MINUTES OF MEETING
ON
THE 2nd STEERING COMMITTEE
FOR
THE STUDY ON
GROUNDWATER RESOURCES ASSESSMENT
IN THE RIFT VALLEY LAKES BASIN
IN
THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

Addis Ababa,
February 28, 2011

Mr. Toshiyuki Matsumoto	Ato. Abera Mekonnen
Team Leader	Chief Engineer
Study Team	Ministry of Water and Energy
Japan International Cooperation Agency (JICA)	Federal Democratic Republic of Ethiopia

Tesfaye Tadese
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Witnessed by
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In response to the official request of the Government of the Federal Democratic Republic of Ethiopia, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Study Team ("the Team") for THE STUDY ON GROUNDWATER RESOURCES ASSESSMENT IN THE RIFT VALLEY LAKES BASIN ("the Study") based on the agreement on the Scope of Work ("S/W") which was signed on July 23rd, 2009.

Stakeholders of the Project gathered at the Ministry of Water Resources (name was changed to the Ministry of Water and Energy in October 2010 "MoWE") and held the series of discussion on the contents of Progress Report (2) ("P/R (2)") and the direction of the Project in the second Steering Committee ("SC") meeting. The list of the participants is shown in the Annex together with the Counterpart ("C/P") Meeting held on the same day.

The Counterpart Meeting was held on the same day prior to SC, and the contents of P/R (2) was explained and discussed between the Team members and the C/P.

1. COUNTERPART MEETING

2.1 Explanation of P/R(2)

The Team handed over the Draft of P/R (2) about 10 days prior to the Meeting, and the Team presented the progress of the Study after the P/R (1) focusing on the results of geology, hydrogeology, geophysical survey, observation well drilling and survey of small town water usage technical discussions were made on each of the Study items, and the results of the survey.

The Ethiopian side agreed on the contents of the P/R (2) in principle, in particular, on the methodology of the Study, the Study results and schedule after the discussion.

Major issues and the contents of the discussion regarding the P/R (2) are as follows:

2.2 Discussion on the Contents of P/R(2)

1) The stagnant condition of groundwater indicated on trilinear diagram

The participants asked for more detailed explanation on the water quality test results indicated in the tri-linear diagram. The team mentioned that the environment of groundwater is generally plotted in the area of I and II on the diagram which concludes that most of the collected water is from circulation and stagnant groundwater conditions. The C/P questioned that more detailed correlation between stagnant water condition and the aquifer shall be required. The Team said that the groundwater condition indicated in this diagram is a preliminary result to grasp the overall trend of groundwater in the study area, and correlation between independent aquifer and the environment of groundwater is not yet

clarified.

2) Karstic condition of the groundwater

The C/P pointed out that the description of "Karstic Aquifer" in groundwater classification does not apply because there are no major limestone terrains in the study area. The Team replied that it is indicating the state of aquifer that is not classified under either strata aquifer or fissure aquifer. Such aquifer has a river like flow in the large and continuous conduit in a formation that may be generally called "Karstic Type Aquifer" in the Hydrogeological Map of Ethiopia published by GSE.

3) Scale of study area and relation with geological map

The C/P raised questions about the efficiency of the study when considering the amount of investigative efforts the Team is making and the number of test wells to be drilled as compared to the largeness of the study area. The Team replied that it would make the most of the existing data that are already available to achieve reliable results.

4) Well numbers in the Study

There are only 10 boreholes to be drilled in the study area, and the C/P mentioned that considering wide extent of area and the scope of the Project, it is too small number to clarify the hydrogeological features in the area. The Team replied that the drilling locations are considered to understand stratigraphical distribution of geology and cross sectional settings of the basins. Not only from the geological consideration, but also from the aspect of detailed aquifer interpretation and chemical, isotopic analysis will be made. It is very small in number but there is data from hundreds of existing boreholes available to supplement the data on aquifer distribution and its characteristics. The C/P side strongly emphasized the need for additional wells as required especially for deeper levels.

5) Butajila – Shalla, correlation of Geology

The C/P suggested that it would be better if the Team started the geological survey from Butajira area to move on to adjacent Shalla area but to start from Awassa area. The study team replied that that it was easier to start from Awassa area because a lot of information was available in that area and thus, it was suitable to establish the standard geological stratigraphy. The survey will continue to cover Butajira area.

6) Groundwater level fluctuation

The C/P asked if the monitoring results of the groundwater levels were not responding to the precipitation, what it was related to and asked if it could be related to lake water levels. The Team answered that the Team meant to explain that there was no direct or immediate response in the groundwater level to precipitation but the water level should

show a delayed response to precipitation in the long run.

