New Partnership for
Africa's Development (NEPAD)

Comprehensive Africa Agriculture
Development Programme (CAADP)

Food and Agriculture Organization
of the United Nations

Investment Centre Division

GOVERNMENT OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

SUPPORT TO NEPAD–CAADP IMPLEMENTATION

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Volume II of VI

BANKABLE INVESTMENT PROJECT PROFILE

Water Harvesting and Small–Scale Irrigation

January 2005

ETHIOPIA: Support to NEPAD–CAADP Implementation

Volume I: National Medium–Term Investment Programme (NMTIP)

Bankable Investment Project Profiles (BIPPs)

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Volume III: Human Resource Development for Agricultural Extension

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NEPAD–CAADP BANKABLE INVESTMENT PROJECT PROFILE

Country: Ethiopia

Sector of Activities: Water Control

Proposed Project Name: **Ethiopian Five–Year SSI and WH Programme**

Project Location: All 9 Regional States & Dire Dawa Council

Duration of Project: 5 years

Estimated Cost: Foreign Exchange .....US$539.9 million
Local Cost .....US$951.1 million
Total ..... US$1,491.0 million

Suggested Financing:

Source	***US$ million***	***% of total***
Government	345.44	23.2
Financing institution(s)	881.40	59.1
Beneficiaries	257.47	17.3
Private sector	6.74	0.5
Total	***1,491.05***	***100.0***

ETHIOPIA:

NEPAD–CAADP Bankable Investment Project Profile

"Ethiopian Five–Year SSI and WH Programme"

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Abbreviations

ADF	African Development Fund
ADLI	Agriculture Development–Led Industrialization
ASSP	Agricultural Sector Support Project
BoARD	Bureau of Agriculture and Rural Development *[formerly, BoA, Bureau of Agriculture]*
BoCPO	Bureau of Cooperatives Promotion & Organization
BoW	Bureau of Water
CAADP	Comprehensive Africa Agriculture Development Programme
CWHA	Community Water Harvesting Association
DA	Development Agent
ERHA	Ethiopian Rainwater Harvesting Association
GDP	Gross Domestic Product
GoE	Government of Ethiopia
HH	Household
HVH	High Value Horticultural
M&E	Monitoring and Evaluation
MoARD	Ministry of Agriculture & Rural Development *[formerly, MoA, Ministry of Agriculture]*
MoWR	Ministry of Water Resources
NEPAD	New Partnership for Africa's Development
NGO	Non–Governmental Organization
NMTIP	National Medium–Term Investment Programme
NPC	National Project Coordinator
NPSC	National Project Steering Committee
NPV	Net Present Value
O&M	Operation and Maintenance
PCU	Project Coordinating Unit
PRA	Participatory Rural Appraisal
REST	Relief Society of Tigrai
RSC	Regional Steering Committee
SDPRP	Sustainable Development & Poverty Reduction Programme
SMS	Subject Matter Specialist
SNNPR	Southern Nations, Nationalities & Peoples Region
SSI	Small–Scale Irrigation
SSID	Small–Scale Irrigation Development
WH	Water Harvesting
WSDP	Water Sector Development Programme
WUA	Water Users Association

I. PROJECT BACKGROUND

A. Project Origin

I.1. The *Small–Scale Irrigation Development* (SSID) component of the *National Medium–Term Investment Programme* (NMTIP) is a time–slice of the irrigation component of the 15–year (2002–16) national *Water Sector Development Programme* (WSDP) prepared by the *Ministry of Water Resources* (MoWR). Published in 2002, the WSDP envisages the development of 127,000 ha of SSI schemes over the program period, including approximately 40,300 ha in 2002–06, 40,300 ha in 2007–11 and 46,400 ha in 2012–16.

I.2. With regard to water harvesting, each region has independently planned and implemented tens of thousands of underground water storage structures in 2002/03 and 2003/04. So far the four regions (Amhara, Oromiya, SNNPR and Tigray) have been involved in large–scale water harvesting activities.

I.3. Within the framework of the NMTIP, the Government of Ethiopia (GoE) gives top priority to the development of water harvesting and small–scale irrigation. This is consistent with GoE's *Sustainable Development and Poverty Reduction Programme* (SDPRP). In this connection, the GoE and the African Development Fund have recently concluded a US$53.4 million loan agreement in support of the agricultural sector, with small–scale irrigation and water harvesting constituting the major components of the ADF *Agriculture Sector Support Project* (ASSP). Given the similarity of the two projects and the limited financing available under the ASSP, ***the current programme is a scaling–up of the ASSP***.

B. General Information

I.4. Ethiopia's population of 70 million is currently growing at around 2.7 percent per annum. On the other hand, Ethiopia's economy is based predominantly on subsistence smallholder agriculture, which almost entirely depends on the vagaries of rainfall, with less than 2 percent of the cultivated area (estimated to be upto16 million ha) under irrigation. Consequently, Ethiopia has been facing chronic food shortages and occasional famine due to frequent droughts that occurred during the last three decades. Yet Ethiopia is endowed with significant surface water resources (122 billion cubic meters) and an irrigation potential of up to 3.7 million hectares, constituting 6.7 percent of the total arable land (55 million ha). The small–scale irrigation potential consists of about 473,000 ha. Currently, 197,250 ha are under irrigation out of which an estimated 86,000 ha is under small–scale irrigation, with each small–scale irrigation scheme commanding up to 200 ha of land. Small–scale schemes consist of traditional schemes as well as modern schemes. As part of the SDPRP, around 450,000 water harvesting tanks, ponds and hand–dug wells have been constructed in four regions in 2002/03 and 2003/04.

I.5. The GoE views the development of SSI and water harvesting as a means of attaining food security in the rural areas of the country where 85 percent of the population lives. To this end, the SDPRP gives special emphasis to water harvesting, small–scale irrigation and utilization of water resources.

I.6. Small–scale irrigation schemes shall be implemented in drought–prone parts of all nine regions and the Dire Dawa Administrative Council. Water harvesting activities shall be carried out in Dire Dawa and seven regions, namely Afar, Amhara, Harar, Oromiya, Somali, SNNPR (Southern Nations Nationalities and Peoples Region) and Tigray. The need for water harvesting works in the

remaining two regions (Gambela and Benshangul–Gumuz) has not been demonstrated. The agro–ecological conditions of the regions are characterized by their diversity, with 18 agro–ecological zones identified in the country. They all fall within five traditional climatic zones, including afro–alpine (*Wurch*), temperate (*Dega*), sub–tropical (*Woyna Dega*), tropical (*Qolla*) and desert (*Bereha*). Ordinarily, SSI and WH are practiced in the *Woyna Dega* and *Qolla* zones, where rainfall is mostly erratic and drought tends to occur rather frequently. The socio–economic conditions of the vast majority of the population in these areas feature high levels of poverty, illiteracy, disease and food insecurity.

I.7. Nearly all the regions have significant resources potentials for the development of SSI. Some of these potentials have already been developed. All the seven regions identified for the development of water harvesting have large areas of arid and semi–arid lands that are suitable for water harvesting. Major constraints include: gaps in awareness and know–how, lack of appropriate technology, land degradation due to soil erosion and inadequacy of production support such as credits, inputs, marketing, extension and research.

I.8. The focal government institution spearheading the development of irrigation is the *Ministry of Agriculture and Rural Development* (MoARD). In collaboration with regional *Bureaus of Agriculture and Rural Development* (BoARDs), the ministry has been active in capacity building, demonstration and promotion of smallholder water harvesting technologies since the late 90s. With the recent re–organization of the MoARD, the overall responsibility for SSI has been transferred from the MoWR to the MoARD. At the regional level, the regional *Bureaus of Water* (BoW) or *Irrigation Authorities* are responsible for the planning and implementation of SSI schemes. Several NGOs have been providing financial support toward the implementation of both SSI and WH projects in the country. At the grassroots level, beneficiaries are actively involved through the supply of labour and local construction materials.

II. PROJECT AREA

II.1. The target areas selected for the implementation of SSI schemes in the nine regions and WH projects in the seven regions are drought–prone areas where crop production deficits, exacerbated by population pressure, have been common (see map in Annex 1). Dire Dawa has also been selected due mainly to its semi–arid climate and its very high population density. A GoE–donor group has identified 315 very highly to moderately vulnerable *woredas* according to a number of criteria that included risk of drought, probability of extreme weather conditions and past emergency needs. These *woredas* will be the target project areas for the proposed NMTIP in the development of SSI and WH.

A. Topography, Climate, Soils and Water

II.2. Located in the Eastern part of Africa, Ethiopia is a landlocked country with an area of 1.13 million square kilometres. The country is divided into nine administrative regions and two city councils of Addis Ababa and Dire Dawa. These regions are made up of 528 rural *woredas*. Prominent topographic features include rugged landscape, which is divided into the Central Highlands and the Eastern Highlands by the Great Rift Valley from Northeast to Southwest. Altitudes range from 110m below sea level in the northeast to over 4,600 m in the northwest. Broad expanses of lowland areas with altitudes of less than 1,000 m are found along the western, eastern and southern boundaries of the country.

II.3. Generally speaking, the highlands enjoy subtropical and temperate climate with annual temperatures averaging less than 20°C and the lowlands are characterized by tropical and desert climates with average annual temperatures of 20°C and 30°C, respectively. Annual rainfall in the relatively humid western half varies from 800 mm in the northern and northwestern margins to over 2200 mm in the southwest, while the dry eastern, northeastern and southern parts receive annual rainfalls ranging from less than 200 mm to 1,000 mm. Although the amount of rainfall in most instances may be sufficient for crop growth, uneven temporal and spatial rain distributions in many places often result in drought. The rainy season generally lasts from June to September in the western half, and in the eastern half rainfall generally occurs in a bimodal pattern between February and October.

II.4. Common soil types include Nitosols, Acrisols, Vertisols, Luvisols and Cambisols, which are mainly found in the highlands, and Fluvisols, Regosols, Xerosols, and Yermosols, which are mainly found in the lowlands. Due to deforestation, overgrazing and centuries of continual cultivation, much of the highland soils are degraded with soil erosion. Ethiopia's ten major river basins generate an annual runoff estimated at 122 billion m^3, 76 percent of which comes from three western river basins, namely Blue Nile (locally Abbay), Baro Akobo and Omo–Gibe. The groundwater potentials of the country are estimated to be 2.6 billion m^3. Yields of groundwater wells are generally low.

B. Agriculture

II.5. Agriculture, the backbone of the economy, contributes 46 percent to GDP, up to 90 percent to export earnings and 85 percent to employment. Disaggregated into sub–sectors, the sector's output constitutes 60 percent crop production, 30 percent livestock and 10 percent forestry. Although peasant households produce more than 90 percent of food crops, 45 percent of rural families are living below the absolute poverty line, surviving with much less than the minimum 2,100 calories per person per day or with a daily per capita income equivalent of less than US$1. Rural literacy rate, estimated at 27 percent, is low.

