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Integrated water resources management in Nigeria: Implications for sustainable national development

B U Ngene C O Nwafor G O Bamigboye A S Ogiye J O Ogundare and V E Akpan

Department of Civil Engineering, Covenant University, Ota, Ogun State, Nigeria

E-mail: christiana.nwafor@covenantuniversity.edu.ng

Abstract. This research is aimed at reviewing the current position and implication of sustainable national development of Nigeria as it concerns holistic water resources management. A new model of integrated water resources management (IWRM) has been developed by researchers and theorists and supported by international organisations that emphasize the multifunctional nature of water. However, there has been much debate on the feasibility of IWRM especially in the African context. The approach adopted in this paper is the review of literature centred on the implementation of IWRM in developing countries and with particular reference to Africa and makes recommendations that would ensure continued progress in the management of water resources in Nigeria. Among the conclusions reached in this paper is the fact that although the process of implementing IWRM in Nigeria may be difficult, a progressive approach that prioritises capacity development, policy and institutional reforms, and transparency will go a long way towards ensuring that Nigeria's vast water resources are managed and developed in a way that maximises benefit while maintaining the health of the natural environment.

1. Introduction

As at 2015, only 69 percent of Nigerians had access to public water supply and many more people were living in areas experiencing medium to high water stress. While Nigeria is not a water-poor country, poor water governance has led to inadequate water supply and consequently, degradation of water resources. At present, water resources management in Nigeria utilises a sectoral, top-down approach with a Federal Ministry in charge of Water Resources superintending over all water resources development projects. Consequently, the effective management of water resources is hindered by sectoral interests and lack of co-ordination among stakeholders, resulting in waste, conflict, and negative impacts on water quality which threatens vital ecosystems [1,2].

Nigeria as a nation is bordered by the Atlantic Ocean to the south with an extensive coastline covering about 850 km from east to west of the country. The coastal area is characterized by lagoons, estuaries, wetlands and the most extensive mangrove ecosystem in West Africa [3]. Nigeria is populated by over 180 million people with an estimated population growth rate of 2.61% in 2018. Although the country is rich in water resources with an estimated annual surface water discharge of 267 billion m³ and about 52 billion m³ of groundwater potential available for use [2], the water resources are unevenly distributed



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spatially and temporally. This uneven distribution is even more noticeable in the arid and semi-arid regions of the country where precipitation averages 100 – 250 mm annually, stress is placed on the available water resources [4]. Despite the increasing population and the unequal spatio-temporal location of available water resources in Nigeria, the Federal Ministry of Water Resources (FMWR) asserts that the amount of water resources available in the country can meet the water need of the vast population. However, mismanagement of these resources has restricted water access even in water-rich parts of the country [2,5]. The global consensus is that the traditional, sectoral water management bodies are incapable of capturing the multifunctional nature of water and a new approach has been conceptualized called integrated water resources management (IWRM) [6].

Arising from this, this work examines the concept of IWRM and how applicable it is in the Nigerian context, its potential for national development and the nature of the empirical challenges that could hinder its implementation. The paper addresses the following sub-questions: What is the current position of water resources management in Nigeria? How can implementing the principles of IWRM fuel national development? Are there lessons that can be learned from other developing countries especially in Africa?

This paper draws on information gathered through an extensive literature review of relevant papers detailing the concept of IWRM and the experience of other developing nations in implementing IWRM as well as an analysis of the institutional and policy framework of relevant government agencies in Nigeria.

2. Evolution of the nature of water resources management in Nigeria

Water resources management in the country has developed over time from the pre-colonial era to the present attempt at IWRM. Although not much has been implemented, policies have been put in place to forward the shift from the fragmented approach of water resources management to IWRM. The River Basin Development Decree in 1979 saw the creation of 11 River Basin Development Authorities (RBDAs) and repealed the previous decree in 1976 and its 1977 amendment. The RBDAs grew between 1976 and 1990 with the expansion of the number to 12 (as shown in Figure 1) to cover the whole country [7]. The RBDAs were charged with the responsibility of harnessing, developing and controlling available land, surface and underground water resources of the country with a view to improving agriculture output and providing raw water as necessary input for multi-purpose uses as indicated in Table 1 [8].



Figure 1. Map of Nigeria showing the spatial extent of the 12 river basins.

