



Water resources development in relation to irrigation in Nigeria

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Water resources are usually considered as that part of fresh water, which is renewable annually. It is a dynamic resources which include surface water and underground water, their common supply being the atmospheric precipitation. Nigeria has vast water resources receiving very large part of the water from drainage arteries of west and central Africa, south of the Sahara, which are international. Available data show that the country's surface water and ground water potentials were put at 267,300 (106 cum) and 51,930 (106 cum) respectively (FM WR, 1995).

Therefore, developing the country's water resources potential is of prime importance for any meaningful strategy for sustainable irrigation development. Three decades ago, the country recognised the need to develop her water resources potential for irrigated agriculture as an extremely important component of the national economy. That is the reason for establishing large irrigation projects in the 1970's and 1980's. These were to substantially provide solution to drought problems as experienced in 1970's as to curtail future occurrences. Despite such efforts, the country is still battling to maintain the few established irrigation schemes. Available data have shown that the country's irrigation capacity utilization is above 35% while actual irrigation is less than 9% (Table I). A number of factors including technical, management, legislative and institutional framework constitute the core of these problems. These have been observed to vary from project to project and from zone to zone in the country (Adeniji, 2001). A critical review of all institutional functions is therefore highly required.

There are quite considerable potential of developing our water resources for irrigation if appropriate technical and management strategies are developed.

The paper, therefore, attempts to suggest technical measures for the effective development and utilization of our water resources for irrigation development.

Suggested technical measures for effective utilisation of water resources for irrigation in Nigeria

- i. Construction of storage facilities for regulation of seasonal distribution of runoff:

Nigeria has many rivers and these rivers have large runoff fluctuation with very high runoff in wet season per year, and poor in dry season/year. Under this uneven time distribution situation, effective surface water uses for irri-

gation and other uses could not be without the construction of large enough amount of storage facilities to regulate the natural situation of runoff. Within the past three decades, Nigeria has constructed more than 200 dams of various sizes nationwide with a total active storage capacity of almost 30,670 million m³, 1995 estimate (Gundiri, 2001). Of the total water consumption 36% is for irrigation (Table II). It is obvious from the table that water resources in Nigeria is not fully utilized in irrigation. This situation is not only wasteful but also present under achievement of the set goals in the national objective for irrigated agriculture. Consequently, it is imperative to increase the degree of promoting the effectiveness of water use in irrigated agriculture.

In addition to the above mentioned reasons, it is necessary to construct a series of new storage facilities in order to expand the total storage capacity, regulate the river runoff in higher degree, and any future dam development should be in line with the National Water Resources Master plan and the possible enforcement of the Water Act and then the water resources could be able to provide the rapid growing population of our country with a better service.

- ii. Construction of More - hydro projects to direct water from regions of abundant water to regions with less water.

Nigeria is blessed with abundant natural resources of water and land resources which can provide the rapid growing population with a better service. Variations exist in water and land resources as well as population in the country as presented in table III and Figure 1.

From the statistics presented in Table III, it is evident that the northern part of the country has more cultivated land with less runoff compare to the southern regions. The deficiency is very serious. There is then the need to improve on the situation. The improvement cannot be done without the adoption of measures for comprehensive exploitation, economic utilization, and quality protection of our water resources. Here again, lies a great task for the federal government to study engineering measures to divert the surplus water from hydro-project in the southern part to the north. The diversion of water, though capital intensive, will provide for industrial use, domestic and municipal water supply, improve on navigation, improve downstream environment, and for irrigation especially in order

to develop and to enhance the national food security objective through the development of irrigated agriculture.

iii. Utilization of all kinds of water for irrigation.

Another important measure for the development of the country's water resources for irrigation is the utilization of available water from various sources in order to increase the water supply. Although, there is shortage of water per capita and per unit area of cultivated land, farmer in this country have successfully used several kinds of water, including mainly saline water, nitric ground water, water of hyper-concentration sediment and sewage water (Musa et al, 1996). Utilizing these types of water resources can greatly increase the yield of crops and the national economy. Sewage water mainly in the cities should be carefully controlled as it might lead to deterioration of the environment. Irrigation with such water should be given considerable attention by the government so as to obtain further success in its use in the near future.

iv. Control of water quality for irrigation.

An extremely important factor in water resources development for irrigation is to adopt technical measures to control water quality because of pollution of river flow, contami-

nation of surface water and groundwater through the use of agricultural chemicals, industrial effluents and domestic wastes to a considerable extent as a consequence of fast population growth.

At present, the country cannot boast of data of continuous water quality monitoring of the various irrigation schemes in the country. Unfortunately, no national water quality monitoring agency has been established to coordinate that. Considerable effort should be geared towards this from now on. Continuous assessment of water quality will be essential if our water resources are to be efficiently conserved and used for irrigated agriculture. In view of this, the various institutions responsible for developing water resources for irrigation should ensure a periodic assessment of all water resources utilized for irrigation. All the stakeholders in irrigation development must ensure a broad and multi - disciplinary input from environmental experts to execute the tasks of monitoring and improving the quality of irrigation water as required by the international standard. They should ensure that the quality of irrigation water is maintained at levels required by the international standard and should be used as an index of measurement.