7) Iron content of water quality test result

The C/P mentioned that laboratory test result seemed too low at the particular site where the well was abandoned due to high iron contents. The site water quality shall be referred to and cross-checked with the laboratory water quality test. The Team replied that the laboratory water quality test was cross-checked with site tests. However the accuracy of the detection of parameter is very different and the laboratory tests are conducted based on the quality test standard applied in this country. Therefore, unless the data of the site and laboratory have big differences, the laboratory figure shall be considered as the true value.

8) Time of continuous pumping test.

The C/P commented that the duration of pumping test, 24 hours, was not enough and therefore should be revised. The Team answered that the duration was reasonable because it was long enough to stabilize the water level in a borehole and, thus, could calculate hydrogeological parameters, which is the major purpose of the pumping test. The C/P further questioned the capacity of the installed pumps and questioned that the fact that the water level has stabilized did not mean that the pumping duration was enough when we are using an inappropriate pump capacity, the type of pump used for the pumping test suggested 72 hrs. pumping for example. The Team repeated that the major purpose of the pumping test was to evaluate hydrological parameters and that could be done by the 24-hour pumping test.

9) Age dating of volcanic rocks

The C/P questioned about dating (chronology) of rock samples. The Team answered that the samples from two horizons of the welded tuff (Green strongly welded tuff and highly welded tuff characterized by the flattened obsidian) in the stratigraphic classification were taken in ten areas and already sent to Japan for the laboratory analysis of K-Ar dating method.

10) The relation between drilling depth and Fluoride concentration

The C/P questioned about the relation of fluoride concentration and well depths. The Team replied that the water samples have been taken every 5 meter in current drilling operation when drilled by DTH. The relation shall be further investigated after the data is collected.

11) Survey at the southern end of the study area

The C/P raised concern about the method of study of the southern area that had not been

discussed yet. The Team replied that it had be in principle agreed on at the beginning of the study and the Team would depend only on the existing data since the area was off limit for the members.

12) The hand-drawn geological maps

The C/P mentioned that since PR(1), the geological maps are still drawn by hand (not digitized). For the future, it should be made as a form of electric file for GIS and other purposes. The Team answered that it would digitize the borders of delineation of the formation and faults as soon as the further confirmation of geological map was made.

Finally the Team received the question and comment letters from C/P during/after the meeting. The contents of those letters will be considered in the next Interim Report.

2. STEERING COMMITTEE

After distribution of copies of P/R (2), the Team received the C/P's comments regarding the P/R (2), such as the general comments for the selection of small town, technical comments for the geology, hydrogeology, geophysical survey and the results of observation well drilling. Those items which can modify would be amended in the P/R (2) by the Team and the other items will be considered in the Study of the second half of the second year by the Team.

Finally, the Team promised to submit eighteen (18) copies of the P/R (2) to the MoWE by 4th March, 2011.

The Team first explained the purpose of the committee and afterwards responded to the participants that the team will make efforts to consider the suggestions raised to improve the study.

The committee members commented that in consideration of the vastness of the study area and also the importance of this study in clarifying the hydrogeological conditions of the study area, the number of test well drilling sites and other relevant specifications are not sufficient to achieve the purpose and proposed the following ideas for improvement.

- Increase the number of test wells to 30
- Deeper target depths of the test wells
- Locate some wells in the southern part of the study area.
- Change specifications of boreholes to accommodate larger capacity pumps for pumping test.

They added that budget should be increased to realize the above changes and if necessary the schedule of the study should be revised (extended) to accommodate the changes.

The Team responded that the objectives of this survey are to 1) clarify groundwater potential of the study area, 2) create hydrological maps and cross sections of the study area, and 3) draw up a water supply plans for small towns in the study area and that these objectives could be achieved by employing the existing but not effectively utilized data in addition to the test well drilling work of current specifications. The Team added that balancing the input and outcome is important and that changing study specifications and schedule is difficult since they were agreed upon at the beginning of the project, although the Team will make maximum effort to improve better results of the Study.

The committee members proposed to set aside the budged issues that may result from changes in specifications, and suggested that participants will discuss how they can improve the quality of the study from only the technical aspects.

The committee members requested that at the end of the Study, recommendations should be

made with regard to water quality issues as part of the results of groundwater potential evaluation, for example Fluoride contents. The Team answered that the Team are working to obtain some new scientific findings of the generation of fluoride in groundwater but can not promise if the Team will get any and that on the other hand, as for the health related recommendations, the Team will make appropriate suggestions since the groundwater potential should be evaluated in both quantity and quality.