II.6. Only about 15 percent of Ethiopia's surface area is covered with crops of which annual crops occupy 13 percent and perennial crops 2 percent. The cultivated land consists of around 30 percent of the arable land resources potential. The remaining land area is under other land use categories, including grazing land (51 percent), forests (3 percent), woodland (8 percent) and unusable and unproductive land (23 percent). The majority of the rural households cultivate less than 1 ha per household. Up to 9 million ha of land is under food crops every year of which 84 percent, 11 percent and 5 percent are under cereals, pulses and oilseeds, respectively. Crop yields are generally very low ranging from 1–1.2 tons/ha for cereals 0.7 to 0.9 tons/ha for pulses and 0.4 tons/ha for oilseeds. About 60,000 ha are under smallholder traditional irrigation. Use of agricultural inputs such as improved seeds and fertilizers are also very low.

II.7. The agriculture sector is grappling with the following constraints:

- Erratic rainfall and drought;
- Land degradation due to deforestation and overgrazing;
- Inadequate integration of extension and research;
- Poor access to farm inputs such as improved seeds and fertilizers;
- Inadequate extension services;
- Lack of credit facilities; and

- Lack of a developed marketing system, including road network, storage facilities, agro–processing industries, marketing co–operatives, private sector marketing and market information.

II.8. Only 5.3 percent of the total irrigation potential of 3.7 million ha has been developed. The implementation of the national WSDP (of which SSI is a sub–component) over the next 12 years presupposes that the following ***major constraints*** will be removed:

- Lack of clearly stated implementation guidelines on operation, maintenance and administration;
- Poor organizational and institutional effectiveness and lack of proper co–operation among public, private and NGO institutions;
- Shortage of trained manpower and limited implementation capacity;
- Uncertainty surrounding the issue of cost recovery in irrigation; and
- Poor market access and marketing infrastructure.

II.9. The smallholder peasant farmers and pastoralists would be the population target groups. While smallholder farmers are expected to be the target population for both SSI and WH, the pastoralists could be the targets for WH. Both groups have succeeded in devising survival and production systems that are peculiar to their circumstances. The smallholder employs the oxen–plow and mixed crop–livestock farming system of production while the pastoralist makes cyclical migrations in search of pasture and water to raise livestock. During drought, both cope by migrating to other areas in search of employment (in case the smallholder) or greener pasture (in case of the pastoralists). To minimize such migrations it is essential to introduce participatory SSI and WH projects for the population target groups.

C. Institutions

II.10. The *Ministry of Water Resources* (MoWR) is the federal institution responsible for regulating and managing the development and utilization of water resources of the country. The ministry's remit, until very recently, included the promotion of the development of small, medium and large–scale irrigation when the responsibility for SSI development was transferred to the newly restructured MoARD. Included in the major powers and responsibilities of the MoWR are issuing water policies and strategies, setting and enforcing safety and quality directives and standards for waterworks design and construction and ensuring that studies are conducted in water resource development, protection and control.

II.11. The responsibility for the study, design and implementation of small–scale irrigation has been delegated to the regional *Bureaus of Water* or to the *Irrigation Development Authorities* as in the case of Oromiya and SNNPR. Some Regions had established *Commissions for Sustainable Agriculture and Environmental Rehabilitation* (Tigray, Amhara & SNNPR) to ensure the implementation of SSI schemes on force account. Tigray now has a Bureau of Water and SNNPR an Irrigation Authority. There is no sign that the restructuring seen at the level of the MoARD will also be implemented at regional level.

II.12. The MoARD is presently responsible for extension activities in crop production, soil conservation, water harvesting, watershed management and small–scale irrigation.

II.13. Currently, the BoARD at the regional level is responsible for providing agricultural extension services and guidance to small–scale farmers on O&M of irrigation schemes. Subject matter specialists (SMSs) are deployed at the *woreda* level and development agents (DAs) at each *kebele* level to provide the required services.

II.14. At the grassroots level, the smallholders, organized into water committees or *Water Users Associations* (WUAs), mobilize their members to participate in the implementation, operation and maintenance of small–scale irrigation and water harvesting schemes. There is the *Bureau of Cooperatives* that aids grassroots farming communities to organize into different forms of cooperatives, including WUA, marketing cooperatives and even unions.

III. PROJECT RATIONALE

III.1. The GoE's SDPRP provides for the development of both small–scale irrigation and rainwater harvesting. Ethiopia's ADLI strategy, the *Rural Development Policy* and *Strategy* as well as the *Water Resources Management Policy* give top priority to the development of small–scale irrigation and water harvesting as part of the national effort to attain food security and food self sufficiency. The Water Sector Development Program envisages the development of 127,000 ha of SSI during the 2002–2016 period. The proposed programme is also within the framework of the *Comprehensive Africa Agricultural Development Programme* (CAADP) in which small–scale irrigation and rainwater harvesting have been included as part of Pillar #1: *"Expansion of areas under sustainable land management and reliable water control systems"*.

III.2. The smallholder rain–fed agricultural sector is the mainstay of the Ethiopian economy contributing 46 percent to national GDP, up to 90 percent to export and 85 percent to employment. Despite Ethiopia's considerable agricultural resources potentials, the country has been facing chromic food shortages since the early 70s as a result of recurrent drought and high population growth. Even in years of adequate rainfall Ethiopia needs some food aid. In 2001/2002, one of the worst droughts in recent memory, 14 million people required food aid amounting to 1.45 million tons. With the projected population growth and the continuing loss of land productivity due to soil erosion, the situation could get worse unless measures such as the development of SSI and WH are taken. Under the circumstances the country cannot depend on the vagaries of rainfall to meet its food requirements. Therefore, the reasons for promoting the development of SSI and WH in drought prone areas of the country are compelling. The option would be to continue with the status quo, which means continuing to depend on international food aid to meet food production shortfalls likely to arise from adverse climatic conditions in the future.

III.3. Both SSI and WH have been traditionally practiced in the country for generations in the past. So, peasant farmers in drought prone areas would appreciate the value of such technologies. Federal and regional institutions are in place to undertake the implementation of the proposed programme provided their capacity is strengthened in terms of trained manpower and finance.

IV. PROJECT OBJECTIVES

IV.1. While the superordinate sector goal is to contribute towards poverty alleviation in the country, the primary objective of the proposed programme would be to ***improve food security and income level of poor rural households in drought prone and food insecure areas*** of the country through:

- The development of small–scale irrigation;
- Promotion of integrated water harvesting; and
- Capacity building for all stakeholders.

IV.2. Secondary objectives of the programme are:

- To reduce dependence on rain–fed agriculture and the vagaries of climate;
- To improve land productivity through soil protection from erosion and flooding;
- To increase land productivity through higher cropping intensity (e.g. double cropping);
- To improve rural employment through increased cropping intensity; and
- To improve the nutritional quality of the target population.

V. PROJECT DESCRIPTION

A. Overview

V.1. The programme, which will last for five years, will consist of five components:

V.2. ***Small–scale Irrigation:*** This will involve the development of 30,438 ha of SSI schemes at around 400 sites in 9 Regions and Dire Dawa council, benefiting about 121,000 households. It is linked to Pillar # 1 of CAADP.

V.3. ***Water Harvesting:*** This component too is linked to Pillar # 1 of CAADP. Some 3,500 micro–watersheds in as many *kebeles* of 315 drought–prone *woredas* will have:

- Soil moisture storage system of water harvesting (875 thousand ha) benefiting 1.75 million HHs at the rate of 0.5 ha per HH
- 1.05 million water harvesting tanks/ponds benefiting 1.05 million HHs from backyard gardening and livestock watering.
- 700 thousand hand–dug wells supplying drinking water to 1.75 million HHs and benefiting 680 thousand HHs from backyard gardening; and
- Support to *woreda* offices in terms of equipment and training.

V.4. ***Crop Production and Marketing:*** It entails

- The training of about 121,000 farmers in irrigation practices;
- The training of 320 private entrepreneurs and 6,000 farmers in crop marketing; and
- The production of onions, potatoes, shallots, cabbages, pepper, chilies, carrots, beet roots and garlic.[1]

[1] The amount of vegetables that could be produced would be staggering if only vegetables are to be produced under the SSI and WH programme — 487,000 tons under SSI and 2.03 million tons under supplementary

V.5. ***Capacity and Institution Building:*** This constitutes training at every level ranging from the farmer to the federal official. It includes:

- ***SSI:*** The training of 121,000 farmers and 5,000 staff;
- ***WH:*** Training of 24,300 DAs and Lead farmers and 15,805 staff; 96 inter–farm visits, 3 national and 20 regional workshops.

V.6. ***Project Coordination and Management:*** This will involve the setting up of a Coordination Office under the MoARD and the appointment of the Project Coordinator, the Chief Accountant and the M&E Officer.

B. Detailed Features

(i) Small–Scale Irrigation

V.7. The project will be implemented in 315 drought–prone *woredas* of all nine regions and Dire Dawa Council. The regions are Afar, Amhara, Benshangul–Gumuz, Gambela, Harar, Oromiya, Somali, SNNPR and Tigray. All the regions have the natural resources and the institutions required for the implementation of SSI schemes. The four main regions (Amhara, Oromiya, SNNPR and Tigray) also have considerable experience in planning and implementation of SSI.

V.8. The 5–year programme would be a time–slice of the ongoing 15–year (2002–16) WSDP of which SSI is a sub–component. It envisages the development of up to 400 SSI schemes occupying a total area of 30,438 ha (see Table 1 below for regional distribution). These schemes are at various levels of preparation with some having undergone detailed design while many more are at the feasibility and reconnaissance stages. However, the majority is at the identification stage. The responsibility for the study, design and implementation of SSI schemes lies with regional Water Bureaus, Irrigation Development Authorities, or Commissions for Sustainable Agriculture and Environmental Rehabilitation, as the case may be. Where capacity limitations are foreseen, as in the case of construction of dams, private consultancy firms and contractors may be engaged. As part of the SSI project, finance will also be provided for the construction of 2,000 km of access roads from each site to main feeder roads to facilitate marketing. To enable communities to plan, implement and operate SSI schemes, not only will the project provide support toward the formation of WUAs but it will also train them in irrigation practices. This will assist current regional efforts at *woreda* and *kebele* levels.

V.9. Projects implementation shall be based on existing modalities, which consist of force account supplemented with contracting out to local firms. Given the large volume of work involved, dam–based SSI schemes could attract the attention of private contractors. Adequate capacity exists in most regions for the construction of SSI schemes, especially diversion schemes and even some dam schemes. The capacity of some regions needs to be improved to enable them to independently execute diversion schemes. Consulting firms need to be engaged in the design and construction supervision of SSI schemes, especially relatively bigger schemes.

V.10. Operation and maintenance of schemes will be the responsibility of the beneficiaries who shall contribute labour and local materials toward O&M. They will also bear 10 percent of scheme

irrigation using RWH micro–ponds, cisterns and hand–dug wells. Of course production can be diversified through the introduction of other high value crops such as spices.

construction cost through labour and material contribution. It is expected that the *Water Development Fund* under the MoWR will establish the means of cost recovery through water charges.

