



Report on IWMI-IPMS Project Training  
on  
Agricultural Water Management (AWM)

Conducted 21<sup>st</sup> to 1<sup>st</sup> September 2006 at Bahir Dar, Ethiopia

November, 2006

## Report on IPMS/IWMI Training on Agricultural Water Management (AWM)

### I. Introduction

The training took place from 21<sup>st</sup> to 31<sup>st</sup> August 2006 at Bahir Dar, Ethiopia. There were 19 participants, who came from Afar, Amhara, Oromia, SNNP, and Tigray Regional States and Federal Government. They were from Wereda OoARD, BoARD, Federal MoARD and TVET Colleges. The following five modules were dealt during this time. Module 1: Watershed Hydrology for Improved Agricultural Water Management; Module 2: Water Harvesting and Development for Improving Productivity; Module 3: Soil-Plant-Water Relationship; Module 4: Pumps for Small Scale Irrigation, and Module 5: Irrigation Methods for Practitioners.

The achieved objectives were justified through oral questions.

### II. Course Offerings in the Training

#### A. August 21, 2006

The participants were registered and then entered the prepared venue at Azwa Hotel. Dr. Sileshi Bekele, the regional representative of IWMI, made an opening speech by introducing the objectives and importance of the training on Agricultural Water Management. He broadly explained the advantages of investing in agriculture in facilitating the Ethiopian Development Strategy in achieving the goals of food security, absence of poverty and finally the national economy development. He made clear to the trainees the problems connected with Agriculture and water; the present status and targets of irrigation development in Ethiopia; the importance of the involvement of stakeholders, donors, government and NGOs in irrigation development; and the physical, technical and socio-economic constraints and limitations in Agricultural Water Management. He also indicated the opportunities for investment and the research needs in this area. After drawing conclusions to his speech, he gave several important recommendations. Finally, Dr. Sileshi Bekele officially declared the training to be started and called upon Prof. Dr. Taffa to start the training.

Prof. Taffa Tulu started giving training using Module 1. The topics dealt under this module on this day were: Watershed management; principles of watershed management; practices of watershed management; planning of watershed management; steps of watershed management; and evaluation

#### B. August 22, 2006

Prof. Taffa Tulu continued the training using Module 1 dealing with the following topics: factors affecting runoff; methods of runoff computation; agronomical practices to control erosion; mechanical erosion control measures; gully erosion control plan; and gully erosion control measures.

On the completion of Module 1, the following project topics were given to the trainees as homework.

1. Prepare watershed management plan for any watershed known to you.
2. Prepare Gully Erosion Control plan of any gully known to you.

### C. August 23, 2006

The training continued on the 3<sup>rd</sup> day by Prof. Taffa Tulu using Module 2, in which he dealt with the following topics: harvesting of rainwater; farm ponds; and floodwater harvesting.

### D. August 24, 2006

The following topics of Module 2 were dealt on this day by Prof. Taffa Tulu: harvesting surface water; diversion head works; extraction of Groundwater; groundwater recharge; wells; development of wells; yield test and sanitary protection of wells; springs; and development and protection of springs.

On the completion of Module 2, the following homework was given to the trainees.

1. Outline design, construction, and limitations of short-term water harvesting structures in your locality.
2. Explain the type, occurrence and development of a spring that is familiar to you.

### E. August 25, 2006

On this day Prof. Taffa gave the training using Module 3 by dealing with the following topics: soil composition, profile, texture, and structure; entry of the water into the soil; soil moisture conditions; available water content; groundwater table; crop water needs; influence of climate on crop water needs; influence of crop type on the crop water needs; influence of the growth stage of a crop on crop water needs; determination of crop water needs; effective rainfall and irrigation water needs; and irrigation water needs.

### F. August 26, 2006

Prof. Taffa, dealing with the following topics, also continued the training: irrigation scheduling; influence of water shortages on yields; determination of irrigation schedule for crops other than rice; plant observation method; estimation method; estimating the irrigation schedule; adjusting the irrigation schedule; simple calculation method; and duration of irrigation application.

