Annex 3.3

Report on the pilot baseline survey in the upper Awash Basin

Federal Democratic Republic of Ethiopia

Ministry of Water Resources

Food and Agricultural Organization of the United Nations

Project: Strengthening national water monitoring capacities, with emphasis on agricultural water management (GCP/GLO/207/ITA)

REPORT ON PILOT BASELINE SURVEY IN THE UPPER AWASH BASIN

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1. General Background

The Government of Ethiopia has been making a lot of efforts in water resources development and improved water management for different purposes and environmental benefits. However, information on water use for different purposes remains unknown. Monitoring the advancements in water resources management is essential if political commitment is to be sustained and put into practice. This need has been widely acknowledged in several occasions.

In view of this, the Food and Agriculture Organization of the United Nations, in collaboration with the Ethiopian Government, initiated the project "Strengthening National Water Monitoring capacities with emphasis on agricultural water management", with financial assistance of the Government of Italy. This one-year project (December 2008 to November 2009), has contributed to filling a critical gap: It has developed a methodology for collection and analysis of information on irrigated agriculture, established easily accessible database system to make the information available to decision makers, project managers, and the public in general. The methodology was tested through a baseline survey in pilot areas in the upper Awash Basin carried out by the Amhara and Oromia Regional States.

2. Pilot Baseline Survey

2.1 Arrangement for Baseline Survey

Following the selection of the Awash River Basin and launching workshop, it was decided to conduct the pilot baseline survey in the upper part of the basin falling in Amhara and Oromia Regional States. As indicated in the project document that the government of Ethiopia has to contribute to the implementation of the project, the water bureaus of both regions have deployed their staff and vehicles for the pilot survey. A Letter of Agreement (LoA) was signed between the FAOR Ethiopia and Water Bureaus of respective regions for covering only operational costs (daily subsistence allowance-DAS and fuel and related costs) in conducting the survey. The two regions submitted reports on completion of the survey.

2.2 Preparation of Questionnaire and Guideline

A questionnaire was prepared and distributed to all stakeholders including MoWR, water bureaus of the two regions, International Water Management Institute (IWMI), Global Initiative for Rationalizing Water Information (GIRWI) Project, Central Statistics Agency (CSA) and FAO HQ for comments. Comments from the stakeholders particularly from CSA, MoWR, Amhara Water Bureau and FAO HQ enriched the questionnaire. The questionnaire covers the data required for estimating the following four indicators identified by GIRWI and endorsed by government of Ethiopia.

1. Area of land under irrigated agriculture or under improved rainwater agriculture per capita by type of system and river basin.
2. Proportion of annual freshwater consumption to renewable freshwater resources by river basin- in this case agricultural water use or withdrawal
3. Irrigated area using advanced practices (% of total irrigated area) by type of technology and by river basin
4. Area of the watershed developed under soil and water conservation practices or measures by type of measure by river basin.

Relevant socioeconomic and environmental data as are also included in the questionnaire.

The questionnaire is divided into three parts:

1. Irrigation scheme
2. Improved rainwater agriculture[1]
3. Soil and water conservation

Information and data on irrigation are collected at scheme level while woreda aggregate data are collected on improved rainwater agriculture and soil and water conservation.

A guideline for conducting the survey and filling the questionnaire was prepared. The contents of the guideline include:

- Types of data to be collected;
- General steps to be followed for conducting the survey by a development agents and a team;
- Definition of terms;
- Estimation of areas and conversion of local measurements into standard units;
- Estimation of irrigation water requirements and yield or production;
- Example on developing cropping patterns; and
- An agro-ecology map of the Awash Basin overlaid with woredas (including woreda towns and major roads) to enable easy location of irrigation sites

2.3 Conducting the Survey

The Amhara region decided to carry out the survey by woreda water management staff in North Shoa Zone while the Oromia region deployed one team of experts in both zones. Before the surveyors were deployed in the field, 10 GPS were distributed to each of the regions and training on how to conduct the survey and use of GPS was organized for each region. The training of Amhara surveyors was conducted at Debre Berhan, town of North Shewa Zone in which 15 surveyors have participated. The training was given by the FAO Water Use Survey Consultant and the Head of Irrigation and Drainage Process of Amhara Water Bureau. The training of the Oromia survey team was given by FAO Water Use Survey Consultant in Addis Ababa. In both cases, the training was guided by the guideline prepared for the survey and all the questions

[1] Improved rainwater agriculture" comprises non-conventional irrigation such as rainwater harvesting, spate irrigation and runoff farming.

included in the questionnaire were treated one by one. The comments of Amhara trainees enriched the questionnaire.

