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NSSP Report 4

# Environmental Considerations in Nigerian Agricultural Policies, Strategies, and Programs

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Nigeria Strategy Support Program (NSSP)

Report No. NSSP 004

November 2009

**IFPRI-ABUJA**

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# **THE NIGERIA STRATEGY SUPPORT PROGRAM (NSSP)**

## **BACKGROUND PAPERS**

### **ABOUT NSSP**

The Nigeria Strategy Support Program (NSSP) of the International Food Policy Research Institute (IFPRI) aims to strengthen evidence-based policymaking in Nigeria in the areas of rural and agricultural development. In collaboration with the Federal Ministry of Agriculture and Water Resources, NSSP supports the implementation of Nigeria's national development plans by strengthening agricultural-sector policies and strategies through:

- Enhanced knowledge, information, data, and tools for the analysis, design, and implementation of pro-poor, gender-sensitive, and environmentally sustainable agricultural and rural development policies and strategies in Nigeria;
- Strengthened capacity for government agencies, research institutions, and other stakeholders to carry out and use applied research that directly informs agricultural and rural policies and strategies; and
- Improved communication linkages and consultations between policymakers, policy analysts, and policy beneficiaries on agricultural and rural development policy issues.

### **ABOUT REPORTS**

The Nigeria Strategy Support Program (NSSP) reports contain information that has been gathered and discussed but is not analytical. They are circulated in order to stimulate discussion and critical comment.

This paper received support from the Agricultural Policy Support Facility (APSF), funded by the Canadian International Development Agency (CIDA).

# **Environmental Considerations in Nigerian Agricultural Policies, Strategies, and Programs**

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## **Introduction**

Agriculture is the major sector upon which the majority of Nigeria's rural poor depend on for their livelihood. Over 70 percent of the active labor force is employed in agriculture (World Bank 2007). The federal government of Nigeria (FGN) has identified agriculture as the key development priority in its efforts to halve poverty by 2015 and diversify the economy away from the oil sector.

The FGN is designing strategies to increase agricultural production, processing, and marketing. Some of these are tied to the National Economic Empowerment and Development Strategy (NEEDS), which the government designed in 2004 to reduce poverty and empower the poor. Given the importance of agriculture in poverty reduction, NEEDS sets out a number of qualitative performance targets that were to be achieved by 2007. These include 6 percent annual growth in agricultural export and a drastic reduction in food import from 14.5 percent of total imports to 5 percent. The "Seven Point Agenda" of the present administration specifies "food security" as one of the priorities in the country's "Medium Term Development Plan and Vision 20: 2020."

It is important to look at the evolution of Nigerian environmental policy before establishing its links to agricultural policies. The illegal dumping of toxic waste at the Koko Port in the then-Bendel State (now Delta State) culminated in the creation of the Federal Environmental Protection Agency (FEPA) through Decree 58 of 1988, as amended by Decree 59 of 1992. The states then followed by creating agencies dealing with environmental protection. In 1999, all units and departments in the different federal agencies that deal with the environment, including FEPA, were pooled to form the Federal Ministry of Environment, Housing, and Urban Development (FMEH&UD) in order to eliminate duplication. The Ministry is therefore made up of following technical departments

- Environmental Assessment Department
- Erosion Flood Control and Coastal Zone Management Department
- Pollution Control and Environmental Health Department
- Forestry Department
- Drought and Desertification Amelioration Department.

It is important to note that the forestry and the erosion, flood control and coastal zone management departments came out of the then ministry of agriculture and water resources.

The Federal Ministry of Agriculture and Water Resources (FMAWR) formulates policy aimed at developing the agricultural sector. Its stated goals are to foster an agricultural sector "with reduced drudgery," and a "small effective workforce ensuring national food security and meeting the industrial raw material and export needs of the nation" (Servicom Policy).

## **Nigeria's Environmental Challenge**

In 1990, the World Bank listed three primary environmental problems as priorities in Nigeria: soil degradation, water contamination and deforestation (World Bank 1990). It also noted eight more problems: gully erosion, fisheries loss, coastal erosion, wildlife and biodiversity loss, air pollution, unchecked spread of water hyacinth, global warming, and ozone layer depletion.

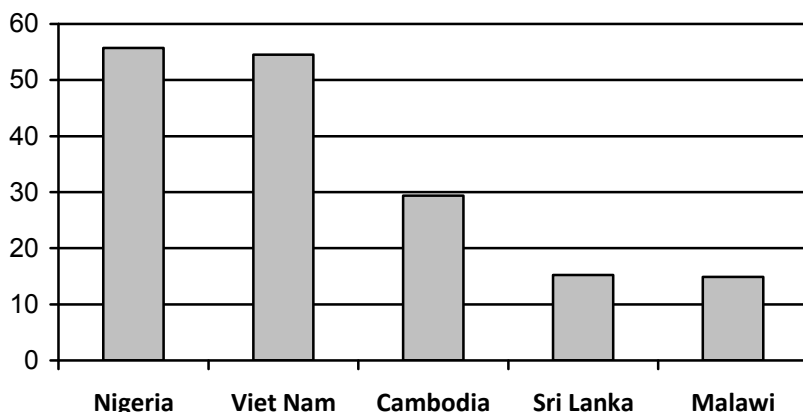
In 2008, during Nigeria’s National Environmental Summit, the FMRH&UD listed the key environmental challenges as

- deforestation and land degradation,
- biological diversity depletion,
- drought and desertification,
- flooding,
- erosion,
- pollution (marine coastal, industrial),
- urban decay and municipal waste disposal, and
- climate change and other energy-related problems.

### Deforestation

The deforestation rate of Nigeria’s primary forest ranks among the highest in the world, as shown by Figure 1. Also, land use estimates between 1976 and 1995 show that undisturbed forest cover in Nigeria decreased by 53.5 percent from 25,951 square kilometers in 1976 to 12,114 square kilometers in 1991 (FORMECU 1998).

