FEDERAL GOVERNMENT OF NIGERIA
FEDERAL MINISTRY OF WATER RESOURCES
ABUJA-NIGERIA

NATIONAL IRRIGATION AND DRAINAGE POLICY AND STRATEGY

March 2015

With the Technical Support of

Food and Agriculture Organization of the United Nations

LIST OF ACRONYMS AND ABBREVIATIONS

AAGDS	Accelerated Agricultural Growth and Development Strategy
ADPs	Agricultural Development Projects
AESON	Agricultural Extension Society of Nigeria
ARCN	Agricultural Research Council of Nigeria
ARMTI	Agricultural and Rural Management Training Institute
ATA	Agricultural Transformation Agenda
AWM	Agricultural Water Management
CAC	Corporate Affairs Commission
CMO	Catchment Management Office
CBOs	Community Based Organizations
CU	Co-operative Union
COREN	Council for the Regulation of Engineering in Nigeria
EHA	Environmental Health Assessment
EIA	Environmental Impact Assessment
ERR	Economic Rate of Return
FEPA	Federal Environmental Protection Agency
FMLHUD	Federal Ministry of Lands Housing and Urban Development
FMITI	Federal Ministry of Industry Trade and Investment
FMoJ	Federal Ministry of Justice
FAPIM	Farmers' Participation in Irrigation Management
FAO	Food and Agriculture Organization
FCT	Federal Capital Territory
FGN	Federal Government of Nigeria
F&IIs	Financial and Insurance Institutions
FMARD	Federal Ministry of Agriculture and Rural Development
FMEnv	Federal Ministry of Environment
FMICT	Federal Ministry of Information and Communication Technology
FMWR	Federal Ministry of Water Resources
FMTI	Federal Ministry of Trade and Investment
FUAs	Fadama Users Associations
GDP	Gross Domestic Product
HCs	Host Communities
IAR	Institute of Agricultural Research
ICID	International Commission on Irrigation and Drainage
ICOLD	International Commission on Large Dams
ICRC	Infrastructure Concession and Regulatory Commission
IFAD	International Fund for Agricultural Development
ISC	Irrigation Service Charges

ISM	Irrigation Schemes Management
IVC	Irrigation Value Chain
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
IRR	Internal Rate of Return
JICA	Japan International Co-operation Agency
LGCs	Local Government Councils
MAN	Manufacturers Association of Nigeria
MDGs	Millennium Development Goals
NMPID	National Master Plan for Irrigation Development
NACCIMA	Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture
NAERLS	National Agricultural Extension and Research Liaison
NBTE	National Board for Technical Education
NBS	National Bureau for Statistics
NCA	National Council on Agriculture
NCAM	National Center for Agricultural Mechanization
NCWR	National Council on Water Resources
NCEnv	National Council on Environment
NEPA	National Electric Power Authority
NEPAD	New Partnership for African Development
NEPC	National Export Promotion Council
NESREA	National Environmental Standards and Regulations Enforcement Agency
NFDP	National Fadama Development Programmes
NGOs	Non-Governmental Organizations
NIDPS	National Irrigation and Drainage Policy and Strategy
NIFAEAS	Nigeria Forum for Agricultural Extension Services
NIIMP	National Integrated Infrastructure Master Plan
NINCID	Nigeria National Committee on Irrigation and Drainage
NIWA	National Inland Waterways Authority
NIWRMC	Nigeria Integrated Water Resources Management Commission
NOTAP	National Office of Technology Acquisition and Promotion
NPC	National Planning Commission
NSE	Nigerian Society of Engineers
NUC	National Universities Commission
NWP	National Water Policy
NWRC	Nigeria Water Resources Commission
NWRI	National Water Resources Institute
NWRMP	National Water Resources Master Plan

OMR	Operations, Maintenance and Repairs
PFAN	Practicing Farmers Associations of Nigeria
PIM	Participatory Irrigation Management
PIs	Private Investors
PPP	Public Private Partnership
PSPs	Private Sector Participants
RBDAs	River Basin Development Authorities
R&D	Research and Development
RWH	Rain Water Harvesting
SIDs	State Irrigation Departments
SMWR	State Ministry of Water Resources
SMJs	State Ministries of Justices
SON	Standard Organization of Nigeria
SWAs	State Water Agencies
TEIs	Tertiary Educational Institutions
TIs	Traditional Institutions
TWG	Technical Working Group
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WUAs	Water Users Associations
WUE	Water Use Efficiency

TABLE OF CONTENTS

FOREWORD

This document presents the Irrigation and Drainage Policy and Strategy for improving irrigation and drainage development and management in Nigeria in order to achieve the broad goals of the agricultural sector, which are: (a) food and raw materials security; (b) increased employment; (c) creation of wealth and poverty alleviation; and (d) greater contribution to GDP, foreign exchange reserve and government revenue. It addresses the problems, constraints and opportunities, which cut across the whole irrigation sub-sector; and specifically for informal, formal and commercial irrigation.

The policy and strategy document were prepared based on the findings and recommendations of a team of local and international consultants, consultations / contributions from relevant public and private organizations, irrigation agency managers, water users associations, service providers, professional bodies, and comments from review and validation workshops.

A Technical Working Group (TWG) made up of staff of the Federal Ministry of Water Resources (FMWR), Federal Ministry of Agriculture and Rural Development (FMARD), Federal Ministry of Environment (FMEnv), River Basin Development Authorities (RBDAs), Nigeria National Committee on Irrigation Drainage (NINCID), and other stakeholders including water users association representatives, guided the policy development.

The process consisted of: i) an inception workshop to sensitize the relevant stakeholders including the consultants, ii) field work to interact with critical stakeholders and fill in critical information gaps and supporting data, iii) critical review of legal aspect of the policy by international consultants, iv) review meetings between the members of the TWG and the team of local consultants on the draft Institutional and Legal Frameworks and the revised draft Irrigation Policy and Strategy, v) review of the output at a stakeholders workshop, vi) Final review of the draft Irrigation Policy and Strategy by the technical working group and vii) a stakeholders validation workshop on the final Draft Irrigation Policy.

This policy and strategy document is presented in five (5) parts. The first part provides the background establishing both general and specific contexts as well as the rationale for a specific sub-sector policy. The set of specific problem areas addressed by the policy is the subject of the second part. The policy goal and objectives; the intended beneficiaries and guiding principles make up the third part. The fourth part outlines the strategies for implementation of the policy. The fifth part provides action plan comprising the policy matrix and policy development pathway, indicating proposals for enhancing the sector through enactment of laws, review of regulations, amendments to existing provisions and development of new guidelines.

EXECUTIVE SUMMARY

Nigeria's irrigation and drainage policy and the strategy for its implementation are designed to reposition the sub-sector and open up the investment space for intensified and diversified irrigated agriculture in Nigeria where there is clear comparative advantage. The policy is designed to accomplish this by addressing eight key 'problem' areas concerning the formal, informal, farmer-owned and managed irrigation, and the perspective commercial practices that have been identified during extensive consultative review. The areas are:

1) low agricultural productivity, income and return from investment;
2) low capacity for regulation, coordination, operation and provision of support services;
3) low inclusiveness of users of land and water resources;
4) inappropriate funding mechanism and low private sector participation;
5) environmental imbalance and lack of sustainability;
6) underutilization of land & water resources;
7) low capacity for research and development and low accessibility to improved technologies to support irrigation development and sustain growth; and
8) low capacity for data generation and information, management and use.

There are eight policy objectives or 'thrusts' are proposed to address these areas, with a view to achieving accelerated and sustained irrigation development in Nigeria. These are:

1) efficient performance, viability and competitiveness;
2) good governance and enhanced services;
3) socio-economic and cultural inclusion;
4) responsive funding mechanism and effective private sector participation;
5) responsible production and sustainable development;
6) efficient resource utilization and rapid irrigation growth;
7) improved capacity for generation of and accessibility to as well as uptake of innovations; and
8) improved capacity for sustainable data generation, management and use.

The strategy for implementing this set of policy objective includes addressing prominent issues of good governance, resource utilization, socio - economic and cultural inclusion, funding mechanism and effective participation, sustainable production amongst others.

Key collaborating agencies outside the FMWR that will facilitate the implementation of the policy objectives include FMARD and FMEnv (at both State and Local Government levels), the Water Users Associations (WUAs) and Fadama Users Associations (FUAs) with effective links with Non- Governmental Organizations (NGOs), and private sector service providers.

An essential component of the policy and its strategy would be the establishment of revised regulatory provisions to clarify the following conflicting roles and responsibilities among

public and private institutions as contained in the National Water Resources Policy and the draft National Water Resources Bill: a) The conjunctive use of surface and groundwater, b) Promote the concept of water as a public asset and recognizing its economic value c) Make explicit reference to the human right to drinking water and sanitation as essential to successful irrigation policy, d) Recognition of priority of water uses based on the principles of equitable and reasonable utilization, e) Enactment of a specific law regulating the creation and operations of WUAs, and f) Removal of uncertainties in Land Use Act to allow holders enjoy possessory right to their land and provide registerable titles to all land holders.

The policy is predicated on a commitment to decentralization of irrigation services, and private-sector participation.

Irrigation Policy Goal: Sustainable growth and enhanced performance of irrigation contributing fully to the goal of the Nigerian agriculture sector.

Policy Targets: National food security; intensified and diversified production of agricultural commodities; increased livelihood options; optimum natural resource use; reduced negative environmental impacts; and expanded investment space for irrigation productions.

Policy Beneficiaries: The Nigerian economy as a whole and all existing and potential irrigators and related user groups, including private sector service providers.

PART I: BACKGROUND

1.0. Introduction

A comprehensive sector review of irrigation and agriculture institutions carried out by Food and Agriculture Organization (FAO) in 2000 and 2003 respectively led to identification of a critical vacuum due to the complete absence of policy direction on irrigation development to address current and future challenges. Consequent upon the review, efforts were made in 2004 to produce policy on irrigation that culminated in the drafting of a policy document and its circulation to stakeholders for inputs. Despite these efforts, the National Irrigation and Drainage Policy and Strategy (NIDPS) remained in draft form up to 2012. In 2013, the Federal Government of Nigeria (FGN) requested the FAO to facilitate the completion of this very important policy document.

This document seeks to link the NIDPS with other relevant policies (water, agriculture, environment and trade & investment). In doing so, this document considers crosscutting issues and linkages between the various institutions in the fields of water and agriculture that are essential to achieve pragmatic policy and workable strategies. This is aimed primarily at facilitating the reform of existing institutions and organizations so as to make the NIDPS effective.

To support the formulation exercise, FAO carried out another technical cooperation project aimed at strengthening national and state levels capacity for evidence based policy formulation involving key Ministries of Agriculture, Water Resources, Environment and National Planning Commission. The output of the evidence-based policy formulation project was part of the inputs and working documents used in the review and formulation of the NIDPS.

In an effort to meet national target on poverty reduction and food security, the government realized the need to achieve a strategic balance between rain-fed and irrigated production. Rain-fed production accounts for the bulk of Nigeria's agricultural production at lower cost per hectare but is more vulnerable to drought, floods and other impacts of climate change. Irrigated production can buffer the impacts of drought where it can draw from groundwater or surface water or both. It is important that the policy provisions on irrigated production within the broader context of agricultural production be clarified and a clear mechanism be put in place for a viable structure of public and private irrigation with a balanced set of small, medium and large scale irrigated production.

This policy is consistent with and expands on the irrigation and drainage sub-sector components outlined in the 2004 draft National Water Policy that is in line with vision 20:2020, 2012 Agricultural Transformation Agenda of the FGN and the aspirations of the National Water Resources Master Plan (NWRMP) 2013 respectively. The policy is also in

conformity with the FGN programme of public service reform, which seeks to improve government agency responsiveness to local demands and obtain a much more coherent and transparent targeting of public funds. At the same time, the policy is predicated on removing constraints on private sector engagement to provide irrigation services within a broader commitment to agricultural commercialization. This is important if agricultural intensification offered by irrigation is to be taken to higher scale in Nigeria in order to meet the demands of a rapidly expanding population.

This policy also seeks to institutionalize Integrated Water Resource Management (IWRM), which is necessary to provide citizens of this nation with adequate response to the growing demand for water and the associated problems. The policy further seeks to coordinate the management of water, land and other resources for irrigation and drainage while taking into account all users and uses. Similarly, it moves away from top-down development approach towards transparent, accountable, and participatory basin - wide approach, in which all can negotiate their legitimate interests in water resources.

The policy essentially harmonizes strategies for managing water for agriculture without compromising the integrity of productive ecosystems. The policy provides direction for driving the implementation of the proposed institutional reform of the RBDAs. The reform is required as part of FGN programme of public service initiative to ensure coherence and transparency in the development and management of Nigeria's irrigation sub-sector.

There are two dimensions to the scope of the Irrigation Policy. The policy is to prompt complementary policy alignment in specific aspects of agricultural production, commercial environment, socio-economic planning and environmental management across Nigeria's river basins and groundwater on one hand and poised to improve the performance of the water services in irrigated production on the other.

1.1General Context

1.1.1. Irrigated agriculture potential

Irrigated agricultural practice is fast becoming an important sector in Nigerian economy in view of the fact that most of the populace rely on agriculture and agro-related activities for their daily incomes and livelihood. More than 60 % of the Nigerian population is engaged in agriculture or agriculture related enterprises. Despite this massive engagement in agriculture, Nigeria imports food to meet the nutritional needs of the teeming population largely because the bulk of agricultural production is under rain-fed system, which is limited by incessant droughts translated into low yields. This situation of low agricultural productivity is largely responsible for the gross under-employment and deepening poverty in the rural areas nationwide. Thus, there is a widening gap between demand for food and domestic supply. Erratic and low rainfall, recurrent droughts and rapid population growth

have all combined to make irrigation an essential factor in the food security strategies.

