

**ASSESSING THE CONSTRAINS OF WATER SUPPLY FOR  
IRRIGATION IN HADEJIA VALLEY IRRIGATION PROJECT  
AREA, JIGAWA STATE NIGERIA.**

**BY**

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## **Abstract**

*The study assess water supply constraints to irrigated crops in the Hadejia Valley Irrigation Project (HVIP). The HVIP has been identified with declining yields over the years. Different researchers have investigated the reason why soil quality has been the target of many of the researchers. However, findings on the soil have indicated that, the problem is not only on the soils but to water supply. Considering the importance of water supply to irrigated crops, the study investigates into the water supply situation. This study uses random sampling in selecting the sectors and questionnaire survey in the field for data collection. The study show that there is no problem of water availability but the constraints are in the destruction of irrigation infrastructures and the apathy of farmers towards canal maintenance couples with the emergence of a notorious invasive species of plant (typha grass). Simple statistical techniques and descriptive statistics were used in the study. It recommends that H-J.R.B.D.A should provide funds for provision of more irrigation infrastructures and maintenance of existing ones and for research. It also shows the need to encourage Famers Associations to undertake self-help activities for the maintenance of the irrigation structures.*

Keyword: assessing, constraints, water supply, irrigation, project

## **Introduction**

Irrigation is an old-age art historically civilization has followed the development of irrigation. Pre-historic tablets and carvings indicate that early civilization developed along rivers that supplied irrigation water to the fields. Egypt claims to have had the world's oldest dam built, 5,000 years ago to store water for drinking and irrigation (Ngaba, 2000) with new development in irrigation today it can be considered as a modern science for the whole world.

The world is facing twin challenges of water stress and food insecurity challenges that are projected to grown (Rockstom, 2009). Because crop production is the largest global consumer of freshwater, and because water is a key resource in food production, neither of these challenges can be addressed in isolation (Rockstom, 2009) this producing more food for each drop of water will be a crucial strategy to address both challenged (Linker, 2010) many recent studies have tied water scarcity to agricultural water consumption (Hoff, 2010).

The importance of irrigation to dry land areas cannot be over emphasized. In most developing countries, agriculture plays more important role than any other sector of the economy in the development process. In Nigeria, agriculture has contributed greatly to the national income in form of food supply and export crops. (Yahaya, 2007).

The Hadejia Valley Irrigation Project (HVIP) is part of the project under the supervision of the Hadejia Jama'are River Basin Development Authority (H-J.R.B.D.A) which is a parastatals under the Federal Ministry of Water Resources and Rural Development. It was established by decree No. 87 of 1979 and was formally launched on 1<sup>st</sup> June, 1976. (Terrumun and Deniel, 2002.) Other project under authority is the Kano River Irrigation Project (KRIP). All the projects were designed for irrigation purposes. Globally there has been recognition of the important contribution made by irrigation activities towards agricultural productivity, especially in dry areas with variable rainfall.

Dhawan (1989) in Ngaba (2000) stated that every community will unexceptionally subscribe to the following goals of irrigation management. Maximum farm production along stable growth path, realizing full utilization of created irrigation potential, minimizing over irrigation and ecological development, attaining cost effectiveness and reliability in irrigation services, achieving high water conveyance and storage efficiency and, promoting sustainable irrigation farming.

Accordingly, the introduction of the Hadejia Valley Project has introduced an increase in the total production of tomatoes, wheat, maize, rice etc (Olofin, 1984). These have led to double cropping increase in farmers' income as well as an improvement in the Gross National Product (Olofin, 1984). Jamil (1996) defined irrigation as the application of water to the soil for the purpose of supplying the moisture essential for the growth of arable plants, this process secures the plant against short term drought through cooling the soil and the atmosphere so that plants grow under favourable conditions. Irrigation is an artificial application of water to the soil usually for assisting in growing crops in crop production. It is mainly used in dry areas and in periods of rainfall shortfalls Snyder (2005).

Additionally irrigation helps to suppress weeds growing in rice fields (William, 2007). Irrigation is a system of farming that has been practiced for long.

Archeological investigation has identified evidence of irrigation in Mesopotamia and Egypt as far back as the 6<sup>th</sup> millennium BCE, where barley was grown in areas where the natural rainfall was in sufficient to support such crops Dillehay (2005).