The committee members suggested that the produced hydrogeologial maps (geological maps) were fragmented and thus they should be combined to produce a single map. The Team replied that it would produce a single map for the study area.

The Team commented that there were always limitations in any projects and the projects had to be conducted within those limitations to achieve the objectives and that this had to be understood. The Team added that the Team had compiled a small hydrological database by integrating all the existing data and some newly discovered data that had never been utilized. The committee members replied that such work done by the Team was very good and appreciated.

The Team explained the schedule of the remaining part of the study.

END

ANNEX

ATTENDANCE LIST

ETHIOPIAN SIDE

Ministry of Water and Energy　(MoWE)

Ato Abera Mekonnen (Chairman)

Ato Zebene Lakew

Ethiopia Groundwater Resources Assessment Program (EGRAP+)

Ato Tesfaye Tadese

EWTEC

Ato Tamiru Fekadu

Ato Mulugeta Kiufu

GSE

Ato Muhuddin Abdela

SNNPRS

Ato Meskelu Tumiso

Oromia Rigion

Ato Fekadu Levekba

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JICA Study Team

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Mr. Naoki Yasuda	Drilling supervision/Hydrorology
Mr. Yousuke Yamamoto	Project coordinator
Ato Getachew Geletu	Research Adviser of project

MINUTES OF MEETING
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THE 3rd STEERING COMMITTEE
FOR
THE STUDY ON
GROUNDWATER RESOURCES ASSESSMENT
IN THE RIFT VALLEY LAKES BASIN
IN
THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

Addis Ababa,
July 6, 2011

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Stakeholders of the Project gathered at the Ministry of Water Resources (name was changed to the Ministry of Water and Energy in October 2010 "MoWE") and held the series of discussion on the contents of Interim ("IT/R") and the direction of the Project in the second Steering Committee ("SC") meeting. The list of the participants is shown in the Annex together with the Counterpart ("C/P") Meeting held on the same day.

The Counterpart Meeting was held on the same day prior to SC, and the contents of IT/R was explained and discussed between the Team members and the C/P.

1. COUNTERPART MEETING

2.1 Explanation of IT/R

The Team handed over the Draft of IT/R about 5 days prior to the Meeting, and the Team presented the progress of the Study after the P/R (2) focusing on the results of geology, hydrogeology, groundwater modeling, observation well drilling and survey of small town and water supply plan usage technical discussions were made on each of the Study items, and the results of the survey.

The Ethiopian side agreed on the contents of the IT/R in principle, in particular, on the methodology of the Study, the Study results and schedule after the discussion.

Major issues and the contents of the discussion regarding the IT/R are as follows:

2.2 Discussion on the Contents of IT/R

(1) Groundwater modeling

The C/P pointed out that the lakes should have outflows as well as inflows and that the exchange of water in this manner does not seem to be considered in the modeling. The C/P also asked a question about the groundwater modeling why the groundwater amount was calculated by multiplying by BFI.

The study team answered as follows: In progress report 2, the modeling was conducted for the whole Abalya Lake basin that is hydrologically a closed system. Thus, there are no inflows or outflow into/from the basin as rivers or groundwater. Thus almost all water is exchanged through the lake surface. In such case, groundwater recharge is equal to the loss

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flow component. For the other basins for the modeling (Ziway-Shalla sub basin), they were combined with other lakes to form closed basins so the same method can be applied.

The C/P pointed out that the rivers should not necessarily be defined as constant head boundaries and asked what the reason is for applying constant head boundary conditions for the rivers in the model.

The study team replied as follows: the constant head boundary conditions applied to the rivers function in principle the same way as river boundary package. The groundwater can flow into the river based on the head of surrounding cells. Therefore there is no need to employ river boundary package.

The C/P suggested that the modeling should include water budget.

The study team replied that it is simply a matter of running the water budget package and that can be done any time.

The C/P asked if the study team has any plan to do the groundwater modeling for the area (southern most part of the study area) that is not covered in this study.

The study team answered as follows: The study area is very large and difficult to study thoroughly and the southern most part of the study area that is not covered by the groundwater modeling has very little data and the terrain is generally covered by hard bedrocks. Thus it is not worth running a groundwater model for the area.

The C/P asked if the study team obtained enough data of hydrogeological parameters for the modeling.