Table 1: Five–Year SSI Development Programme

Region	No. of SSI schemes	Area (ha)	No. of beneficiaries
1. Afar	3	570	2,280
2. Amhara	84	7,850	31,280
3. Benshangul–Gumuz	7	640	2,560
4. Gambela	5	500	2,000
5. Harar	1	120	480
6. Oromiya	110	8,255	32,525
7. Somali	3	500	2,000
8. SNNPR	155	8,300	33,063
9. Tigray	28	3,473	13,892
10. Dire Dawa Council	4	230	920
Total	400	30,438	121,000

Source: Based on the *Water Sector Development Program* (WSDP), 2002.

(ii) Water Harvesting

V.11. The integrated water harvesting programme under the NMTIP plans to increase the income levels of asset–poor smallholder farming communities through participatory:

- In–situ soil moisture storage to improve rain–fed crop productivity;
- Runoff storage for individual backyard gardening of high value horticultural (HVH) crops;
- Runoff storage for livestock watering from ponds; and
- Construction of hand–dug wells for domestic water supply as well as for the production of HVH crops.

V.12. It is recognized that an integrated system of water harvesting bestows numerous benefits to the farming community. These include conventional conservation of soil and water resources of the micro–catchments and meeting the various water supply needs of the community through storage. The integrated WH approach is particularly significant from the standpoint of the role it plays in freeing the inordinate amount of time women spend in fetching domestic water. This time will be used for other productive ventures such as backyard gardening.

V.13. Implementation of integrated WH will be via community resource management method, which involves the combined application of construction, training, capacity building, on–farm piloting and demonstration in order to promote farmer adoption and multiplication. In keeping with participatory methods that need to be promoted, the PRA (participatory rural appraisal) technique will be employed to:

- Cater to the needs of women and the disadvantaged;
- Come up with better alternatives;

- Involve people from regional organizations (BoARD, BoW, etc.) in project planning/implementation, and
- Learn from existing interventions by other institutions.

V.14. The objective of the above approach would be to come up with best practices in planning, implementation and operation of WH in the project area.

V.15. During the last two years, the four regions (Amhara, Oromiya, SNNPR and Tigray) have been engaged in a large–scale implementation of tens of thousands of water harvesting structures including micro–ponds or tanks, cisterns and hand–dug wells. Each of the first three regions plans to build about 200,000 WH works per year during the next few years while Tigray intends to construct around 100,000 per year.

V.16. The WH component proposed in this programme will be implemented in seven regions and Dire Dawa Council. The regions include Afar, Amhara, Harar, Oromiya, SNNPR, Somali and Tigray. Finance would be required for:

- WH works
- Capacity building for farming communities and government staff for project related activities
- Equipment and vehicles and
- Technical assistance, consultancy service & technical studies or research.

V.17. To facilitate implementation of the project the farming community will be encouraged to form CWHAs (*Community Water Harvesting Associations*). Project sites will serve as training grounds for lead farmers and DAs, who will train farmers with the technical support of *woreda* and Regional staff. Beneficiaries will contribute labour valued at around 20 percent of project construction cost.

V.18. Support needs to be provided to 315 *woreda* offices and 3,500 *kebeles* in Dire Dawa & the 7 Regions over a period of 5 years. About 11 watersheds per *woreda* or one watershed per *kebele* will be treated resulting in a total of 3,500 watersheds. Up to 1.75 million HHs will benefit from soil moisture storage practices, 1.73 million HHs from backyard gardening, 8.75 million people from improved access to drinking water and 1.75 million HHs from improved access to water for livestock.

V.19. ***Soil Moisture Storage*** will multiply rainfall by concentrating runoff in the crop area. Techniques that can be tested and adapted include contour ridges & bunds, permeable rock dams, trapezoidal bunds, etc. A total of 875,000 ha will be treated with such system of WH.

V.20. ***Drinking Water*** supply for the community will be available from 20,000 hand–dug wells and 8,400 livestock ponds will provide drinking water for livestock. The improved accessibility of drinking water will enable individuals to use the extra time for productive activities such as raising small ruminants and poultry, backyard gardening, beekeeping, etc.

V.21. ***Water Harvesting for Backyard Crop Production*** entails the construction of 1.05 million individual WH tanks/ponds or cisterns and 680,000 hand–dug wells for the irrigation of backyard high–value horticultural crops (HVH) using family drip or surface irrigation. Lead CWHA members will play pivotal role in disseminating the technology to other members of the association who in turn

will provide free labour to women and beginners. Guidelines and training courses will be provided and various technical solutions will be offered.

(iii) Crop Development and Marketing

V.22. This component comprises three sub–components:

- Improvement of the management skill of farmers
- Marketing support and
- Soil conservation for enhancing crop productivity. Under the overall guidance of the MoARD, the regional *Bureaus of Agriculture*, in collaboration with *Bureaus of Cooperative Promotion & Organization* (BoCPOs), will implement the sub–components.

V.23. ***Improvement of Farmer Management Skills:*** The sub–component aims at disseminating technical messages and practices on double–cropping vegetables under SSI through demonstration and training on efficient water use, use of improved seeds, fertilizer application, integrated pest management and post–harvest handling. To facilitate these activities, the programme will support the establishment of 1,200 demonstration plots of 0.25 ha each. One plot will serve a group of 100 farmers and the plot will belong to one of the members selected by the group. The plots will be planted with improved varieties of assorted vegetables. While the programme will provide improved seeds and fertilizers the farmer will contribute his labour and local inputs. About 6,000 contact farmers will be trained in post harvest crop handling technologies. The project will adapt/build on existing SSI successes in the project area.

V.24. Field days and farmers exchange visits will be arranged to facilitate information dissemination to farmers. A consultant will undertake a short–term baseline survey at the start of project implementation. Furthermore, refresher courses and workshops to SMS and short intensive training courses on extension to DAs will be offered. The revised FAO irrigation manuals(s) or other existing manuals shall be used to train farmers in the methods of vegetable production. To facilitate transport of SMSs and DAs, motorcycles would be procured.

V.25. ***Marketing Support:*** The objectives of this subcomponent are to:

- Form irrigation cooperatives to promote agricultural marketing activities at each of the 400 irrigation sites;
- Build the marketing and management capacity of selected cooperatives and farmers associations;
- Construct 800 farm storage structures and produce packaging for demonstration purposes;
- Train 320 farm produce entrepreneurs and 4,800 farmers in vegetable marketing and handling;
- Facilitate marketing by rehabilitating 2,000 km of access roads connecting irrigation schemes and feeder roads and;
- Support the establishment of market information systems within the MoARD, *Commission of Cooperatives*, BoCPO and BoARD for dissemination to farmers. This will include a two–month study on market analysis of vegetables. To enhance the speedy

dissemination of information the project will provide motorcycles to SMS at *woreda* and DAs at *kebele* levels. In addition, double cabins will be made available to the Planning Department of the MoARD for coordination of marketing, M & E and project supervision in the regions. An additional role of marketing officers will be to link farmers with micro–financing institutions.

V.26. ***Soil Conservation:*** This subcomponent is closely linked to the WH component through the integration of measures such as agro–forestry, planting of trees, protection of gullies, etc. Up to 400 nurseries will be set up so that each SSI scheme will have access for fruits, agro–forest and other tree seedlings. The *Soil Conservation Unit* of the BoARD at the *woreda* level shall take the responsibility for executing this subcomponent.

(iv) Capacity Building and Institutional Development

V.27. Capacity will be built at all levels of government institutions ranging from the farmer to the ministry with a view to enabling all those involved to execute their duties successfully.

V.28. ***Small–Scale Irrigation:*** The focus will be on building capacity for design and implementation. In order to attain this capacity, staff will undergo a series of short–term in–field and in–country training and provisions will be made for light and mobile construction equipment. In addition, technical assistance and short–term consultancy will be offered to strengthen the design and supervision departments and to assist the formation and mobilization of WUAs. Within 5 years about 121,000 farmers from 9 regions and Dire Dawa Council will be trained. A total of about 4,800 officers from all regions will be offered in–field training in relevant areas for about one month. An additional 2,200 will undergo a more comprehensive 3–month training at National training institutes with 65 staff acquiring additional professional training.

V.29. ***Water Harvesting:*** All offices involved in the programme will benefit from funding and resource support. These offices are found in 3,500 *kebeles*, 315 *woredas*, 8 regions and Federal offices of the MoARD. Training in WH techniques will be given to 24,300 DAs / Lead farmers, who will train up to 800,000 farmers. Some 14,600 *woreda* and field technicians in all 8 regions shall be trained in practical WH through a series of short–term in–service courses. Higher–level training in WH will be provided to about 1,000 regional and woreda staff and 150 federal level professional staff in planning, design and development of integrated WH. Inter–farm visits will be conducted for 96 farmers' groups over 5 years and 3 National and 20 Regional workshops will be organized, in which the GoE, donors and NGOs will be invited to contribute. The findings of the workshops will be incorporated into a comprehensive Technical Design Manual, giving all options.

V.30. All information originating from Federal and regional sources will be disseminated to implementation entities through the networks of the *Ethiopian Rainwater Harvesting Association* (ERHA) for which ERHA will gain the support of the programme. The programme will also support studies undertaken in collaboration with ERHA to verify detailed features of proposed technologies and to define the appropriate conditions of adaptability by the farming community. Acquired information will be made available to designers in the form of *Rainwater Harvesting Manual*.

V.31. ***Crop Development and Marketing:*** This aspect of capacity building will target irrigation agronomy, promotion of new crop technology and crop marketing. The objective is to enable both staff and the private sector to perform the activities of the programme in such a way as to improve the household income and private sector development in the area. This will be achieved through field

demonstrations, a series of short–term local trainings, workshops, field days and farmers' and staff exchange visits. In terms of targets:

- A total of 121,000 farmers will be trained in irrigation water management, fertilizer application and improved cultural practices over a period of 5 years though demonstration plots;
- Training workshops, seminars and demonstrations will be held to provide training on crop marketing to 6,000 contact farmers and 320 crop marketing entrepreneurs;
- 33 in–country short courses in irrigation agronomy, pest management and crop marketing will be offered to staff at various levels;
- 40 woreda staff will attend three months overseas short courses to improve their knowledge in irrigation agronomy and pest management; and
- 4 M.Sc. courses will be offered in crop marketing and irrigated horticulture to strengthen the planning capability of the MoARD.

(v) Programme Coordination and Management

V.32. The role of programme coordination is critical to the success of the programme. Therefore, the programme will provide support for coordination between the various entities and financers. It will support the recruitment of a Deputy National Project Coordinator, Project Accountant and an internationally recruited M&E Specialist to develop and introduce a system of monitoring project impact and effectiveness. The Deputy National Project Coordinator, who will be responsible for overseeing the activities of the SSI &WH Programme, will work under the ASSP National Project/Programme Coordinator to be appointed to run the National ASSP Coordination Office located in the MoARD. As the programme is gender sensitive, each implementation agency will designate a gender focal officer who will oversee the implementation of the social and gender aspects of the programme, monitoring and reporting progress in this aspect of the project.