The survey in Amhara Region was monitored the Irrigation and Drainage Branch and Agriculture and Rural Development offices of North Shewa Zone. The head of the Irrigation and Drainage Process has also participated in the monitoring. The zone's monitoring contributed a lot to ensuring the quality of data as much as possible to the extent of re-conducting the survey whenever there was to be skeptics in data quality. Accordingly, all the 14 woredas and one town were covered in the survey. There are situations where one woreda falls in two zones. Only the parts of the woredas falling in Awash Basin were considered in the survey.

The Oromia survey team started the survey in West Shewa Zone where Awash River Starts. Initially the survey team consisted of three experts two from Water Bureau and one from Bureau of Agriculture and Rural Development 10 woredas. The second round of the survey in East Shewa consisted of two experts from Water Bureau, with a lady in both teams. The second team covered 12 woredas making a total of 22 woredas. Most public irrigation schemes are in East Shewa and one large-scale irrigation scheme serving one public and several private farms is found in Afar Region.

The survey of irrigation schemes in Addis Ababa was conducted by the Urban Agriculture Office led by the FAO Water Use Consultant.

The pilot survey covered a total of 520 irrigations schemes of all scales with the following breakdowns:

Region	Number of schemes	Equipped area (ha)
Addis Ababa	13	261
Afar	1	12,310
Amhara	386	11,051
Oromia	122	44,082
Total	**520**	**67,704**

The area covered by the survey, reports by the regions, and the questionnaire are given in Annexes 1, 2 and 3 respectively.

According to the AQUASTAT profile (2001) 112,500 ha were equipped for irrigation in the Awash Basin. The result of the baseline survey is about 60% of what was reported in 2001. As most of the medium and large scale schemes are covered in this pilot survey, the remaining area equipped for irrigation is expected to be less than the survey result, may be about 50% which makes the total area equipped for irrigation of about 100,000 ha.

3. Comparison of Survey Approaches of the Two Regions

As indicated above, the baseline survey was carried out by different approaches. A comparison of the two approaches is shown in Table 1. The Table indicates a balance of problems. However,

as monitoring should be regularized as part of extension activities, the Amahra approach should be promoted. To ensure quality of the data, woreda staff must be trained accordingly. . .

Table 1: Comparison of Survey Approach

Item to compare	Woreda staff (Amhara)	One Team (Oromia)
1. Survey duration*	2.5 months for 385 irrigation schemes in 15 woredas** (154 schemes/month)	3 months for 122 irrigation schemes in 22 woredas (41 schemes/month)
2. Logistics	• Slow budget disbursement to woredas • Low transport requirement • Several GPS required	• No budget disbursement to woredas • Long time of transport requirement • Only one GPS required
3. Monitoring requirement	High	No or minimal
4. Workload on Surveyors	High initially, due to additional task to their regular activity but later they were relieved from their regular duties	• Minimal workload due being out of duty station • Regular duty may be affected
5. Data quality	• Possibility of bias • Skill of surveyor	Better quality but also it still depends on woreda reporting
6. Woreda involvement	Active involvement	Required to guide the team
7. Cost	Low	Expensive mainly due to long travel time

* Also depends on density of the irrigation schemes **One of them is town.

4. Problems Encountered

The pilot survey has not been carried out without problems. The following are the major ones.

- **Accessibility**: Most of the traditional irrigation schemes are inaccessible by vehicle. The surveyors had to travel up to 5 km on foot. Traveling such a distance, even if rest days are included, does not only take time but also causes exhaustion of the surveyors thus affecting data quality.

- **Measurement/estimation**: In some situations, canals traverse villages or rugged areas supplying water to non-contiguous plots and such configuration of irrigated areas posed difficulties in measurement or estimation of areas which receive irrigation water.