Conclusion

Available data have indicated low capacity utilizing of our water resources for irrigation. It is therefore, imperative for

Table 1. Status of irrigation capacity utilization and achievement in Nigeria as at the end of 1999/2000 season

Zone	Southern	Northern	Country
No. of Scheme (A)	35	57	92
Area Planned (ha) (B)	79,759	333,635	413,394
Area Developed (ha) (C)	7,030	93,670	100,300
Area Irrigated (ha) (D)	488	34,639	35,127
Capacity Utilizing (%) (100(D)/(C)) (E)	6.94	37.14	35.02
Achievement 1 (%) (100(C)/(B)) (F)	8.81	27.96	24.26
Achievement 2 (%) (100(C)/(D)) (G)	0.61	10.38	8.50

Table 2. Number and active capacity of the existing dams in Nigeria on objective basis

Main objective	No. of Large & Small Dams	Active Capacity (mcm)
Irrigation Water KN-Ir	71 (44)	11,160(36%)
Water Supply most Dams	83 (52)	910(4%)
Hydropower Dadin Kowa Ht/05/Ir	6(4)	18,600(60%)
Total a. Bakori b. Goronyo	160(100)	30,670(100%)

Adapted from FMWR&RD 1995

Table 3. Variations in water and land resources as well as population in country based on regions

Regional hydrological Areas							
Indicators	NW	NE	CW	CE	SW	SE	TOTAL
1. Area (103 sq.km)	131.6	188	158.1	231.9	100.5	113,7	923.8
2. Population(106) 1991	10.3	16.8	10.5	9.7	22.3	18.9	88.5
3. Potential water resources							
a. surface water							
Annual yield (109 m3)	22.4	8.2	32.6	83	35.4	85.7	269.3
Specific yield (mm p.a)	38	44	206	245	352	674	1559
b. Ground water							
Annual yield (109 m3)	4.3	5.6	8.2	11.4	9	13.4	51.9
Specific yield (mm p.a)	33	30	52	49	132	118	414
4. Existing development							
a. Water Storages							
No. of Dams	20	23	32	35	32	18	160
Acting reservoir capacity(106m3)	13,269	5,951	7,980	2,413	1,053	2	30,668
b. irrigation and drainage							
Public Service Area (ha)	8	27	12	12	3	8	70
Private Service Area (ha)	35	98	10	3	0	4	150
c. Water Use Rate							
Surface Water (%)	2	14.6	1.1	0.3	0.8	0.2	19
Ground Water (%)	0.5	1.1	0.2	0.1	0.9	0.5	3.3

Adapted from FMWR 1995
 Key:
 1. N W North West
 2. N E North East
 3. C W Central West
 4. C E Central East
 5. S W South West
 6. S E South East

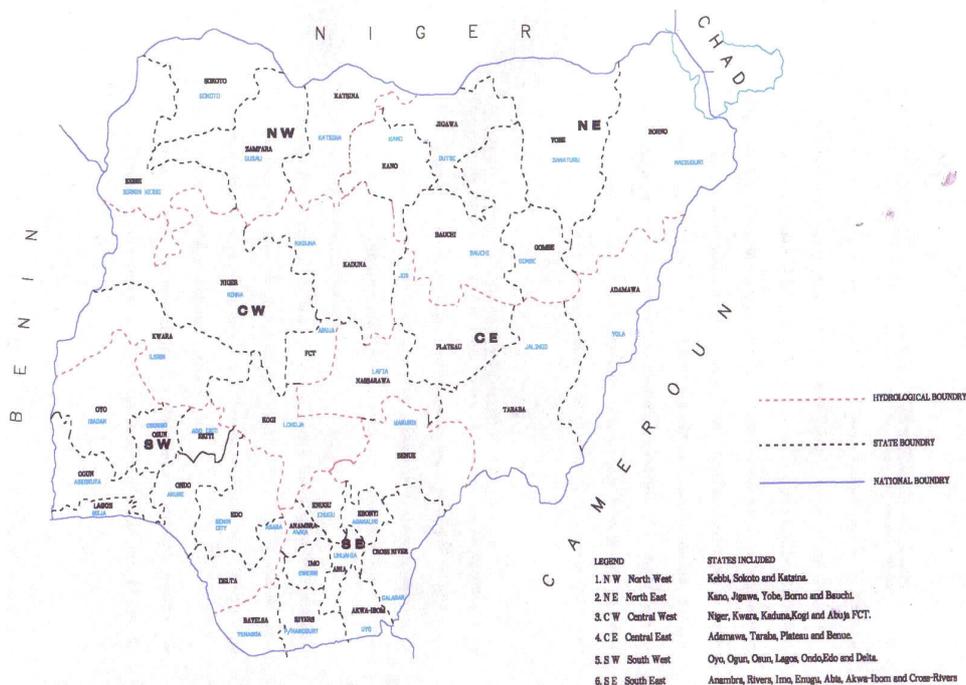


Figure 1: LOCATION OF VARIOUS HYDROLOGICAL AREAS

Figure 1. Location of various hydrological areas

the federal government to adopt measures that can enhance full development and utilization of our water resources to meet the national objective of food security for the rapid growing populace through irrigated agriculture and the enhancement of national economy, water demand and the improvement of the environment in near future.

In addition to the aforementioned technical measures for development and effective utilization of water resources for irrigation, it is necessary to adopt measures that will reduce evaporation loss from reservoirs, canal systems and farm-lands, increase the efficiency of water use, ensure that the provision of water act stipulating release of 20-30% of inflow in large dams to downstream users for irrigation and other related activities is enforced.

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