VI. INDICATIVE COSTS

VI.1. At current prices, the programme would cost an estimated Birr 12.87 billion (US$1.49 billion). This includes a provision of 10 percent of total investment costs for physical contingencies and 5 percent of total baseline costs for price contingencies. About 36 percent of the total programme costs constitute the foreign exchange component. Approximately 80 percent of the baseline costs represent the development cost of the water–harvesting component. Most of the remaining 20 percent of the programme cost is intended to be used for SSI development (9 percent) and recurrent costs (9 percent), with approximately 2 percent left for the three minor components — capacity building (1.4 percent), crop development and programme coordination. The very large percentage share of the WH component is significant in view of the priority status given to WH by the Federal and Regional governments. Programme costs would be incurred over a period of five years, in increasing annual instalments. Cost estimates were derived from official sources and suppliers' quotations. The MoARD, the MoWR, Regional BoWs and *Irrigation Development Authorities* provided source documents for estimation of SSI and WH investment costs. Costs for the other programme components were mostly obtained from ADF's ASSP document prepared for a similar programme. The following tables summarize the programme costs.

Table 2: Summary of Cost Estimates by Component								
Component	Birr ('000)			US$('000)			% Foreign Exchange	% Total Base Cost
	Local	Foreign	Total	Local	Foreign	Total		
1. Small–scale Irrigation Development	607,253.4	404,835.6	1,012,089	70,365.4	46,910.3	117,275.7	40	9.0
2. Water Harvesting Development	5,687,766.7	3,327,918.3	9,015,685	659,069.2	385,620	1,044,691.2	37	79.9
3. Crop Development	124,660.6	2,3152.4	35,619	1,444.6	2,682.8	4,127.4	65	0.3
4. Capacity Building								
• Capacity Building for SSI Development	54,311.6	34,870	89,181.6	6,293.3	4,040.6	10,333.9	39	0.8
• Capacity Building for Water Harvesting	30,273.5	8,340.7	38,614.2	3,507.9	966.5	4,474.4	22	0.3
• Capacity Building for Crop Development and Marketing	24,672.5	6,052.9	30,725.4	2,858.9	701.4	3,560.3	20	0.3
5. Programme Coordination	1,740	5,178	6,918	201.6	600.0	801.6	75	0.1
Total Investment Costs	6,418,484.3	3,810,347.9	10,228,832.2	743,740.9	441523.6	1,185,264.5		
Total Recurrent Costs	787,745.2	264,313.9	1,052,059.1	91,279.9	30627.3	121,907.2	37.2	90.7
Total Baseline Costs	7,206,299.5	4,074,661.8	11,280,891.3	835,020.8	472150.9	1,307,171.7	25.1	9.3
Physical Contingencies	641,848.4	381,034.8	1,022,883.2	74,374.1	44,152.3	118,526.4	36.1	100.0
Price Contingencies	360,311.5	203,733.1	564,044.6	41,751.0	23,607.6	65,358.6	37.2	9.1
Total Program Cost	8,208,459.4	4,659,429.7	12,867,819.1	951,145.9	539,910.8	1,491,056.7	36.1	5.0

Table 3: Summary of Cost Estimates by Component per Year						
Component	Year 1	Year 2	Year 3	Year 4	Year 5	Total ('000 US$)
1. Small–scale Irrigation Development	16,897.6	20,994.3	24,195.3	26,722.8	28,465.7	11,7275.7
2. Water Harvesting Development	175,023.4	191,498.0	208,878.6	226,473.7	242,817.5	1,044,691.2
3. Crop Development	1,676.0	712.1	585.2	582.8	571.3	4,127.4
4. Capacity Building						
• Capacity Building for SSI Development	3,674.7	3,732.6	2,923.3	1.7	1.7	10,333.9
• Capacity Building for Water Harvesting	1,126.6	1,016.5	1,053.0	821.2	457.1	4,474.4
• Capacity Building for Crop Dev. & Marketing	717.9	717.9	717.9	718.0	688.6	3,560.3
5. Programme Coordination	160.3	160.3	160.3	160.3	160.4	801.6
Total Investment Costs	199,276.5	218,831.7	238,513.5	255,480.5	273,162.3	1,185,264.5
Total Recurrent Costs	18,286.1	21,333.8	24,381.4	27,429.1	30,476.8	121,907.2
Total Baseline Costs	217,562.6	240,165.5	262,894.9	282,909.6	303,639.1	1,307,171.7
Physical Contingencies (10 % of Total Investment)	19,927.6	21,883.2	23,851.4	25,548.0	27,316.2	118,526.4
Price Contingencies (5 % of Total Baseline Costs)	10,878.1	12,008.3	13,144.7	14,145.5	15,182.0	65,358.6
Total Programme Costs	248,368.3	274,057.0	299,891.0	322,603.1	346,137.3	1,491,056.7

VII. PROPOSED SOURCES OF FINANCING

VII.1. The sources of finance for the programme will be

- Multilateral financing institutions such as the World Bank;
- The Federal and Regional Government budgets;
- The intended beneficiaries, and
- Private investors.

VII.2. International financing institutions are expected to finance about 59 percent of the programme costs or about US$881.4 million. This includes the entire foreign currency component plus an additional 22.9 percent of the total project cost. The government and the beneficiaries would contribute 23.2 percent and 17.3 percent toward financing the programme, respectively. Given the predominantly smallholder features of the programme, the role of the private sector in financing the project is expected to be insignificant, contributing less than one–half of one percent. The financing structure of the WH component (the largest single programme component) consists of: government US$149.98m (14.4 percent), financing institutions US$682.55m (65.3 percent) and beneficiaries US$212.16m (20.3 percent). With regard to SSI, it is envisaged that regional governments would provide 45 percent (US$52.8m), with 40 percent (US$46.9m) coming from international financing institutions and 10 percent (US$11.7m) to be contributed by the beneficiaries.

Table 4: Proposed Financing Structure('000 US$)

Programme Component	Government	Int'l Financing Institutions	Beneficiaries	Private Investors
1. SSI Development	52,774	46,910	11,727.7	5,864
2. WH Development	149,982.4	682,551.5	212,157.2	–
3. Crop Development	1,444.6	2,682.8	–	–
4. Capacity Building	12,641.9	5,726.7	–	–
5. Project Coordination	200.4	601.2	–	–
Recurrent Costs	91,279.9	30,627.3	–	–
Contingencies	37,120.5	112,302.2	33,582.8	879.6
Total ('000 US$)	345,443.7	881,401.7	257,467.7	6,743.6
% of Programme Cost	23.17	59.11	1,7.27	0.45
Total Programme Cost	1,491,056.7			

VIII. PROJECT BENEFITS

VIII.1. The benefits of SSI and WH are reflected in the considerable and sometimes dramatic increases in crop yields. In drought–prone areas in particular, the difference between rain–fed fields and irrigated fields could be between having little or no crop yields on the one hand and having normal or high crop yields on the other. In the case of WH, cereal crop production increases ranging from 100 percent to as high as 600 percent have been reported in East African countries that used different techniques of in–situ soil moisture storage water harvesting (Ngigi, 2003). In Ethiopia, for example, yield increases of 100–200 percent, 100–500 percent, and 100 percent for *teff*, pepper and sorghum, respectively have been reported as a result of a flood spreading type of a traditional system of WH in Northern Wollo. In Tanzania, innovative farmers succeeded in raising the yields of maize from 0.7 to 3.8 t/ha and millet from 0.3 to 0.9 t/ha by adopting homegrown techniques of WH. As a result of supplemental irrigation of vegetables from a 100 m^3 of underground micro–pond or tank in Kenya, household income had improved by US$192 in 3 months. This was surplus income earned after

meeting household vegetable requirements. In the 2003/04 season, the Sasakawa Global 2000 pilot WH schemes (each based on 500 m^2 family drip scheme abstracting water from a 65 m^3 cistern), has reported vegetables sales proceeds ranging from Birr 1,890 to 4,500 (US$219–521) per household in the Rift Valley area of Ethiopia. According to the MoARD, two farmers from Tigray and Amhara regions secured gross incomes of Birr 10,000 (US$2,259) and Birr 4,000 (US$463) from their irrigated plots of tomato and garlic corps, respectively. Both used hand–dug wells as source of irrigation water.

VIII.2. Average yields of vegetables produced under small–scale irrigation in Ethiopia are: tomatoes (18 t/ha), Irish potatoes (17 t/ha), onions (16 t/ha), garlic (12 t/ha), chilies (1.4 t/ha), beet–root (16 t/ha), carrot (16 t/ha), shallot (14 t/ha) and head cabbage (20 t/ha). Market prices of these products vary considerably, depending on market access and season of production.

VIII.3. In addition to increasing crop production and productivity, among the major benefits of SSI and WH are:

- Improvement on crop quality;
- Enhanced food security and food self sufficiency at national and household level;
- Improved nutritional status of farming households;
- Creation of employment opportunities;
- Increased family income and raised standard of living;
- Improved supply of drinking water for human and livestock consumption; and
- Enhanced soil and water conservation

VIII.4. The main beneficiaries of the programme would be the millions of rural households that are afflicted with poverty and hunger. Included in the positive and negative environmental impacts of the SSI and WH Programme are:

- ***Positive:***
  - Control of soil erosion and land degradation associated with reduced runoff as a result of WH. This in turn improves soil productivity;
  - Enhanced groundwater recharge, which provides water supply for domestic use, livestock or irrigation;
  - Increased availability of forage and fodder for livestock;
  - Improved environment as a result of afforestation of upper catchment under integrated micro–watershed approach.
- ***Negative:***
  - Increased incidence of water–borne diseases, particularly malaria;
  - Increased risk of soil salinity as a result of small–scale irrigation in arid and semi–arid areas;
  - Displacement of people resulting from inundation by irrigation storage reservoirs;
  - Loss of communal grazing land stemming from allocation of land for irrigation development, and;
  - Increased risk of drowning of people and livestock in unprotected micro–ponds, cisterns and small reservoirs.

IX. IMPLEMENTATION ARRANGEMENTS

A. Programme Execution and Coordination

IX.1. The *Ministry of Agriculture and Rural Development* will take overall responsibility for project execution. A *Project Coordinating Unit* (PCU) will be established within the MoARD to coordinate the activities of ADF's ASSP as well as the activities of the present programme. A Deputy Project Coordinator will lead the coordination activities of the SSI & WH Programme. In implementing the programme, use will be made of the line structure of the MoARD currently existing at the National, Regional, *woreda* and *kebele* levels.