Figure1: Worst Deforestation Rate of Primary Forest, 2000-2005 (percent of forest lost)

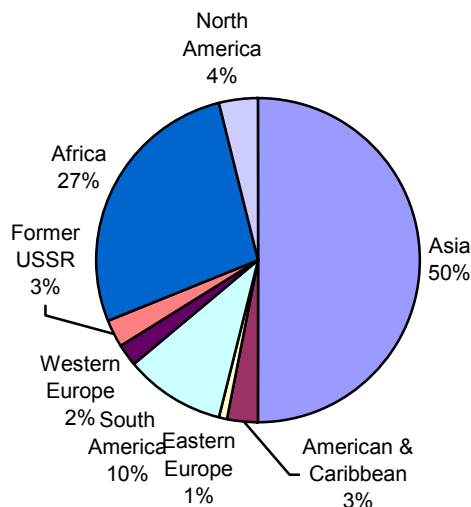


Source: Mongabay 2006

Currently over 90 percent of Nigeria’s rural population depend solely on forest resources for livelihood and economic survival (Nigeria, FMEH&UD 2008). The indiscriminate conversion of the forest for agricultural use and fuel wood extraction is rampant. Grazing animals convert the forest in an intensive manner and bush burning is persistent. As a result, the fallow periods allowed in shifting cultivation are reduced or completely absent in some cases. The use of marginal land for agricultural purposes is rising. The forest is also being lost to logging. However, the chief use of the world’s wood is for fuel. (Matthews 2001). Low income nations depend most heavily on wood for fuel (Figure 2). Five countries—Brazil, China, India, Indonesia, and Nigeria—account for about half the firewood and charcoal produced and consumed each year (Matthews 2001). In a survey carried out by the Development Association for Renewable

Energies (DARE)<sup>1</sup> in Kaduna, Nigerian in 2008, 65 percent of urban respondents use wood for cooking compared with 95 percent of rural respondents. According to Yahaya Ahmed, the engineer who heads the association, those surveyed included people who use fuel wood exclusively and those who use it as a supplement.<sup>2</sup>

**Figure 3: Global Woodfuel Production, 1998**



Source: FAOSTAT

Note: Woodfuel production in 1998 totaled 1.8 billion cubic meters

### ***Drought and desertification***

Desertification as defined in Chapter 12 of the United Nations' Agenda 21 and in the International Convention on Desertification is "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climactic variations and human activities." It is accompanied by a reduction in the natural potential of the land and depletion in the surface and ground-water resources. It has serious negative repercussions on the living conditions and the economic development of the people affected by it. Drought occurs frequently in the areas affected by desertification. In northern Nigeria the main ecological types are sudan, savanna and sahel vegetation. These zones are most vulnerable to climatic and human pressures. The National Action Programme to Combat Desertification in Nigeria estimate, about 50 percent and 75 percent of Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Yobe, Sokoto, and Zamfara states are seriously affected by desertification. These states, with a combined population of about 46 million people, account for more than 33 percent of the country's total

1 DARE is a nongovernmental organization based in Kaduna, Nigeria that promotes renewable energy resources. For more information see [www.dareworld.org](http://www.dareworld.org)

2 DARE Executive Director Yahaya Ahmed discussed the survey at an exhibition on the Save-80 Stove @ at the National Conversation on Climate Change organized by Climate Change Network Nigeria (CCN Nigeria) in collaboration with the Special Climate Change Unit (SCCU) of the Federal Ministry of Nigeria held at the Gubabi Royal Hotel, Zone 5, Abuja, on September 23, 2009.

population (nigeriamasterweb.com) and about 35 percent of the country's land area. Experts have not yet established the exact extent and severity of Nigeria's desertification, nor have they documented its rate of progression. However, the National Action Programme to Combat Desertification in Nigeria estimates a rate of 0.6 kilometers per year (Nigeria 2000).

Although northern Nigeria constitutes the country's "grain basket," entire villages and major access roads have been buried under sand dunes in the extreme northern parts of Katsina, Sokoto, Jigawa, Borno and Yobe states. The FMAWR selected the states of Borno, Katsina, Sokoto and Yobe to be the recipients of the Food and Agriculture Organization of the United Nations' (FAO) program on input supply to vulnerable populations, which part of the government's "Initiative on Soaring Food Prices "(I.S.F.P). The program pinpointed this region because it has Nigeria's most resource-poor farmers. Furthermore, desertification has shown to lead to the migration of populations and exacerbates resource-related conflicts that threaten national or regional security. Population pressures from overgrazing and overexploitation of marginal lands have aggravated the problem and human and livestock populations emigrating from the frontline states are absorbed by buffer states such as the Federal Capital Territory (FCT) and Plateau, Taraba, Niger, Kwara and Kaduna. Studies estimate that desertification threatens about 10–15 percent of the land in these buffer states (Nigeria, Federal Ministry of Environment 2005).

### ***Erosion & Flooding***

Erosion is one of the most critical environmental problems affecting parts of the country. The National Erosion and Flood Control Policy in 2005 estimated that 10 percent of the country's land mass has severe erosion problems and that more than 50 percent of the affected areas were in Nigeria's southeast (Environmental Resources Management 2009).

With increasing human activities and a number of natural forces, coastal and marine erosion and land subsidence have been recorded in the coastal areas of Lagos, Ogun, Ondo, Delta, Rivers, Bayelsa, Akwa Ibom and Cross River states. This erosion and subsidence has resulted in oceanic surging (Vision 2010 Committee, 1997).

Flooding is common in many parts of Nigeria. Heavy rainfall and poor watershed management are two major causes. Moreover, human activities such as land clearance for agricultural purposes, poor dam construction, and deforestation may also contribute to the problem. The most flood-prone areas in Nigeria include

- low-lying coastal areas in the south where annual rainfall is quite heavy such as Calabar, Warri, Port-harcourt and Lagos,
- flood plains of major rivers such as the Niger, Benue, Gongola, Sokoto, Hadejia, Kastina Ala, Donga, Kaduna, Gurara, Ogun and Anambra, and
- flat, low-lying areas around and to the south of Lake Chad, which may be flooded during and even a few weeks after the rains.

Erosion of various types, including sheet, rill, and gully, is affecting nearly all parts of Nigeria. Gully erosion is most visible in Anambra, Enugu, Imo, Ekiti, Gombe and Kogi states. By 1997, the government estimated that there were more than 2000 active gully erosion sites spread across the country. Sheet erosion is not prominently visible whenever it occurs, but it removes the surface's solid layers. It is caused by rainfall runoff down slopes and results in soil

degradation and impoverishment, pollution and so on. Sheet erosion occurs in Anambra, Imo Plateau and Sokoto states as well as Kwara state. Generally, erosion leads to the loss of farmlands, forest resources, and agricultural outputs. Also, land is lost that could be used for other purposes.

### ***Climate Change***

Climate change is a serious environmental threat. Agriculture is sensitive to changes in climate. Sustainable agricultural practice as well as sustainable forest management can help address climate change. Notable evidence of climate change in Nigeria includes

- the drying up of most lakes and natural ponds in Nigeria, such as Lake Chad, in a period of less than 30 years,
- the disappearance of some species of flora and fauna,
- Sahara desert encroachment speed at the rate of 0.6 kilometers per year.
- Flooding of coastal areas like the Bar Beach in Lagos.

