NVE

Report from field trip, Ethiopia

Preparation for ADCP testing (14-21.08.2012)

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RAPPORT

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Norges vassdrags- og energidirektorat
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Report from field trip, Ethiopia

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PREFACE

Activity 3 (A3), "Capacity Building of Hydrological Services", arranged a pre-training session on ADCP and pressure sensor on 14th – 21st August 2012. Testing of the ADCP took place at Awash River while the measurement sites at Kessie and Bure were visited.

A3 is one of the activities under the Agreement regarding Institutional Cooperation for Feasibility Studies of the Mandaya and Beko-Abo Multipurpose Projects, between the Ministry of Water and Energy (MoWE) of the Federal Democratic Republic of Ethiopia, and the Norwegian Water Resources and Energy Directorate of the Kingdom of Norway.

The purpose of the visit was to perform the initial part of the training in discharge measurements with ADCP and automatic water level recording, which is planned for February 2013. The activities included testing of equipment (parts and functionality) at the hydrology work shop, visit to the locations to evaluate the practical conditions and preparations needed before the actual training, and a functional test of the ADCP equipment at the training location in Awash River.

Testing of ADCP instrument was carried out by NVE and MoWE staff at Awash River.

This report presents observations and recommendations.

Oslo, Norway, September 2012

Sverre Husebye

Head of Section

Hydrology Department NVE

Report from fieldtrip 14.08 – 21.08 on Awash, Kessie and Bure

The purpose of the visit was to perform the initial part of the training in discharge measurements with ADCP and automatic water level recording, which is planned for February 2013. The activities included testing of equipment (parts and functionality) at the hydrology work shop, visit to the locations to evaluate the practical conditions and preparations needed before the actual training, and a functional test of the ADCP equipment at the training location in Awash River.

Program

Date	Time	Place	Activities and observations
15.08.2012		Addis	Short meeting with Semunesh, Dawit and Biruk Testing of ADCP carried out at the hydrology work shop
16.08.2012		Addis	Continued testing of ADCP and radio modems at the hydrology work shop
17.08.2012	08:30	Addis –Awash at Metehara - Addis	Testing of ADCP with trimaran and radio modem on Awash river at Metehara with Solomon and Lemma. Some difficulties with the radio modem communication. Incomplete measurements with the ADCP due to bad and lost signals. Too much sediment.
19.08.2012	08:30	Addis – Kessie – Debre Markos	Field inspection at Kessie. Observed the current meter, the crane, sounding weight and the sediment sampler. Discussed the condition of the equipment with the field hydrological team. Visited the Debre Markos office which is to be rehabilitated
20.08.2012	08:30	Debre Markos – Bure – Debre Markos	Field inspection at Bure. Observed the staff gauge, the current meter, the crane, the sounding weight, the sediment sampler and the proposed location for the pressure sensor installation. Discussions with the field hydrological team
21.08.2012	09:00	Debre Markos – Kessie – Addis	Field inspection at Kessie Observed the staff gauge and the proposed location for pressure sensor installation.

Observations and recommendations

Current meters

- There is presently only one current meter at each station. Three or four is needed to reduce the risk of having to abort measurements if the current meter is damaged during a measurement.
- The Price Current meters are in bad condition, with cups partly damaged and temporary repairs that possibly affect the calibration of the instruments. The cups are made of a soft material (brass?) and are easily damaged by the high sediment concentrations in the river.
- Recommendations: Check with the producer of the Price meter if it is possible to buy just the cups and if they can be delivered in material that is more solid(e.g.. stainless steel).
- Crane and motor needs reconditioning

Sounding weights

At both Kessie and Bure the discharge measurements are made by suspension techniques from bridges, approximately 40 m above the water surface. On high flow the sounding weights are not heavy enough to keep the current meter stationary, and neither the bottom nor 0.8 of the depth can be reached. As a result the velocity is only measured at 0.2 of the depth and sometimes at the surface. The depth at each vertical is calculated by measuring the distance from the bridge to the water surface and subtracting this distance from the distance measured from the bridge to the river bed in dry season. This method is ok provided there is no change in the cross section.