The 2013 National Water Resources Master Plan (NWRMP) estimates that Nigeria has about 3.4 million hectares of irrigable land. Approximately 1.8 million hectares of this land lie within the Niger-Benue valley, which contains sufficient water to effectively develop irrigated agriculture. Irrigation development in Nigeria has remained at a very low level. In addition to overall expansion of irrigation, Nigeria is intending to develop land reclamation program for irrigation purposes using drainage techniques that may be suitable and beneficial in the deltaic ecosystems.

According to AQUASTAT-FAO, (2005) Nigeria has significant water resources estimated at 214 billion m^3 of surface water and 87 billion km^3 groundwater resources. In spite of these, Nigeria still faces the challenges of ensuring proper and sustainable management of its water resources for both domestic and agriculture purposes.

The Federal Government vision for agricultural development under the Agricultural Transformation Agenda (ATA) is to achieve a hunger – free Nigeria through an agricultural sector that drives income growth, accelerates achievement of food and nutritional security, generates employment, and transforms Nigeria into a leading player in the global food market to grow wealth for millions of farmers (ATA, 2012). To achieve this vision, the development of irrigated agriculture and promotion of value chain of irrigated crops and other produce must be mainstreamed in the development agenda.

1.1.2 Irrigation status in Nigeria

The Government complemented and further improved farmers' efforts in boosting irrigated agriculture by formulating various programmes and policies aimed at promoting the development of irrigated agriculture. Notably among these frameworks are: a) twelve (12) River Basin Development Authorities (RBDAs) b) thirty-seven Agricultural Development Projects (ADPs) located in the 36 States and the Federal Capital Territory (FCT) and c) State Irrigation Departments (SIDs).

In 1999, the Federal Ministry of Water Resources (FMWR) estimated a total irrigation potential of about 3.14 million ha made up of 1.10 million ha for public large-scale irrigation projects and 2.04 million ha of formal irrigation projects operated by ADPs in the States. Infrastructural development to harness these resources provided the RBDAs with dormant reservoir capacity to irrigate a planned area of 320,000 ha. However, the developed downstream irrigation facilities cover only about 70,000 ha, out of which only 50,000 ha commanded by RBDAs are actually cultivated.

An estimated area of 186,000 ha is put under cultivation by the small farmer-owned and managed irrigation (Fadama). Development of more *Fadama* lands is constrained largely by their inability to raise funds for the construction of upstream infrastructure to control/divert surface water and/or exploit the shallow groundwater. Cost of irrigation pumps, spare parts and fuel are also constraining factors. A total of 13,009 ha is under the command of 4 private companies in only 4 States essentially for sugarcane and vegetable production which is also declining due to energy and other key production constraints. With this scenario, it is evident that only marginal increase at very slow pace was achieved in developing new lands for irrigated agriculture

1.1.3 Irrigated agriculture contribution to National economy

Irrigated agriculture is key to Nigerian economy accounting for high percentage of Gross Domestic Product. The FGN Agricultural Transformation Agenda (ATA) is a major initiative to drive rural income growth, accelerate achievement of food and nutritional security, and generate employment. Despite the critical challenges in the irrigation sub-sector, it recorded some contributions to Nigerian economy, which include:

- introduction of the culture of dry season farming in the affected communities;
- raised the cropping intensities and diversified the cropping patterns that addresses family, community and national food security and economy;
- job creation and increased income for the rural populace;
- increased production of food and some cash crops;
- increased family, community and national food security;
- enriched the rural economy; and
- developed rural institutions in form of WUAs and FUAs for cohesive participation, advocacy and representation.

1.2. SPECIFIC CONTEXT

The varying climatic conditions in the country and the historical development of irrigation, among other things, are responsible for the existence of different types of irrigation over the last 35 years. The prominent types of irrigation obtainable in the country, which continue to grow, include: formal type; farmer-owned and managed small-scale type; informal type; and the emerging type based on rainwater harvesting. The absence of a policy to guide and provide direction for prioritization is responsible for the uncoordinated development of the different types of irrigation. This policy document will provide and give clear direction on the kind of mix comprising of these and other future irrigation practices adaptable to the various ecologies found in the country.

1.2.1 Formal irrigation

The major type of irrigation initially practiced in Nigeria is the public large scale gravity-based type using large to medium size dams. Irrigation schemes of different sizes from 100ha to 23,000ha managed under the RBDAs are features of formal irrigation. Generally, users access irrigated land through customary laws and the Land Use Act. There are more than 70 irrigation schemes of different sizes located across the country under the supervision of the RBDAs. The total potential irrigable area is 335,000ha with 130,000ha developed and out of which 92,317ha are being cropped annually (NWRMP, 2013). Generally, this type of irrigation system recorded the highest investment from loan facility with low IRR. The benefits in terms of productivity, job creation, income, etc. are also lower than the African average. The principal reasons of the lower performance of this type of irrigation are largely inconsistent, with conflicting government policies and untimely interventions reversing or changing or completely stopping programmes prematurely. The existing irrigation schemes can be grouped into three categories:

a) Completed projects with operational and maintenance constraints.
b) Projects with completed head works but no downstream infrastructure.
c) Uncompleted projects without head works.

Under the formal irrigation, the following achievements were made:

- Introduced the culture for dry season farming in different parts of the country. Raised the cropping intensities and diversified the cropping patterns, leading to job creation and increased income for the rural populace.
- Increased production of food and some cash crops.
- Increased family, community and national food security.
- Enriched the rural economy.
- Initiated rural institutions in the form of WUAs and FUAs for effective participation, advocacy and representation.

1.2.2. Farmer-owned and managed small-scale irrigation.

Small-scale irrigation schemes are the general practice, privately owned and farmer managed (popularly known as Fadama irrigation). Interventions were introduced with the support of the World Bank to assist them grow under National Fadama Development Programmes (NFDP). The fadama land is generally considered more productive, valuable but, limited in size. The issue of land fragmentation is more critical in the fadama irrigation with the attendant consequences to private investors' participation and mechanized production. A total of 183,000ha was estimated as the land cultivated under this type of irrigation (NWRMP, 2013).

1.2.3 Informal irrigation

This is the traditional flood-based cultivation where farmers take advantage of the annual flooding and recession of rivers. Variations in operation of the large upstream reservoirs (releasing or not releasing water during dry and wet season) to plant crops that can

withstand flooding such as flooded Rice, sorghum (Masakwa), sugarcane, is another major source of the annual flooding and recession of the low lands. This type of irrigation is in pockets of lands scattered across the various hydrological areas associated with the major river basins and their tributaries. The most extensive and developed practice is in Hadejia-Nguru Wetlands and Niger-Benue Valleys. Although, this practice is adopted in many places nationwide, there is no official figure on the estimated land area under cultivation.

1.2.4 Rainwater harvesting-based irrigation

Rainwater harvesting-based irrigation is an emerging practice yet to firmly take off. Its success at the pilot levels has not been ascertained. This type of irrigation is practiced successfully in other countries especially in dry areas with climatic similarities to northern part of Nigeria. The system therefore has the potential to form an integral part of irrigation that can be deployed to fit into small-scale schemes that are very relevant in rural communities.

1.2.5. Drainage system and its influence on irrigation development in Nigeria

In many irrigation projects, crop yields are reduced due to waterlogging and salinization of irrigated lands while over exploitation of shallow aquifers is threatening the fadama irrigation. In some cases, there is total loss of production and therefore the land is abandoned. Waterlogging may also cause human health problems, particularly malaria, because of pond water. Two important causes of waterlogging and salinization are: (a) excessive application of irrigation water; and (b) lack of adequate drainage. Uncontrolled drilling of boreholes or tube wells/wash bores tapping the shallow aquifer is the major cause of shrinkage of fadama irrigation. Thus provision of adequate drainage is a solution to the waterlogging and salinization problems of irrigated lands while coordinated control of shallow groundwater exploitation would address the salt-water intrusion to irrigated land, which compounds the salinization. However, it must be pointed out that improving drainage is not a substitute to the reduction of excessive application. Likewise improving drainage should be preceded by precise assessment of waterlogging and the contributory water management practices and whether optimized application can positively influence the alarming drainage challenges in irrigated areas.

Drainage Working Group of the International Commission on Irrigation and Drainage (ICID) showed that over 50 percent of the world's irrigated land has developed drainage problems (Abdel-Dayem 2000). In developing countries, the lack of drainage or poor drainage performance has become a critical development constraint. In addition, poorly drained fields and inadequately maintained drains favor vector-borne diseases, and create poor sanitary conditions. Recognizing these social and environmental costs, it is all the more surprising that drainage still takes a backbench position when it comes to investment in and maintenance of irrigation infrastructure as well as the global drainage. While there is considerable success in improving irrigation management performance,

similar efforts concerning drainage have almost been neglected (IWMI Working paper 28).

Provision of agricultural drainage is of a very low ranking compared with the scale of government interventions as part of public goods (IWMI,2001). Collective action for initial funding, maintenance of drainage infrastructure and its financing is not easily forthcoming. The central issue is whether drainage should be considered a public good to be financed by the general public or treated on a cost sharing partnership between government and beneficiaries or left for direct beneficiaries to take full responsibility.

The provision of drainages in large-scale irrigation projects across the country is the rule, where virtually all-functioning schemes are equipped with drainage networks. For instance, KRIP I, with total area of 15,000 ha equipped with irrigation canals, has corresponding drainage network covering the entire 15,000 ha. This also applies to Bakolori Irrigation Project (BIP), T/Mafara; South Chad Irrigation Project (SCIP), New-Marte; Kiri Irrigation Project (KIP), Kiri; Bagwai Irrigation Project (BIP), Bagwai; Lower Anambra Irrigation Project (LAIP), Omor; Hadejia Valley Irrigation Project (HVIP), Auyo, to mention just a few. There is more than 30000ha of irrigated area under formal system effectively covered by drainage. Except in Jakarade Irrigation Project (JIP) in Gezawa Local Government Area of Kano State, Savannah Sugar and Bachita Sugar Companies irrigated fields, sub-surface drainage is not very common in the country. However, the present condition of these drainage networks is not encouraging, as most of them do not have the capacity to serve their intended use due to numerous factors such as, encroachment by landless farmers, weed infestation, cattle crossing, tractor crossing during seedbed preparation for dry and wet season cropping, etc. The condition of these surface drainage networks combined with poor on-farm water management practices by the farmers resulted in waterlogging and salinization of some irrigated fields.

Efforts are being made in some parts of the country particularly the Niger-Delta region, to boost irrigation practice through land reclamation. In 2012, the FMWR proposed construction of drainage and land reclamation structures in Peremabiri and Otuoke (Bayelsa), Donga (Taraba), KotonKarfi(Kogi), Agharho (Delta), inIlushi-Ega (Edo), Mamu Awka (Anambra), and Obinda (Benue) States.

The NWRMP of 2013 proposed that a total of 66 large scale and 111 medium scale irrigation schemes would have to be completed to bring 34,980 and 8,423 ha, respectively into use. Corresponding area of 107,605 and 17,102 ha was planned for both large and medium scale irrigation under the same plan. All these efforts would have corresponding functional drainage network. Similarly, in the National Integrated Infrastructure Master

Plan (NIIMP) of 2014, drainage of agricultural lands especially under irrigation featured prominently with precise targets to bring more area under irrigation.

1.3. EMERGING ISSUES

1.3.1 Population growth

Nigeria's current population is about 176 million with growth rate of 3.18%. The National Population Commission expects the population to double by 2050. The population growth therefore poses a great challenge in feeding the population and providing raw materials for the industry.

The response to this challenge will come from increase in productivity, increase in land under cultivation and extending cropping periods. For all the three, irrigation has important role to play to transform the production system from predominantly rain-fed. This can be supported by use of high yielding varieties and other interventions like the reduction of post-harvest losses, use of more fertilizers, more pesticides and so on.

1.3.2 Increasing conflicts between various users of land and water resources

There is a growing competition for water by the various users in urban and rural areas: industrial uses; domestic uses; construction work as well as recreational facilities. In its drive to diversify the economy, Nigeria needs to develop a rational approach that would accommodate these competing uses.

The promotion of irrigation to boost crop production limit access to lands (under irrigation) by livestock graziers who hitherto had unlimited access to both water and pasture for their animals. This has resulted in conflicts and clashes with attendant loss of lives and property. In addition, access to these shallow water sources is often limited due to spread of the cropping and economic value of the irrigated lands. Similarly, the construction of numerous dams for domestic urban water supply, hydro-electric power generation and irrigation has in some cases resulted in limiting access for domestic and other uses especially for rural communities downstream of the constructed dams. The nation must therefore strike a balance between all users of the land and water resources in order to promote peaceful co-existence and harmony amongst the different users of these resources.

1.3.3 Land fragmentation and its implication on irrigation development

The inherent contradictions in the land use Act of 1978 allow the co-existence of customary and statutory land tenure systems. This promotes the transfer of land titles within family to extend to generations without any restriction on continuous fragmentation to smaller sizes. The consequence of this open-ended legal provision encouraged the fragmentation of irrigated land (whether in schemes or in Fadama areas) to very small sizes that seriously

restrict the scope and kind of investment or in direct production lead to low productivity of the water, land and labour. This situation makes irrigated agriculture uncompetitive and unattractive, thereby discouraging potential investors and youths to participate in irrigated agriculture.

