# PROBLEMS OF SPACE BASED (ARGOS AND METEOSAT DCP) EQUIPMENTS ON INTEGRATED WATER RESOURCES MANAGEMENT OF THE RIVER NIGER BASIN

by

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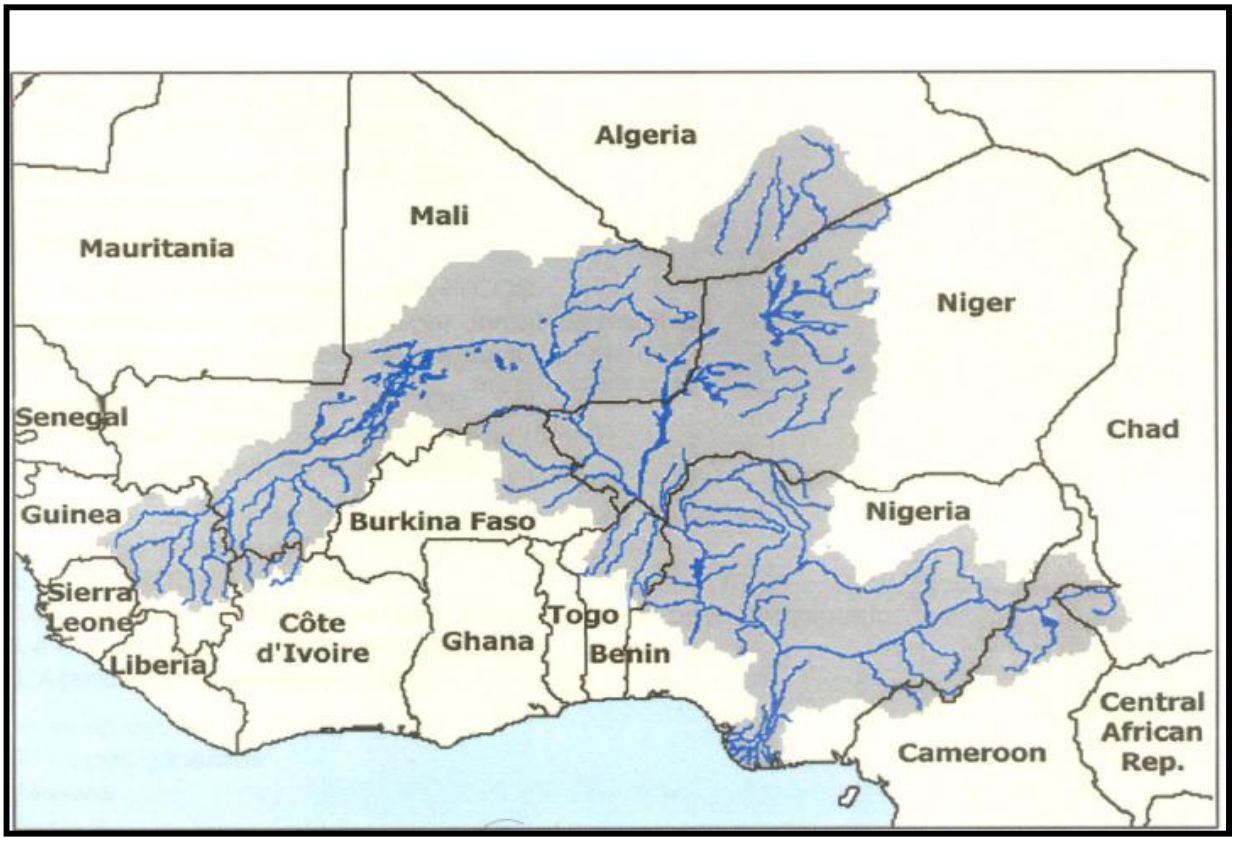
## 1.0 INTRODUCTION

River Niger is the third longest river in Africa and the 9th largest river system in the world. It takes its source from the Fouta Djallon highland in Guinea at an approximate altitude of 800m before traversing over a distance of 4,200 km to empty into the Atlantic Ocean in Nigeria. The Niger basin has an active catchment area of about 1,500,000 sq km covering the following 9 Countries in West and part of Central Africa that also constituted the Niger Basin Authority (NBA) member Countries; Benin, Burkina, Cameroon, Chad, Cote D'Ivoire, Guinea, Mali, Niger and Nigeria as shown in Fig. 1.