### G. August 28, 2006

Mr. Philippe Lemperiere handled the training using Module 4, by dealing with the following topics: Energy measurement (calculating energy and power), human power, diesel and petrol engines coupled with centrifugal pumps, criteria and tips for selecting irrigation pumping technology, operation and maintenance of pumps; suction head; suction and delivery pipe; maintenance of pumps; pumping cost; and sustainability of pump-fed irrigation.

### H. August 29, 2006

Prof. Taffa Tulu handled the training using Module 5 by dealing with the following topics: Furrow-Basin Irrigation (layout, irrigating and planting techniques), Basin irrigation (layout, construction, irrigating and maintenance) and Furrow irrigation (layout, construction, irrigating, planting techniques, and maintenance).

### I. August 30, 2006

Using Module 5, Mr. Philippe Lemperiere dealt with the following topics: principles of drip irrigation, advantages of drip irrigation, problems associated with drip irrigation, components of drip irrigation systems, and low cost drip irrigation systems for smallholders.

### J. August 31, 2006

This day was left for self discussion of the trainees.

### III. Achieved Objectives

The objectives, which were achieved in Module 1, were that the participants could define a watershed; carry out careful field survey; define document for watershed management plan and analysis; understand the issues of environmental protection in water resource development; appreciate integrated water resource development; describe a watershed; list problems of a watershed; propose watershed management programmes; compare benefit and cost of watershed management; understand steps of watershed management; evaluate the results obtained through the management works; define runoff; understand the effects of climatic and physiographic factors on runoff formation; know some methods of runoff estimation; adapt principles of soil erosion control practices; explain agronomic and mechanical soil and water conservation practices; facilitate the different methods of soil and water conservation measures; explain and facilitate gully erosion control principles and plan; and discuss and apply gully erosion control measure.

On the completion of Module 2, the participants could harvest rainwater from roofs and runoff; identify types of farm ponds; select the site of a pond; design pond's embankment; design mechanical and emergency spillways; understand seepage loss in ponds; construct farm ponds; protect, maintain and sanitize ponds; harvest floodwater; identify types of earth dam; plan earth dams; understand design principles of earth dam; estimate storage capacity and quantity of earthworks; understand design principles of spillways of earth dam; understand construction principles of earth dam; identify types of diversion weirs; design modern weirs and barrages; construct diversion weirs; recharge groundwater; design water wells; construct open wells; understand drilling principles of tube wells; develop wells; test yield of groundwater; protect sanitary of groundwater; identify types and occurrence of springs; develop and protect springs;

The objectives, which were achieved in Module 3, were that the participants could describe soil composition; identify soil profile, texture and structure; discuss entry of water into the soil; explain factors influencing the infiltration rate; differentiate saturation, field capacity and permanent wilting point; calculate available water content; discuss groundwater table; explain capillary rise; describe the influences of climate, crop type and growth stage on crop water need; explain evapotranspiration; determine crop water need; estimate effective rainfall; determine irrigation water need; describe influence of water shortage on yields; determine which crop is more sensitive to water shortage; determine irrigation schedules by plant observation, estimation and simple calculation methods; adjust irrigation schedule for estimation method; and determine duration of irrigation application.

After completing Module 4, significant objectives were achieved, in that the participants could name different types of pumps; calculate power and energy requirement of pumps; select irrigation pumps; discuss different types of pumping stations; explain the operation of suction head; install and prime pumps; install suction and delivery pipes; discuss the operation of pumps; appreciate the need for pump maintenance; calculate pumping cost; and appreciate the need for pump replacement at the end of its working life.

The objectives, which were achieved in Module 5, were that the participants could understand and use furrow-basin irrigation; layout of basins; understand the shape and size of basins; realize the shape and dimensions of bunds; construct basins; understand the wetting patterns of basins; maintain basins; layout furrows; design length, shape and spacing of a furrow; construct a furrow; techniques of irrigating in furrows; understand wetting patterns and planting techniques in furrows; maintain furrows; could understand principles of drip irrigation, advantages of drip irrigation, problems associated with drip irrigation, components of drip irrigation systems, and low cost drip irrigation systems for smallholders.