IX.2. The SSI component will be implemented in all nine regions and the Dire Dawa Council. The coordinating entity will be the SSI Team of the SSI, WH and *Rural Infrastructure Development Promotion Department* under the *Natural Resources Branch* of the MoARD. The WH component will be implemented in 7 regions and the Dire Dawa council, with the WH Team of the same institution taking the coordinating role. Coordinating the tasks of the agricultural development & marketing component will be the *Rural Development Branch* of the MoARD in cooperation with the *Agricultural Marketing Branch* of the MoARD and the *Ministry of Trade and Industry*.

B. Institutional Arrangements

IX.3. Given the scale and complexity of the two programme components, the Federal Ministry of Agriculture & Rural Development (the *Implementing Agency*) will strengthen the two sub–programme coordinating units — the SSI Team and the WH Team currently organized under the SSI, WH & *Rural Infrastructure Development Promotion Department*. Each unit, led by a Team Leader, will oversee the implementation of its portion of the programme and ensure the submission of periodic reports regarding the programme. The Implementing Agency will assign a *Training & Participatory Specialist* and a *Procurement Expert*. Implementation Agency experts in relevant fields will oversee programme implementation as required.

IX.4. The small Project Coordinating Unit (see IX.1 above) to be established in the MoARD will coordinate and liaise with international financers and implementing units, consolidate project accounts and reports, facilitate supervision missions of lenders, compile quarterly reports, and provide for annual audits, mid–term review and project completion reports. While the ASSP project will employ the *National Project Coordinator* (NPC) for the PCU, the MoARD, on behalf of the Federal Government, shall designate a *Deputy National Project Coordinator* to oversee the implementation of the SSI & WH Programmes. Furthermore, the Programme will employ the services of an international M&E Specialist to establish monitoring and evaluation mechanisms for monitoring programme implementation progress and assessing programme impacts. He will also prepare and submit an M&E report. As to measurable indicators for M&E, quantified targets are provided in Annex 2, representing each component.

IX.5. At the highest level of the federal Government, a *National Project Steering Committee* (NPSC) will be set up as proposed in the ADF ASSP Report. However, in view of the recent restructuring of the MoARD the composition of this Steering Committee is proposed to be different. Accordingly, the NPSC will be an inter–ministerial committee chaired by the State Minister of Natural Resources with committee members drawn from the *Ministry of Finance & Economic Development* (state minister), the Cooperatives Commission, the *Environmental Protection Authority* (Deputy General Manager), the Heads of BoARD and BoW of Amhara, Oromiya, SNNPR and Tigray as well

as representatives of Women Affairs and Farmers/Water Users Associations. The NPSC will approve project work plans and budgets, employment of key staff, and training programme.

IX.6. Similarly, a *Regional Steering Committee* (RSC) will also be formed under the chairmanship of the BoARD and will consist of members from the BoW/*Irrigation Authority*, BoCPO, *Environment Office* (if any), and *Food Security Office*. This RSC will be the same RSC that ADF proposed for its ASSP but with slight changes in membership. The RSC will be responsible for approving the regional annual work plan and budget. Actual project implementation responsibility is that of the BoARD for WH schemes and the BoW/*Irrigation Authority* for SSI schemes. It is not clear as to whether the regional responsibility for SSI will be shifted from the BoW to the BoARD in the same way as the federal responsibility for SSI was transferred from the MoWR to the MoARD (see I.8). It may be prudent not to go ahead with such transfer unless the benefits of doing so have been proven to be compelling. As it stands now, the BoW/Irrigation Authorities in the four Regions (Amhara, Oromiya, SNNPR and Tigray) are capable of undertaking reconnaissance and feasibility studies, engineering design as well as implementation of irrigation schemes on a turnkey basis. It is imperative to strengthen the regional BoARD and the BoW/Irrigation Authority with trained manpower, including DAs.

IX.7. As beneficiaries, the farming community will participate fully in the development of SSI and WH schemes in their localities. Organized into WUAs, the beneficiaries will take part in all aspects of the programme including project identification, preparation, implementation, operation and maintenance. They will be backed by the regional BoARD and the *woreda* Agricultural Development Office during the operation phase. DAs will play a critical role in this respect. During project implementation, the farming community will be mobilized to participate through labour contributions valued at a minimum of 10 percent of the investment cost of the project. Upon completion of implementation, the scheme will be turned over to the WUAs, who will ensure day–to–day on–farm O&M of the scheme. O&M of the head works and the main canal will be the responsibility of the BoW/Irrigation Authority. CWHAs (see V.17) will be formed to facilitate implementation of WH works. Furthermore, women heads of household will be encouraged to join WUAs and CWHAs and wherever possible land will be allocated to landless women heads of household.

X. TECHNICAL ASSISTANCE REQUIREMENTS

X.1. The programme would require inputs of technical assistance for three of the project components, namely small–scale irrigation, water harvesting and crop development and marketing.

X.2. Technical assistance in the form of domestic consultancy services are envisaged to be required to support the efforts of Regional BoWs and Irrigation Authorities in feasibility studies and engineering designs of some of the small–scale irrigation schemes, particularly those involving storage dam components. Cost provisions for such services are built in the unit investment cost of the schemes.

X.3. With regard to water harvesting, domestic technical assistance or consultancy services would be needed in three areas — water harvesting, training and participatory rural appraisal. A provision of some 16 professional person–months each has been made for a *Water Harvesting Expert*, a *Training Specialist* and a *PRA Expert*. In addition, expatriate technical assistance could be needed in such areas as engineering hydrology for which a provision of 8 professional person–months has been made for short–term consultancy in miscellaneous fields.

X.4. The agricultural development and marketing component would require domestic technical assistance or consultancy services in various areas, including marketing studies/analysis, data collection system, training needs assessment, baseline survey on vegetables and socio–economic study. A total of 8 person–months of professional inputs are provided for technical assistance in these areas.

XI. IDENTIFIED ISSUES AND PROPOSED ACTIONS

XI.1. There are several issues that need to be resolved in order to successfully implement the proposed SSI and WH Programme. These include technical, institutional, financial, economic, social and environmental. The major outstanding issues are outlined hereunder.

A. Small–scale Irrigation

XI.2. Each regional BoW/Irrigation Authority will have to ensure that adequate number of SSI schemes have ***detailed engineering design documents*** ready in preparation for implementation during the first year of the programme. Should there be any shortfall in designed projects the water bureau should prepare design documents from its existing portfolio of feasible projects. Concurrently, the Bureau needs to undertake project preparation activities for design and implementation in subsequent years. This will minimize delay in project implementation.

XI.3. The GoE should undertake to establish ***cost recovery mechanisms*** within 3 years of the start of SSI component implementation. The Water Fund, already established under the Ministry of Water Resources, needs to work towards that end.

XI.4. The issue of what will become of the ***SSI Implementing Agency*** at the regional level has to be resolved as early as possible. Regional bureaus had undergone repeated restructuring and renaming during the past decade. With the transfer of responsibility for SSI from the MoWR to the newly organized MoARD, expectations are that taking this cue each Regional WoB/Irrigation Authority may yet be combined with the BoARD. This amalgamation, however, is undesirable, given the loss of autonomy this will cause to the existing bureau as a result of centralization.

XI.5. Critical to the successful implementation of the SSI sub–programme is adequate institutional capacity. Given the high staff turnover due to uncompetitive remuneration, the institutional capacity of the water bureaus is limited in terms of trained manpower. Hence, to redress this situation ***capacity building*** should be given priority attention. This means providing different types of short–, medium–, long–term training to various categories of thousands of personnel, including engineers, officers, technicians and farmers. Furthermore, the timely acquisition of the necessary construction machinery, equipment, vehicles and laboratory facilities is essential.

XI.6. The success of SSI projects very much depends on the ***full participation of the beneficiaries***. In order to facilitate organized participation, beneficiaries should be encouraged to form WUAs. Members of the WUAs can then be trained and motivated to take part in the development process of SSI including planning, implementation, operation and maintenance of schemes.

XI.7. The government should do its utmost to ***secure sufficient funds*** for the successful implementation of the SSI component of the programme. This is very important in view of the fact that the WSDP has accorded the highest priority to the development of SSI because of its crucial role towards ensuring food security. While 40 percent of the SSI cost is anticipated to come from

multilateral financers, 45 percent is expected to come from the government and 10 percent would be beneficiary contribution. Therefore, effort should be made to secure the commitments of the funding entities in advance of the start of project implementation.

XI.8. ***Right of use of land*** for at least the duration of the programme (30 years) should be guaranteed through the issuance of a user certificate similar to what the government has been issuing in some regions. Otherwise, the farmer may not feel secure enough to undertake improvements of a permanent or long–lasting nature on his land.

XI.9. ***Possible riparian disputes*** could arise over use of rivers or streams and contiguous lands planned for irrigation development. Such disputes, unless resolved upfront, would block sub–project implementation of individual schemes. Therefore, detailed guidelines need to be issued in order to resolve such issues.

B. Water Harvesting

XI.10. The ***scale of the WH component*** of the project is based on regional plans and activities during the last two years and the trends during the next few years. It would appear that the regions had set ambitious targets for 2002/03 and 2003/04 because they achieved only 35 percent and 50 percent of planned targets, respectively, but achievement seems to be improving. The modest achievements of the previous years notwithstanding, the regional states appear to have chosen to plan for even higher targets for the next year or two. Oromiya Region, for example, plans to construct 240,000 and 269,000 micro–ponds and hand–dug wells during 2004/05 and 2005/06 respectively, compared to 227,330 and 83,400 for 2003/04 and 2002/03, respectively. In view of the limited availability of financing, however, this project profile has been planned for approximately 50 percent of regional plans.

XI.11. Sustainability of WH schemes can be ensured through the ***integrated WH approach***, whereby each micro–catchment is holistically treated with soil and water conservation measures including catchment and gully protection, soil storage systems and structural WH for various purposes. This is not the current approach followed by most regions. Therefore, all regions should follow the integrated WH principle.

XI.12. The MoARD has established the ***economics of WH***[2] before embarking upon its implementation (MoA 2002). Since this issue is at the heart of a project planning exercise in WH, it should be verified through subsequent studies. This is important in view of the high cost of WH micro–ponds and cisterns.

XI.13. Most regions offer ***relief grain as incentive*** in mobilizing the community to implement WH structures. Although incentives are sound in principle, food–for–work as an incentive could have an undesirable effect on local farm–gate prices of food crops, unless the relief food is to be procured locally, which is not mostly the case. Therefore, cash for work should be the preferred incentive for beneficiary participatory implementation of WH schemes.

XI.14. A number of ***technical issues*** remain outstanding in WH:

- Rainfall–runoff relations need to be established for major agro–ecological zones where WH works are likely to be undertaken. This means mostly drought–prone, arid and semi–arid areas of the country.

[2] The MoA has estimated the Net Present Value (NPV) of vegetable production under RWH on 300 m^2 of land to be Birr 133–459 (US$16–55), and Birr 337–989 (US$41–119) on 600 m^2 of land.

- Standard criteria and methods should be developed for siting WH schemes, including ponds, cisterns and hand–dug wells.