1.3.4 Mechanization of irrigated agriculture

Low or absence of extension delivery services in public irrigation schemes, obsolete machineries and equipment in addition to small fragmented lands are major disincentives to mechanization of irrigated agriculture nationwide. This situation makes large-scale production using agricultural machineries to take advantage of the economy of scale and timeliness of operations in the production of any commodity uneconomical, unattractive and not competitive. There must be deliberate arrangement to promote mechanization of every aspect of irrigated agriculture in order to raise the productivity of water, land and labour which can then translate into higher production, increased produce quality and income and improved living conditions.

1.3.5 Private investor's participation in irrigation development

The initial concept of irrigation development adopted the approach of sharing of infrastructural development amongst the various political entities in the country. The concept of irrigation schemes as developmental projects guided largely by political considerations and often sited in locations, which require dramatic social change for it to be relevant and beneficial, was promoted. This initial error lingered up till now with different sizes and types of irrigation schemes routinely used to cultivate traditional food and few cash crops, which hardly attract investors. Aside the land ownership and/or tenure issues which militate against full scale mechanization, the inability to designate irrigation schemes to strategic commodities that would encourage specialization on a specific value chain, to address both domestic needs and exports opportunities is another major disincentive to private sector participation. The need for development of irrigation schemes, for instance rice-based, sugarcane-based, wheat-based, etc. in both formal and Fadama systems is imperative for the private investors to be encouraged. Also the designation of Fadama sites or formal irrigation schemes for fodder production, specifically to address the need of the pastoralists and reduce the incessant conflicts being scaled up into a dangerous national security challenge is another strategy to motivate the private investors. Facilitating easy access to contiguous land through leasing for reasonable period and inviting private investors to take complete on-going medium size schemes with clear conditions involving the local communities, LGAs, SGs, etc. is another viable option to promote private investors participation in the advancement of this critical sub-sector.

1.3.6 Aging farming population

Statistics of labour availability for agricultural activities show that direct on-farm activities is still dominated by adults within the age range of 45-65 years who are often deficient and less exposed to modern irrigation practices (UNDP 2010-2012). The absence of basic infrastructure for decent living in the rural areas like potable water, electricity, healthcare services, education, transport system, and recently, security of lives and properties compelled the youths to move to the urban centres in search of better opportunities and living conditions. The result is abandonment of the critical agricultural tasks in the hands of the elderly and weak labour, making most agricultural production activities (rain-fed or irrigated) expensive, translating into high but avoidable cost of production. Deliberate measures to modernize production activities and other irrigation related enterprises in order to attract the youths, complemented with targeted infrastructural development in the rural areas in a sustainable manner, to create decent living conditions, are imperative. Until these happen, irrigated agriculture in Nigeria would continue to decline and can hardly compete with that of even neighbouring countries.

1.3.7 Deterioration of irrigation facilities

Although Nigeria's formal irrigation had some growth, one of the biggest challenges is the rapid deterioration of systems that have already been developed (FAO report on Review of Public Irrigation Sector in Nigeria (ROPISIN), 2004). Maintenance has been grossly inadequate, leading to low capacity utilization, rising incidence of water logging and salinity and low water use efficiency (WUE). On the whole, large irrigation schemes have become unsustainable physically, environmentally as well as financially. The vicious circle of inadequate funding, poor design, poor O & M, weak institutions for regulation and operation, poor service delivery, poor cost recovery, leading to low productivity, environmental pollution, rapid deterioration, etc. has to be broken and reversed. New initiatives to address these issues are imperative.

1.3.8 Water resources management legislation

The comprehensive review of fifteen (15) prominent federal enactments on water resources and other related laws on land tenure, environment and public health legislation revealed that the laws are scattered and related to different uses such as agriculture, transport, environment, hydropower industry or domestic uses. Presently, regulatory framework on water resource management in Nigeria is diffused thus leading to a diversity of laws. This sectorial approach to water laws has often led to lack of coordination, overlap of powers and functions of institutions, gaps, fragmentation of policies or inefficiencies in water resources management in Nigeria. The objectives of some sectorial laws may be inconsistent or sometimes at cross-purposes with those of other sectors with no effective mechanisms for inter-sectorial coordination and conflict resolution.

PART II: THE PROBLEM

2. Specific Problems Guiding the Policy

Nigeria's experience with irrigation development is characterized by an initial careful plan to harness the huge water resources mainly in the northern parts resulting in steady rise of irrigation infrastructure. This was supported with elaborate and carefully planned resource inventories, capable personnel sourced locally and from abroad. This built the national capacity for planning, design, construction, operation, maintenance and training of farmers to adapt to irrigation as a way of life. The oil boom however changed the situation. Except in few cases, the rate of providing irrigation infrastructure in all parts of the country could not allow the observance of the logical pathway of detailed studies on irrigation, to produce a national irrigation development plan, and a workable framework for the implementation of the policy. Few States pursued isolated plans for the development of large-scale "formal irrigation" schemes that were not guided by a common direction from the national level.

The farmer-owned and managed small-scale irrigation became popular with the rural communities. But ironically there was very little synergy and coordination at the level of policy and implementation between the major types of irrigation practiced in the country. Evidence showed little synergy between the FMWR and FMARD on irrigation development. Consequent upon this, the policy and strategies required to guide visionary development and effective management of irrigation was lacking.

A key constraint to resolving irrigation development issues in Nigeria is the lack of synergy and complementarity between agricultural policy and water related policies, and to some extent industrial and trade policies. Over the years at different fora, the nation identified wide range of constraints on successful and sustainable irrigation. Notwithstanding the degree of overlap and inter-linkages, these can be clustered as:

2.1.1 Low agricultural productivity, income and return from investment

The irrigation sub-sector is not performing to expectation, despite the declarations and commitments from several administrations at the various levels over the last 3 decades. Formal public schemes are operating far below their design capacities. The informal irrigation has full recognition in terms of performance and potentials to compliment the rain-fed agriculture but suffers from low capacity utilization, due to land insecurity as a result of accessibility, ownership, tenure and incessant conflicts among others. Both the formal and informal irrigations suffer from weak support services, especially agricultural extension services in the formal schemes, due to operational policy changes of RBDAs. The combined result is stunted growth and capacity decline. Amongst the diverse reasons responsible for low productivity are: low income and low return on investment in the

irrigation sub-sector, poor operation and maintenance linked to inadequate cost recovery, and insufficient attention given to post-harvest processing and marketing strategies. Lack of market infrastructure and corresponding policy and strategies lead to poor produce prices while low sales and unamortized debt compromise a farmer's ability to finance the next season's production. As a consequence, the depreciation of public assets is far too high and when taken with the associated loss of human skills, the costs of rehabilitation and modernization of irrigation schemes become very expensive. The high capital cost of irrigation schemes arises from the high costs of social connectivity; the use of expensive planning and design services; and limited economies of scale which make policy formulation around return on investment very challenging especially where private sector participation is quite low due to absence of deliberate strategies for encouragement.

For the informal irrigation, expensive, untimely, inappropriate and inaccessible credit products coupled with limited risk assessment capacity among formal credit service providers sets a severe limit on small-scale private initiatives.

2.1.2 Low capacity for regulation, coordination, operation and provision of support services

Institutional mandates on irrigation development are unclear and often conflicting among the key actors. Weak legal and institutional framework for holistic regulation and multi-dimensional coordination is also evident. There is no clear separation of regulation and operation responsibilities amongst the MDAs at all levels, promoting avoidable multi-dimensional competition rather than complementarity. Water service and allocation arrangements are not clear at all levels and this affects negatively the maximal utilization of the huge water bodies and translates into large expense of cropped land. Ownership structures for land and water bodies are not clear leading to low service charges collection, recovery rates and hence unsustainable service delivery.

2.1. 3. Low inclusiveness of land and water resources users

Existing set of policies, enabling legislation and supporting regulations on water rights and land accessibility/use/tenure are often conflicting at different levels and inhibit critical socio-economic engagements between the two resources and the diverse users. Water and labour productivity criteria and objectives along with statutory/customary rights are unclear, yet both are of profound importance. Equally, land accessibility / use / tenure arrangements in both formal and informal irrigation do not encourage responsible management of land for enhanced productivity and these promote further land fragmentation to small and uneconomic sizes discouraging private investors' participation.

Formal irrigation has been very much supply driven with little regard paid to stakeholder awareness and aspirations. This has become particularly apparent in relation to water user

associations that are currently established under Cooperative law. While this is pragmatic where no alternative is available, it is less than perfect as i) statutory processes such as formal audits and the issue of shares may be more complicated than required; and ii) the desirability of maintaining voluntary memberships of cooperatives are lost when common public infrastructure justifies forced membership of user organizations.

Irrigation habitually fails to take into consideration existing imbalances between men and women's ownership/access/use rights, division of labour and incomes. Water resource development programmes have sometimes proven detrimental to women and other vulnerable groups' rights and, therefore, detrimental to sustainable management and use of water.

2.1.4 Inappropriate funding mechanism and low private sector participation

The existing funding mechanism is unpredictable, **i**nconsistent and unrealistic to the set targets. The process of budgeting is generally input / process rather than output / results based, thus addressing more of operational rather than strategic issues. Due to the weak collaboration and territorial defense, most irrigation interventions / projects are characterized by single or solid line funding with little or no horizontal or vertical collaboration and/or partnership. The result is adhoc and politically motivated interventions without long-term vision, which are often initiated by one government and abandoned by the successive governments. Isolated investments in irrigation interventions are seldom supported with realistic and sustainable cost recovery options to be sensitive to users' profitability and income as well as social responsibility. The funding mechanism failed to involve users' right from inception of irrigation intervention, especially the level of setting the criteria and fixing the rate of water fees and its collection as a reflection on the type and scope of operation and maintenance expenditure.

There is no conscious effort by the irrigation agencies to develop the capacity (technical, organizational and managerial aspects) of the users' associations to participate in operation and maintenance of the irrigation schemes. The country is yet to establish policy that would strict a balance between cost recovery and subsidy regimes to an extent that would allow the scheme managers maintain functional irrigation infrastructure and ensure sustainability on one hand, and on the other hand, ensure the capability (based on their productivity and level of production) of the farmers to pay such charges and still earn profits to remain in the business of irrigated agriculture and also willingly invest in the improvement of the system. This seeming unattractive economic environment is equally a key disincentive for the effective participation of the private investors. Absence of mechanism to expand the capability of the private sector in both equipment manufacture and supply and in development activities, including value addition of irrigated produce,

which can trigger backward integration in favour of the advancement of irrigation, is compounding the situation.

2.1.5 Environmental imbalance and lack of sustainability,

Irrigated agriculture's environmental "footprint" in Nigeria is similar to that of any other sub-Saharan country, but concentration of intensive agriculture around urban centres and densely populated mega towns and cities will exacerbate degradation of land and water resources. The management of agricultural chemicals and drainage across irrigation schemes will be of crucial importance in relieving these pressures and maintaining the productive services of the natural resource base. The massive and uncontrolled drilling of shallow aquifers to irrigate the extensive fadama land with the high threat of salt-water intrusion in the southern parts and salinity build-up in the northern parts under surface is the similarity of the two types of irrigation systems. The groundwater resource is currently being over exploited not only for irrigation but also for portable water supply due to non-enforcement of controlled drilling of boreholes, tube-wells and wash-bores alike. This is compounded by the complete absence of any form of aquifer recharge to maintain ecological balance while promoting economic growth. This is as much an economic opportunity as an environmental imperative.

Also human health has to be considered due to water-related diseases like malaria, guinea worm and bilharzia, particularly in locations where the use of marginal quality water in some informal irrigation is popular. The emerging option of adopting rainwater harvesting-based irrigation, especially in marginal environments for either crop production, livestock or fish production must also take into cognizance the environmental responsiveness of the package.

2.1.6 Underutilization of land & water resources

The persistent capacity under-utilization of the irrigation sub-sector can be associated with: i) absence of clear policy directions and the corresponding strategies and programmes to guide the policy implementation; ii) weak institutions that would provide the platform for regulation, coordination, supervision, monitoring and evaluation of designed programmes based on consensus; and iii) the critical mass of qualified, skillful and right oriented personnel who would drive all initiatives to their logical conclusion, with the sole aim of efficient use of the land and water resources. Clearly there is a role for much more consistent approach to both public and private irrigation development in which both public and private agencies can participate within an enhanced institutional framework, and under conditions of improved information flow, technology transfer, economic incentives and financial services.

Public supply initiatives will still be important in providing critical public services to accelerated growth, to obtain a balanced and much more responsive structure for the irrigation sub-sector. But this can only accelerate, and be sustained with much more attention to the factors that generate demand for irrigated production and irrigation services.