#### IV. Conclusions and Recommendations

The discussions with the trainees clearly showed that priority should be given to watershed management. There is no meaning in talking about irrigation, where there is no soil. If deforestation and erosion continues in the future as they are at present, many researchers indicated that there will be no topsoil in most part of Ethiopia within the coming 50 years and many perennial streams will turn to ephemeral streams within the coming 130 years. The trainees could strongly recognize these problems and were highly concerned about the future fate of our coming generation, our children. The discussion was geared towards the proposals of the solutions to these problems.

The trainees proposed the following recommendations:

1. Several training programs and conferences concerning watershed management shall be carried out throughout the country. Those who are trained shall further teach and train the farmers about the big problems lying in front of us, i.e watershed degradation and possible complete desertification of our country. This point should be clear to all Ethiopians, from the higher officials to the daily labourers.

2. An integrated watershed management shall be materialized as soon as possible. The process of erosion, deforestation and land degradation will never give us time. We shall run as soon as possible. Otherwise all of us will perish together. This national issue shall never be undermined.

3. There should be a strong cooperation between the government and highly qualified intellectuals in solving these problems as soon as possible.

4. There should be a Land Use Policy, which allows using the land only according its capability. In the policy formulation, the concerned intellectuals should participate. Farmers should be certified to use their lands according to their capability. If a farmer didn't follow the given permission, he should loose his land. In this way, steep slops shall be used for forestry and pastureland while gentle slopes shall be used for agriculture under prescribed control measures. The flat slopes can be used for permanent agriculture.

5. To paste in the mind of every Ethiopians the problems of watershed degradation, the work shall start at childhood. Therefore, teaching about the problem shall start from elementary schools.

6. Researchers shall widely participate in this activity.

7. Every one of us shall be devoted to save our coming generation.

Annex: Results of Watershed Management plan, which was given as Homework

In the Watershed Management Plan, the trainees indicated the following watershed problems and proposed management programmes.

SN	Region	Watershed Problem	Proposed management Programme
1	Amhara R.S., South Gonder, Fogera Wereda	Flood, erosion damage	Watershed protection and management
2	Amhara R.S Awi Zone, Banja Wereda	Severe soil erosion, flood damage	Watershed management and protection
3	Amhara R.S. Metema wereda	Flood damage	Flood protection
4	Oromia R.S., East Shewa Zone	Serious sheet erosion, sedimentation of irrigation channels	Watershed treatment and protection, training of the farmers and development agents
5	Oromia R.S., Western Hararghe	Sheet and gully erosion, land slide, river bank slide and erosion, sedimentation, deforestation, drainage problems, weak Water Users Association, diversion of streams causing problems to downstream users, poor water supply system	Treatment of watershed, maintenance and improvement of existing irrigation structures and conveyance systems, upgrading the traditional irrigation to modern scheme, strengthen Water Users Association, conduct capacity building activities to create awareness, construct night storage ponds, removing silt from headwork
6	Oromia R.S. West Shewa, Bako Wereda	Sheet erosion, undulating topography not suitable for irrigation	Watershed treatment and management, roof and surface water harvesting
7	Oromia R.S., Arsi Zone, Munessa Wereda	Sheet and gully erosion, sedimentation, deforestation	Introduction of use of biogas and solar energy, watershed treatment and protection, afforestation, planting of “kacha tree” along contour line
8	SNNPRS, Sidama Zone, Dale Wereda	Erosion, sedimentation	Watershed treatment and protection
9	SNNPRS, Dawuro Zone, Mareka Wer.	Severe erosion, flooding	Watershed management, training development agents and farmers, afforestation, flood control
10	Tigray R.S., Awlalo Wereda	Erosion, flood damage, lack of animal feed, drought	Watershed treatment and protection, afforestation, preparation of compost at household level, preparation of improved seeds, construction of water harvesting structures at family level, introduction of modern beehives
11	Tigray R.S. around Adwa	Severe erosion, water shortage	Watershed protection, water harvesting