- At Bure the sounding weight is modified
- At Kessie the weight is way to small, heavier weight is required
- Generally heavier weights are needed on both locations

Sediment sampler and accessories

- Generally there should be two sediment samplers at each station
- At Kessie they have only one and the condition of the sampler is very bad.
- At Bure they also have only one sampler. The condition is bad but slightly better than at Kessie
- There is shortage of sampling bags, mouth holder and mouths

Staff gauge

- At Bure the staff gauge has been extended up to 19 m, but water level as high as 23 m has been observed and it is necessary to extend the staff gauge further to cover the total range of water level variation.
- At Kessie a low flow staff gauge is located on the right bank. When the water level exceeds 4m, readings are made from a staff gauge on the bridge pillar at the left bank. This staff gauge is planned to be moved to the right bank and located together with the low flow scale.

Cable way

- At Bure the Mid-term Review Report states that a cable way was installed years ago 80m downstream the bridge. This is not correct. There is no cable way at Bure and all discharge measurements and sediment sampling are made from the bridge. The cable way should be installed as soon as possible as it will improve the quality of the measurements immensely. The measurement station at Bure was established in 2008 flood season.
- At Kessie the old cable way was damaged by construction work at the new bridge and it cannot be repaired. A new cable way is determined to be located approximately 150 m downstream the old bridge. Procurement and installation should be done as soon as possible to have the cable way in operation before the next flood season.

Pressure sensors

- At Kessie the pressure sensor should be located at the right bank close to the low level staff gauge. Weekly reading of the staff gauge should be continued after the pressure sensor installation for control and adjustment of the sensor recordings. For good control readings the high level staff gauge has to be moved to the same location.
- At Bure the best location for installation of the pressure sensor is by the staff gauge.
- The pressure sensors at both stations will be installed during the coming low flow season(2013)

Tool box

- In 2010 two complete tool boxes was imported. One for each station. None of them were available at the measuring stations.

PC

- In 2010 two laptops was imported for each station to digitalize daily measurements. None of them were available at the stations.

Field car

- Both cars were in bad conditions. (old and bad tires, not safe)

Data processing

- Due to the measurement problems at the stations, the total discharge has not been calculated for all measurements. As a result of these problems, the rating curve at Kessie has not been updated since 2008 when the collaboration with NVE started.
- At Bure no rating curve has been generated since 2008 when the collaboration with NVE started.
- Generally we do not know the status on data processing at neither of the stations.

ADCP training

Regarding ADCP training we have to agree about time, participants and location. We suggest:

- Time: February 18-26
- Participants: 10 (Field technicians from each regional office including staff from head office.)
- Place: Addis Ababa for theory and Awash for the practical part

Requirements and preparations for ADCP training

- Conference room with PCs and projector facilities.
- 2 persons on each PC.
- The participants must have basic computer knowledge and have professional Microsoft Office course.
- All ADCP equipment and accessories must be available during the theoretic and practical training.
- All ADCP equipment and accessories/connections should be tested on site in Awash River by MOWE before the training. Batteries must be fully charged.
- Inflatable boat should be available. (According to Lemma a boat is available, but it is punctured and need repair. Support from the head office may be needed for this task). The plan is to fix the boat on a rope across the river for part of the ADCP training.

Requirements and preparations for installing pressure sensor at Kessie

- All Orpheus mini (pressure sensors) with fresh batteries, software and IRDA cable must be available. (IRDA cable – for communication between the pc and logger)

- All pre installations must be finished at Kessie at the location we agreed on at the fieldtrip. Fitting and fasten the pipes into the river and the cabinet for the logger. This was talked about at the fieldtrip. If it is necessary with a principle drawing please let us know.

- All necessary equipment must be purchased if it is not at storage.

Tentative ADCP course plan including pressure sensor training:

Day 1:

- ADCP theory and WR II training

Day 2:

- WRII training continues
- Pressure sensor theory
- Travel to Metehara

Day 3:
- Practical training on Awash river at Metehara.
- Travel back to Addis

Day 4
- ADCP Post processing
- Travel to Dejen for pressere sensor installasjon

Day 5:
- Pressure sensor installation at Kessie

Day 6:
- Travel back to Addis

Conclusions

- Procurement of measurement equipment and cars should be given high priority. Preparations for the ADCP training and pressure sensor mounting in feb 2013 should start immediately

- Regarding data processing for both stations, MOWR is invited to suggest what kind of future training that is needed in order to solve the issue.

- Tool box and PC should be available at site during measurements

- In order to utilize effectively the allocated training time, MOWR should make sure that all necessary requirements (listed above) are in place in good time before the training.

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