2.1.7Low capacity for research & development and low accessibility to improved innovations

Long lasting benefits of irrigation and drainage development can only be achieved through methods that preserve the productivity of water and land resources that are already under stress. Research in irrigation and drainage is therefore crucial if our knowledge to use water, land and labor wisely is to be increased, improved and applied. Research & development, training and support services are amongst the key requirements necessary for sustainable irrigation development and growth. Recognizing this, Nigeria invested in the establishment of pilot research stations and training schools in the area of irrigation as early as 1960s. Institute of Agricultural Research (IAR), Samaru and National Water Research Institute (NWRI), Mando in Kaduna State, Bakura School of Irrigation (now taken over and converted to polytechnic by Zamfara State) and Experimental Farm in Zamfara State and Kadawa and Gezawa Experimental Irrigation Farms in Kano State are some evidence. But, over the last three decades, the uptake of irrigation and drainage technology has been at a very slow rate. This has been in part due to erosion of critical human resource from the sub-sector as well as the absence of required critical research facilities, relevant technologies, and conducive operating environment. This situation led to sharp decline of good quality research and training necessary to support the irrigation sub-sector in its drive to meet its mandate. In addition, there has been little adaptation of the significant technological advances to specific ecologies in the country. Furthermore, adherence to conventional technologies and practices by end users is at its lowest level, leading to the collapse of the public support services with very little effort from the private sector. Promoting irrigation and drainage research, targeted training of human resources, and a mix of reliable and quality public-private support services as well as standardization of equipment and practices in Nigeria is therefore, critical if irrigation and drainage developments are to be sustained.

2.1. 8 Low capacity / priority accorded for data generation, information management and use

Information and/or data collection, collation, storage, retrieval and use to support effective planning, project formulation, designs, project implementation, and management of irrigation infrastructure is another major challenge, which defy most interventions as

observed by FMWR (1990). An example of this issue is the case of staff gauge network installed on major bridges for recording water levels to guide the operations of dams, and predict potentials of flooding. By 1965, 1058 staff gauges were in operation in the country. By 1971, only 300 gauges reported reliable information and data covering only 10 continuous years. The National Water Resources Master Plan (NWRMP,1995) reported that as at 1992, there were 358 staff gauges out of which only 173 were in good condition, 111 intermittently used, and 74 in bad conditions. This situation deteriorated at both federal and state levels and clearly indicates the unreliable nature of data gathering system. The stations are scanty and for the few ones available, the quality and quantity of the data are grossly inadequate due to poor instrumentation, lack of skilled personnel, inadequate funding, etc. (NWRMP 1995, 2013). Compounding this situation is the weak planning, monitoring and evaluation system to effectively guide the planning process using reliable benchmarks, and also to track project implementation as well as the performances of corporate institutions against set targets (short, medium or long term).

PART III: THE POLICY

3.0 Goal and Objectives

The Irrigation **Policy Goal** is: "to achieve sustainable growth and enhanced performance of irrigation, contributing fully to the goals of the Nigerian agricultural sector", as outlined in vision 20:2020; National Transformation Agenda; Agricultural Transformation Agenda; and National Policy on Agriculture for Nigeria (2012).

3. 1Objectives

Eight major policy objectives are outlined to address existing constraints and achieve accelerated and sustained irrigation development in Nigeria. These are:

3.1.1 Performance, viability and competitiveness

Raising and sustaining the productivity and performance of Nigeria's irrigation sub-sector will only be achieved by realizing and maximizing the productive capacity of the land, water and human resources that make up the irrigated agricultural system and assets, irrespective of the type of irrigation, environment and community involved. This must be supported by continuously responding to new demands for irrigated production via a mix of well-coordinated public and private initiatives, including specific interventions on subsidy, markets development, price stabilization, etc. based on accurate production statistics and projected demands.

Each and every intervention must pass the Economic Rate of Return (ERR) criteria with very specific target commodity suitable/adaptable in that location. A realistic cost recovery module appropriate for every irrigation facility would then be applied after rigorous consultations and engagements with the relevant institutions. Specific sub-objectives include: a) to raise productivity of agricultural water for irrigation, livestock watering, aquaculture and human skill/technique in each production system; b) to enhance production potentials of on-going irrigation facilities (changing some laws regarding land ownership/tenure, water rights between Federal Government (FG), State Governments (SGs)&Local Government Areas (LGAs), based on size of dams, and schemes, etc.); c) to rehabilitate/remodel/modernize irrigation schemes based on viability index and ERR test; d) to extend agriculture area in time and space by drainage techniques, where possible and pertinent without negative impacts on environment; and e) to develop new irrigation areas according to demand, feasibility and opportunities (commodity-based schemes, Fadamas earmarked for specific commodities like fodder, sugarcane, rice, etc.), internal demand and export opportunities, etc.

3.1.2 Governance and enhanced services

In response to the conflicting mandates between the seeming regulators, operators, users operating in the irrigation sub-sector, leading to weak coordination at horizontal and vertical dimensions, institutional reforms leading to mainstreamed institutions and enhanced enabling environment are imperative. A service-oriented approach is emphasized under this policy thrust, which will extend cost-effective, demand driven irrigation services to public and private irrigators, through a series of clear economic incentives for farmer participation. The specific policy sub-objectives are: a) to mainstream institutions and enhance enabling environment leading to: i) streamline the activities of the various agencies involved in irrigation development to avoid duplication of functions and wastage of resources; ii) ensure probity, accountability, and transparency; and iii) enhance the efficiency and effectiveness of irrigation agencies in service delivery to the irrigation farmers; b) to develop well-focused and service oriented public institutions; c) to provide cost-effective and demand driven irrigation support services to both public and private irrigators; and, d) to develop appropriate human resource capacities targeting user organizations and institutions.

3.1.3 Socio-economic and cultural inclusion

The current arrangements governing access to land and water resources inhibit long-term productive engagement; particularly with respect to vulnerable groups principally women and elderly. Hence a key policy thrust will be to remove current constraints and promote a balanced socio-economic engagement with land and water resources. Central to this policy objective is the need to reform land tenure and water use right provisions to discourage land fragmentation beyond sizes regarded as economic and to allow dam ownership right and access for use based on International Commission on Irrigation and Drainage (ICID)and International Commission on Large Dams (ICOLD) definitions. The reform should further give landless users, tenants/investors, women, etc. special protection and equal voices in natural resource management, and ensure that local water management arrangements are inclusive. In addition, clear economic incentives for users (farmers, herders, fishermen, labourers, service providers, etc.) participation in scheme management, operation and maintenance will be set under Effective Participation Policy Thrust.

3.1.4 Funding mechanism and effective private sector participation

In response to the low levels of operation and maintenance, low cost recovery, poor service delivery, etc., user participation in scheme management will need a major boost. Pragmatic and innovative funding mechanism involving public and private sectors need to be initiated to :a) establish appropriate funding mechanism for public irrigation under partnership of the three tiers of government; b) increase private sector investment in irrigation; c) provide palliatives in terms of incentive for private investors to participate

in the business of irrigated production; d) facilitate the development of strong and reliable rural institutions like Community Based Organizations (CBOs), WUAs, etc.; and e) develop the capacity and empower the rural institutions for effective participation. In addition, application of appropriate recovery regimes for effective operation and maintenance, and other improvement costs in form of Irrigation Service Charges (ISC) need to be determined and supported by policy declaration to reduce the wide gap between existing recovery rate and actual expenditure, so as to ensure sustainability. The full involvement of WUA leadership in this matter is pertinent and need to be institutionalized with signed agreement and payment of rebate to performing associations by scheme managers. Promotion of the Participatory Irrigation Management (PIM) concept and approach is therefore imperative in all irrigation schemes in the country.

3.1.5 Responsible production and sustainable development

Agriculture has to be responsible for internalizing its impact on environment and human health, thereby ensuring that economic advantages of the seeming abundant water resources can be realized downstream. Impacts on water and soil quality and quantity are equally important. Raising the environmental performance of all types of irrigation and related agricultural practices will be a prime policy objective that will be met through a broad adoption of good agricultural practices on irrigated land. Integrated water and land resource management, supporting responsible agricultural production under both rain-fed and irrigation is imperative and can be achieved through establishing strong synergies between the relevant Ministries, Departments and Agencies (MDAs) on regulation, assessment, monitoring, enforcement, etc.

3.1.6 Efficient resource utilization and rapid irrigation growth

Promotion of concurrent development of all types of irrigation, including options under controlled environments targeted at diverse commodities is imperative if irrigation growth is to keep pace with population growth and food demand. The concept of land and water resource or dam centered economic development drive in the rural areas is pertinent. To support this initiative, promotion of multiple uses of the land and water resources is also necessary through joint investments by public, and in private sectors, targeted at production, post-harvest/processing and marketing activities under irrigated agriculture.

3.1.7 Development and uptake of innovation

Nigeria must develop and maintain the required critical human resource for research and development in the irrigation subsector. Upgrading and expansion of research and development (R&D) facilities for the generation of responsive innovations to support the dynamics of irrigation value chain is imperative. The PIM concept and practices should be adopted and institutionalized. This is to be followed by robust promotion of appropriate

technologies in irrigation systems to raise the productivity of water, land, labour, etc. to a level above the African average. This will trigger significant increase in income and profitability of those involved in irrigated agriculture. To achieve this, mechanisms for quality assurance and quality control of manufacturing, sales and servicing of irrigation technologies to support irrigation infrastructure and practices for quality products and services, must be put in place. Furthermore, promoting the development and utilization of a cost effective and affordable diverse energy sources and their accessibility for profitable irrigation in Nigeria must be given priority.

3.1.8 Improved capacity for sustainable data generation, management and use.

Nigeria should develop and maintain both the required facilities as well as the human resource for sustainable data generation, processing, storage, retrieval, sharing and use to guide effective project planning, formulation, design, implementation, management, monitoring and evaluation, including irrigation infrastructure. Modernization, upgrading and targeted installation of field and laboratory equipment and instruments are also desired in strategic locations, to cover the different environments/ecologies so as to enable real time forecasts and spatial dimensions of information management. The data and information templates should conform to the global uniformity and standardization to ensure comparison, integration and sharing with regional, continental and global data. The existing framework for supervision, monitoring and coordination of data generation and management should be reviewed and restructured to improve the quality and reliability of data on a sustainable manner. This can be achieved more easily with an integrated human resource development plan where the personnel involved in this type of assignment are highly remunerated and motivated. Equally important is the establishment of central and localized monitoring and evaluation system based on objectively verifiable indicators, key performance indicators, etc drawn from the log-frame generated for each and every operational plan.

3.2 Beneficiaries

The primary beneficiary of the Irrigation Policy is the Nigerian economy. Specifically, targeted beneficiaries are: i) irrigated crop farmers; ii) livestock herders; iii) fishermen; iv) land owners; v) tenant farmers; vi) labourers; vii) service providers; viii) consumers; ix) women and youths; etc. Others with direct interests include: institutions, user groups and organizations operating in all types of irrigation. The Policy also ensures that private sector investors and service providers will be given new opportunities to competitively perform.

3.3 Guiding Principles

3.3.1 Responsive ownership

The responsibilities and benefits accruing to participation in ownership of any aspect of irrigation facilities by the various partners (FG, SGs, LGAs, private sector) in capital cost recovery are acknowledged; but so are the limited abilities of typical rural communities and institutions (WUAs) to partake in the ownership. The pathway to capital cost recovery in the irrigation sub-sector will remain partial for the foreseeable future, and levels will have to be set pragmatically and in accordance with the prevailing macro-economic policy guidelines.

3.3.2 Demand-driven performance and productivity

Irrigation development planning should be guided by target setting based on specific demands of strategic commodities adaptable to the diverse environments and capabilities of the different communities in the country. Equally critical is the productivity of the soils, water and labour that translate into the final output of crops & fodder, livestock and fish.

3.3.3 Environmental responsibility

While the nation strives hard to advance the performance and growth of the irrigation sub-sector for its strategic food security, it should do so in a harmonious balance with the protection and conservation of the environment and biodiversity to promote sustainable development, especially in drainage programs for agriculture.

3.3.4 Integrated resource management and sustainability

Irrigation development planning should pay adequate attention to the need for productivity and sustainability in terms of operation, maintenance and the conservation and responsible use of natural resources. Water issues must not be treated as mere inputs to a productive system or social need but across all its competing sectorial uses. This would lead to making the distinction between treating water as a finite natural resource as against the notion of water being an inexhaustible resource.

3.3.5 Gender sensitivity and participation

In recognition of the diverse and integrated roles and responsibility in the provision, management and safeguarding of water for the multiple tasks of water supply & sanitation, irrigation, livestock and aquaculture, etc., the vulnerable groups in the society, particularly women, including the aged, youths and physically challenged should enjoy equitable access to the benefits of irrigation services while participating fully in the management activities of water.

3.3.6 Decentralization and subsidiarity

Government remains committed to pursue decentralization process across the irrigation sub-sector to its logical conclusion. Equally important is the need for the irrigation sub-

sector institutions to adhere to the principle of subsidiarity, with management responsibilities of public infrastructure devolved to users to the greatest practical extent, with public participation in decision making at all levels.

3.3.7 Right of access to and use of land and water resources

Although by law, all land belongs to the State, users' right and access to land for Federal, State, Local Governments, traditional and other institutions should promote irrigation purposes. Roles of community leaders, NGOs and CBOs should be recognized under this policy as instrument for utilization of land for irrigation, dispute resolution and prevention of conflicts. The legal instrument and regulatory mechanism should be reviewed to allow access to and use of land for irrigation and promoting investment for the growth of the subsector.

PART IV: STRATEGY

4.1 Performance, Viability and Competitiveness

Strategic actions:

4.1.1 Raise productivity of water for crops, livestock and aquaculture

(a) Promote water saving techniques, farming systems and incentives among existing irrigators.

(b)Promote improved water allocation and use efficiency mechanisms among various users at national and basin levels as well as among farming communities and within irrigation schemes.

(c) Support best practices for the safe use of marginal quality water.

(d) Promote the efficient conjunctive use of water for irrigation practices.