Agriculture for Irrigation has developed most extensively in the arid and semi arid regions, with areas having prolonged dry spells. The practice is essentially to supplement the available rainfall in an area. A review of the development of irrigation in the world is fascinating. It reveals the ingenuity and foresightedness of many of the ancient civilization in harnessing the resources of nature for the benefit of man; it also shows the importance of careful planning of irrigation system and efficient water management for maintaining the productivity of the land (Michael, 2009).

The principal irrigation practice of the ancient times was diverting the flow of springs and streams with temporary barriers, constructed across them and irrigating the adjoining fields. The practice is still common in small scale works owned by farmers. The practice of storing water in tanks was subsequently developed. Tanks of various sizes were in existence since the ancient times. Major river diversion projects to harness water of large rivers constructed by ancient ruler using indigenous technology. However, modern well designed large scale irrigation systems were developed mainly after the 18<sup>th</sup> century. Irrigation technology made rapid development in the 20<sup>th</sup> century (Michael, 2009).

Amina (2006) reported that, Hadejia Jama'are River Basin is located in vulnerable zone in northern Nigeria. It is characterized by long dry season October – May with a relatively short

wet season (June-Sept). The rainfall is scanty and erratic in distribution. Also the rainfall pattern is characterized by spatial and temporal variabilities and has often led to drastic reduction in the growing season, low yields, malnutrition, and even famine.

### **Statement of the Problems**

Old traditional irrigation has been practiced in the area, but, the modern system came in to being in the 1970s. At the beginning of the modern irrigation project, peoples obtained high yield of crops per acre especially rice. Unfortunately, the yield is decline due to certain constrain. Various studies has been conducted in the area which gives more attention to soil, while this study concentrate on water supply.

### **Objectives of the Study**

The objective of the study is to evaluate the constraints of water supply for irrigational purposes in Hadejia Valley Irrigation Project area.

The specific objectives include:

- Identify the problems of water supply for irrigational purposes.
- To find out the causes associated with insufficient water supply for irrigation.
- Identify the nature of water supply for irrigation.
- To find out possible solution to the constraint of water supply for irrigated crops.

### **Description of the Study Area**

The Hadejia Valley Irrigation project lies in the Auyo and Kafin Hausa local government areas of Jigawa state, between Hadejia River and its branch of Kafin Hausa river around the Fadama town of Auyo. It is a multipurpose project involving the use of water resources, land and irrigation development to enhance agricultural production of the farming communities in and around Hadejia town. The project was conceived to give employment opportunities and livelihood to farmers in the immediate vicinity, who are expected to produce tons, of assorted agricultural products such as wheat, rice, corn, sugarcane, sorghum and vegetable annually the design of the project is to top the water releases from Challawa Gorge and Tiga Dams in to Kano – Hadejia River system. A barrage was constructed to store water, where it is diverted through water control structures in to the canals and laterals of the project. The H-J.R.B. covers

about 6,175 hectares and is located approximately between latitude 10<sup>0</sup>N and 13<sup>0</sup> 20' N and longitude 7<sup>0</sup> 25'E and 11<sup>0</sup> E. (Consolint International, 1975) in Tanko, (1999).

### **Methodology**

The methodology employed in carrying out this study includes issues such as the main sources of data, project design, research population, research sample and sampling techniques, research instruments, data collection procedure and data analysis procedure were used for the study.

### **Population of the Study**

The population of this study consists of all irrigation farmers in the ten (10) sectors, out which population of farmers in the five (5) selected sectors which are 743 were used for the study (Hadejia Jama'are River Basin Authority, 2014).

### **Research Design**

The study conducted by the use of survey design using a structured questionnaire and focus group discussion.

### **Sample and Sampling Techniques**

Two hundred and fifty (250) farmers were selected using simple random sampling process. Five (5) sectors were selected through balloting and the farmers to be given questionnaire were selected using a Microsoft Excel in computer by the formula:-

Random Between (1, any number of population).

e.g. Random Between (1,184) then press enter menu, the computer will automatically select the number without bias.

The numbers selected by the computer were traced in the farmers list and questionnaire given to them.