- **Logistics**: lack or inadequate transport in both regions affected timely conducting of the survey.

- **Equipment**: Shortage of GPS equipment in Amhara region also affected timely completion.

- **Capacity constraint**: Although the surveyors were trained in conducting the surveyor and use of GPS, some surveyors could not fill the questionnaire appropriately. This necessitated re-doing the survey in some irrigation schemes of Amhara Region.

- **Cooperation**: In some woredas of Amhara Region, there was resistance for releasing the surveyors from their regular duties merely due to lack of awareness and urgent activities of the staff. This was later on solved by intervention of the zone agriculture and water offices which included awareness-raising on the importance of the survey. The woredas have finally appreciated the survey as it helped them for know the status of the irrigation schemes and

created an interest for conducting resource assessment whenever irrigation development is contemplated.

5. Comparison of Areas Reported by Woredas and Baseline Survey

It has been repeatedly mentioned that areas under irrigation are unknown and different organizations used to quote different figures. Even government institutions such as MoARD and MoWR do not report the same figures. The report of MoARD depends on the figures reported by woredas which are the source of the information. However, the woreda reports are not in most cases based on actual measurements but estimates made based on the number of beneficiaries and applying a thumb rule, '0.25 ha of irrigated area per household'.

The areas under modern small scale irrigation schemes can be taken from design documents but actually irrigated areas are either increased due to expansion or reduced due to shortage of water or damage to structures, or the construction might not cover the designed area. The situation for areas under traditional irrigation schemes is even more difficult. There is no reference document for estimating the areas. Furthermore the areas in most cases are highly dynamic: they are expanded if topographic condition permits or reduced if water shortage occurs or local diversion becomes impossible due to changing of river morphology caused by riverbank erosion. In some cases, traditional schemes that are not functional are reported as functional.

The same reason holds true for areas under other forms of agricultural water management as rainwater harvesting, spate irrigation and flood recession and areas irrigated under household water harvesting systems (under-/above ground water storage systems and ponds). The area irrigated is reported based on the number of such structures but not based on the actual area irrigated.

However, as this pilot survey considered areas irrigated under water harvesting system at woreda level, the reported figures are expected to be biased although every precaution is taken not repeat the mistake. Anyway, the total reported area irrigated under any form of water harvesting amounts to only 162 ha.

During the survey the surveyors used to consult their supervisors and FAO Water Use Survey Consultant which area figure to consider in filling the questionnaire because the actual areas they measured or estimated were much lower than the figures reported by their respective woredas. As Table 1 shows areas equipped for irrigation in some woredas entirely falling in Awash Basin (Amhara) are consistently higher than survey results by 29-179% of the survey results, total over-reporting being about 81%.[2] According to the surveyors, some woredas are used to double-count equipped areas where there are two cropping seasons.

[2] At the final workshop of the project in December 2009, a senior irrigation engineer who led the groups of Oromia reported on a similar case in the .Oromia region.

Table 1: Irrigated areas reported by Woredas and Survey Results in North Shewa (ha)

Woreda	Reported by woredas in 2007	Survey Results	Over-reporting as a % of survey result
1. Ankober	828	642	29.0
2. Antsokia	3852	1715	124.6
3. Asagirt	462	274	68.6
4. Berehet	236	145	62.8
5. Efratanagidim	3658	1587	130.5
6. Kewot	4551	3332	36.6
7. Hageremariam	816	292	179.5
8. Minjarshenkora	412	155	165.8
9. Shewarobit	2450	1243	97.1
10. Tarmaber	865	642	34.7
Total	**18,130**	**10,027**	**80.8**

6. Cost Estimate for Scaling up the Methodology at Country Level

It is very difficult to extrapolate resources requirements for scaling up the methodology a country level due to the different approaches followed in this pilot survey and spread of irrigation schemes in different parts of the country. However, a rough estimate can be made based on the costs incurred in the pilot survey. As indicated in Table 2 the numbers of irrigation schemes and woredas covered by the two regions. Accessibility and terrain should also be considered.