- Appropriate seepage control mechanisms need to be developed especially for micro–ponds. Among the options being used are lining with high–density polyethylene plastic sheets (currently preferred by many) and lining with compacted clay. Cracking of ferro–cement lined cisterns is a feature frequently observed as a result of poor workmanship and/or expansive Vertisols. Related to this is the issue associated with placement of plastic lining. A recent evaluation in the Tigray Region has concluded that covering the plastic lining with a soil layer will make it vulnerable to puncture (L. Mills, 2004). So, it is better to leave it without cover.

- The mechanisms of water abstraction and application have to be addressed adequately. Manual methods are ruled out on account of excessive labour requirement. Although very costly, the preferred options are treadle pumps for abstraction from ponds and family drip for water application. In this programme profile, provisions have been made for treadle pumps and water storage tanks.

- A comprehensive national design and O&M manual will go a long way towards addressing these and other technical issues.

C. Cross–cutting Issues

XI.15. These are:

- Massive community participation in project planning, implementation and operation needs to be ensured, including the participation of women heads of household.

- The issue of health, especially with respect to HIV/AIDS and malaria, should be given due attention.

- Precautionary measures need to be taken against adverse environmental and social impacts such as soil salinity, water–borne diseases, displacement of people and drowning of people and livestock.

- The stability of market prices of high value horticultural products (the main crops likely to be produced by the programme), may be adversely affected in response to large supplies from the programme. To counter this, storage, agro–processing and household consumption should be promoted. In addition, marketing cooperatives should be established and diverse products should be produced and marketed on the domestic and foreign markets.

- The government should provide all–round support to farmers through the provision of extension services, credits, farm inputs, and marketing services, including organizing cooperatives.

XII. RISKS ANALYSIS

XII.1. ***Delays in programme implementation*** are likely to occur from one of several possible causes. These causes include inadequate capacity and shortage of funds for programme implementation. The programme has made adequate provisions for capacity building and institutional development for all levels of the hierarchy including farmers, *kebele* personnel, *woreda* staff, regional officers and federal officials (see V.27–V.31). To avoid undue delays in programme implementation every effort should be made to execute the capacity building component of the programme according to schedule. With regard to funds, the successful implementation of the programme presupposes the availability of the required funds. Therefore, it is imperative that the government secures the commitment of prospective donors as early as possible. In this connection, the GoE has visibly succeeded in securing donor funding for the *Road Sector Development Programme*. Similar or better success rating is expected of this programme.

XII.2. A big risk to the programme would be the ***unwillingness of the beneficiaries to participate***. Effective participation of prospective beneficiaries holds one of the keys to project success. Given the risk–avert nature of farmers, they should be convinced about programme benefits through consultative participatory approaches and training for which the programme has made provisions. Such an approach will entice them into participating in the planning, implementation and operation of the project, thus enabling them to become project owners. This includes women heads of households, who will be encouraged and assisted to establish their farm, earn a living, make decisions and join WUAs with their own irrigation plots. Generally, the records of beneficiary participation to date have been satisfactory, in both small–scale irrigation and water harvesting schemes implemented previously.

XII.3. ***Insufficient rainfall*** may pose risk for WH in view of the fact that WH is dependent on availability of sufficient runoff generated from adequate rainfall. Therefore, to ensure success of WH during drought, adequate storage should be built. As it is difficult to design for all extreme events, a definition of the probability for which the system works is critical. Hydro–meteorological data on rainfall intensity, frequency and duration are necessary for relevant designs of WH schemes. However, such data are in short supply in many parts of the project area.

XII.4. An important aspect is the ***inadequacy of technical support and training*** that need to be provided with respect to processes and designs. For sustainable utilization of WH systems, the beneficiaries should be presented with a range of alternative techniques so that they can choose solutions that are well adapted to their specific conditions. However, appropriate training, guidance and construction supervision should be provided to ensure the desired quality of workmanship in construction and maintenance. Therefore, a comprehensive technical manual on the design, construction, operation and maintenance of WH systems should be made available to all implementers, DAs and beneficiary farmers.

XII.5. A distinct risk would be that ***farm products***, notably vegetables, from the SSI and WH Programme, ***could glut the market***. As a way out of this risk, the programme has designed a "*Crop Development and Marketing"* component (see V.22–V.26). Important means of preventing glut would be diversifying supply, encouraging the development of agro–industry, and promoting export and domestic consumption of vegetables, particularly in rural areas where the market potential is huge.

XII.6. ***Possible negative environmental impacts*** pose a risk. The spread of water–borne diseases and soil salinity are the major negative environmental impacts associated with the programme. To ensure programme sustainability, measures mitigating negative environmental impacts should be introduced, once the problem has been identified and perhaps quantified. Above all, training and raising awareness on preventive measures need to be given early, before situations get out of control.

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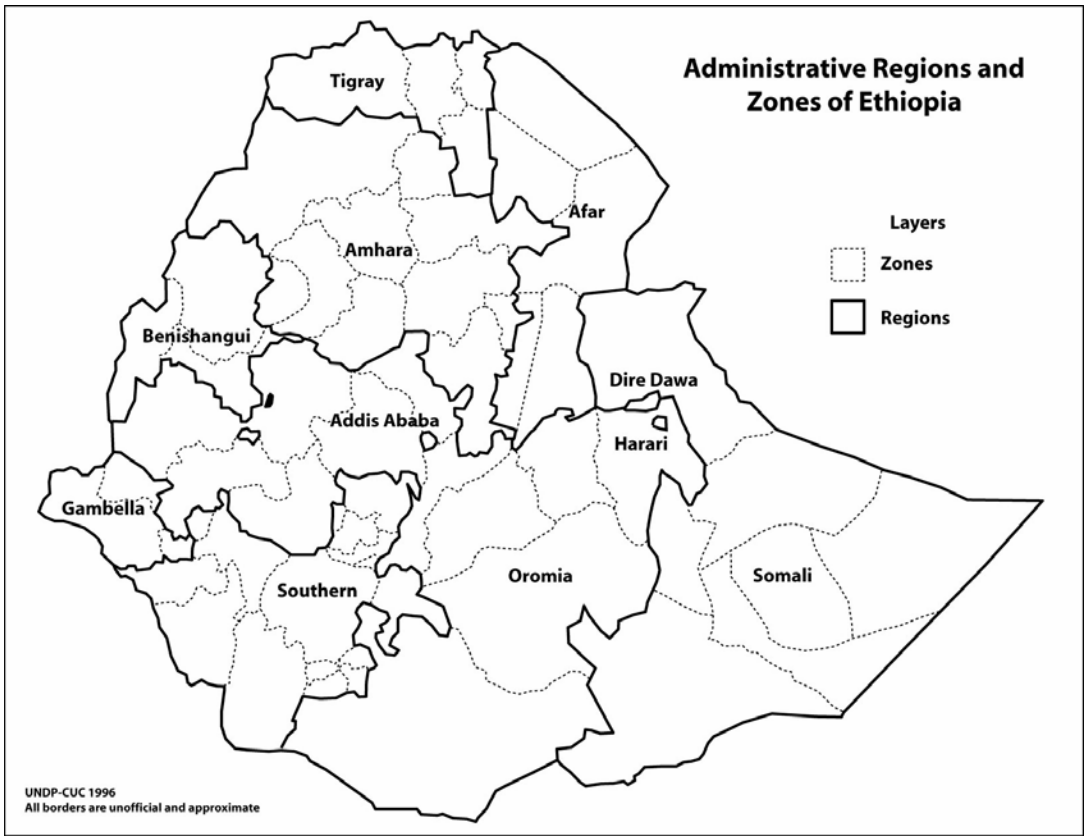
ANNEXES

Annex 1: Administrative Map of Ethiopia

Annex 2: Programme Cost Tables

Annex 3: References

Annex 1: Administrative Map of Ethiopia



Annex 2: Programme Cost Tables

A2.1: Small–scale Irrigation – Investment ('000 Birr)																		
Region	Year 1			Year 2			Year 3			Year 4			Year 5			Total		
	No	Ha	Cost	No	Ha	Cost	No	Ha	Cost	No	Ha	Cost	No	Ha	Cost	No	Ha	Cost
1. Afar	–	–	–	1	170	5,936.6	1	200	6,984.2	1	200	6,984.2	–	–	–	3	570	19,905.0
2. Amhara	13	1,215	45,256.3	15	1,400	52,147.2	17	1,590	59,224.3	19	1,775	66,115.2	20	1,870	69,653.8	84	7,850	292,396.8
3. Henshangul	1	100	3,492.1	1	100	3,492.1	1	100	3,492.1	2	170	5,936.6	2	170	5,936.6	7	640	22,349.4
4. Gambela	1	100	3,492.1	1	100	3,492.1	1	100	3,492.1	1	100	3,492.1	1	100	3492.1	5	500	17,460.5
5. Harar	–	–	–	1	120	4,190.5	–	–	–	–	–	–	–	–	–	1	120	4,190.5
6. Oromiya	17	1,275	26,475.4	19	1,425	29,590.1	22	1,650	34,262.3	25	1,875	38,934.4	27	2,030	42,152.9	110	8,255	171,415.1
7. Somali	–	–	–	–	–	–	1	150	5,238.2	1	150	5238.1	1	200	6,984.2	3	500	17,460.5
8. SNNPR	23	1,230	44,653.9	27	1,445	52,459.3	31	1,660	60,264.6	35	1,875	68,070.0	39	2,090	75,875.4	155	8,300	301,323.2
9. Tigray	4	495	22,456.2	5	620	28,126.9	6	744	33,752.3	6	744	33,752.3	7	870	39,468.4	28	3473	157,556.1
10. Dire Dawa	–	–	–	1	50	1,746.0	1	60	2,095.3	1	60	2,095.3	1	60	2,095.3	4	230	8,031.8
Total	59	4,415	145,826.0	71	5430	181,180.9	81	6,254	208,805.3	91	6,949	230,618.2	98	7,390	245,658.6	400	30,438	1,012,089.0

A2.2: Soil Storage System of WH – Investment ('000 Birr)												
Region	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Item	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost
1. Afar:												
Water spreading bunds	300	546	350	637	400	728	450	819	500	910	2,000	3,640
Contour bunds	300	360	350	420	400	480	450	540	500	600	2,000	2,400
Permeable rock dams	150	504	175	588	200	672	225	756	250	840	1,000	3,360
Sub–total	*750*	*1,410*	*875*	*1,645*	*1,000*	*1,880*	*1,125*	*2,115*	*1,250*	*2,350*	*5,000*	*9,400*
2. Amhara:												
Contour ridges	16,500	17,820	19,250	20,790	22,000	23,760	24,750	26,730	27,500	29,700	110,000	118,800
Contour stone bunds	16,500	14,175	19,250	16,537.5	22,000	18,900	24,750	21,262.5	27,500	23,625	110,000	94,500
Trapezoidal bunds	3,750	10,050	4,375	11,725	5,000	13,400	5,625	15,075	6,250	16,750	25,000	67,000
Sub–total	*36,750*	*42045*	*42,875*	*49,052.5*	*49,000*	*56,060*	*55,125*	*63,067.5*	*61,250*	*70,075*	*245,000*	*280,300*