## Results

**Table 1: Demographic Characteristics of the Farmers in the study area**

Sectors	Sex		Age Range						Marital Status		Educational Level				
	M	F	01-20	21-30	31-40	41-50	51-60	61-Above	Married	Single	Non Formal Educati	Primary	Seconda ry	Post Seconda	None
AUYO	50	-	-	5	12	11	12	10	50	-	10	13	12	15	-
GAMSARKA	45	05	1	4	19	19	1	3	50	-	-	-	-	50	-
FURAWA	39	09	-	11	10	10	9	8	34	14	06	16	21	01	-
MARINA	46	04	-	17	18	12	03	-	35	15	03	05	04	38	-
ZUMONI	40	10	-	26	08	11	05	-	50	-	01	48	01	-	-

From the above table it shows that, majority of the farmers were males even though there are few females farmers which total to be 28. Majority of the respondents falls within the age category of 31 to 40 years and less in category of 60 years and above. Also the study found that, majority of the farmers was married. In terms of educational background of the respondents, majority of them were found to have Post Secondary Education.

**Table 2: Nature of Water Supply in the Five Sectors**

Sector	Less Water Supply	Over Water Supply	Regular Water Supply
AUYO	50	-	-
GAMSARKA	-	-	50
FURAWA	48	-	-
MARINA	45	-	05
ZUMONI	50	-	-

The above table indicates that, there is less water supply in Auyo, Furawa, Marina and Zumoni Sectors. While there is Regular Water supply in Gamsarka sector only.

**Table 3: Causes of Insufficient Water Supply**

Sector	Typha Plant Species	Flooding	Deterioration of Field Channel	Erosion	Other
AUYO	04	-	46	-	-
GAMSARKA	50	-	-	-	-
FURAWA	38	08	01	-	01
MARINA	43	05	02	-	-
ZUMONI	50	-	-	-	-

The table revealed that typha plant species is the major cause of insufficient water supply in the area, as reported by the farmers. The other factor is the destruction of channels, followed by flooding.

**Table 4: Ways of Improving Water Flow**

Sector	Removal of Typha Species of Plant	Avoiding Flooding	Maintenance of Field Channel	Others
AUYO	-	-	50	-
GAMSARKA	50	-	-	-
FURAWA	23	07	18	-
MARINA	36	02	12	-
ZUMONI	28	-	22	-

The table indicates that some strategies that improve water flow include: Removal of typha species of plant, avoiding flooding and maintenance of field channel.

**Table 5: Communal or Agency Responsible for the Task.**

Sector	H-J.R.B.D.A	Farmers	Farmers Association	All of the above
AUYO	14	11	12	13
GAMSARKA	-	-	-	50
FURAWA	21	09	01	17
MARINA	20	-	-	30
ZUMONI	10	10	10	20

The constraints of water supply improvement could be improve based on the efforts of Hadejia Jama'are River Basin Development Authority or combine effort of farmers and farmers association.



## **Conclusion**

The study assesses the constraints of irrigational water supply in Hadejia Valley Irrigation Area. It was found that most of the constraints are related to typha plant species, destruction of field channel and flooding. The project area has eleven sectors, the study also found that there is no problem with water availability. To enhance food production in the area it was found that, all stakeholders like Hadejia Jama'are River Basin Development Authority, farmers and farmers association should take responsibility of solving the constraints to water supply in the study area.

## **Discussion**

The result of the study indicated that the major constraints to water supply in the HVIP, is typha species this is in line with finding of Jibrin (2007) in his work of IUCN – NCF Komadugu Yobe Basin Project for improving land and water resources management.

Also with regard to the destruction and lack of maintenance couple with emergence of typha species was the finding of the Afremeser (2014) which also correspond with finding of this study.

However, some finding on other studies indicated that problem of water supply is connected to the construction of Tiga Dam at the upstream of river Hadejia not typha species, these are in line with studies of Barbier (2003) on the upstream dam and downstream water allocation. The case of Hadejia Jama'are flood plain northern Nigeria Water Resources Research 39(ii): 1311 – 1318.