Table 2: Costs per woreda and irrigation site of areas covered by pilot survey

Parameter	**Amhara**			**Oromia**			**Average**		
	No	**Birr**	**USD**	**No**	**Birr**	**USD**	**No**	**Birr**	**USD**
No. of woredas	15	99,000	7,500	22	99,000	7,500	37	198,000	15,000
No. of irrigation sites	386	99,000	7,500	122	99,000	7,500	508	198,000	15,000
No. of site per woreda	26			6			14		
Cost per woreda		6,600	500		4,500	341		535	406
Cost per irrigation site		257	20		812	62		390	30

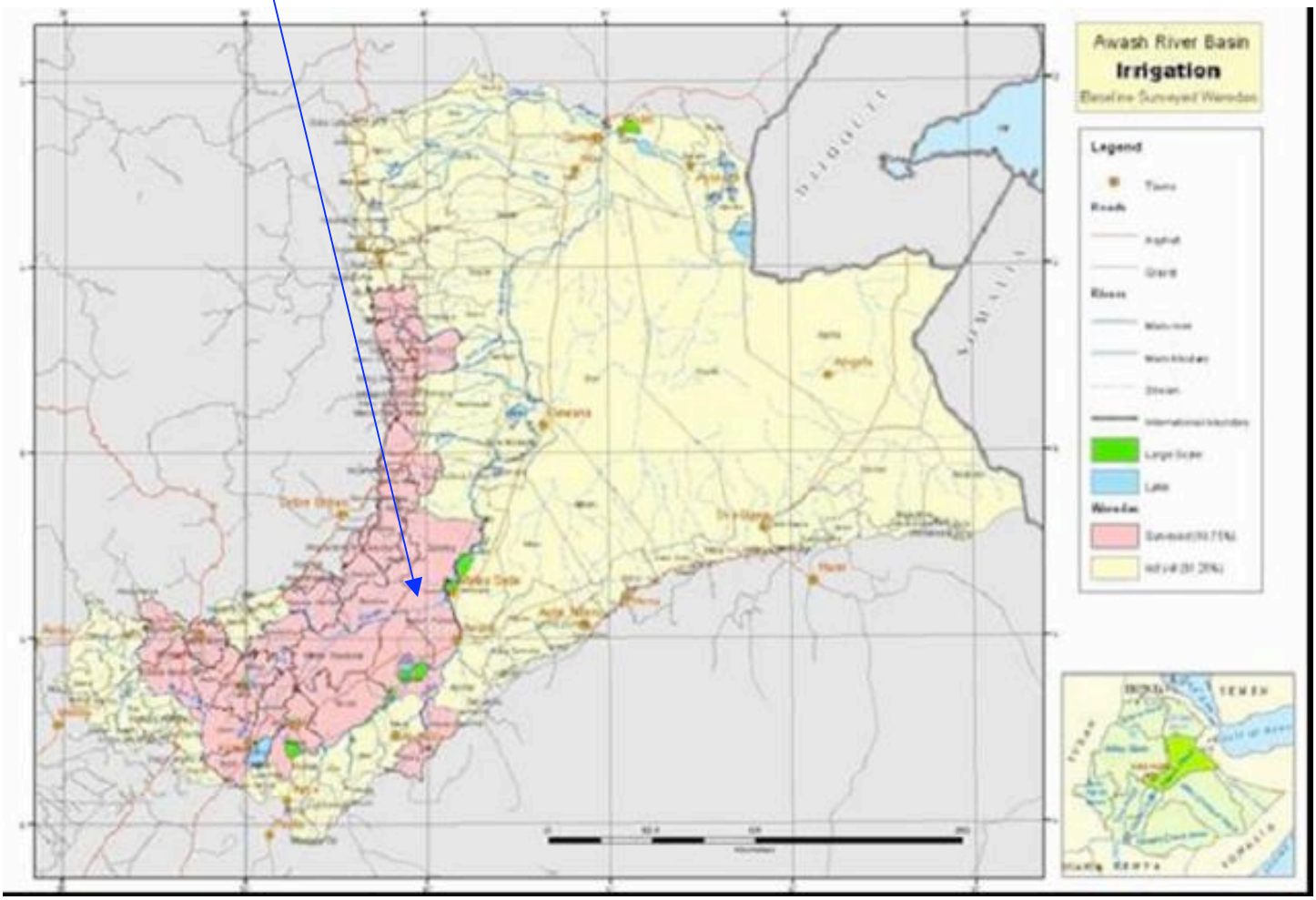
The pilot survey covered about 18% of Awash Basin where most of the medium and large scale irrigation schemes are found. Public and commercial farms in Afar and small scale irrigation schemes in Arsi and Western Harerge Zones (Oromia), Kemise, South and North Wello zones (Amhara), Shinile Zone (Somali), some part of Gurage zone (SNNPR), four zones (Afar) and Dire Dawa administration are still to be covered. Most of other river basins have very rugged terrain with difficult accessibility. Some woredas may not have adequate staff or development agents thus requiring the deployment of a team from zones like Oromia in the pilot survey.

