUG 2002</i>
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International Livestock Research Institute (ILRI)  
Addis Ababa

Re: Intent

As well known to you, the International Water Management Institute (IWMI), through its Comprehensive Assessment Program, has posted the first call for proposals. We believe this is an excellent opportunity to assess the constraints and gaps in Water management especially for Agriculture (Crop + Livestock).

Indeed, we are very much happy to jointly submit a proposal that suits the Comprehensive Assessment framework.

This Letter is, thus, written to officially express our intent for the collaboration.

Looking forward to a fruitful partnership,

Sincerely,

*Mintesinot Behailu*



Mintesinot Behailu (Dr.)  
 Vice President for Academics and Research

FAX / E - MAIL / TLX  
 ILRI - ETHIOPIA  

30 AUG 2002

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