TRANSBOUNDARY GROUNDWATER MONITORING IN KEBBI STATE, NIGERIA.

BY

SOLA FISAYO OJO

AT THE INTERNATIONAL WATER LAW TRAINING, UGANDA ON 4/8/2015

INTRODUCTION

According to the African Development Bank's (ADB) report on Integrated and Concerted Water Resources Management of the Aquifer System of Illumeden (IAS), West Africa is rich in Transboundary Surface Water Resources within the River Basins the shared aquifer systems.

Although special attention is always paid to the management of surface water in the river basins the same cannot be said on groundwater and the Transboundary aquifer systems. The increasing demand of both surface and groundwater resources is presently threatened by the climate variability, pollution of various origins and over abstractions of aquifers. The management of transboundary

groundwater resources by two or more countries is also not coordinated.

Information available up till now on the aquifer systems are fragmentary and a study was therefore needed on the aquifer system as a whole in order to better understand the flow fluctuation and functioning of the system and also the Transboundary risks that could compromise the development Groundwater Resources activities.

OBJECTIVES

- The Transboundary Groundwater Monitoring, middle and long term objectives are as follows;
- Understanding Groundwater Resources Potential of the existing aquifers in both quantitative and qualitative terms;
- Simulate the behavior of the groundwater tables in response to the water demand of each Country;
- To enable a set up of Legal Instrument for equitable management of Transboundary Groundwater among Countries in question;
- Offering of adequate and appropriate data for an integrated Water Resources management strategy, planned to meet the objectives of each Country.
- Provision of a baseline study, data and information for future establishment of groundwater monitoring boreholes in the demarcated area.
- Provision of capacity building and technological transfer
- Protection of Groundwater resources against pollution and contamination thereby protecting human lives.

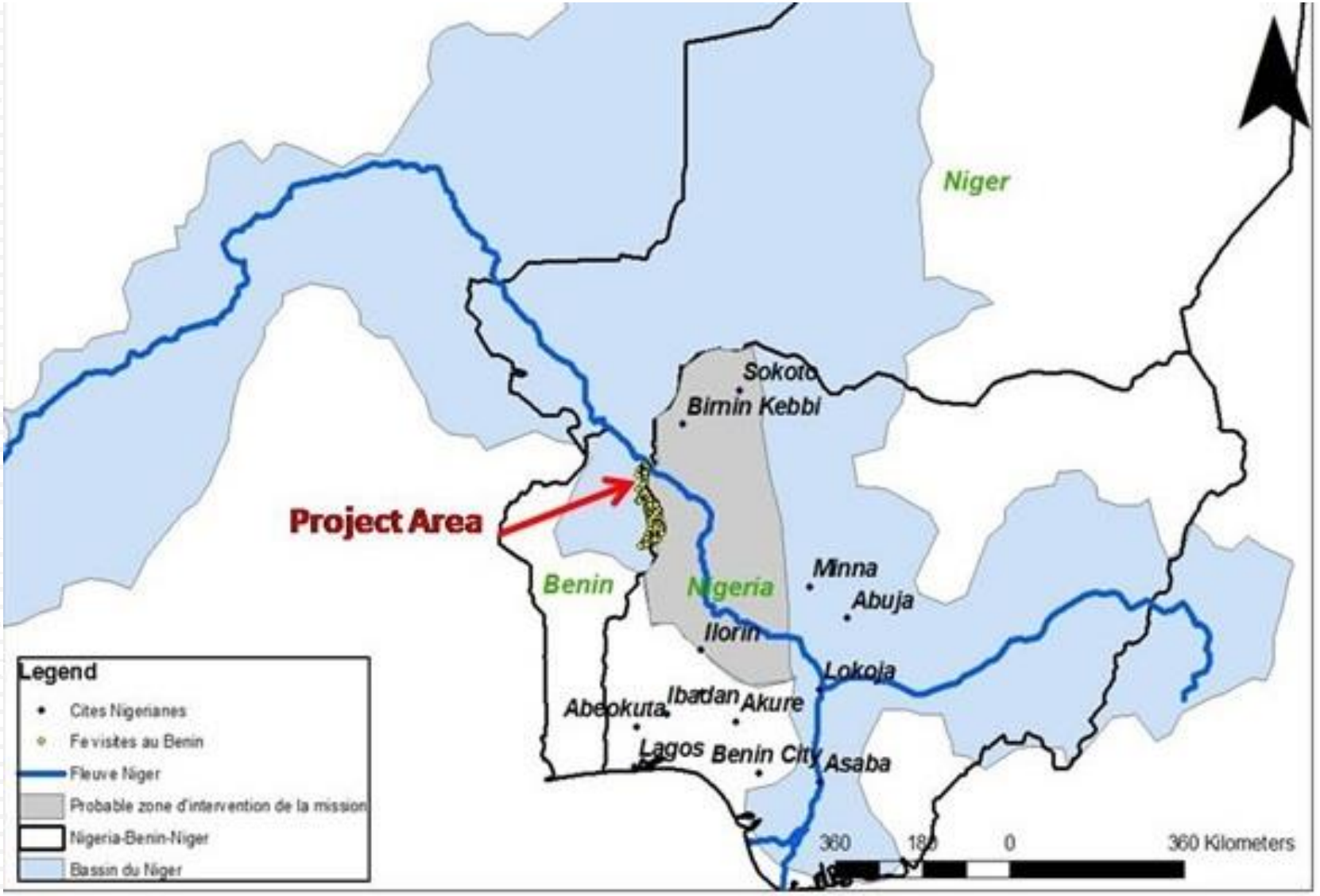

Fig 1: The Map of Transboundary Project Area

FIELDWORK ACTIVITIES ON PROJECT SITE

The activities carried out covered 44 wells and 16 boreholes in 44 villages are as follows;