Considering all the above and price inflations, a rate of US$ 600 per woreda which includes logistics, allowances for surveyors and supervisors could be reasonable. This includes budget for zones and regions for monitoring. There are a total of about 560 woredas in the country of which about 87 are in Awash Basin. Deducting 37 woredas covered by pilot survey (50 woredas in Awash) and assuming that irrigation is practiced in about 50% of the remaining woredas in the

country (262 woredas), budget requirements for completing the survey are US$ 45,500 for the Awash Basin and US$ 228,000 for the country. The cost of data checking, analysis and entry into the database system may cost about US$17,000 and US$ 45,000 thus making total budget requirements of US$ 65,000 for the Awash Basin and US$ 267,000 for the entire country.

Considering maintenance costs of the database and publication of the data, and allowing a margin of error for the above estimations, the baseline survey may cost 300,000 US$ for the whole country. If we further consider updating the database every 5 years, that would mean **average costs of 60,000 US$ per year for the whole of Ethiopia**. Considering the growing importance of agricultural water use for water resources management, and the millions of dollars invested in irrigation infrastructure every year, that is a very modest investment.

Annex 1: Area Covered by Pilot Baseline Survey



Annex 2: Reports of Regions on Baseline Survey

2.1 Amhara Region

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ANRS WATER RESOURCE DEVELOPMENT BUREAU
Irrigation &Drainage SDC.Core Process

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FAOR Ethiopia
Addis Ababa

Subject:- Submission of Final Report and Request for Reimbursement (GCP/GLO/207/ITA)

First of all we would like to extend our thanks for the initiative of undertaking the inventory of irrigation schemes and keep them in well established database system which is the first and the moist needed in Ethiopia. We also thank for financial and technical support for undertaking the inventory of irrigation schemes and organizing training in conducting the survey, water management irrigation performance assessment and water resources modeling.

In accordance with the agreement signed with you FAOR/PRO/?oA:01/09, we have carried out the pilot baseline survey in North Shewa of Amhara Region falling in Awash Basin, we have hereby enclosed physical reports.

With regards

Signature
Irrigation & Drainage Study, Design & Construction Core Process Owner

Food and Agriculture Organization of the United Nations (FAO)
FAO - Ethiopia - Registry
Date Rec'd 16 DEC 2009
Sign.

Physical Report on

Inventory of Irrigation Schemes in Awash Basin Falling in Amhara Region

In accordance with the agreement with FAO for conducting inventory of irrigation schemes in North Shewa Zone, the Water Bureau of Amhara Region has made necessary preparations. The Bureau in collaboration with the North Shewa Agriculture and Rural Development Office has carried out the following activities in conducting the inventory.

- Organized training on the objective of the survey and conducting the survey at Debre Berhan. The training was given by Coordinator of the Regional Irrigation and Drainage Process and FAO irrigation engineer for one zone and 15 woreda experts. The training included technical aspects of the survey (definition of terminologies contained in the guideline), the procedure of filling the questionnaire and use of GPS. Each question in the questionnaire was discussed and elaborated based on the questions from the participants. The questions and issues raised by the participants contributed to refine the questionnaire.

- All the 14 woredas and one town had prepared their respective action plans and submitted to the Zone

- Having aggregated the plans and budget requirements, the Zone had sent it to the Regional Irrigation and Drainage Process and Zone Finance and Economic Development Office requesting budget disbursement. The budgets were then disbursed to respective woredas and one town.