A United Kingdom Department for International Development (DFID) report (2009) on the impact of climate change on Nigeria's economy indicates that the country is likely to be one of the most negatively affected countries in the world as a result of climate change. The reasons given are

- its low lying coastline, which is highly populated with a heavy concentration of important industry and infrastructure, and
- the vegetation of the northern part of the country is Sahel, vulnerable to drought and desertification (Environmental Resources Management 2009).

Nigeria is not a major contributor of greenhouse gas emissions when compared with the developed, industrialized countries. But the country does supply oil and gas to countries with high greenhouse gas emissions. This exploitation of gas and oil for export from the Niger Delta contributes to global warming, damages the environment, and hurts communities nearby. The oil fields contain crude oil mixed with very large amounts of gas and the oil is separated from the gas by burning off the gas. Such gas flaring is debilitating to the sensitive ecosystem of the Niger Delta with effects like acid rain, burst oil pipelines, unwholesome noise, high temperatures, retarded crop yield, corroded roofs and so on. The gas flared in Nigeria contains high amounts of methane and carbon dioxide (major greenhouse gases). This flaring produces more emissions than the rest of Sub-Saharan Africa combined.

### **Scope and objectives of this study**

The objectives of this study are to:

- assess how environmental information is considered in the formulation of agricultural policies, strategies and programs,
- gather Nigerian environmental policy and strategy documents and relevant literature on research linking environment and agriculture,
- identify available environmental data in regards to the environment and agriculture,
- identify gaps in the available data would be identified, and
- identify Nigeria specialists in the domain of agriculture and the environment who might serve on a relevant technical committee as members or research experts.



A literature search of policies, strategies, and program documents on the environmental aspects of Nigerian agriculture, poverty, nutrition, and food security policies was conducted. I also tried to identify existing environment-related data that can form the basis for policy analysis.

## **The process of policy formulation in Nigeria's agricultural sector and environmental issues**

The formulation of agriculture policy in Nigeria is a process in which the government receives input from stakeholders' workshops and interactions. A series of these interactions produces policy documents for the consideration of the national council for the sector. The Federal Minister of Agriculture and Water Resources is the chairman of the National Council for Agriculture and state commissioners are the members. The chairman and members present consider memoranda that, if approved, are forwarded to the Federal Executive Council (FEC). The FEC is presided over by the ministers of the different sectors of the economy. The FEC passes bills on to the legislature for consideration or issues directives as the need arises. The legislature also conducts public hearings to gather public opinion before discussion of the legislation. Although some units and departments of the FMAWR were transferred to the FMEH&UD in 1999, the two ministries help each other gather input for policy formulation. However, the link between the two is not strong, as this paper will discuss later.

Annex 2 of the report shows the structure (Organogram) of the FMAWR as approved in May, 2007. There are eight departments:

- Dams, Irrigation and Drainage
- Water Supply, Quality control and Inspectorate
- Agriculture and Rural Development.
- Livestock
- Fisheries
- Planning, Policy and Statistics (PPAS)
- Human Resources
- Finance and Account

Each department is headed by a director who is responsible to the permanent secretary (PS), the chief accounting officer, and the highest official in the ministry. Under the PS there are also special units that perform auxiliary duties. These units specialize in law, protocol, reforms, internal audits, and information and communication technology (ICT). Others disseminate information and verify stocks and stores.

As a relatively large ministry, FMAWR has two ministers. They are political office holders appointed by the president. One of the ministers is junior and designated as the minister of state. Both ministers supervise the activities coordinated by the PS and rely on his or her technical expertise and advice when making decisions.

Generally, the departments in each ministry are of two types:

1. Common service departments, namely
  - a. Human resources departments, which deal with personnel and related matters

- b. Finance and accounts, which deal with financial records, disbursement and so on
  - c. Planning, Policy and Statistics, which serve as a data link for technical information
2. Technical departments, which deal with issues related to a particular sector, such as in the case of agriculture and water resources:
- a. Dams and irrigation and drainage,
  - b. Water supply quality control and development,
  - c. Livestock, and
  - d. Fisheries.

All the federal ministries have policy planning and research (PPR) departments that store data from the technical departments. This information is used for policy formulation among other things. The PPR departments are usually asked by the different ministries/agencies for input into policy formulation into the later operations, but they may not have the required information from the technical department. The routine duties of the respective technical departments do not seem to include regular information dissemination to the PPRs. This means the overall process is marred.

My investigation found that such information is rarely forwarded to PPR departments until a request is made to the technical departments. There may be more than one technical department within a ministry dealing with different aspects of any one issue. For instance, land degradation concerns; drought and desertification amelioration; erosion, flood control and coastal zone management are all dealt with by different departments of the Federal Ministry of Environment. Other departments, like forestry, which deal with deforestation, also have a role to play.

If ministries can rely more upon their PPR departments to provide them with data on demand, then policy formulation will be enhanced on issues—such as agriculture and the environment—that straddle more than one sector. It is important to note here, though, that inter-ministerial committees tackle further implementation of policies on cross sectoral matters.

Policymakers and implementers surveyed by the University of Ibadan in 2003 judged environmental policies to be weak. The survey examined the perceived effectiveness of policies and regulations in different areas of agriculture. Table 1 reports the survey's results.

**Table 1: Effectiveness of policies, regulations, and institutions on Nigerian agriculture**

| Policies and Regulations                                       | Rank | Position |
|--|------|----------|
| Agricultural input supply to farmers                           | 2.83 | 4        |
| Agricultural input demand by farmers                           | 2.17 | 2        |
| Foreign investment in agriculture                              | 8.83 | 20       |
| Domestic Investment in agriculture                             | 4.00 | 5        |
| Commercialization of agriculture                               | 6.17 | 14       |
| Agricultural production for domestic market                    | 1.83 | 1        |
| Agricultural production for export market                      | 5.33 | 8        |
| Agricultural commodity storage                                 | 7.17 | 18       |
| Agricultural commodity processing                              | 6.17 | 15       |
| Agricultural commodity transport, distribution and Information | 6.50 | 16       |

|  |      |    |
|--|------|----|
| Domestic agricultural commodity trade            | 2.67 | 3  |
| Agricultural commodity export                    | 5.83 | 11 |
| Agricultural commodity utilization               | 5.50 | 9  |
| Agricultural research and technology development | 4.33 | 7  |
| Agricultural technology adoption                 | 4.00 | 5  |
| Food security                                    | 5.50 | 9  |
| Poverty reduction                                | 5.83 | 11 |
| Closing gender gap                               | 6.00 | 13 |
| Protection / welfare of vulnerable groups        | 6.67 | 17 |
| Sustainable environmental management             | 7.5  | 19 |

Source: Field survey, February–March 2003; Olayemi et al (1994).