4.1.2 Raise land productivity for crops, livestock and aquaculture

a) Put in place land reform regulations and supporting guidelines, including registration to ease access to use and transfer, and discourage land fragmentation.
b) Promote soil fertility improvement and management and land conservation practices guided by acceptable standards for different terrains and climates.
c) Promote agricultural land drainage techniques.
d) Undertake targeted and intensive research and extension to promote high yielding agricultural materials to enrich diversity and intensities of irrigation schemes.
e) Promote integrated irrigated agriculture where irrigation infrastructure strongly supports competitive and profitable crop, livestock and aquaculture production.

4.1.3 Enhance production potential of on-going irrigation activities

a) Promote participatory appraisals to analyze the needs and potential of existing irrigation types.
b) Promote participatory rehabilitation/upgrading of existing irrigation projects where feasible.
c) Devolve management of public irrigation schemes to the greatest extent possible;
d) Diversify the types of enterprises undertaken in the existing irrigation facilities taking into account, the variations in ecologies, culture and needs of local/host communities.

4.1.4 Develop new irrigation areas according to demand and feasibility

a) Review existing local studies and experiences of irrigation development and practices for the purpose of up-scaling to national level.
b) Analyze local demand, feasibility and viability for irrigated agriculture through cost-benefit analysis, such as is contained in Cost-Benefit Analysis of Selected Policy Options and Investment for Water and Irrigation Sector in Nigeria.
c) Continually update inventory of irrigation areas for all types of irrigation, including areas already earmarked for development.,
d) Develop a National Irrigation and Drainage Map.
e) Develop a National Master Plan for Irrigation and Drainage Development (NMPIDD).

4.1.5 Increase level of mechanization of irrigation activities

a) Support legislation to promote land consolidation while maintaining accessibility and right to transfer through registration system.
b) Support the standardization of equipment and machineries in the country using world best practices in harmony with local content policy, as contained in NCAM mandate, to promote mechanized irrigation.
c) Support the standardization of production, harvest and post-harvest practices for irrigated produce, to enhance the competitiveness of products and services.
d) Develop code of practice and capacity for quality assurance and quality control of irrigation infrastructure, equipment, practices, products and services.
e) Encourage value chain approach in production, harvest and post-harvest targeted at irrigated produce.
f) Support commercially viable equipment and machinery hire and/or lease one-stop shops, to promote primary production of irrigated produce.

4.1.6 Enhance competitiveness of irrigated agriculture

a. Promote viable and competitive irrigation practices applicable to the different agro-ecological zones of Nigeria.
b. Promote private sector investment in more efficient irrigation systems that promote sustainable natural resource use and enhance return on investment.
c. Promote smallholder investors to acquire more efficient irrigation systems/practices for sustainable productivity and higher income.
d. Promote market penetration and price stabilization of agricultural produce.
e. Promote warehouse and receipts system in rural communities, translated into shopping centers managed by cooperatives linked to households enterprises.
f. Institutionalize micro-finance banks targeted at specific producers, marketers or processors of irrigated produce in order to enhance net return and income.

4.2 Good Governance and Enhanced Services

Strategic actions:

4.2.1 Review legal mandate to accommodate decentralization of authority

a) Build consensus among principal stakeholders on contentious issues, to guide the review of enabling laws relevant to the irrigation subsector.
b) Support the passing of National Integrated Water Resources Management Commission (NIWRMC) and National Water Resources (NWR) Bills into law.
c) Develop relevant regulations and guidelines pursuant to Water Resources Act.
d) Support land reforms that protect irrigable lands.
e) Review the legal framework, regulations and guidelines to provide incentives and encourage the private sector, field based NGOs WUAs/FUAs, etc. to participate in development and management of irrigation and drainage in Nigeria.
f) Review the legal framework, regulations on and guidelines for shallow or deep ground water exploitation and use for portable water supply, agricultural and industrial uses,

to curtail the dangerous trend of over exploitation and causing of imbalance in the ground water system

4.2.2 Develop service-oriented public institutions

a) Separate regulatory and operational functions from a single agency, and develop supporting guidelines to facilitate the implementation.
b) Support public sector independent service providers to more efficiently respond to the needs of irrigation sub-sector.
c) Develop and maintain quality standards in all services.
d) Institutionalize transparency and accountability of public institutions in regulations, operation and service delivery functions of the irrigation subsector.
e) Develop and retain critical mass of staff through improved employment packages for regulatory and operation agencies.
f) Promote closer collaboration among the FG, SGs, LGAs and Communities in discharging their mandates to support irrigation Subsector.

4.2.3 Streamline institutions for irrigation development and practices

a) Provide a clear definition of regulation, operation and service delivery responsibilities in the irrigation subsector and identify the institutions involved in these principal functions.
b) Provide each category of the institutions with assigned specific mandates, type of responsibilities, areas of operation and powers.
c) Provide coordination mechanisms for different categories of institutions to promote efficiency and diligence
d) Create a platform for review, feedback and decision making in their operations with stakeholders.
e) Support WUAs, FUAs, Cooperatives, CBOs ,etc. to obtain legal status and attain recognition.

4.2.4 Provide cost-effective, demand-driven irrigation support services

a) Characterize and promote all types of irrigation for efficient and demand-driven service delivery.
b) Increase investment in the development of irrigation infrastructure.
c) Improve operation and maintenance by capacity development of institutions, and insist on prompt payment of appropriate irrigation service charges by all categories of users as and when due to promote quality service provision and accountability.
d) Simplify the decision-making mechanism to promote investments that will facilitate access to water for irrigation.
e) Promote the implementation of guidelines on cost sharing mechanism among the stakeholders (FG, SGs, LGs, Private sector, Host Communities, etc.) for the management of existing and development of new public irrigation schemes.

4.2.5 Develop the required human resource capacities

a) Strengthen user capacity for effective participation, and ensure the application of regulations through sustained mobilization and capacity building programmes.
b) Implement institutional restructuring, reorientation and capacity building of regulatory and operation agencies, to address the need and opportunities of all types of irrigation.
c) Mobilize and support personnel in rural institutions to participate in the production, harvest and post-harvest activities in the irrigation subsector.
d) Improve the capacities of vulnerable groups (Women, aged and youths, physically challenged) for effective participation in irrigation subsector.
e) Promote and facilitate networking of farmer groups and service providers to attain and sustain higher productivity (water, land and labour).
f) Strengthen extension services with respect to enterprise diversification, intensification, on-farm water management and off-farm post-harvest operations and value additions for all categories of irrigation.

4.3 Efficient Resource Utilization and Rapid Growth

Strategic actions:

4.3.1 Provide access to and right of use of irrigation facilities to communities

a) Develop and champion the implementation of a mechanism that promotes multiple and equitable access to and right to use of public irrigation infrastructure like dams, diversions, *fadamas*, etc. (developed by FGN, SGs and LGCs) by host communities
b) Ensure compliance of the codes of practice and standards by host communities in the utilization of irrigation infrastructure to promote judicious use and sustainability, failure of which can attract sanction by regulator.

4.3.2 Develop national capacity for land and water resource management

a) Design and promote the advancement of technical capacities of institutions involved in land and water resources training
b) Adopt knowledge-based methodologies such as Agricultural Water Management (AWM) to guide prioritization of interventions targeted at irrigation development and practices.
c) Develop a comprehensive National Irrigation and Drainage Master plan (NIDMP) that accounts for agro-ecological diversity of Nigeria, and delineates areas of comparative advantage of irrigation for each agro-ecological zone, and identifies environmental issues.

4.3.3 Diversify irrigation options and composite irrigation systems adaptable to different environmental settings

a) Promote irrigation practices that are in consonance with environmental sustainability.
b) Consider climate change in the design, operation and management of irrigation schemes, especially with respect to impacts on downstream ecology in dams-dependent irrigation schemes.

c) Ensure the existence of technically sound feasibility studies that account for environmental and social impact assessment, especially in the design of large irrigation schemes.

4.4. Socio-Economic and Cultural Inclusion

Strategic actions:

4.4.1 Encourage land consolidation for mechanized irrigation

a) Support land cadastralization to enhance irrigation development.
b) Promote land titles registration to facilitate easy access, use, transfer and financial services.
c) Promote cluster, out-growers, contract farmers and collective commercial and mechanized irrigated agriculture for economy of scale and profitability.

4.4.2 Give vulnerable groups more access to natural resources and equal voice for effective management

a) Mainstream gender issues in all aspects of irrigation and throughout irrigation schemes management cycle.
b) Promote equitable land tenure reform to prevent land grabbing and fragmentation, especially with respect to accessibility to land and water for irrigation by women and other vulnerable groups.
c) Domesticate the use of "Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security," globally adopted by UN member countries for inclusive access and use of irrigation land in Nigeria.
d) Empower the women, youth, vulnerable groups and senior citizens to have legal capacity to protect their interests, and promote their participation in irrigated agriculture.

4.4.3 Promote specialization along irrigation value chain (IVC)

a) Embark on capacity building of operators of the different segments along the irrigation value chain.
b) Promote and support targeted interventions like soft loan, to strengthen identified weak links along the IVC.
c) Strengthen institutional support to the operators of the different segments along the irrigation value chain.
d) Monitor and regulate the quality and standardization of products and services provided by the operators of the different segments along the irrigation value chain.

4.5. Funding Mechanism and Effective Participation

Development of irrigation infrastructure and management is capital intensive requiring huge funding, for the construction and expansion, instrumentation, operation and maintenance, and capacity building, thus necessitating demand for various funding options. The following funding options are proffered: i) Public Sector

budgets; ii) Donors and Development Partners; iii) Multi-lateral and Bi-lateral funding mechanisms; iv) Public-Private Partnership; and v) Community-Driven and Financing of Projects.

Strategic actions:

4.5.1 Establish appropriate funding mechanism for public irrigation schemes:

a) Prioritize sustainable funding based on strategic importance/apparent opportunities around targeted schemes.
b) Develop the irrigation component of the National Water Resources Master Plan (NWRMP) into a full National Irrigation and Drainage Master Plan (NIDMP).
c) Align irrigation development programmes to NIDMP.
d) Attract donor financing to implement irrigation development programmes;
e) Increase direct budgetary allocation to MDAs responsible for the development and management of public irrigation.
f) Extend credit facilities to smallholders investors to promote enterprises in irrigation subsector.
g) Promote cost recovery for operation and maintenance expenditure, and institutionalize its actualization in form of irrigation service charge (ISC), to be borne by the users, subject to commercialization drive and prevailing economic realities the scheme managers find themselves in.
h) The level of subsidy to irrigated agriculture would be in form of: a) initial cost for irrigation development and subsequent improvement of schemes; b) training of technicians and field officers; c) strengthening and capacity development of WUAs; d) market and price stabilization of irrigated produce; and e) waiving tariff on certain imported goods such as irrigation equipment (solar pumping system) and inputs (fertilizers, agricultural machines).
i) Strengthen mechanism for agricultural insurance coverage for irrigated agriculture.

4.5. 2 Set investment targets focusing on priorities

a) Implement an action plan to actualize the recommendations of irrigation investment component of NWRMP 2013.
b) Update the national status of the irrigation schemes, including farmer managed systems since ROPISIN report of 2004.
c) Characterize the 240 dams in the country to establish their economic viability and business opportunities via involvement of the private investors where feasible.

d) Introduce and develop commercial, business practices to crop production, build the capacity of the stakeholders, and transfer O and M to users associations.
e) Develop an incentive mechanism and technical capacity that would encourage host communities, LGs and SGs to lead in the establishment of irrigation system network, and participate in their effective management.
f) Identify projects with only dams and head-works in place for leasing to private investors to complete the network, and put into use the scheme for an agreed period with a clear financial and economic plan that promotes win-win situation for owners, the investor and the users alike.

4.5.3 Increase private sector participation and investment in irrigation

a) Adapt and implement Public Private Partnership (PPP) guidelines for increased investment in irrigation.
b) Mount sustained awareness campaign and mobilization for private investments.
c) Identify opportunities along the irrigation value chain and promote partnership.
d) Create an enabling environment for profitable private irrigation.
e) Identify corridors to leverage on and promote innovations for increased competitiveness of informal irrigation.

4.5. 4 Promote sustainable user participation in irrigation management

a) Ensure sustained capacity development of user associations to enable them effectively participate in irrigation management.
b) Promote legislation for user associations and provide visible advocacy support for consolidation.
c) Ensure beneficiary participation in the planning, implementation and management process of development projects including awareness campaigns, capacity development, etc.
d) Empower user associations to specialize in selected skills and services required by various actors operating in irrigation schemes, to increase their resource base and become service providers to the irrigation agency.

4.6 Sustainable Production

Strategic action:

4.6.1 Improve environmental management within irrigation systems

a) Ensure compliance with environmental guidelines and regulations in all irrigation practices.
b) Raise awareness of grass-roots, rural institutions and key actors involved in irrigation of the environmental linkages and risks.
c) Put in place a comprehensive mechanism for monitoring the occurrence of infrastructural interaction with social and economic sub-systems, including water-related diseases.
d) regulate and monitor ground water.

4.6.2 Promote an all-inclusive land and water management arrangements

a) Provide potable water within the irrigation scheme as part of irrigation facilities.
b) Promote sound environmental impact assessments (EIAs), for dam construction, and design irrigation systems to support decision making at different levels.
c) Ensure participatory catchment area protection in vulnerable irrigation schemes.
d) Ensure the enforcement of environmental guidelines, regulations and standards for irrigation water.
e) Ensure collaboration amongst relevant agencies across MDAs at Federal and State levels, for the enforcement of environmental laws, regulations and guidelines.
f) Promote regular monitoring of ground water use for controlled abstraction and ensure access to safer ground water.
g) Promote aquifer recharge practices in areas where ground water exploitation is massive and the situation is favourable to maintain a balance in ecology.