- One woreda expert was assigned to each woreda for the survey. The survey was closely monitored by the Zone Irrigation and Drainage Process and Agriculture and Rural Development Offices. The Coordinator of the Regional Irrigation and Drainage Process was also involved in monitoring the survey. FAO irrigation engineer closing following up the survey and used to elaborate questions raised by the surveyors and guided the survey by telephone.

- A total of 386 irrigation schemes were covered by the survey in the zone as shown in Table 1. In additional, improved water harvesting and soil and water conservation activities were carried out have been reported as aggregate by woreda. These were reported by five woredas.

One of the woredas, namely Mojanawodera has no perennial river/stream which drains to Awash except some part of the woreda that contributes little runoff in the rainy season. This woreda was excluded from the survey.

Problem encountered

- Accessibility of traditional irrigation schemes coupled with logistics problem
- Initially the woredas were not in position to release the surveyors from their regular activities and support them due to lack of attention. This was later on solved by the intervention of the zone during monitoring visits
- Inadequate capacity of surveyors-refilling
- Inadequate GPS

Conclusion

- This exercise has contributed a lot in improving our capacity of monitoring the status of our irrigation schemes.

Recommendation

- The initiative which created a great momentum in assessing the status of existing irrigation schemes should be continued to cover all the irrigation schemes not only in Awash Basin but also in Abbay Basin falling in the region
- This could also give good opportunity to assess the potential of small scale irrigation schemes and contributes to planning of irrigation development
- Building the capacity of woreda agriculture and rural development office and the beneficiaries in irrigation water management is very vital in order to ensure timely monitoring and improve data quality.

List of woredas by in the Survey

Name of Woreda	No of irrigation schemes with areas above 2.5 ha	Average distance of schemes from the woreda town (km)
1. Tarmaber	51	25
2. Gisherabel	6	45
3. Menzmama	19	25
4. Menzgera	2	38
5. Angolelanatera	31	25
6. Basonaworana	2	25
7. Efratanagidim	51	21
8. Berehet	23	30
9. Asagirt	34	30
10. Ankober	35	30
11. Kewot	39	25
12. Shewarobit	19	10
13. Minjarshenkora	11	30
14. Hageremariam	22	25
15. Antsokiagemza	41	20
Total	**386**	**26.93**

OROMYA WATER RESOURCE BUREAU

IRRIGATION AND DRAINAGE CORE PROCESS

Technical Report on Pilot Baseline survey in upper Awash Basin

Irrigation and drainage Core Process
December, 2009
Finfinne

1. INTRODUCTION

Oromia is one of the regions of Ethiopia which has ample water resources. There are different irrigation projects that have been developed by community, government and non-governmental organizations. There are also public large scale irrigable schemes such as Metahara and Wonji Shoa and commercial farms. However, area under agricultural water management is not known.

Therefore, Oromia Bureau of Water Resources Development carried out pilot baseline survey in Oromya part of Upper Awash River Basin fincinaicla and technical support from the Food And Agriculture Organizing of The United Nation. The survey was carried out from January to November 30, 2009.

2. PURPOSE OF MONITORING WATER USE

The main purpose of monitoring agricultural water management practices is to know the status of irrigated Agriculture and agricultural water use to enable informed decision making. The baseline survey (Data collection and reporting) has the following specific objectives.

- To have geo-referenced information of existing irrigation schemes to enable preparation of GIS-based information system
- To study the existing condition of irrigation practices, water management, cropping pattern, and cropping intensities in the project area.
- To investigate the physical conditions of irrigation system, and water distribution.
- To study the socio-economic conditions of the current water users of the irrigation water use of the irrigation schemes ; and
- To help plan irrigation system improvement interventions

3. METHODOLOGY USED

Two baseline survey groups consist of 3 and 2 experts from OWRB and OA &RDB were deployed for the survey at regional level. The team adopted the following Methodology to execute the baseline survey.