Note: The lower the value, the better

The study lists the following as factors responsible for the ineffectiveness of policies and regulations, especially in the downstream segment of agriculture:

- instability of political climate,
- insecurity of investment, and
- high production cost and lack of storage facilities for export crops

Conversely, the factors responsible for effectiveness of policies and regulations are listed below:

- High demand for agricultural produce
- Availability of improved technology
- Efficient dissemination of information by the agriculture development program (ADP )
- Value added leading to improved income

The following factors apply partly to environmentally-related agricultural policies and regulations as well but in a very complex way. The issues involve social, cultural, political, and economic factors coupled with technical and scientific information within the environmental protection and agricultural sectors. Specifically, the lack of integration of the available indigenous knowledge into the formulation and enforcement of policies is a serious problem.

Since the creation of the FMEH&UD, the link with agriculture has been very weak. Each ministry seems to focus on its sector's goals and mission without concern for issues that cross sectors. Sometimes, three or more agencies are working on an issue, each performing roles that are not well coordinated. For instance, the following agencies all work on agricultural biotechnology issues in this haphazard way:

- Federal Ministry of Environment,
- Federal Ministry of Science and Technology—National Biotechnology and Development Agency, and
- Federal Ministry of Agriculture and Water Resources

## **Nigeria Policy Documents on the Environmental**

The FMEH&UD's main policy document—the National Policy on Environment—was prepared in 1989 but revised in 1999. The revised version has not been approved for implementation. Below is a comprehensive list of specific policies and plans defined in the document:

1. National Policy on Drought and Desertification 2000, Drought Preparedness Plan (not yet approved)
2. National Policy on Erosion, Flood Control and Coastal Zone Management
3. National Policy on Environmental Sanitation, National Environmental Sanitation Action, Nation Policy Guidelines on:
  - a. solid waste management;
  - b. market and abattoir sanitation;
  - c. excreta and sewage management;
  - d. sanitary inspection premises; and
  - e. pest and vector control.
4. National Policy on Forests
5. National Biodiversity Strategy and Action Plan
6. State-of-the-environment reporting (the first such report, which will be used for policy monitoring, is under preparation).

There are legal and regulatory measures that have been established as well. These include the:

1. Federal Environmental Protection Agency act repealed in 2007 by the National Environmental Standards and Regulations Enforcement Agency (NESEREA) Act of 2007, which is being developed into the National Environmental Management Bill.
2. Environmental Impact Assessment Act retained as E12LFM 2004 (sets out the general principles, procedures and methods of environmental impact assessment in various sectors).
3. Harmful Waste Act retained as H1LFN 2004 (prohibits the carrying, depositing and dumping of harmful waste on Nigeria's land and territorial waters).
4. National Park Service Act (for conservation and protection of natural resources)
5. Endangered Species Act (Conservation of wildlife and protection of threatened and endangered species).
6. National Oil Spill, Detection and Response Agency (NOSDRA) Act.
7. National Environmental Standards and Regulations Enforcement Agency (NESREA) Act
8. Other laws that indirectly affect the ministry's activities include
  - a. Water Resource Act and
  - b. Agriculture (Control Importation) Act.

Furthermore, Nigeria is party to a number of multilateral environmental agreements (MEAs), which needs to be internalized into the nation's agenda and strategies:

1. Convention on Biological Diversity
2. Biosafety Protocol to the Biodiversity Convention (the Cartagena Protocol)
3. Framework Convention on Climate Change (UNFCCC)

4. Convention to Combat Desertification
5. Convention for the Protection of the Ozone Layer (1985)
6. Convention on International Trade of Endangered Species (CITES)

### **Available environmental data with regard agriculture in Nigeria**

Environmental data imply a set of variable indices on the state of the physical, biological, and human components of a specific location per period of time. These include

- type of changes over time,
- degree of changes,
- source and cause of changes,
- effect of the observed changes on the environment and human wellbeing, and
- policy options for effective management.

The Environmental Performance Index 2008 (BETA) defines agriculture to include “annual and perennial crop production and livestock production in both intensive and extensively managed systems.” The index identified the complete elements of agriculture as

- protecting natural habits in agricultural landscapes,
- environmental management for agricultural production needs,
- sustainable human livelihoods from agro-ecosystems, and
- environmental management of the full food-fiber value chain,

According to the report, the key indicators to use in developing environmental parameters for agriculture and the ones that reflect policy concerns are:

- degradation of land
- pollution of water and air green house gas emissions
- soil degradation,
- biodiversity, and
- land use change.

The report identified the following indicators for future development of the data set:

- crop intensity,
- irrigation stress,
- agricultural subsidies,
- pesticide regulation, and
- burned land area.

For both agricultural planning and production, necessary environmental data will include metrological data, that is, the sort of climate data required to plan farming activities. This type of planning might involve the timing of planting, harvesting, and farm chemical applications, the types of crops planted, irrigation scheduling and so on.

## **Environmental Information for Agricultural Policy Analysis in Nigeria**

The environmental information below (1-10) was generated as inputs for the formulation of Nigerian agricultural policy:

1. Rate of desertification
  - a. rate of desert recovery effort
  - c. proportion of land and population affected by desertification
  - d. existing institutions as they concern desertification and drought control
2. Land-use statistics
  - a. soil pollution types
  - b. sites and rates production of arable land permanent cultivations
  - c. changes in land use
  - d. prevalent agricultural practices
3. Protected areas and forestry
  - a. intensity of forest exploitation (total of forest withdrawal/natural annual growth of reforestation)
  - b. land area covered by forest
  - c. existence and level of management of forest development units
  - d. existence and level of management of protected areas
  - e. degree of control land conversion trends
  - f. existence of plant committees or reforested surface areas (natural and artificial reforestation) or both.
4. Climatology and evolution of preparation in time and space
  - a. agrodemographic index,
  - b. agroclimatic zones
  - c. vulnerability of populations to climate changes
  - d. extent of flooded area
5. Erosion and flooding
  - a. rate of water erosion
  - b. rate of wind erosion
  - c. identification of agricultural flood-prone areas
  - d. monitoring of relevant parameters in the areas
6. Agrochemical effects
  - a. existence of indigenous chemical blends
  - b. quantity of chemical in use
  - c. specific fertilizers, pesticides in use
  - d. phosphate content of the water in agricultural zones
  - e. nitrogen level of water
  - f. pesticide level of water
  - g. crop yield and productivity in relation of chemical use
  - h. source of agro-chemical
  - i. available pricing
7. Livestock
  - a. livestock census
  - b. productivity of different husbandry practices
  - c. pollution rates and remedial situations
  - d. miscellaneous issues
8. Agriculture-population density