**Fig.1: Map showing the Niger Basin Catchment Areas**

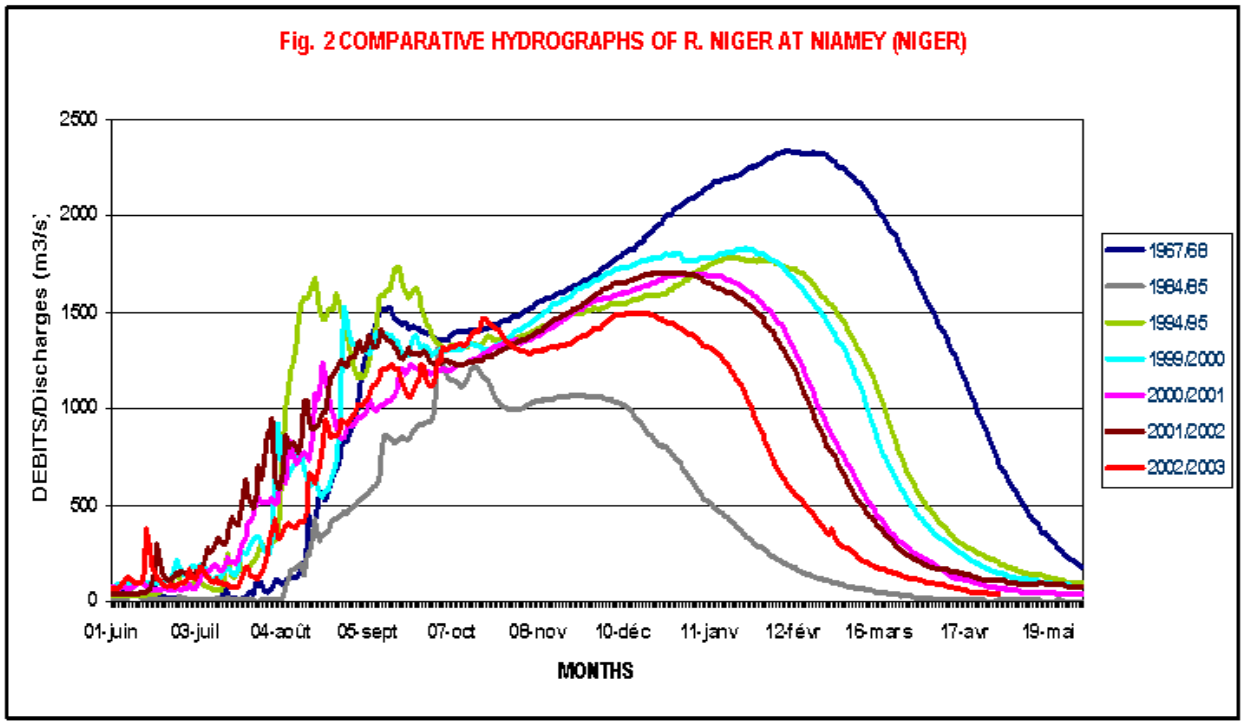



Most of these NBA member Countries are among the world's poorest nations with economic subsistence based on Agriculture and Livestock that are now adversely affected by the inadequate water supply, increasing urban migration and hydro-climatic changes.

As the major source of potable water for over 100 million people, the river Niger has in the recent years, been adversely affected by the menace of drought. For example on 16th June 1985, the river was completely dry in Niamey, Niger Republic, for the first time in history. Similarly, the

flow recorded during the 1984/85 and 2002/2003 hydrological years along the river Niger were the lowest in 50 years as shown in fig. 2.

**Fig.2: COMPARATIVE HYDROGRAPHS OF RIVER NIGER**




Consequently, in the last 4 decades the basin has been experiencing series of hydro-climatic changes that has resulted in the persistent drought causing the Sahara desert movement southward towards the Atlantic Ocean; erosion and river silting that is causing floods with its attendant loss of lives and properties; continued low flow that is reducing reservoir storage capacity with consequences on acute water shortages and increasing water demands; pollution, weed encroachment and increasing water borne diseases that are now ravaging the river and the ecosystems as well as increasing mortality rate, famine, poverty and high rate of urban migration.

Thus, in 1984, the UNDP, OPEC, EEC and the NBA member countries funded the establishment of 65 satellites controlled hydrological **Data Collection Platforms** (DCP) stations along the river Niger and its major tributaries under the framework of the Hydroniger project., using the Argos Satellite Controlled DCPs. Presently the NBA is gradually changing from the use of Argos to the Meteosat DCP because of the latter having added advantages.