- Available Records of Agricultural Water Management use Data at Zones, District and PA level were referred and technically verified at field level.
- Group discussions were made with direct beneficiaries of the schemes on data related with cropping pattern, yield, year of start, problems related with water distribution and other.
- Locations of the schemes were taken using GPS.
- Questionnaires Prepared for baseline survey at national level by FAO in collaboration with other relevant institutions were used.
- The guide line prepared for Monitoring Agricultural Water Use and management was referred.

4. NAME AND COMPOSITION OF THE BASELINE SURVEY TEAM

To carry out the Baseline survey two teams consist of Engineers and Agronomists were deployed. They were **drawn** from Bureau of **Oromia Agriculture and Rural Development and Bureau of Oromia water Resource.** Their composition illustrated in the following table

Table 1 participants of the baseline survey

Team No	S/No	Name	Profession	Bureau
1	1	Abate Mangesha	Irrigation Agronomist	OBA&RD
	2	Tadese Sori	Agricultural Engineer	OWRB
	3	Zarafu Seifu	Agricultural Engineer	OWRB-EAST SHOA
2	1	Awel Kedir	Irrigation Agronomist	OWRB-EAST SHOA
	2	Sintayehu Getahun	Soil and Water Engineer	OWRB-S/WEST SHOA

5. OUTPUT OF BASELINE SURVEY

The base line survey of Agricultural water management in Upper Awash Basin was carried out as per the agreement made between Our Bureau, OWRB & Food and Agricultural Organization of the United Nation (FAO) by deploying two survey teams. Hence the team collected the relevant Data of Agricultural water use and management of **Upper Awash River Basin** within the timeframe, January to November 30, 2009. During the baseline survey 21 Werada of four zones of *OROMIA, WEST SHOA, S/ WEST SHOA, FINFINNE and EAST SHOA* found in the basin were covered, therefore, AWM data (Cropping pattern, soil, Environmental Impact of the schemes, socioeconomic data, irrigation scheduling and water use) of 122 schemes consist of small scale, medium and large scale were assessed. In baseline survey, schemes under ownership of community, Commercial investors and the Public owned schemes and schemes of different companies were included. All traditional and Modern schemes found in the basin were recorded and reported to FAO head office. Finally the river basin profile was prepared.

6. CHALLENGES AND SHORTCOMINGS

- Lack of reliable data on Agricultural water use at all level, even if availed it was highly exaggerated.
- Shortage of time to take direct measurement on all traditional schemes
- Lack of Willingness to provide data of Agricultural water management (some public owned and commercial investors)
- Inaccessible road to reach all site i.e. long distance travel on foot.

7. COLLABORATING INSTITUTIONS

In order to under take the baseline survey Oromia water Resource Bureau has jointly worked in collaboration with all stakeholders. Therefore, the following institutions were involved in the survey

- Zonal water resource offices
- District (woreda) water resource offices
- Zone and Woreda Agriculture and Rural Development office
- Commercial investors who have been using Agricultural Water from the Basin.
- Matehara and Wanji shoa Sugar Factories
- Agricultural water users community and PA agricultural office

8. CONCLUSIONS

- Although there were the challenging and some shortcomings, the planned Baseline survey have been carried out with satisfactory level
- Bureau Expertise and decision makers participated on the data survey directly or indirectly have got an overview of the agricultural water use in upper Awash Basin.
- The baseline survey initiated agricultural water management information system has created awareness among the various stakeholders to extent of conducting similar surveys using the prepared questioners.
- It paves the way to conduct baseline survey in the remaining basin that found in the region.
- The project contributed for the development of skills in agricultural water management baseline survey

9. RECOMMENDATION

1. All stakeholder including **OWRB** and its office at all level should have access to use the **DATA BASE** of agricultural water management created on the web-site
2. Proper training on Agricultural water management i.e **DATA** entry and utilization should be given for concerning Experts of the stakeholders
3. Incase of Future baseline survey, appropriate training of staffs should be given before executing the survey to create better awareness on each step of the DATA collection.
4. The project should have rescheduled in the same way to carry out the some work on other untouched basins and the remaining part of Awash River Basin to provide with clear overview of Agricultural Water Management of the country to decision makers
5. Incase of future similar survey, team approach with multidiscipline should be used for better accuracy and Reasonable cost.