- a. birth rate
  - b. financial turnover generated by tourism and relevant effect where it exists,
  - c. rate of collection of taxes and fees associated with exploitation of agricultural resources
  - d. area of land development with carbon credits and the methods employed to control deforestation
9. Institutional frameworks
- a. degree of application of environmental and socioeconomic regulatory framework
  - b. survey of the environment and agriculture sectors
  - c. hydro-electric uses and energy
  - d. number of dams
  - e. land area dedicated to energy crops (bi-carbon)
  - f. demand for fuel wood
  - g. proportion of renewable energies in primary energy consumption
  - h. rural electrification rate
  - i. number of projects and programs promoting renewable energies
  - j. rate of distribution of energy efficiency and materials and equipment
10. Agroclimatic statistics
- a. rainfall data across agro-vegetation zone
  - b. temperatures
  - c. humidity
  - d. sunshine-light and photo periods
  - e. intensity and irradiation
  - f. daily duration in the different seasons
  - g. cloud cover

### **Institutions responsible for environmental data in Nigeria**

In Nigeria, the collection of environmental data cuts across the activities of many agencies, including the federal and state environment ministries, the National Bureau of Statistics, the Nigerian Meteorological Agency, and so on. Usually the data are collected and contained in technical reports that are unlikely to be comprehensively collected and analyzed.

#### ***The Federal Ministry of Environment***

The ministry is involved in the international initiative started by the United Nations Environment Programme and known as the INFOTERRA network. This network exists for the exchange of environmental information and gathers data from 177 countries, including Nigeria. The ministry identified about 80 desk officers for INFOTERRA to facilitate public access to environmental information. These desk officers are located in the ministry's technical department, parastatals/field offices, and state environmental ministries/agencies across the nation. Unfortunately a lack of necessary funds has stalled this initiative, which is the major thrust of the ministry's data collection effort. If the funds become available, these officers will collect and disseminate environment data and information nationwide. They will also work with the field officers of the National Bureau of Statistics in the 36 states and the Federal Capital Territory.

#### ***National Bureau of Statistics***

This office collaborates with other institutions to fulfill its mandate, which is to provide comprehensive, timely, relevant, responsive, and customer-focused statistical information about

the condition of Nigerians and their social and economic activities. According to the staff I met in the course of this study, environmental data are generated from information gathered by the FMEH&UD and related state agencies. These institutions therefore are the main sources of the data. There is no evidence of a continuous and strong link between them and activities seems to be on the basis of special projects and assignments. A major effort of the office in collecting environmental data is the publication titled, ``Nigerian Environment Statistics (Climate and Natural Disaster Statistics) 2004-2007.'' Data for the work were obtained from NIMET.

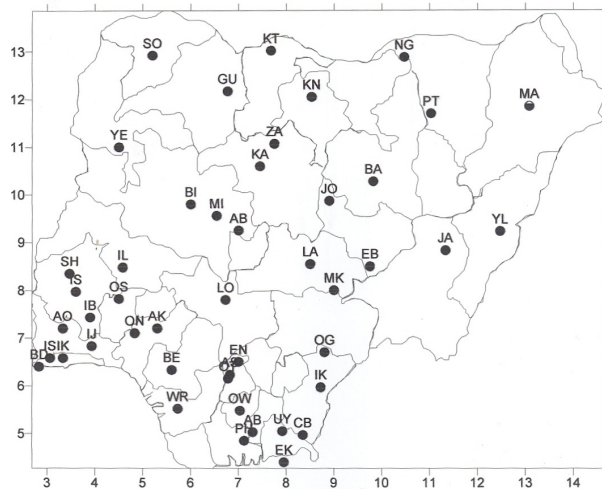
***Nigerian Meteorological Agency (NIMET)***

This agency is generally responsible for providing weather, climate, and water information and services. The federal government created it in 2003 and its responsibilities cut across various sectors. According to the statutes that set it up, is to

“Project, prepare and interpret government policy in the field of meteorology; collect, process data, issue weather forecasts and give early warning for safe operation of aircrafts, ocean-going vessels, national food production, drought, desertification, natural disaster management, hydrological and water resources activities, environmental pollution, ozone concentration and bio-meteorology for climatic and human health activities.”

The agency has 54 weather stations spread across the country (Figure 3). They provide data on rainfall, temperatures, solar radiation, wind speed and direction, and other meteorological elements. The data can be presented over different time scales, such as weekly, ten-day, monthly, seasonal, and yearly. According to the agency’s officers, data are available for as long ago as 52 years, when some of the stations were in existence.

**Figure 3: Nigerian Metrological Agency Station Network**



Source: Collected from NIMET office during visit.

For a fee, the agency will provide data in response to requests made to the director general. The requests must specify what data are required and for what length of time. The agency delivers the data after it receives payment.



### ***Federal Ministry of Agriculture and Water Resources***

Two major areas of focus in this study are the agricultural research institutions and the river basin development authorities. With regard to agriculture, the points of reference for environmental information and data collection are basically the agricultural research institutions. Agricultural research in Nigeria is coordinated, supervised, and regulated by the Agricultural Research Council of Nigeria (ARCN), which was established in 1999. However, the council did not start operation until 2007. According to the Nigeria Food Security Document the member institutions are

- national agricultural research institutions, of which there are 18,
- universities of agriculture, of where there are three
- national colleges of agriculture, of which there are 19
- faculties of agriculture, of which there are 40
- faculties of veterinary medicine, of which there are eight

The efforts of the research centers to link agricultural environmental issues merit study but are beyond the scope of this report.

One major agricultural development of significant environmental consequence was the establishment of River Basin Development Authorities (RBDAs). There are currently a number of RBDAs, including:

- Anambra—Imo RBDA in Enugu.
- Benin—Owerri RBDA in Akure
- Chad—RBDA in Maiduguri
- Cross River RBDA in Calabar
- Hadejia Jama'are RBDA in Kano
- Lower Benue RBDA in Makurdi
- Lower Niger RBDA in Lokoja
- Niger – Delta RBDA in Asaba
- Ogun – Osun RBDA in Abeokuta
- Upper Benue RBDA in Yola
- Upper Niger RBDA in Minna
- Sokoto Rima in Sokoto.