A2.2: Soil Storage System of WH – Investment ('000 Birr)												
Region	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Item	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost
3. Oromiya:												
Contour ridges	16,500	17,820	19,250	20,790	22,000	23,760	24,750	26,730	27,500	29,700	110,000	118,800
Contour stone bands	16,500	14,175	19,250	16,537.5	22,000	18,900	24,750	21,262.5	27,500	23,625	110,000	94,500
Trapezoidal bunds	3,750	10,050	4,375	11,725	5,000	13,400	5,625	15,075	6,250	16,750	25,000	67,000
Sub–total	*36,750*	*42,045*	*42,875*	*49,052.5*	*49,000*	*56,060*	*55,125*	*63,067.5*	*61,250*	*70,075*	*245,000*	*280,300*
4. SNNPR:												
Contour ridges	16,500	17,820	19,250	20,790	22,000	23,760	24,750	26,730	27,500	29,700	110,000	118,800
Contour stone bunds	16,500	14,175	19,250	16,537.5	22,000	18,900	24,750	21,262.5	27,500	23,625	110,000	94,500
Trapezoidal bunds	3,750	10,050	4,375	11,725	5,000	13,400	5,625	15,075	6,250	16,750	25,000	67,000
Sub–total	*36,750*	*42,045*	*42,875*	*49,052.5*	*49,000*	*56,060*	*55,125*	*63,067.5*	*61,250*	*70,075*	*245,000*	*280,300*
5. Tigray:												
Contour ridges	8,250	8910	9,625	10,395	11,000	11,880	12,375	13,365	13,750	14,850	55,000	59,400
Contour stone bunds	8,250	6930	9,625	8,085	11,000	9,240	12,375	10,395	13,750	11,550	55,000	46,200
Trapezoidal bunds	1,500	5025	1,750	5,862.5	2,000	6,700	2,250	7,537.5	2,500	8,375	10,000	33,500
Sub–total	*18,000*	*20865*	*21,000*	*24,342.5*	*24,000*	*27,820*	*27,000*	*31,297.5*	*30,000*	*34,775*	*120,000*	*139,100*
6. Somali:												
Contour bunds	600	720	700	840	800	960	900	1,080	1,000	1,200	4,000	4,800
Water spreading bunds	600	1,092	700	1,274	800	1,456	900	1,638	1,000	1,820	4,000	7,280
Permeable rock dams	300	1,008	350	1,176	400	1,344	450	1,512	500	1,680	2,000	6,720
Sub–total	*1,500*	*2,820*	*1,750*	*3,290*	*2,000*	*3,760*	*2,250*	*4,230*	*2,500*	*4,700*	*10,000*	*18,800*
7. Harar:												
Contour ridges	150	162	175	189	200	216	225	243	250	270	1,000	1,080
Contour stone bunds	150	126	175	147	200	168	225	189	250	210	1,000	840
Trapezoidal bunds	75	2,010	87.5	2,345	100	2,680	112.5	3,015	125	3,350	500	13,400
Sub–total	*375*	*2,298*	*437.5*	*2,681*	*500*	*3,064*	*562.5*	*3,447*	*625*	*3,830*	*2,500*	*15,320*
8. Dire Dawa:												
Contour bunds	150	126	175	147	200	168	225	189	250	210	1,000	840
Water spreading bunds	150	273	175	318.5	200	364	225	409.5	250	455	1,000	1,820
Permeable rock dams	75	252	87.5	294	100	336	112.5	378	125	420	500	1,680
Sub–total	*375*	*651*	*437.5*	*759.5*	*500*	*868*	*562.5*	*976.5*	*625*	*1,085*	*2,500*	*4,340*
Total	131,250	154,179	153,125	179,875.5	175,000	205,572	196,875	231,268.5	218,750	256,965	875,000	1,027,860

A2.3: WH for Backyard Gardening – Investment ('000 Birr)												
Region	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Item	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost
1. Afar												
Micro–pond/tank (182 m³)	–	–	–	–	–	–	–	–	–	–	–	–
Cistern (60 m³)	45	202.5	52	236.2	60	270	68	303.8	75	337.5	300	1,350
Hand–dug well	306	306	357	357	408	408	459	459	510	510	2,040	2,040
2. Amhara												
Micro–pond/tank (182 m³)	40,755	158129.4	47,548	184,484.3	54,340	210,839.2	61,132	237,194.1	67,925	263,549	271,700	1,054,196
Cistern (60 m³)	4,245	4,245	4,952	4,952	5,650	5,650	6,368	6,368	7,075	7,075	28,300	127,350
Hand–dug well	28,866	28,866	33,677	33,677	38,488	38,488	43,299	43,299	48,110	48,110	192,440	192,440
3. Harar												
Micro–pond/tank (182 m³)	142	553	166	645	190	737	214	829	238	922	950	3,686
Cistern (60 m³)	15	68.5	18	78.8	20	90	22	101.2	25	112.5	100	450
Hand–dug well	102	102	119	119	136	136	153	153	170	170	680	680
4. Oromiya												
Micro–pond/tank (182 m³)	40,755	158,129.4	47,548	184,484.3	54,340	210,839.2	61,132	237,194.1	67,925	263,549	271,700	1,054,196
Cistern (60 m³)	4,245	4,245	4,952	4,952	5,650	5,650	6,368	6,368	7,075	7,075	28,300	127,350
Hand–dug well	28,866	28,866	33,677	33,677	38,488	38,488	43,299	43,299	48,110	48,110	192,440	192,440
5. SNNPR												
Micro–pond/tank (182 m³)	40,612	157,576.5	47,381	183,839.25	54,150	210,102	60,919	236364.8	67,688	262,627.5	270,750	1,050,510
Cistern (60 m³)	4,245	4,245	4,952	4,952	5,650	5,650	6,368	6,368	7,075	7,075	28,300	127,350
Hand–dug well	28,866	28,866	33,677	33,677	38,488	38,488	43,299	43,299	48,110	48,110	192,440	192,440
6. Somali												
Micro–pond/tank (182 m³)	–	–	–	–	–	–	–	–	–	–	–	–
Cistern (60 m³)	90		105		120		135		150		600	2,700
Hand–dug well	612	612	714	714	816	816	918	918	1,020	1020	4,080	4,080
7. Tigray												
Micro–pond/tank (182 m³)	20,092	86,958.9	23,441	101,452	26,790	115,945.2	30,139	130,438.4	33,488	144,931.5	133,950	579,726
Cistern (60 m³)	2,100	9,450	2,450	11,025	2,800	12,600	3,150	14,175	3,500	15,750	14,000	63,000
Hand–dug well	14,280	14,280	16,660	16,660	19,040	19,040	21,420	21,420	23,800	23,800	95,200	95,200
8. Dire Dawa												
Micro–pond/tank (182 m³)	142	552.9	166	645	190	737.2	214	829.4	238	921.5	950	3,686
Cistern (60 m³)	15	67.5	18	78.8	20	90	22	101.2	25	112.5	100	450
Hand–dug well	102	102	119	119	136	136	153	153	170	170	680	680

A2.3: WH for Backyard Gardening – Investment ('000 Birr)												
Region	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Item	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost	Ha	Cost
Total												
Micro–pond/tank (182 m^3)	142,500	552,900	166,250	645,050	190,000	737,200	213,750	829,350	237,500	921,500	950,000	3,686,000
Cistern (60 m^3)	15,000	67,500	17,500	78,700	20,000	90,000	22,500	101250	25,000	112,500	100,000	450,000
Hand–dug well	102,000	102,000	119,000	119,000	136,000	136,000	153,000	153000	170,000	170,000	680,000	680,000
Grand Total	259,500	722,400	302,750	842,800	346,000	963,200	389,350	1,083,600	432,500	1,204,000	1,730,000	4,816,000

A2.4: WH for Water Supply – Investment ('000 Birr)												
Region	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Item	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
1. Afar:												
Livestock pond (community)	50	1,256	59	1,466	67	1,675	75	1,884	84	2,094	335	8,375
Community Water Supply (hand dug well)	60	60	70	70	80	80	90	90	100	100	400	400
2. Amhara:												
Livestock pond (community)	328	8,194	382	9,559	437	10,925	492	12,291	546	13,656	2,185	54,625
Community Water Supply (hand dug well)	819	819	956	956	1,092	1,092	1,228	1,228	1,365	1,365	5,460	5,460
3. Harar:												
Livestock pond (community)	–	–	–	–	–	–	–	–	–	–	–	–
Community Water Supply (hand dug well)	6	6	7	7	8	8	9	9	10	10	40	40
4. Oromiya:												
Livestock pond (community)	441	11,025	514	12,862	588	14,700	662	16,538	735	18,375	2,940	73,500
Community Water Supply (hand dug well)	1,110	1,110	1,295	1,295	1,480	1,480	1,665	1,665	1,850	1,850	7,400	7,400
5. SNNPR:												
Livestock pond (community)	252	6,300	294	7,350	336	8,400	378	9,450	420	10,500	1,680	42,000
Community Water Supply (hand dug well)	639	639	746	746	852	852	958	958	1,065	1,065	4,260	4,260
6. Somali:	:											
Livestock pond (community)	139	3,469	162	4,047	185	4,625	208	5,203	231	5,781	925	23,125
Community Water Supply (hand dug well)	180	180	210	210	240	240	270	270	300	300	1,200	1,200
7. Tigray:												
Livestock pond (community)	50	1256	59	1466	67	1675	75	1884	84	2094	335	8375
Community Water Supply (hand dug well)	180	180	210	210	240	240	270	270	300	300	1,200	1,200

A2.4: WH for Water Supply – Investment ('000 Birr)												
8. Dire Dawa:												
Livestock pond (community)	–	–	–	–	–	–	–	–	–	–	–	–
Community Water Supply (hand dug well)	6	6	7	7	8	8	9	9	10	10	40	40
Total – pond	*1,260*	*31,500*	*1,470*	*36,750*	*1,680*	*42,000*	*1,890*	*47,250*	*2,100*	*52,500*	*8,400*	*210,000*
Total – well	*3,000*	*3,000*	*3,500*	*3,500*	*4,000*	*4,000*	*4,500*	*4,500*	*5,000*	*5,000*	*20,000*	*20,000*
Total	4,260	34,500	4,970	40,250	5,860	46,000	6,390	51,570	7,100	57,500	28,400	230,000