- **Use of topographic maps:** Topographic maps covering the area under consideration were used as guide to Communities under consideration and determination of the distance between them.
- **Determination of borehole co-ordinates using GPS:** A GPS was used to determine the co-ordinates (Longitude and Latitude) and altitude of the water point.
- **Determination of piezometric (static) water level:** Deep meter was used to determine the static water level.
- **Determination of total depth:** Total depth of well/borehole is determined using depth meter.

- **Determination of internal and external diameter of well/borehole:** These were carried out using a meter rule.
- **Water sample Collection:** This was done using a plastic bucket with a rope attached.
- **Filtration of water samples in situ:** Thermofilter was used in filtering the collected sample in situ, before putting it into 2 labeled sampling bottles, 100ml and50ml , the former un acidified and the later acidified (with concentrated Hydrochloric Acid, HCl) for laboratory analyses of Cations and Anions respectively.
- **Determination of water samples physical and chemical parameters:** chemical parameters such as: PH, REDOX, Electrical conductivity and temperature are determined using Electrophotometer.

- **Collection and preservation of water samples collected:** One of the two samples (100ml) collected was preserved after addingconcentrated Hydrochloric Acid while the other sample (500ml) remains un-acidified and both preserved in a portable refrigerator.

- **Recording of Data and information:** For each of the water points visited, well/borehole data, chemical and physical parameters are were fully recorded, refer to the appendices.

- **Pictorial Documentation:** Pictures are taken of the fieldwork activities carried out in each of the water points during the field work using a digital camera. Some of these pictures are shown in Annex 3

RESULT FROM THE FIELDWORK

The result from the fieldwork covering 44 wells and 16 boreholes in 44 villages can be summarized as follows:

i. The area visited in proposed project area is from latitude 3.61°E to 4.3006°E and from longitude 11.66°N to 11.981°N

ii. The altitude ranges from 143m to 274 m

iii. The Acidity pH of the water sample ranges 4.6 to 6.93 while only one sample has ph of 8.0.

iv. The Electrical conductivity (EC) ranges from 73 µS/cm to 2090 µS/cm v. The depth of hand-dug wells ranges from 3.25 m to 34.1 m

RESULT FROM THE FIELDWORK

vi. The borehole depth cannot be measured because they are not accessible because of the casing.

vii. The total depth of the wells ranges from 3.45 m to 34.95 m

viii. There is no odor or smell from all the water samples except in 3 wells at Gaten Tudu, Danai and Illo.

ix. The water samples are colorless in 3 wells located at Jiderebode, Todi and Tunga Tafana

x. The water samples are not turbid except at Boule Langu, Lafagu, Jiderebode, Rahan Taru villages

OBSERVATIONS

Whenever a village was visited, the team has to consult the Chief of the village to sensitize them on the mission. The reception received was always warmly and hospitable, in most cases the communities support the team in fetching water from the wells. Beside this the following are also the major observations made:

- Though the visit was made during the dry season with some of villages not easily accessible, such villages may be practically be inaccessible during rainy season
- There was difficulty in collecting data from boreholes which are capped or sealed up.
- The hand pumps boreholes are generally shallow to reduce pumping energy from human effort. They are therefore not likely to penetrate deep unconfined and confined aquifer formation. Hence data from them may not be representative of existing aquifer formation.

•Many hand pump borehole are either damaged or abandoned or out of use while most of these villages use hand dug wells or surrounding river as a sources of potable water most especially during the dry seasons when most of the wells dries up. These areas are therefore likely to be prone to acute water shortages during the dry season.

•There are no signs of carrying out scientific investigation such as geophysical investigation for location of groundwater which contributes to low yield of most boreholes that dries up during the dry season.

•There is no single monitoring well or borehole in the entire village visited.

•There many other villages within the project areas which shall be visited if need in line with monitoring arises

RECOMMENDATION

The following are hereby recommended:

- **Establishment of Monitoring Wells:** There is need to establish monitoring wells (boreholes) in order to adequately and effectively monitor the aquifer performance during the wet, dry and medium season. The monitoring wells should be well equipped with gadget such as well loggers. The wells/Boreholes should be designed for dual operation i.e. taking data from aquifers and as a source of potable water to population.
- **Fieldwork on other Areas not covered:** There is need to cover other villages in the project areas and including them in the project list.

CONCLUSION

There is no doubt that Transboundary groundwater resources is of strategic importance to Nigeria and other Niger Basin Authority (NBA) Member Countries where millions of people depend on it for their daily lives subsistence and agricultural practices. As also rightly noted by the African Development Bank, not much is known on groundwater when compared to surface water that is visible. Nevertheless, since groundwater is easily available and affordable with high quality, more attention is urgently required now to arrest the persistent pollution and contamination from oil fields, mining, agricultural inputs, abattoirs and refuse dumping from markets and homes.

THANK YOU