4.6.3 Promote good environmental governance in irrigation for sustainability

a) Develop water charter, and ensure its use to protect the interests of both up and downstream communities pursuant to NWRMP 2013,
b) Encourage research and training on safe irrigation practices for all types of irrigation, and ensure their effective and sustained dissemination.
c) Promote holistic and integrated approach that is multidisciplinary and multi-sectorial to minimize negative impacts of irrigation on ecosystem.

4.7 Development and Uptake of Innovations

Strategic actions:

4.7.1 Develop and maintain human resource and institutional capacity for responsive research and development in the irrigation subsector

a) Create a mechanism for partnership with tertiary institutions to promote tailor-made manpower development to support irrigation subsector.
b) Encourage the curricula review/development and targeted research and development addressing innovations and needs of all irrigation categories.
c) Design and conduct training modules targeted at the different actors.
d) Collate, package and disseminate research results for adoption by diverse users.
e) Strengthen the institutional capacities of relevant organizations/agencies for effective and efficient service provisions.

4.7.2 Upgrade and expand the R&D facilities, to lead in the generation of responsive innovations, to support the dynamics of irrigation value chain

a) Support the generation and promotion of high quality and appropriate technologies, for irrigation to improve the productivity of water, land, labour, etc., for increased income and profitability.
b) Develop code of practice suitable for Nigerian conditions for quality assurance and quality control of manufacturing, sales and servicing of irrigation technologies, to support irrigation infrastructure and practices for quality products and services.

c) Support local production of irrigation equipment and technologies for the market.

4.7.3 Support research agenda on environment, bio-diversity, resource conservation, to promote sustainable irrigation development and practice in Nigeria

a) Promote the development and utilization of a cost effective and affordable diverse energy sources and their accessibility, for profitable irrigation in Nigeria.
b) Develop and promote integrated water management models for medium and large dams, to facilitate water sharing for different uses, including irrigation, water supply, hydro-power generation and environment.
c) Develop or adopt strategies that promote sustainable land and water management and minimal disturbance to ecosystem and biodiversity conservation.
d) Develop standard practices on flood-based cultivation, feasible around floodplains, riverbanks, valley bottom and downstream of reservoirs, to promote the informal irrigation in relevant areas and ecologies across the country.

4.8 Capacity for Data Generation, Information Management and Use

Strategic actions:

4.8. 1 Establishment of a dynamic real time and accessible database

a) *Establish* a comprehensive database on all aspects of irrigation and effective data sharing, to guide decision-making. This can be performed by National Irrigation Map with GIS data tool.
b) Put in place robust system for sustainable and responsive data generation, management and use to guide effective planning, monitoring and evaluation of field situations, to mitigate the effect of calamities and natural disasters, such as: flooding, drought, salt-water intrusion and ground water/aquifer pollution.

4.8.2 Upgrade and update the instrumentation of field data collection

a) Develop necessary instrumentation and protocol for field data collection processing and use on a sustainable basis.
b) Develop the capacity for sustained field data generation, using world best practices and standards.
c) Develop the national capacity (human and material) for data sharing and deployment into policy formulation, project design, implementation and monitoring.
d) Deploy ICT-based technologies like hydrologic GIS-based models to support field data collection, processing, storage, management, project formulation, design, implantation and monitoring and evaluation.

4.8.3 Upgrade and improve the capacity for effective planning, monitoring and evaluation systems

a) Develop the institutional capacity for adopting WBP in planning process, to return to sectorial strategic, operational plans at MDAs, scheme and rural institutions/cooperatives levels.
b) Institutionalize, and enforce regular conduct of oversight functions of the appropriate MDAs on all irrigation and related projects, to promote compliance to standards, quality delivery of goods and services, accountability and sustainability.
c) Develop strong linkages and synergies with MIS and the M&E team to ensure quality conduct of benchmark surveys, mid-term monitoring, and final/post project evaluation/assessment.
d) Promote compliance with provisions of procurement Act of 2007 in securing M&E services, to ensure objectivity and credible outcomes that would guide informed decisions.

PART V: ACTION PLAN (Policy Matrix)

PROBLEM STATEMENT	POLICY THRUST (OBJECTIVES)	STRATEGIC ACTIONS	TIMELINE	IMPLEMENTING UNIT	COLLABORATING AGENCY/ PARTNER	NECESSARY INTERVENTIONS
Low agricultural productivity and low income/return on investment	4.1.1 Raise water productivity for crops, livestock and aquaculture	(a) Promote water saving techniques, farming systems and incentives among existing irrigators. (b) Promote improved water allocation and use efficiency mechanisms among various users at national and basin levels as well as among farming communities and within irrigation schemes. c) Support best practices for the safe use of marginal quality water. (d) Promote the efficient conjunctive use of water for irrigation practices	Medium term Short term Medium term Long term	FMWR FMARD NIWRMC RBDAs ISMs WUAs FUAs NGOs	FMEnv NWRI ARCN NAERLS ADPs	Water Resources Act Cap W2 of 2004 (to be revised) RBDAs Act Cap R9 LFN 2004 (to be revised)
	4.1.2 Raise land productivity for crops, livestock and aquaculture	a) Put in place land reform regulations and supporting guidelines, including registration to ease access to use and transfer, and discourage land fragmentation b) Promote soil fertility improvement and management and land conservation practices guided by acceptable standards for different terrains and climates c) Promote agricultural and drainage techniques d) Undertake targeted and intensive research to promote high yielding agricultural materials, to enrich diversity and intensities of irrigation schemes e) Promote integrated irrigated agriculture where irrigated agriculture infrastructure strongly supports competitive and profitable crop, livestock and aquaculture production.	Medium term Medium term Medium term Short and medium Term Long term	FMWR FMARD NIWRMC RBDAs ISMs WUAs FUAs NGOs	FMEnv ARCN ADPs SGs LGC TIs TEIs	• Land Use Act of 1978 (to be revised) • Legal clarification of scheme ownership & access rights • Guidelines for land cadastral mapping to establish fertility status of different land mass.
	4.1.3 Enhance production potential of on-going irrigation activities	a) Promote participatory appraisals to analyze the needs and potential of existing Irrigation types b) Promote participatory rehabilitation/upgrading of existing Irrigation projects where feasible c) Devolve management of public Irrigation schemes to the greatest extent possible	Medium term Medium term Short term	FMWR NIWRMC RBDAs NWRI SGs ISMs ADPs WUAs	FMARD FMEnv NFDP	• Review of existing institutional framework to promote decentralization • Establishment of competent agencies with clearly defined functions • Establishment of Water Resource Management

		d) Diversify types of enterprises undertaken in the existing irrigation facilities taking into account the variations in ecologies, cultures and needs of local/host communities	Short term	FUAs		Commission at national and basin levels • Separation of functions of regulation and operations • Clear definition of roles on water allocation through Water Use Rights for the promotion of IWRM • Application of the principle of subsidiarity
	4.1.4 Develop new irrigation areas according to demand and feasibility	a) Review existing local studies and experiences of irrigation development and practices for the purpose of up scaling to national level. b) Analyze local demand, feasibility and viability for irrigation agriculture through cost benefit analysis such as contained in Cost-Benefit Analysis of selected Policy Options and investment for water and irrigation sector in Nigeria. c) Continually update inventory of irrigation areas for all types of irrigations, including areas already earmarked for development. d) Develop a National Master Plan for Irrigation Development (NMPID)	Short term Short term Medium term Long term	FMWR FMARD NIWRMC RBDAs NWRI ISMs	NPC FMEnv APDs LGCs WUAs FUAs	• Harmonization of PPP Policy with NIPS and NMPID • Put in place mechanism for effective control of the private sector and for protecting the third parties
	4.1.5 Increase level of mechanization of irrigation activities	a) Support legislation to promote land consolidation while maintaining accessibility and right to transfer through registration system. b) Support the standardization of equipment and machineries in the country using world best practices, in harmony with local content policy, and with NCAM mandate, to promote mechanized irrigation c) Support the standardization of production, harvest and post-harvest practices for irrigated produce to enhance competitiveness of product and services d) Develop the capacity for quality assurance and quality control of irrigation infrastructure, equipment, practices, products and services	Medium term Medium term Medium term Short term	RBDAs ISMs ARCN NCAM NWRI SON SGs	NSE MAN TEIs WUAs FUAs LGCs FMLHUD	• Land use Act of 1978 (to be revised) • Review of local Content Policy to mainstream into standardization and quality assurance • Harmonization with agriculture policy to promote import substitution • Ensure amendment of NWRI, NCAM functions to allow focus on equipment and machineries for irrigation development and practice.

		e) Develop code of practice for construction and management of irrigation infrastructure and irrigation practices in Nigeria f) Encourage value chain approach in irrigated production, harvest and post-harvest targeted at irrigated produce g) Support commercially viable equipment and machinery hire and/or lease one-stop shops to promote primary production of irrigated produce.	Medium term Short term Long term			
	4.1.6 Enhance competitiveness of irrigated agriculture	a. Promote viable and competitive irrigation practices applicable to the different agro-ecological zones of Nigeria b. Promote private sector investment in more efficient irrigation systems that promote sustainable natural resource use and enhance return on investment c. Promote smallholder investors to acquire more efficient irrigation systems/practices for sustainable productivity and higher income d. Promote market penetration and price stabilization of agricultural produce through appropriate fiscal and economic policies e. Promote warehouse and receipts system supported by micro financing approach to enhance net return and income. f. Introduce subsidy regimes at both production and market levels to raise labour, productivity and net income	Short term Medium term Short term Medium term Medium term Short term	RBDAs NWRI ISMs ADPs WUAs FUAs SGs FMWR	FMTI NACCIMA NEPC CAC PFAN NAERLS	• Land use Act of 1978 (to be revised to allow title registration and promote consolidation) • RBDA Act Cap R 9 2004 to accommodate mono-crop schemes • Enactment of new regulations for private sector effective participation to guarantee control that promotes confidence and assurance
4.2 Low capacity for regulation, coordination, operation and provision of support services	4.2.1 Decentralize authorities with commensurate responsibilities through review of legal mandate	a) Build Consensus among principal stakeholders on contentious issues, to guide review of enabling laws relevant to irrigation subsector b) Support the passing of National Water Resources Bill into law c) Develop relevant regulations and guidelines pursuant to Water Resources Act d) Support land reforms that protect irrigable lands	Short term Short term Short term Medium term	FMWR NIWRMC RBDAs SGs LGCs	FMoJ NASS SMsoJ TIs WUAs FUAs NGOs Media	• Organized advocacies by NGOs for amendments of laws • WUA/FUA Legislation • Enforcement of Operational standards for service providers and putting in place effective mechanism for M&E

		e) Review legal framework, regulations and guidelines to provide incentives, and encourage the private sector, field based NGOs, WUAs, etc. to participate in development and management of irrigation and drainage in Nigeria	Short term			
	4.2.2 Develop service-oriented public institutions	a) Separate regulatory and operation functions from a single agency and develop supporting guidelines to facilitate the implementation b) Support public sector independent service providers to more efficiently respond to the needs of irrigation sub sector c) Develop and maintain quality standards in all services d) Develop code of practice for construction and management of irrigation infrastructure and irrigation practices in Nigeria e) Institutionalize public transparency and accountability of public Institutions in regulations, operation and service delivery functions of the irrigation subsector f) Develop and retain critical mass of staff through improved employment packages for regulatory and operation agencies g)Promote closer collaboration among the FG, SGs, LGs and host communities in discharging their mandates to support irrigation subsector	Short term Short term Short term Medium term Short term Medium term Short term	RBDAs NWRI ISMs ADPs NIFAEAS	FMARD NSE AESON WUAs FUAs NAERLS COREN SON	• Develop service delivery standards • Amend existing provisions on service delivery in relevant agencies • Advocate for the strengthening of COREN, Nigerian Forum for Agricultural Extension and Advisory Services (NIFAEAS), to regulate the quality services delivery in the irrigation schemes • Empower the WUAs and FUAs for effective assessment of quality of services
	4.2.3 Streamline institutions for irrigation development and practices	a) Provide a clear definition of regulation, operation and service delivery responsibilities in the irrigation subsector and identify the institutions involved in these principal functions, b) Provide each category of the Institutions with assigned specific mandates, type of responsibilities, areas of operation and powers c) Provide coordination mechanism for different categories of institutions to promote efficiency and diligence	Short term Short term Short term	FMWR	NASS FMARD RBDAs ISMs SGs LGCs NGOs WUAs FUAs NPC	• Review of Water Resources Act Cap W2 of 2004 • Review of RBDAs Act Cap R9 2004 • Development of new guidelines for the operations of NIWRMC, RBDAs, ISMs,

		d) Create a platform for review, feedback and decision making in their operations with stakeholders e) Support WUAs, FUAs, cooperatives, CBOs, etc. to obtain legal status and attain recognition.	Short term Medium term			
	4.2.4 Provide cost-effective, demand-driven irrigation support services	a) Characterize and promote all types of irrigation for efficient and demand-driven service delivery b) Increase investment in the development of irrigation infrastructure c) Simplify the decision making mechanism to promote investment that will facilitate access to water for irrigation d) Promote the implementation of guidelines on cost sharing mechanism among the stakeholders (FG, SGs, LGs, private sector, and host communities etc.) for the management of existing and development of new public irrigation schemes	Medium term Medium term Short term Medium term	FMWR NIWRMC RBDAs ISMs WUAs FUAs FMARD	NWRI, ARCN IAR SGs LGCs HCs TIs	• Enter into legal agreement (MoA) between FG, SGs and LGCs on implementing cost sharing guidelines for the development of new facilities and/or operating existing schemes • Promote partnership between ISMs and WUAs on cost recovery of irrigation schemes and facilities
	4.2.5 Develop the required human resource capacities	a) Strengthen user capacity for effective participation and ensure the application of regulations through sustained mobilization and capacity building programmes b) Implement institutional restructuring, reorientation and capacity building of regulatory and operation agencies, to address the need and opportunities of all types of irrigation c) Mobilize and support personnel in rural institutions to participate in the production, harvest, and post-harvest activities in the irrigation subsector, d) Improve the capacities of vulnerable groups (Women, aged and youths, physically challenged) for effective participation in irrigation subsector e) Promote and facilitate networking of farmers groups and service providers for higher productivity f) Strengthen extension services with respect to enterprise diversification, intensification, on-farm water management and off-farm post-harvest operations and value additions for all categories of irrigation,	Medium term Medium term Medium term Medium term Short term Medium term	NWRI NAERLS NCAM ARMTI ADPs WUAs FUAs FMWR FMARD	NIWRMC ARCN AESON NSE COREN NIFAEAS NGOs Consultants FMEnv	• Review the Acts of NWRI, ARMTI, NCAM to allow for mandatory training of all registered service providers • Establish specialized monotechnics to support middle cadre skills requirement for irrigation schemes • Regulation to integrate the existing Skill Acquisition and Development Centers with specific requirements of irrigation schemes