A2.5: Vehicles & Equipment – WH ('000 Birr)												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Vehicles												
4WD – Federal	4	860	–	–	–	–	–	–	–	–	4	860
4WD – Region	32	6,880	–	–	–	–	–	–	–	–	32	6,880
Motorcycles – Region	64	1,600	–	–	–	–	–	–	–	–	64	1,600
Motorcycles – woreda	250	6,250	250	6,250	250	6,250	250	6,250	–	–	1,000	25,000
Equipment												
Federal Support	l.s.	331	–	–	–	–	–	–	–	–	l.s.	331
Region Support	l.s.	1,652	l.s.	1,652	–	–	–	–	–	–	l.s.	3,304
Woreda Support	l.s.	1,002	l.s.	1,002	l.s.	1,002	l.s.	1,002	–	–	l.s.	4,008
Kebele Support	l.s.	3,248	l.s.	3,248	l.s.	3,248	l.s.	3,248	–	–	l.s.	12,992
Hand Pump for Comm. Water Supply	4,000	,6,000	4,000	6,000	4,000	6,000	4,000	6,000	4,000	6,000	20,000	30,000
Treadle Pump for WH System	346,000	339,080	346,000	339,080	346,000	339,080	346,000	339,080	346,000	339,080	1,730,000	1,695,400
Water Tank (1 m^3) for WH System	346,000	231,820	346000	231,820	346,000	231,820	346,000	231,820	346,000	231,820	1,730,000	1,159,100
Total		598,723		589,052		587,400		587,400		576,900		2,939,475

A2.7: Water Harvesting Investment Cost Summary												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
WH Expert (Local)	6	150	4	100	2	50	2	50	2	50	16	400
PRA Specialist (Local)	6	150	6	150	2	50	2	50	2	50	18	450
Training Specialist (Local)	2	50	4	100	2	50	2	50	2	50	12	300
Short term Miscellaneous International TA	2	300	2	300	2	300	2	300	–	–	8	1,200
Total	16	650	16	650	8	450	8	450	6	150	54	2,350

A2.8: Crop Development ('000 Birr)												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1. Land Development (nursery)												
Afar	3	15	–	–	–	–	–	–	–	–	3	15
Amhara	50	250	34	170	–	–	–	–	–	–	84	420
Benshangul	4	20	3	15	–	–	–	–	–	–	7	25
Gambela	3	15	2	10	–	–	–	–	–	–	5	25
Harar	1	5	–	–	–	–	–	–	–	–	1	5
Oromiya	66	330	44	220	–	–	–	–	–	–	110	550
SNNPR	93	465	62	310	–	–	–	–	–	–	155	775
Somali	3	15	–	–	–	–	–	–	–	–	3	15
Tigray	16	80	12	60	–	–	–	–	–	–	28	140
Dire Dawa	4	20	–	–	–	–	–	–	–	–	4	20
2. Vehicles												
4 WD Double Cabins	2	275.6	–	–	–	–	–	–	–	–	2	275.6
Motorcycles – Regions	18	309.6	–	–	–	–	–	–	–	–	18	309.6
Motorcycles – *woreda/kebele*	135	2,322	–	–	–	–	–	–	–	–	135	2,322
3. Office Equipment												
Computer & accessories MoARD	2	51.6	–	–	–	–	–	–	–	–	2	51.6
Computer & acc. BoARD Marketing	16	412.8	–	–	–	–	–	–	–	–	16	412.8
Computer & accessories BoCPO Marketing	18	464.4	–	–	–	–	–	–	–	–	18	464.4
Photocopiers, MoARD & BoARD	9	270	9	270	–	–	–	–	–	–	18	540
Furniture Regions	8	200	–	–	–	–	–	–	–	–	8	200
Furniture *woreda*	135	3,375	–	–	–	–	–	–	–	–	135	3,375
4. Nursery Tools and Materials	400	3,200	400	3,200	400	3,200	400	3,200	400	3,200	2,000	16,000
5. Technical Assistance / Consultants (marketing study, baseline survey, socioeconomic studies, training needs etc.)	8 month	166	–	–	–	–	–	–	–	–	8	166
Field Expenses	10	100	16	160	12	120	10	100	–	–	48	480
6. Special Services												
E–mail Connectivity	20	360	–	–	–	–	–	–	–	–	20	360
Extension Materials BoARD	16	96	16	96	16	96	16	96	16	96	80	480
Extension Materials for Schemes	400	1,600	400	1,600	400	1,600	400	1,600	400	1,600	2,000	8,000
Promotion of Agro processing	2	10	2	10	2	10	2	10	2	10	10	50
Market data Collection & Analysis	12	36	8	24	8	24	8	24	8	24	44	132
Total		14,464		6,145		5,050		5,030		4,930		35,619

A2.9: SSI – Capacity Building for All Regions ('000 Birr)												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost
A. TRAINING												
1. Water Users Association												
Members (3 days training)	30,000	3,000	35,000	3,500	35,000	3,500	–	–	–	–	100,000	10,000
Board Members (15 days)	7,000	4,200	7,000	4,200	7,000	4,200	–	–	–	–	21,000	12,600
2. Employees (1 month)	1,600	2,880	1,600	2,880	1,600	2,880	–	–	–	–	4,800	8,640
3. Bureaus of Water (BoW)												
Woreda (3 months at institute)	120	1,080	120	1,080	120	1,080	–	–	–	–	360	3,240
Zone (3 months at institute)	26	234	26	234	26	234	–	–	–	–	78	702
Region (3 months at institute)	14	126	14	126	14	126	–	–	–	–	42	378
4. Medium–Term Training – BoW												
Woreda (training at local univ.)	95	1,425	95	1425	95	1,425	–	–	–	–	285	4,275
Zone (training at local univ.)	47	705	47	705	47	705	–	–	–	–	141	2,115
Region (training at local univ.)	16	240	16	240	16	240	–	–	–	–	48	720
5. Cooperative Office Staff												
Woreda	216	1,944	216	1,944	216	1,944	–	–	–	–	648	5,832
Zone	33	297	33	297	33	297	–	–	–	–	99	891
Region	13	117	13	117	13	117	–	–	–	–	39	351
Training for marketing Office & Trader	2	9.6	2	9.6	2	9.6	3	14.4	3	14.4	12	57.6
6. Medium–Term Training–Coops												
Woreda (at local university)	106	1590	106	1590	106	1590	–	–	–	–	318	4,770
Zone (at local university)	32	480	32	480	32	480	–	–	–	–	96	1,440
Region (at local university)	11	165	11	165	11	165	–	–	–	–	34	510
7. Overseas Training BoW	6	1,500	6	1,500	6	1,500	–	–	–	–	18	4,500
8. Overseas Training Coops	8	1,520	8	1,520	8	1,520	–	–	–	–	24	4,560
B. EQUIPMENT												
1. BoW												
Office Equipment	l.s.	1,750	l.s.	1,750	–	–	–	–	–	–	l.s.	3,500
Survey & Other Equipment	l.s.	5,250	l.s.	5,250	–	–	–	–	–	–	l.s.	10,500
2. Coops.												
Miscellaneous Equipment	l.s.	3,200	l.s.	3,200	l.s.	3,200	–	–	–	–	l.s.	9,600
Total		31,712.6		32,212.6		25,227.6		14.4		14.4		89,181.6

A2.10: WH – Capacity Building ('000 Birr)												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1. Training – Local												
Farmers Training (group train)	175	1,505	175	1,505	175	1,505	175	1,505	–	–	700	6,020
Short Course DAs & Lead Farmers	175	2,187.5	175	2,187.5	175	2,187.5	175	2,187.5	–	–	700	8,750
Sh. Course *woreda* Technicians/CBOs	146	2,496.6	146	2,496.6	146	2,496.6	146	2,496.6	146	2,496.6	730	12,483
Regional Technicians & CBOs	10	137	10	137	10	137	10	137	10	137	50	685
Federal Level Official	1	17	1	17	1	17	1	17	1	17	5	85
2. Workshops / Seminars												
National	1	50	–	–	1	50	–	–	1	50	3	150
Regional	4	100	4	100	4	100	4	100	4	100	20	500
Inter–farm Visits	9	129.6	9	129.6	10	144	10	144	10	144	48	691.2
3. Training–Foreign												
MSc–Water Eng / Hydrology – Federal	1	250	1	250	1	250	–	–	–	–	3	750
MSc–Water Eng / Hydrology – Regions	3	750	3	750	4	1,000	–	–	–	–	10	2,500
Short Course – Federal Staff	2	200	2	200	2	200	–	–	–	–	6	600
Short Course – Regional Staff	5	500	5	500	5	500	5	500	5	500	25	2,500
Overseas Study Tours for Policy makers	2	500	–	–	2	500	–	–	–	–	6	1,500
4. Support to Ethiopian Rain Water Harvesting Association												
Office & Facilities	l.s.	200	–	–	–	–	–	–	–	–	l.s.	200
RWH Information Management System & Communication	l.s.	400	l.s.	200	–	–	–	–	–	–	l.s.	600
Networking (Local & Int'l)	l.s.	100	l.s.	50	–	–	–	–	–	–	l.s.	150
5. Studies, Research and Dev.	l.s.	200	l.s.	250	–	–	–	–	–	–	l.s.	450
Total		9,722.7		8,772.7		9,087.1		7,087.1		3,944.6		38,614.2

A2.11: Crop Development and Marketing – Capacity Building ('000 Birr)												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost
1. Establishment of Demonstration plots	240	1,800	240	1,800	240	1,800	240	1,800	240	1,800	1,200	9,000
2. Workshops/Seminars /Demonstr.												
Contact Farmers	1,200	720	1,200	720	1,200	720	1,200	720	1,200	720	6,000	3,600
Crop Marketing Entrepreneur (1 month)	64	115.2	64	115.2	64	115.2	64	115.2	64	115.2	320	576
Farmers Visits to Demonstration plots (3 days)	24,200	2,420	24,200	2,420	24,200	2,420	24,200	2,420	24,200	2,420	121,000	12,100
3. Training – Local												
Short Course woreda Technicians (1 month)	5	9	5	9	5	9	5	9	3	5.4	23	41.4
Short Course Regional Technicians (1 month)	2	3.6	2	3.6	2	3.6	2	3.6	2	3.6	10	18
4. Training – Foreign												
Short Course *woreda* Staff (1 month)	8	800	8	800	8	800	8	800	8	800	40	4,000
MSc Course Irrigation Agronomy & Pest Management – MoARD	1	250	1	250	1	250	1	250	–	–	4	1,000
5. Improved Seeds & Fertilizers for Demonstration Plots	l.s.	78	l.s.	78	l.s.	78	l.s.	78	l.s.	78	l.s.	390
Total		6,195.8		6,195.8		6,195.8		6,195.8		5,942.2		30,725.4

A2.12: Programme Co–ordination and Management ('000 Birr)												
Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total	
	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost
1. National Project Coordinator	1	144	1	144	1	144	1	144	1	144	5	720
2. Project Accountant	1	108	1	108	1	108	1	108	1	108	5	540
3. International M&E Expert	1	1,035.6	1	1,035.6	1	1,035.6	1	1,035.6	1	1,035.6	5	5,178
4. Gender Specialist	1	96	1	96	1	96	1	96	1	96	5	480
Total		1,383.6		1,383.6		1,383.6		1,383.6		1,383.6		6,918

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