The National Water Policy [8] presents the National Water Resources Act of 1993, the Minerals Act of 1990, the RBDA Act of 1990, the NIWA Decree 13 of 1997, and State Water Edicts as the only relevant legislation for water resources development in Nigeria. At present, the Federal Ministry of Water Resources (FMWR) is the national body with the full responsibility of managing the water resources of Nigeria. As with many developing countries, the ministry through its parastatals and agencies utilises a sectoral, top-down approach where each agency is concerned with a particular water use. Although an elaborate framework exists for the proper coordination of water resources of the country, the sad reality is that these institutions are crippled by overlapping functions (Table 1), and other institutional deficiencies such as lack of funding, inefficiency, vested interests and corruption, and technological deficit. The result is that the water resources of Nigeria are grossly under-utilized or wasted and further degraded by pollution.

The operation of the RBDAs is of particular importance because the river basin has been frequently promoted as the logical geographical unit for the implementation of IWRM. A study carried out on the Cross River Basin Development Authority (CRBDA) exposed the fact that the RBDA lacked the technical capacity to even carry out its basic functions as key professionals like remote sensing/geographic information system (GIS) experts, hydrologists, water resources managers who are necessary to ensure a holistic approach to river basin management were absent [9]. This situation is not peculiar to one river basin alone as almost all have similar challenges of inadequate technical support for effective operation.

Table 1. Water governance bodies in Nigeria and their functions (Source: [8])

Governing Body	Function
Federal Ministry of Water Resources (FMWR)	To encourage effective and efficient water use through the preservation, use, development, protection, and management of water resources in all parts of the country.
National Council on Water Resources (NCWR)	To advise the Government on any proposed water-related laws, and influence policies and strategies towards the effective use of national water resources.
Nigeria Water Resources Regulatory Commission (NWRC)	To regulate, protect, conserve and control the water resources of the country.
River Basin Development Authorities (RBDA)	To control, develop and conserve the land in Nigeria's, surface and underground water resources with aim of upgrading agriculture and water supply output.
Catchment Management Offices and Committees	To regulate, guide, conserve and manage how water resources are used within the nation's hydrological Area of jurisdiction for equitable use.
National Water Resources Institute (NWRI)	To develop training courses and promote new ideas on Water Resources; advise the Minister on improving national water resources training needs and priorities and other research functions.
Nigeria Hydrological Services Agency (NIHSA)	To serve as information data bank on the status and trends of development of the country's water resources, by providing reliable and accurate hydrological and hydrogeological data continually.
The Nigerian Meteorological Agency (NIMET)	To serve as advisory organ of Government on all issues concerning meteorology, including policy development; and especially to issue climatological forecasts to facilitate hitch-free air transport and sea operations and the optimal operation of oil rigs which services a major source of the nation's wealth.
The National Inland Waterways Authority (NIWA)	To provide regulatory supervision for the navigation of inland waterways and ensure infrastructural development to promote modern inland waterways transportation.

A more in-depth look at the laws that created the governing bodies listed in Table 1 and the inherent functions allotted to the respective authorities, it can be seen that functions overlap especially among the FMWR, the RBDAs, and the NIWA. For example, under section 4 of the RBDA Act and section 9 of the NIWA Act respectively, the RBDAs and NIWA are both charged with the construction of hydraulic structures across Nigeria's waterways to suit their respective objectives. Also, section 13 of the Water Resources Act in 1993 empowers the FMWR to impose a license fee on any individual or public institution (including the RBDAs and NIWA) that tries to construct, or alter any hydraulic structures within or near any source of water. The overlapping functions and conflict among many public institutions is as a direct result of these poorly formulated legislation [10].

3. IWRM and sustainable national development

The prospect of a water crisis all over the world was the enabler that drove water managers to seek out effective ways to meet future demand without compromising the long-term sustainability of current water resource systems. To do this, the argument has been between the supply and demand forms of water management which is better. Before that, the supply-side tendency which is typically the case with Nigeria as also in most developing countries where the demand option is seen as World Bank/IMF prescription. This notwithstanding, the Integrated Water Resources Management option has developed as the most appropriate for all parts of the world as it plans for sustainability in water use, which is, planning for current need while considering future use also.

Many theorists, international bodies and agencies have defined IWRM, however, the most used definition is that of the Global Water Partnership which defines IWRM as:

“A series of steps involved in the effective organisation of development and management of water, land and related resources, in such a way as to take full advantage of the resultant economic and social welfare of a people in an equitable manner without compromising the future use of vital ecosystems” [11].

The International Conference on Water and Environment that held in Dublin in 1992 resulted in the development of four principles that have been the premise upon which much of the reform in the water sector is based. IWRM is based on these four principles: the finite nature of water, vulnerable but important nature of the asset, water management should adopt a participatory approach, women’s involvement in water management is pivotal to the efficiency of the water sector [12], and water should be seen as an economic resource [13].