4.3 Low Inclusiveness of Land and Water Resources Users	4.3.1 Provide access to and right of use of irrigation facilities to communities	a) Develop and champion the implementation of a mechanism that promotes multiple and equitable access to and right by host communities of public of irrigation infrastructure like dams, diversions, *fadama* etc., developed by FGN, SGs and LGCs. b) Ensure compliance of the codes of practice and standards by host communities in the utilization of irrigation infrastructure to promote judicious use and sustainability failure of which can attract sanction by regulators.	Short term Medium term	FMWR RBDAs WUAs FUAs	SGs LGCs TIs Media NGOs ISMs	• Revise Water Resources Act Cap W2 of 2004 to harmonize water rights by issuance of license and by customary rights which often lead to controversies • Regulation to support guidelines for cost sharing for the establishment of irrigation infrastructure
	4.3.2 Develop national capacity for land and water resource management	a) Design and promote the advancement of technical capacities of Institutions involved in land and water resources training b) Adopt knowledge-based methodologies such as Agricultural Water Management (AWM) to guide prioritization of interventions-targeted irrigation development and practices. c) Develop a comprehensive National Irrigation and Drainage Master Plan (NIDMP) that accounts for agro-ecological diversity of Nigeria, and delineates areas of comparative advantage of irrigation for each agro-ecological zone, and identifies environmental issues	Medium term Short term Long term	NIWRMC NWRI NAERLS RBDAs FMWR FMARD	FMEnv WUAs FUAs ARCN ISMs	• Create the niche for the development of NIDMP in WR Act and NIPS • Review of NBTE Act, to accommodate the curricula relevant to irrigated agriculture in monotechnics
	4.3.3 Diversify the irrigation options and composite irrigation systems adaptable to different environmental settings	a) Promote irrigation practices that are in consonance with environmental sustainability b) Consider climate change in the design, operation and management of irrigation schemes c) Ensure the existence of technically sound feasibility studies that account for environmental and social impact assessment, in the design of large irrigation schemes	Short term Short term Medium term	NIWRMC RBDAs ARCN ADPs FMWR FMEnv	FMARD SMEnv WUAs FUAs	• Harmonize NESREA regulations and guidelines with Water Resources Act, National Water Resources Bill and National Agriculture Development Policy
4.4 Inappropriate funding mechanism and low private Sector participation	4.4.1 Encourage land consolidation for mechanized irrigation	a) Support land cadastralization, to enhance irrigation development b) Promote land titles registration to facilitate easy access, use, transfer and financial services	Medium term Medium term	RBDAs SGs LGCs ADPs WUAs	FMoJ NASS PSPs F&IIs	• Review of land use Act of 1978 to promote land titles registration to facilitate easy access, use, transfer and financial services

		c) Promote cluster, out-growers, contract farmers, and collective commercial and mechanized irrigated agriculture for economy of scale and profitability	Medium term	FUAs		• Review the Infrastructure Concession Regulatory Commission Act No.18 (2005) to accommodate the irrigation infrastructure • Provide for the protection of irrigable areas from encroachment and change into other uses
	4.4.2 Give vulnerable groups more access to natural resources and equal voice for effective management	a) Mainstream gender issues in all aspects of irrigation and throughout irrigation schemes management cycle b) Promote equitable land tenure reform, especially with respect to accessibility to land and water for irrigation by women and other vulnerable groups c) Domesticate the use of "Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security," globally adopted by UN member countries d) Empower the women, youths, vulnerable groups and senior citizens, to have legal capacity to protect their interests and promote their participation in irrigated agriculture	Short term Medium term Medium term Long term	RBDAs ADPs CBOs NGOs TIs WUAs FUAs	NAERLS TEIs Media	• Review of Land Use Act of 1978 to promote land titles registration, to facilitate easy access, use, transfer and financial services • Promote gender equity • Give more voice and representation to vulnerable groups
	4.4.3 Promote specialization along Irrigation Value Chain (IVC)	a) Embark on capacity building of operators of the different segments, along the irrigation value chain b) Promote and support targeted interventions like soft loans, to strengthen identified weak links along the IVC c) Strengthen institutional support to the operators of the different segments along the irrigation value chain d) Monitor and regulate the quality and standardization of products and services provided by the operators of the different segments along the irrigation value chain	Short term Medium term Short term Medium term	NWRI NAERLS NCAM ARMTI SON	NSE AESON NIFAEAS F&IIs	• Service delivery standards needed • Regulation for private service providers to meet set standards • Develop certification programmes (courses) for career progression
4.5 Funding Mechanism and effective participation,	4.5.1 Establish appropriate funding mechanism for public irrigation schemes:	a) Prioritize sustainable funding mechanisms based on strategic importance/apparent opportunities around targeted schemes, b) Develop the irrigation component of the National Water Resources Master Plan	Medium term Long term	NPC FMWR FMF F&IIs ICRC	• Donor Agencies • PIs • NASS	• Review the WR Act and NIDPS to accommodate the PPP guidelines • Establish lobby group for continued and targeted

		(NWRMP)into a full National Irrigation and Drainage Master Plan (NIDMP) c) Align irrigation development programmes to NIDMP d) Attract donor financing to implement irrigation development programmes e) Increase direct budgetary allocation to MDAs responsible for the development and management of public irrigation f) Extend credit facilities to smallholders investors to promote enterprises in irrigation subsector g) Institute measures to ensure recurrent and replacement cost recovery is borne by the users, subject to commercialization drive h) Strengthen mechanism for agricultural insurance coverage for irrigated agriculture	Long term Short term Short term Medium term Short term Short term			funding for sustainable irrigation development • Legislate the issue of recovering operations and maintenance expenditure in irrigation schemes • Enact law for cost sharing in establishing new irrigation schemes
	4.5. 2 Set investment targets, focusing on priorities	a) Develop an action plan to implement the recommendations of irrigation investment component of NWRMP, 2013 b) Update the status of the irrigation schemes, including farmer managed systems since ROPISIN report of 2006 c) Introduce and develop commercial, business practices to crops production, build the capacity of the stakeholders, and transfer O and M to users associations d) Develop incentive mechanism and technical capacity, that would encourage host communities, LGs and SGs to lead in the establishment of irrigation system network, and participate in their effective management.	Medium term Medium term Medium term Medium term	FMWR FMARD RBDAs ADPs ISMs	NPC SGs LGCs FMITI	• Harmonize the priorities on irrigation development contained in ROPSIN report of 2006 and NWRMP 0f 2013 • Champion the implementation of agreed high priority projects • Harmonize the irrigation development priorities in ROPSIN Report (2006), NWRMP (2013) and NIIMP (2014), to guide investment pathway
	4.5.3 Increase private sector participation and investment in irrigation	f) Adopt and implement PPP guidelines for increased investment in irrigation g) Mount sustained awareness campaign and mobilization for private investments h) Identify opportunities along the irrigation value c and promote partnership	Medium term Short term Short term	FMWR FMARD RBDAs ADPs ISMs	FMTI NEPC NACCIMA F&IIs WUAs FUAs	• NWR Bill need review, to establish a legal framework to manage water resources, for the PPP to be relevant • An institution to regulate water allocation to avoid

		i) Create an enabling environment for profitable private irrigation j) Identify corridors to leverage on and promote innovations for increased competitiveness of informal irrigation	Short term Medium term			negative effects of a free water market
	4.5. 4 Promote sustainable user participation in irrigation management	a) Ensure sustained capacity development of user associations, to enable them effectively participate in irrigation management b) Promote legislation for user associations, and provide visible advocacy support for consolidation c) Ensure beneficiary participation in the planning, implementation and management process of development projects, including awareness campaigns, capacity development, etc. d) Empower user associations to specialize in selected skills and services required by various actors operating in irrigation schemes, to increase their resource base and become service providers to the irrigation agency	Long term Medium term Short term Medium term	FMWR FMARD RBDAs ISMs WUAs FUAs	NWRI NAERLS ARMTI NCAM AESON NIFAEAS	• Review the NWR Bil,l to develop specific regulation for the WUAs and FUAs • Put emphasis on capacity development of service providers • Develop guidelines to facilitate WUAs and FUAs becoming confident service providers
4.6 Sustainable production	4.6.1 Improve environmental management within irrigation systems	a) Ensure compliance with environmental guidelines and regulations in all irrigation practices, b) Raise awareness of grass roots and rural institutions and key actors involved in irrigation, of the environmental linkages and risks c) Put in place comprehensive monitoring of the occurrence of infrastructural interaction with social and economic sub-systems, including water-related diseases.	Medium term Short term Medium term	FMWR RBDAs ADPs ISMs FMEnv WUAs FUAs SGs	NWRI NAERLS NFDP SMEnvs LGCs Media NGOs NESREA	Harmonize NESREA regulations and guidelines with NIWRMC Bill, the Water Resources Act, National Water Resources Bill and National Agriculture Development Policy
	4.6.2 Promote an all-inclusive land and water management arrangements	a) Provide portable water within the irrigation schemes as part of irrigation facilities b) Promote sound Environmental Impact Assessments (EIAs) for dam construction and design of irrigation systems to support decision making at different levels	Medium term Medium term	FMWR RBDAs ADPs SWBs SEPAs WUAs FUAs NIHSA FMEnv	FMARD NIWRMC NESREA	Harmonize NESREA regulations and guidelines with NIWRMC Bill, the Water Resources Act, National Water Resources Bill and National Agriculture Development Policy

		c) Ensure participatory catchment area protection in vulnerable irrigation schemes d) Ensure the enforcement of environmental guidelines, regulations and standards for irrigation water e) Ensure collaboration amongst relevant agencies across MDAs at Federal and State levels for the environmental laws, regulations and guidelines. f) Promote regular monitoring of groundwater use for controlled abstraction and ensure access to safer groundwater	Medium term Short term Short term Short term			
	4.6.3 Promote good environmental governance in irrigation for sustainability	a) Develop water charter and ensure its use to protect the interests of both up and downstream communities, pursuant to NWRMP 2013 b) Encourage research and training on safe irrigation practices for all types of irrigation, and ensure their effective and sustained dissemination c) Promote holistic and integrated approach that is multidisciplinary and multi-sectorial to minimize negative impacts of irrigation on ecosystem.	Medium term Medium term Medium term	Ditto	Ditto	Harmonize NESREA regulations and guidelines with Water Resources Act, National Water Resources Bill and National Agriculture Development Policy
4. 7 Improve Capacity for development, accessibility to and uptake of innovations	4.7.1 Develop and maintain the critical human resource and institutional capacity for responsive research and development in the irrigation subsector	a) Create a mechanism for partnership with tertiary institutions, to promote tailor-made manpower development to support irrigation subsector b) Encourage curricula review/ development and targeted research and development addressing innovations and needs of all irrigation categories c) Design and conduct training modules targeted at the different actors d) Collate, package and disseminate research results for adoption by diverse users e) Strengthen the institutional capacities of relevant organizations/agencies for effective and efficient service provisions	Short term Medium term Medium term Short term Medium term	RBDAs IAR TEIs NWRI NAERLS ISMs ADPs WUAs FUAs	NIWRMC NUC ARCN NBTE NOTAP	• Review of NWR Bill to accommodate the capacity for R&D and uptake of the innovations by end-users • Harmonize the Acts of NUC, ARCN, NIWRMC, NBTE, NOTAP, and NWRI to promote synergy and resource optimization
	4.7.2 Upgrade and expand the R&D facilities to lead in the	a) Support the generation and promotion of high quality technologies for irrigation, to improve the productivity	Short term	RBDAs ADPs ISMs	NSE MAN TEIs	• Review of NWR Bill to accommodate the capacity for R&D and uptake of the innovations by end-users