There are therefore two main space-based DCP stations in Niger basin uses;

- The Argos Satellite Data Transmission Systems
- The Meteosat (Eumetsat) Satellite Data Transmission Systems

From these DCP stations and through remote sensing, real time hydrological data are received by direct transmission (Argos) and through the Internet (Meteosat) at the NBA in Niamey. The data are processed, analysed and kept in the NBA Data Bank and used by member Countries in their water resources planning and development. Hydrological forecasting is also carried out using the data and it is also disseminated regularly, through the NBA monthly Bulletin and the website as well as on the AOC-HYCOS website and to various institutions, organisations and interested individual worldwide.

So far, the use of these remote sensing technology in the basin that commenced since early 80's has not yielded the desired result because of the numerous technical, environmental and socio-economic related problems which needed to be addressed urgently for the enhancement of a sustainable transboundary water resources planning and development in the West and part of Central Africa sub region.

## 2.0 PROBLEMS FACING ARGOS AND METEOSAT DCP EQUIPMENTS

The problems facing the Argos and Meteosat Satallites DCP equipment in Niger basin can be abbreviated using the word CODE which implied problems derived from Coordination, Operation, Data and Engineering as follows:

### 2.1 Coordination Problems

This involved the following:

- Inadequate coordination between Space Agencies, Equipment Manufacturers and the Stakeholders
- Inadequate coordination between the Stakeholders and the equipment manufacturers
- Inadequate involvement of Local Govt Operators

### 2.2. Operational Problems

This involved the following

i) Inadequate funding
ii) Non availability of spare parts
iii) Operation too dependent on antennae (Meteosat)
iv) Poor maintenance culture
v) Inadequate training

### 2.3. Data Acquisition Problems

This involved the following

- Short data transmission period on the Internet
- Non availability of historical data on the Internet
- Non availability of software for data assessment
- Inadequate training

### 2.4. Equipments Design Problem

This involved the following

- Non standardisation of parts
- Non simplicity of parts or adaptable to indigenous technology
- Early battery expiration time
- Non protection key component against theft and vadalisation

## 3.0 THE WAYS FORWRD

The sways forward towards solving the current the Argos and Meteosat Satellites DCP equipment problems in Niger basin can also be abbreviated using the word DECODE which implied Decision-makers, Equipment, Collaboration Operation, Data and Economic as follows:

### 3.1 Decision-makers Involvement

- Involvement of grass root Local Government Authority to be involved in following
  a) Maintenance of equipment
  b) Protection of equipment
  c) Data acquisition

### 3.2. Equipment

To be carried out as follows

- International Standardisation of parts
- Simplicity of part to be adaptable to indigenous technology when no longer available in the market
- Use of correct and highly durable batteries lasting according to specification
- Adequate protection of sensitive parts such as the Antennae from stolen or vandalisation

### 3.3. Collaboration

This should be carried out by:

- Developing adequate collaboration between Space Agencies, Equipment Manufacturers and the Stakeholders
- Improvement of coordination between the Stakeholders and the equipment manufacturers
- Adequate involvement of Local Govt Operators
- Improvement of relationship between Stakeholders and the general public

### 3.4. Operation

i) Availability of spare parts
ii) Operation not to be too dependent on single key part
iii) Improvement of maintenance culture by involving all stakeholders
iv) Adequate capacity building on remote sensing operation

### 3.5. Data

- Improvement of Internet data transmission periods
- Provision of historical data through the Internet
- Provision of computer software for data analyses
- More training on the use new software for data analyses

### 3.6 Economy

- Adequate funding

## 4.0 CONCLUSION

Countries within the Niger basin are facing serious shortages of surface and ground water for meeting rising demands from population growth.

Despite the immense potential resources such as hydropower, irrigated agriculture, fishing, navigation and tourism in the basin, the lack of adequate remote sensing application and the existing equipment problems are the main causes of lack reliable data for their development and for the monitoring the persistent hydrological and climatic changes and the increasing environmental degradation within the river Niger basin.

In the effort towards the improvement of the water and environmental problems in the Niger basin, the NBA member Countries recently endorsed the New Shared Vision for the basin so as to ensure sustainable integrated water resources management and cross-border cooperation among the member Countries.

Consequently, on 26 April 2004 in Paris at the invitation of Government of France, a Conference of Niger Basin Authority Heads of State and that of Development Partners on the New Share Vision, was held.

During the Conference, the Paris Declaration on the Management and Governance Principles for Sustainable Development of Niger Basin, was signed by the Heads of State, while the development Partners signed an engagement towards the realisation of the New Shared Vision.

However adequate application remote sensing in the areas of monitoring the hydrological and climatic events is urgently required for the realisation of the shared vision which will also enhance of the NEPAD Action Plan for sustainable development in Africa and the UN Millennium Goal of Water for all by 2025.