The range of functions spelled out for the RBDAs in 1976 was extraordinarily wide. They include: irrigation, watershed management, flood control, pollution control, fisheries and navigation, seed multiplication, livestock breeding, and food processing. In real practice, however, the RBDA have focused essentially on irrigation schemes. These consequences are beyond the scope of this study but merit scrutiny. The World Bank has sponsored several of Nigeria's river basin development projects including:

- National Fadama Development Project 1, which developed low-lying alluvial plains for irrigation,
- National Fadama Development Project II,

- the African Stockpile Project, which aimed to put a sustainable pesticide management program in place; and
- an effort to reverse land and water degradation trends in the Lake Chad basin.

The World Bank has institutionalized environmental safeguards for its projects including

- OP/BP 5.01 – Environmental Assessments
- OP/BB 4.04 – Natural Habitats
- OP/4.04 – Pest Managements
- OP/PB 4.12 – Involuntary Resettlement
- OD 4.20 – Indigenous Peoples
- OPN 11.03 – Cultural Property
- OP 4.36 – Forests
- OP/BP 4.37 – Safety of Dams
- OP / BP 7.50 – Projects on international waters.
- OP / BP 7.60 – Projects on disputed area.

Annex 3 of this document assesses the operations of RBDAs to find out whether they conform to environmentally acceptable standards.

### **Problems of Environmental Data Collection in Nigeria**

The basic problem of environmental data collection in Nigeria is non-standardization caused by

- lack of manpower and high turnover,
- lack of proper materials for collection, processing, storage, and retrieval,
- bureaucratic bottleneck,
- poor coordination and collaboration among relevant agencies, and
- excessive protection of organizational society for fear of taxation.

### **Conclusions and recommendations**

Ensuring that policymakers take environmental information into account when they craft agricultural policy depends on the effectiveness of the relevant departments of PPR. The major constraint of the PPR departments' effectiveness is weak links to the technical departments within the same ministries or agencies. These links exist not on a continuous basis but only when the need arises. What's more, PPRs also do not in most cases keep data on a permanent, retrievable basis. Also, the links among ministries and agencies are weak. The PPR departments should be appraised with an eye to streamlining their activities and helping them to become data storehouses with the ability to furnish information for others' use. It is important to note that cross-sectoral policies including environmentally related agricultural policies are implemented through inter-ministerial committees. The government may want to consider setting up a coordinating body for inter-ministerial committees.

The parameters listed on "Environmental Information for Agricultural Policy Analysis in Nigeria" were not found in any of the institutions visited. However, estimates of these parameters were found in some of the FMEH&UD documents, and therefore efforts are needed to make this data available.

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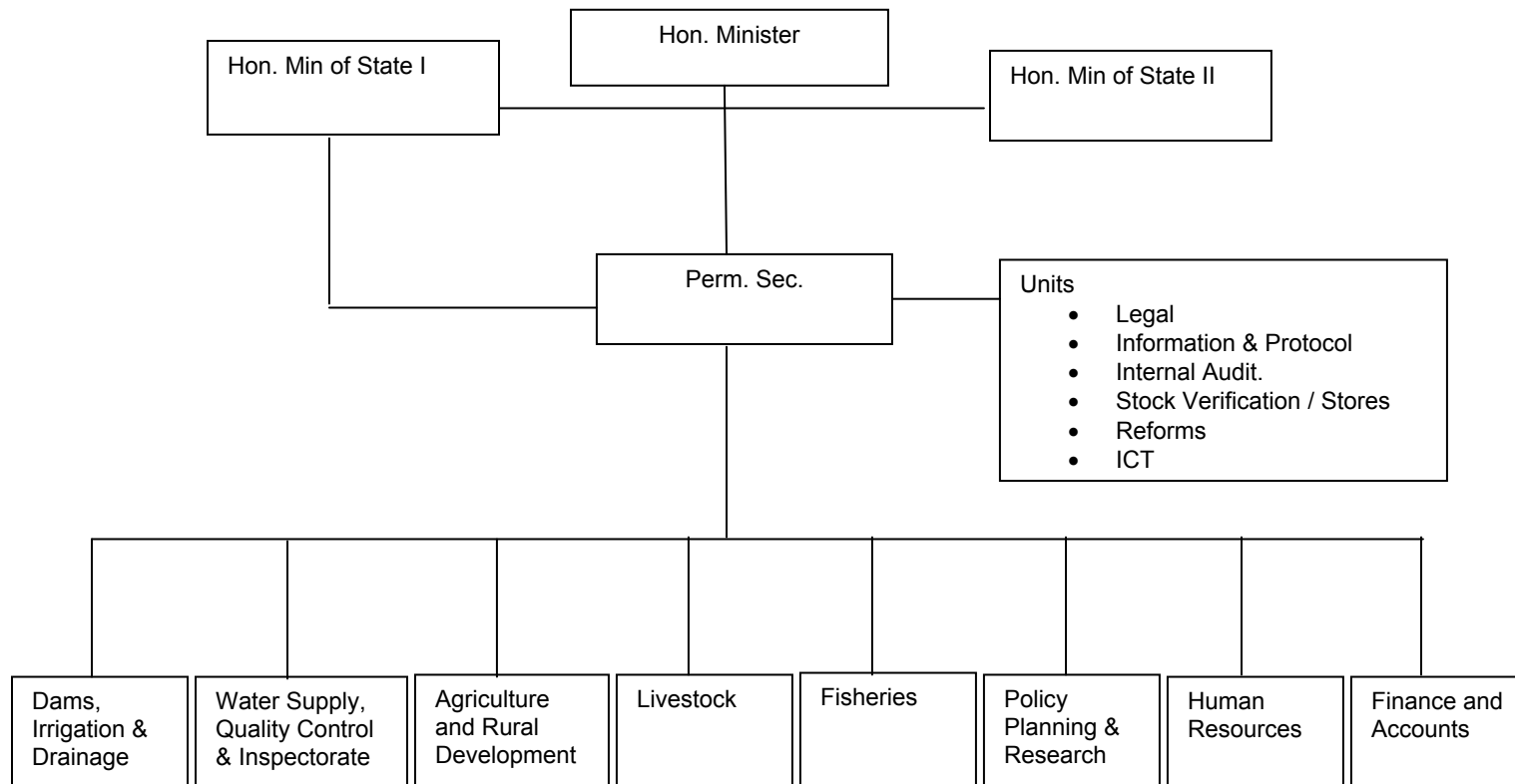
## Annex 1: Identification of Nigerian specialists