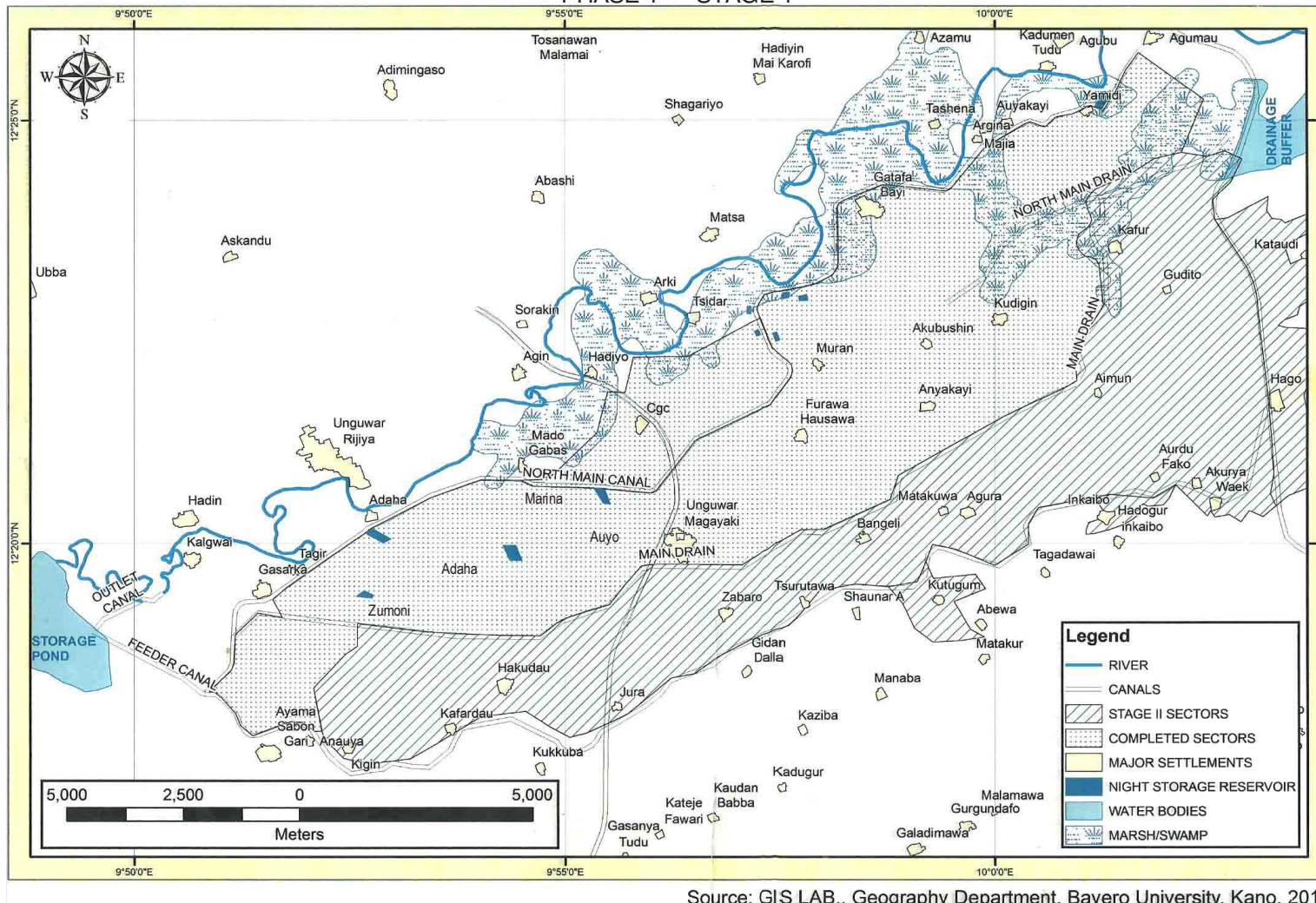
## **Recommendations**

The study recommend that:

- 1) Typha plant and other related species that hinder the flowing of water need to be controlled or eradicated in this area.
- 2) Provision and maintenance of infrastructures such as extension of feeder roads, construction of small bridges, culverts and channels should be extended to small scale irrigation area.

- 3) Public enlightenment campaign on the issues of typha plant eradication, maintenance of field channel and self-help activities in the Hadejia valley Irrigation Project should be encourage.
- 4) Timing of irrigation should be varied among the farmers in the project area to avoid interrupted supply of water when most people are irrigating or watering their plots at the same times.

# HADEJIA VALLEY IRRIGATION PROJECT PHASE 1 - STAGE 1



Source: GIS LAB., Geography Department, Bayero University, Kano. 2016

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