The study team replied as follows: It is a very serious issue in establishing groundwater models for the study area. There is not much data of actual hydrogeological parameters available for the study area. Thus, in this study, representative values of these parameters were applied to specific lithological facies of hdrogeological layers. There are around 10 different hydrogeological layers that were recognized. Even these values are however, adjusted to some reasonable extent during the model calibration. The data needs to be updated in the models as new sets of data are made available.

The C/P asked if any changes to the groundwater model will be made when the data from the existing some 1000 wells are obtained.

The study team replied as follows: The model will be definitely updated when such data is available. Although all available data was used in the model, the current model is far from perfect. Therefore, we need to improve the accuracy of the model by adding new data as such data becomes available. Then, the model will be calibrated again with the data obtained.

The C/P pointed out that the following: The groundwater recharge is affected by the

conditions on the ground surface such as vegetation cover, degree of soil erosion, land use and also water pollution is another issue that concerns. However, such issues are not mentioned in this report.

The study team replied as follows: the amount of groundwater is considered for the entire study area that is hydrologically a closed system. It is based on the assumption that the incoming amount and outgoing amount from the basin is balanced over a long period of time. Thus, such changes as the land surface conditions will be buffered in the calculation process even if integrated in the model. In addition, determining the details of such conditions that may affect recharge in detail will take tremendous time and effort and thus, is not realistic.

(2) Groundwater level observation

The C/P asked if it is appropriate to determine that the groundwater levels at the observation wells show annual fluctuation pattern when the monitoring was just started.

The study team answered as follows: it is true that the monitoring was just started last year in this project but at three sites, nearly one year period of data was already collected and all of them show clear signs of annual fluctuation patter (annual cycle). Since it is common for a confined aquifer to show such delayed response to precipitation, the observed fluctuation is considered to be the annual cycle. This has to be however, confirmed though further monitoring activity by the CP side.

(3) Groundwater resources in general

The C/P asked if there is any indication of the amount of groundwater resources in this study.

The study team replied that the total available groundwater resources amount for the entire study area was discussed and mentioned in the Interim Report

(4) Project implementation method

The C/P asked if the project of small town water supply would be financed by grant aid or loan scheme.

The study team replied that it would be financed by some grant aid.

The C/P asked how the study team intended to improve the capacity of the operators of town water supply targeted for the project and asked if any proposals or suggestions would be made for those towns that had not been selected for priority project.

The study team answered that a capacity building training as a soft component would be incorporated as a part of the project and that also some kind of project propodals would be made for the remaining 54 towns.

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The study team asked if Ethiopian government had its own criteria for defining small towns.

The C/P replied as follows: there is a criteria and according to the criteria, communities with more than 2500 people are small towns. Also according to the government policy, the cost of water supply project for those categorized as small towns should be at least covered by soft loans that are paid by the town's water supply operator.

The study team mentioned the following: the classification of small towns followed the one used in Amhara region water supply project by the Japan's grant aid but it will be checked again and the CP persons of both SNNPRS And Oromiya regions will be notified if there is any change.

2. STEERING COMMITTEE

As a feedback from the study, the study team made the following three recommendations about future activities in groundwater resources study and management and explained the details as well as the reasons for making these recommendations.

1. Establishment of groundwater database system (ENGWIS)
2. Future use of hydrogeological maps that are to be created in this study
3. Improvement of drilling technology of drilling companies

The SC members made the following comments on each of the recommendations.

(1) Recommendation 1 : Establishment of groundwater database system

A uniform format for data collection and description should be employed for every well drilling project in the country. At the level of drillers and woreda water offices where a computer is not always available, paper-based format should be used.

Since formats of data entry for drilling, borehole logging, and pumping test are already available under ENGWIS and these formats and its system should be more actively employed. At the same time, training on the use of ENGWIS should be given to more people at Ministry, regional and zonal levels.

Such system should be established and made official at the level of central government so that the regional and zonal offices can follow the system, data collection and record formats. Some persons in the MoWE should be leading this activity.

(2) Recommendation 2 : Use of hydrogeological maps

At least a few copies of the produced maps should be distributed to regional water offices to use.

(3) Recommendation 3 : Improvement of drilling technology of drilling companies

The government should mandate that the drillers have a qualification that is obtained through a certain period of education at designated institutions, to do the drilling work and that the companies should have such qualified drillers to start well drilling business.

There are not many institutions that can give training on drilling technology in the country but it is said that Mekele University will soon start a course on drilling technology.

Finally, the Team promised to submit eighteen (18) copies of the IT/R to the MoWE by 7th July, 2011.

The Team explained the schedule of the remaining part of the study.

END

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Ato Abera Mekonnen (Chairman)

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Dr. Lei Peifeng	Groundwater Modeling
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