The names and contacts of the resource persons below are the result of searches through the Internet and relevant literature.

| Name, Designation                          | Institute   | Contact   | Specialty   |
|--|---|---|---|
| D.B Madu,<br>Secretary<br>General          | Nigerian National Committee on<br>Irrigation and Drainage (NINCID),<br>FMAWR  | Area 1 Secretariat.<br>P.M.B 159 Garki, Abuja<br>Tel: +234 9 234 2910<br>Fax: +234 9 234 3035<br><a href="mailto:nnicid@yahoo.co.uk">nnicid@yahoo.co.uk</a><br><a href="mailto:info@nincid.com">info@nincid.com</a> | erosion and<br>flood<br>engineer                            |
| I.K Musa                                   | V.P Hon. ICID; Head, National<br>Integrated Water Resources and<br>Drainage (NINCID)  | Tel: +234 09 234 2910<br>Fax: +234 09 234 3035<br><a href="mailto:majidadmusa@yahoo.com">majidadmusa@yahoo.com</a>  | Erosion and<br>flood  |
| Professor<br>Maduekwe                      | Department of Agricultural<br>Extension, University of Nigeria,<br>Nsuka  | Tel: +234 42 771019<br>Fax: +234 42 771500<br><a href="mailto:Maduekwe@hyperia.com">Maduekwe@hyperia.com</a>  | Agricultural<br>technology<br>transfer<br>policy and<br>SME |
| Professor<br>Adefemi Olatunde<br>Olokesusi | Nigeria Institute of Social and<br>Economic Research (NISER);<br>Ogun State Centre for Transport<br>Studies, Ago- Iwoye, Nigeria                              |   | Transport<br>and<br>environment                             |
| Professor O. Ojo                           | Department of Geography,<br>University of Lagos   |   |   |
| Dogara Bashir                              | National Water Resources Institute<br>in Kaduna   |   | Drought and<br>desertification                              |
| F.O.R Akamigbo<br>PhD.                     | Department of Soil Science,<br>Faculty of Agriculture, University of<br>Nigeria, Nsuka, Nigeria   |   |   |
| Professor Oladele<br>Osibanjo              | Base Convention Regional<br>Coordinating Centre for Africa for<br>Training and Technology Transfer<br>in Hazardous Waste Management,<br>University of Ibadan. |   |   |
| Professor<br>Emmanuel A.<br>Olofin         | Bayero University, Kano   |   |   |
| Professor David<br>U.U. Okali              | Nigerian Environmental Study<br>Team (NEST), Ibadan   |   |   |
| Larry Awosika,<br>PhD                      | Nigeria Institute for Oceanography<br>and Marine Research, Lagos  |   |   |

|                              |  |   |  |
|------------------------------|--|---|--|
| O.I Oladele                  | Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria.   | Japan International Research Centre for Agricultural Science<br>1-1 Ohanashi, Isukuba City, Ibaraki 305 – 8686, Japan<br><a href="mailto:oladele20002001@yahoo.com">oladele20002001@yahoo.com</a> |  |
| Dr. Daniel Gwary             | Department of Crop Protection; University of Maiduguri   | Tel: 08036905775<br><a href="mailto:dangwavy@yahoo.com">dangwavy@yahoo.com</a>  |  |
| Professor Olukayode Oladipo  | Regional Coordinator, Nigeria-Niger Trans-Boundary Ecosystem Management; IEM Nigeria Niger Project<br>Nigeria-Niger Joint Commission for Cooperation-Niamey, Niger | Tel: 227 96108922; 227 2176803; 227 207 24286<br><a href="mailto:Olukayode_Oladipo@yahoo.co.uk">Olukayode_Oladipo@yahoo.co.uk</a>   | Climatology and impact assessment, vulnerability analysis, adaptation and mainstreaming issues |
| Professor N.O Adedipe        | Department of Crop Protection and Environmental Biology, University of Ibadan, Nigeria.  |   |  |
| P.A Okuneye                  | Department of Agricultural Economics and Farm Management.<br>University of Agriculture, Abeokuta Nigeria.  |   |  |
| I.A Ayinde                   | Department of Agricultural Economics and Farm Management. University of Agriculture, Abeokuta  |   |  |
| V.I Ibigbami, Director       | Agricultural Biotechnology, National Biotechnology Development Agency  | Area 11 Abuja<br>Tel: 080615606608<br><a href="mailto:viibigbami@yahoo.com">viibigbami@yahoo.com</a>  |  |
| Dr. Amos Abu                 | World Bank   | Tel: 08034417328<br><a href="mailto:aabu@worldbank.org">aabu@worldbank.org</a>  |  |
| Idris Nasiru Medugu          | Faculty of Built Environment University of Technology, Malaysia  | Sukudai, Jahor<br><a href="mailto:medugu@gmail.com">medugu@gmail.com</a>  |  |
| Professor Jaiyeoba           | Faculty of Agriculture Ahmadu Bello University   | Tel: 08034527702<br><a href="mailto:idiyaiyeoba@yahoo.com">idiyaiyeoba@yahoo.com</a>  | drought and desertification , river basin issues   |
| James O. Akanmu              | Civil & Environmental Engineering Department University of Lagos   | <a href="mailto:joakanmu@yahoo.com">joakanmu@yahoo.com</a>  | Nigerian river basin issues  |
| Mr. Ako Amadi                | Governance and Natural Resource Management Advisor at the Canadian International Development Agency  |   | adaptations to climate change  |
| Dr. Elizabeth Samuel Ebukiba | Department of Agricultural Economics, University of Abuja.   | Tel: 08037707962,<br>08023621716  |  |