	generation of responsive innovations to support the dynamics of irrigation value chain	of water, land, labour, etc. for increased income and profitability b) Put in place mechanism for quality assurance and quality control in the manufacturing, sales and servicing of irrigation technologies, to support irrigation infrastructure and practices for quality products and services c) Support local production of irrigation equipment and technologies for the market d) Develop code of practice for construction and management of irrigation infrastructure and irrigation practices in Nigeria	Medium term Long term Short term	ARCN NAERLS NCAM NWRI SON	WUAs FUAs SGs LGCs	• Harmonize the Acts of NUC, ARCN, NIWRMC, NBTE, and NOTAP to promote synergy and resource optimization
	4.7.3 Support research agenda on environment, bio-diversity, and resource conservation, to promote sustainable irrigation development and practice in Nigeria	a) Promote the development and utilization of a cost effective and affordable diverse energy sources and their accessibility for profitable irrigation in Nigeria b) Develop and promote water management models for medium and large dams to facilitate water sharing for different uses, including irrigation, water supply, hydro-power generation and environment	Medium term Medium term	NIWRMC NIMET RBDAs ADPs ARCN NAERLS NWRI ECN	SGs NIWA WUAs FUAs FMEnv	• Review of NWR Bill to accommodate the capacity for R&D and uptake of the innovations by end-users • Harmonize the Acts of NUC, ARCN, NIWRMC, NBTE, and NOTAP to promote synergy and resource optimization
4.8 Capacity for data generation/ information, management and use	4.8..1 Establishment and use of an accessible database	a) Put in place robust system for sustainable and responsive data generation, management and use, to guide effective planning, monitoring and evaluation of field situations, to mitigate the effects of calamities and natural disasters; such as flooding, drought, salt-water intrusion, ground water/aquifer pollution, etc. b) Establish a comprehensive database on all aspects of irrigation, and effective data sharing to guide decision making	Medium term Medium term	FMWR RBDAs ADPs NWRI ISMs NIHSA	FMARD NPC NBS NAERLS NIMET	• Review the NWR Bill and the NWRMP to accommodate the issue of quality data and statistics • Review regulation of NIHSA, NBS, NPC, NAERLS, NIMET to promote synergy, resource optimization and high accuracy
	4.8.2 Upgrade and update the instrumentation of field data collection,	a) Develop necessary instrumentation and protocol for field data collection processing and use on a sustainable basis b) Develop the capacity for sustained field data generation using world best practices and standards	Short term Medium term Medium term	FMWR RBDAs ADPs NWRI ISMs FMWR NIWRMC	FAN NBS NIWA NIMET FMICT FMARD FMEnv	• Review the NWR Bill and the NWRMP to accommodate the issue of quality data and statistics • Review regulation of NIHSA, NBS, NPC, NAERLS, NIMET to promote synergy,

		c) Develop the national capacity (human and material), for data sharing and deployment into policy formulation, project design, implementation and monitoring, d) Deploy ICT-based technologies like hydrologic GIS-based models to support field data collection, processing, storage, management, project formulation, design, implementation and monitoring and evaluation	Medium term	ADPs ISMs NIHSA	NBS ARCN	resource optimization and high accuracy • Review regulation to promote standardization of instrumentation, for uniformity, accuracy, effective resource sharing and data/information comparison.
	4.8.3 Upgrade and improve the capacity for effective planning, monitoring and evaluation system	a) Develop the institutional capacity for adopting WBP in planning process, to return to sectorial strategic, operational plans at MDAs, scheme and rural institutions/cooperatives levels b) Institutionalize and enforce regular conduct of oversight functions of the appropriate MDAs on all irrigation and related projects, to promote compliance to standards, quality delivery of goods and services, accountability and sustainability c) Develop strong linkages and synergies with MIS and M&E team to ensure quality conduct of benchmark surveys, mid-term monitoring, and final/post project evaluation/assessment d) Promote compliance with provisions of procurement Act of 2007 in securing the services of M&E services to ensure objectivity and credible outcomes that would guide informed decisions	Medium term Short term Short term Short term	FMWR RBDAs ISMs NPC NWRI NIWRMC	NBS NIWA NIMET NAERLS FMICT FMARD FMEnv NBS	• Review the law to empower National Council on Water Resources to enforce decisions taken on various stakeholders

Legends of timeline: i) Short term-1 to 2 years; ii) Medium term-2 to 5 Years; and iii) long term- above 5 years

References

Abubakar, S. Z. and M. Kuper (eds.) 2003. Promotion of participatory irrigation management (PIM) in Hadejia Valley Irrigation Project (HVIP), Nigeria: Experiences on approaches, lessons and prospects. A synthesis book on pilot action-research project jointly undertaken by NAERLS, CIRAD, HJRBDA, FMWR&RD, and French Embassy in Nigeria between 1996 to 2003. ISBN: 978-060-332-8:Pp 1-320.

Abubakar, S. Z., I. K. Musa, Y. K. Dalha and M. K. Othman (eds.) 2013. Participatory irrigation management in Nigeria: Handbook and user manual. Supported by NAERLS, FMWR, HJRBDA, and CIRAD. NAERLS Press., ISBN: 978-078-919-209-0: Pp 1-94.

Abubakar, S. Z. 2014a. Progress report: Analysis of the irrigation sub-sector and drafting of national policy, strategy and implementation plan (TCP/NIR/3404). Presentation at the inception workshop organized by FAO to sensitize the key stakeholders in the irrigation sub-sector held on 22ndMarch 2014 at Nicon Luxury Hotel, Abuja.

Abubakar, S. Z. 2014b. Analysis of the irrigation sub-sector and drafting of national policy, strategy and implementation Plan. Consultancy report for the project: Development of National Irrigation Policy and strategy for Nigeria (TCP/NIR/3404) submitted by the lead national consultant to Food and Agriculture Organization (FAO) Office, Abuja, Nigeria.

Abubakar, S. Z. 2014c. Draft national irrigation policy and strategies (TCP/NIR/3404): The current situation and issues. Presentation At validation workshop with stakeholders Held On 23rd April 2015 at Conference Centre Mabushi, Abuja.

Benjamin, N. G., Olufemi, O., Moses, A., Ogundele E.O., Taiwo O., Ugwu, C. E., Ilaria Tedesco and Yerima, A. 2014. Cost-benefit analysis of selected policy options and investment for water and irrigation sector in Nigeria. An analysis on three areas and irrigation schemes in Nigeria. FAO commissioned report.

Carmen Bullon. 2014 Summary of legal reports: Development of national irrigation policy and strategy. (TCP/NIR/3404) submitted by the legal officer, FAO legal office to Food and Agriculture Organization (FAO) office, Abuja, Nigeria.

Cullet, Philippe 2014. Water as a human right and economic good. International Environmental Law Research Centre, 22 Government Gazette (March 2014).

Madaki, A. M 2014a. Review of the legal and regulatory framework for irrigation and water resources in Nigeria. Consultancy report for the project: Development of national irrigation policy and strategy for Nigeria (TCP/NIR/3404) submitted by the national legal consultant to Food and Agriculture Organization (FAO) office, Abuja, Nigeria.

Madaki, A. M 2014b. Findings and recommendations of the legal and regulatory framework of irrigation and water resources in Nigeria. Presentation at validation workshop with stakeholders held on 23rd April 2015 at Conference Centre Mabushi, Abuja.

María E. Milanés Murcia., 2014. Development of national irrigation policy and strategy. Consultancy report for the project: Development of national irrigation policy and strategy for Nigeria (TCP/NIR/3404) submitted by the international legal consultant to Food and Agriculture Organization (FAO) office, Abuja, Nigeria.

Martins O. I., 2014. Assessment of technical and institutional capacities for irrigation development in Nigeria. Consultancy report for the project: Development of national irrigation policy and strategy for Nigeria (TCP/NIR/3404) submitted by the technical and institutional national consultant to Food and Agriculture Organization (FAO) office, Abuja, Nigeria.

Othman, M. K. 2014. Assessment of technical capacities for irrigation development in Nigeria. Consultancy report for the project: Development of national irrigation policy and strategy for Nigeria (TCP/NIR/3404) submitted by the irrigation engineering national consultant to Food and Agriculture Organization (FAO) office, Abuja, Nigeria.

Perry, C.J. Rock,Michael and Seckler, D. 1997. Water as an economic good: A solution, or a problem? International Irrigation Management Institute (IIMI), 14 Research Report (1997).

Sulaiman, A. 2014. Analysis of the irrigation sub-sector and drafting of national policy, strategy and implementation plan. Consultancy report for the project: Development of national irrigation policy and strategy for Nigeria (TCP/NIR/3404) submitted by the agricultural economist and sociologist national consultant to Food and Agriculture Organization (FAO) office, Abuja, Nigeria.

Draft National Irrigation Policy for United Republic of Tanzania with technical support of FAO. 2009.

Draft National Irrigation Policy, Strategies and Regulatory Measures with the technical support of FAO. 2006.

The New National Agricultural Policy, 2001

Promotion of Participatory Irrigation Management in Nigeria: Experiences on approaches, lessons and Prospects, 2003

New approved policy on the operations of River Basin Development
Authorities (RBDAs), 2002

2004 Draft Irrigation Policy and Strategy,

2006 Draft National Policy on Irrigation and Strategy for Nigeria

WB Appraisal Reports on NFDP I, 2000 and II, 2010

WB/FGN Implementation Completion Reports of NFDP I, 1999, and II 2009

WB Implementation Status & Results: Report No ISR13709, March 2014

Draft Policy on Private Participation in Irrigation Development and Management, 2006

MDG Program 2009

National Agricultural Transformation Agenda 2012

First Draft of National Integrated Infrastructure Master Plan 2013

First Final of Nigeria National Water Resources Master Plan 2014

Nigerian National Environmental Policies, (Revised Edition 1999)

Nigerian Vision 20:20:20
Water Resources Act Cap. W 2 L.F.N. 2004, Sections 1(a), (b), 4 and 5.
River Basins Development Authorities Act Cap R 9, L.F.N. 2004.
National Water Resources Institute Act Cap N 83 LFN, 2004.
Water National Policy, 2004 at 23.
World Bank, Transforming Irrigation Management in Nigeria Project, Report No: PAD 1001, Agriculture Rural Development and Irrigation, Sustainable Development Department, Country Management Unit AFW2, Africa Region, May 2014.
United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, UN Doc. A/RES/51/869, 21 May 1997, 36 ILM 700 (1997).
Water Resources Act No. 101 (1993) Schedule (Nigeria).
National Water Resources Institute Act Cap. N83 (2004) (Nigeria).
River Basins Development Authorities Act No. 35 (1987) (Nigeria).
River Niger Transit Act No. 24 (1924) (Nigeria).
Niger-Delta Development Commission (Establishment, etc.) Act No. 6 (2000) (Nigeria).
The Oil Mineral Producing Areas Commission Act (1998) Repealed (Nigeria).
The National Inland Waterways Authority Act No. 13 (1997) (Nigeria).
Environmental Impact Assessment Act No. 86 (1992) (Nigeria).
Land Use Act No. 6 (1978) (Nigeria).
Draft National Irrigation Policy at 9.
Nigerian Minerals and Mining Act, No. 50 (2007) (Nigeria).
National Environmental Standards and Regulations Enforcement Agency (Establishment) Act, No. 25, (2007) (Nigeria).
Harmful Waste (Special Criminal Provisions, etc.) Act, No. 42 (1988) (Nigeria).
National Environmental (Sanitation and Wastes Control) Regulations, Official Gazette – Federal Republic of Nigeria No. 60, Vol. 96, (2009).
National Environmental (Watershed Mountainous, Hilly and Catchment Areas) Regulations, Official Gazette – Federal Republic of Nigeria No. 59, Vol. 96, (2009).
National Environmental (Wetlands, River Banks, and Lake Shores) Regulations, Official Gazette – Federal Republic of Nigeria No. 58, Vol. 96, (2009).
Environmental Impact Assessment Procedural Guidelines Decree 86, Federal Environmental Protection Agency (1992).
Infrastructure Concession Regulatory Commission (Establishment, etc) Act, No. 18 (2005) (Nigeria).
Nigerian Co-operative Societies Act, No. 90 (1993) Chapter N98 (Nigeria).
National Water Policy (2004) (Nigeria).
Fourth Draft National Water Resources Bill, 2013 at section 39.
National Water Policy (2004) (Nigeria)..
The National Policy on Public Private Partnership, 2008 (Nigeria) .
The New Nigerian Agricultural Policy, 2001.
Draft Policy on Private Sector Participation in Irrigation Development and Management (Nigeria) at 2.
FAO, Land and water integration and river basin management, conjunctive use of surface and groundwater. Available at http://www.fao.org/docrep/v5400e/v5400e0c.htm
Fourth Draft of the National Water Resources Bill, March 2013 see p. 48 Part XIII section 133.

Infrastructure Concession Regulatory Commission (Establishment, ETC) Act No. 18, (2005) (Nigeria).
Draft Policy on Private Sector Participation in Irrigation Development and Management at 8 (Nigeria).
National Environmental (Mining and Processing of Coal, Ores and Industrial Minerals) Regulations, 2009
National Environmental (Access to Genetic Resources and Benefit sharing) Regulations, 2009
National Environmental (Ground and Surface Water Quality Control) Regulations, 2010
National Environmental (Coastal and Marine Area Protection) Regulations, 2010
National Environmental (Soil Erosion and Flood Control) Regulations, 2010
National Environmental (Desertification and Drought Mitigation) Regulations, 2010
National Environmental (Control of Bush or Forest Fire and Open Burning) Regulations, 2010
National Environmental (Protection of Endangered Species in International Trade) Regulations, 2010.