Proper management of water resources is essential to ensuring national development because all the key indicators of economic and societal development require water to be developed. Water is used in infrastructural development, inland navigation, agricultural activities, industrial production processes, provision of sanitation, and human consumption etc. This is evident in the links that exist between the SDG 6 – which is centred on providing clean water and adequate sanitation – and the rest of the SDGs [14,15]. Through its targets, SDG 6 is directly linked to building a more sustainable society (SDG 11), ending poverty (SDG 1), reducing inequality (SDG 10), ensuring good health and well-being (SDG 3), promoting gender equality (SDG 5), combating climate change (SDG 13), and ensuring an eye on the future patterns of consumption and production (SDG 12).

However, because of the multidimensional nature of water and the cross-sectoral demand, it becomes necessary to balance the demand from each sector. This is where IWRM comes in – to regulate the synergies and manage potential impacts of other goals on water security and vice versa. IWRM is captured in the sustainable development goal (SDG) target 6.5 which states that “By 2030, the implementation of integrated water resources management at all levels, including through transboundary cooperation as appropriate is effected” [16]. Although the concept of IWRM predates the 1990s [9,17], its inclusion in the sustainable development goals has demanded that it deliver results that will translate to water security across all sectors, improved water resources management, and environmental and socioeconomic benefits [18].

4. Lessons from other countries

The United Nations Environment Programme published a report that chronicles the level of implementation of IWRM in 172 countries of the world. The data presented in the report was collected through a questionnaire that allowed each country to assess themselves based on four main aspects of IWRM. The countries were assessed based on their ability to create an environment that encourages the implementation of IWRM, the establishment of governance institutions and stakeholder participation, management instruments, and financing [19].

Since the conceptualization of IWRM, several developed and developing nations have sought to implement it. However, the challenges that arise with the implementation of IWRM differ in developed and developing countries. Although many international bodies and scholars have argued in favour of IWRM, it has also been likened to a “nirvana” concept that can hardly be implemented [6].

While many developing countries have adopted an integrated mechanism for water asset management in form, the challenge remains practically implementing it. Lessons from other regions such as the Mhlathuze Catchment in South Africa and the Water Resources Commission in Ghana have proven the afore-mentioned claim [6,20]. Particularly in Africa, practical implementation becomes more complicated due to the additional hindrances to the attainment of good governance. Some of these hindrances include low literacy rates, lack of scientific and technological capacity, and widespread poverty [20,21]. Oftentimes, priority is given to the provision of public water supply over the

implementation of IWRM policies [13], perhaps due to lack of financial and skilled human capital to deliver on both projects concurrently.

In Indonesia the policy framework for the implementation of IWRM has been in place since 2004 with the promulgation of the Law No. 7/2004 on water resources. However, lack of coordination between sectors, government bureaucracy, and unreliable water management teams have slowed progress and hindered the implementation of IWRM projects in the country [22].

The challenges notwithstanding, a few successes have been recorded in the implementation of IWRM in Africa. In Ghana, a transboundary river basin management has been developed and in South Africa, IWRM has been fully integrated into the national policy with moderate success in terms of various stakeholder and water users' involvement in water resources decision-making. Also, some progress has been made in the areas of integrated planning (e.g., Ghana, South Africa), stakeholder involvement (e.g., Ghana, South Africa), and cost recovery (e.g., Ghana) [6,23].

5. Conclusion and Recommendations

The performance of the RBDAs in implementing IWRM in Nigeria can be linked especially to inadequate policy directives and lack of accountability amongst stakeholders. Comparing the legal framework for water development in Nigeria with the Water Framework Directive (WFD) of the European Union and its transposition into UK law, it can be seen that Nigeria's water policy is lacking essential elements that ensure the successful implementation of IWRM. For example, the RBDA Act of 1990 focuses on administrative activities of the RBDAs while little attention is given to delineating the roles of each stakeholder in achieving the policy objectives.

From the successes recorded in other African countries, it can be seen that a policy framework for the effective and sustainable management of water assets was first established before any field-level implementation could be carried out. Moving forward, it is important for Nigeria to develop an effective policy framework that enforces coordinated development and management of water resources particularly at the river basin level. One major obstacle to this would be the vested interests that benefit from the overlapping functions and inefficiency of the public sector.

Also, the review of literature showed that among the factors affecting the level of implementation of IWRM in the country includes, inadequate human capacity and lack of funding which were the most common obstacles [23]. Therefore there is need for capacity development among all the stakeholders involved. Data collection and storage efforts should be intensified to strengthen the institutions that are involved in managing Nigeria's water resources.

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