**Annex 2: FMAWR Organizational Structure as approved by the Federal Executive Council (FEC) – May, 2007**



### Annex 3: Key environmental indicators in sustainable management of river basins

| TOPIC   | INDICATOR   |
|---|---|
| <b>KEY ENVIRONMENTAL ASPECTS OF THE BASIN</b> |   |
| 1.<br>Water Resources                         | Indicator 1: Municipal discharges into fresh water: SS(Suspended solids), BOD (biological oxygen demand) and phosphorus   |
|   | Indicator 2: conflict over water use.   |
|   | Indicator 3: daily river flows to key points (maximum, average, lower water level)  |
|   | Indicator 4: Nitrate and phosphorus content of water or organic matter content and changes in physio-chemical parameters (conductivity, pH, turbidity, chlorophyll, nitrogen, phosphorus and pesticides). |
|   | Indicator 5: piezometric level of deep ground water and aquifers, and chemical quality of water.  |
|   | Indicator 6: wastewater processing rate (R).  |
| 2.<br>Plant And<br>Wildlife<br>Resources      | Indicator 1: Number of engendered and extinct species.  |
|   | Indicator 2: Rate of alteration of natural habitats.  |
|   | Indicator 3: Areas of land colonized by invading species, and invaded stretches of banks.   |
|   | Indicator 4: diversity of wild Species  |
|   | Indicator 5: Area covered by protected areas.   |
| 3.<br>Haleiutic<br>Resources                  | Indicator 1: Fishing production   |
|   | Indicator 2: productivity   |
|   | Indicator 3: Genetic diversity of halieutic resources   |
|   | Indicator 4: Contaminant concentration in fish.   |
| 4.<br>Protected<br>Areas And<br>Forestry      | Indicator 1: Intensity of forest exploitation (total withdrawals / natural annual growth + reforestation.   |
|   | Indicator 2: Land area covered by forest in the Niger basin zone.   |
|   | Indicator 3: Existence and level of management of forest development units.   |
|   | Indicator 4: Existence and level of management of protected areas ( botanical gardens, sanctuaries, ecological/ wildlife preserves, national parks, etc)  |
|   | Indicator 5: Degree of control of land conversion trends.   |
|   | Indicator 6: Existence of plant communities and / or reforested surface areas (natural and artificial reforestation).   |
| 5.<br>Pedology<br>and Land<br>Degradation     | Indicator 1: Soil pollution   |
|   | Indicator 2: Number of hectares of soil subjected to salinization and alkalization.   |
|   | Indicator 3: Proportion of arable land and permanent cultivations.  |
|   | Indicator 4: Changes in land use.   |
| 6.<br>Pollution                               | Indicator 1: Degree of reduction of the mass of organic and nutritive debris in stagnant water.   |
|   | Indicator 2: Level of operations and capacity of wastewater and household waste dumps and purification and / or treatment plants in major urban areas.  |
|   | Indicator 3: Proportion of degree of reduction of the use of contaminants and POPs.   |
|   | Indicator 4: Existence of dissuasive mechanisms and level of effectiveness of these mechanisms in reducing the use and / or improper handling of contaminants.  |
| 7.<br>Climatology                             | Indicator 1: Area of land affected by bush fires annually.  |
|   | Indicator 2: Evolution of precipitation, in time and space (droughts).  |
|   | Indicator 3: Agrodemographic index  |
|   | Indicator 4: Agroclimatic zones.  |
|   | Indicator 5: Vulnerability of populations to climate changes.   |
|   | Indicator 6: Extent of flooded areas.   |
| 8.  | Indicator 1: Rate of water erosion (Universal Soil Loss Equation)   |



|                                      |   |
|--------------------------------------|---|
| Geo-Morphology                       | Indicator 2: Rate of wind erosion.  |
|                                      | Indicator 3: Degree of silting of the River Niger.  |
|                                      | Indicator 2: Rate of bank erosion.  |
| 9. Desertification                   | Indicator 1: Arable land lost to wind and water erosion.  |
|                                      | Indicator 2: Proportion of land silted / affected by desertification.   |
|                                      | Indicator 3: Areas of Land recovered and restored by anti-erosion work.   |
| 10. Mines                            | Indicator 1: Mining Production.   |
|                                      | Indicator 2: Mining water demand  |
|                                      | Indicator 3: Level of national expertise in the exploitation and management of toxic ores and of sites contaminated or at risk of contamination.  |
| 11. Demographics                     | Indicator 1: Population Density   |
|                                      | Indicator 2: Birth rate   |
| 12. Socioeconomic Development        | Indicator 1: Turnover by tourism  |
|                                      | Indicator 2: Capacity to bear tourism pressures   |
|                                      | Indicator 3: rate of collection of taxes and fees associated with the exploitation of resources (water, wood, fish, etc).   |
|                                      | Indicator 4: Rate of operating expenditures by drinking water management bodies, compared with amounts allocated to the supply of drinking water.                                       |
|                                      | Indicator 5: Areas of land developed with CDMs (carbon credits) and with avoided deforestation mechanisms (such as REDD: reducing emissions from deforestation and forest degradation). |
| 13. Education                        | Indicator 1: Schooling rate.  |
|                                      | Indicator 2: Literacy rate.   |
|                                      | Indicator 3: Number of ERE programs developed and in execution.   |
|                                      | Indicator 4: Level of competence and improvement in performances by national personnel in charge of purification plants.  |
| 14. Human Hygiene And Health         | Indicator 1: Rate of prevalence of water-borne diseases.  |
|                                      | Indicator 2: Fatality rate associated with malaria.   |
|                                      | Indicator 3: Food vulnerability index   |
|                                      | Indicator 4: Capacity to prevent and treat water borne diseases (related to insalubrities of water), malaria, and diseases associated with malnutrition, and HIV / AIDS.                |
|                                      | Indicator 5: Level of information and openness of local populations to basic care.  |
|                                      | Indicator 6: Level of control/ reduction of infant and maternal mortality (R).  |
|                                      | Indicator 7: Rate of satisfaction of food requirements.   |
| 15. Agriculture and Land Development | Indicator 1: Spreading of agricultural pesticides over cultivated land.   |
|                                      | Indicator 2: Proportion of soil degraded by irrigation  |
|                                      | Indicator 3: Intensity of use of water resources (water withdrawn/ available resources).  |
|                                      | Indicator 4: Quantity of chemical fertilizer used.  |
|                                      | Indicator 5: Agricultural habitats subjected to intensive farming.  |
|                                      | Indicator 6: Degree of development of irrigable land, and surface area of irrigated zones.  |
|                                      | Indicator 7: Phosphate content of water in agricultural zones.  |
|                                      | Indicator 8: Level of nitrogen in the water   |
|                                      | Indicator 9: Level of pesticides in the water (2, 4 -D, atrazine and lindane).  |
|                                      | Indicator 10: Unexploited natural habitats.   |
|                                      | Indicator 11: Level of crop yields and productivity.  |
| 16. Livestock Farming And Health     | Indicator 1: Number of Livestock (livestock Units) and water consumption.   |
|                                      | Indicator 2: Productivity of pastoral resources.  |
| 17. Transport                        | Indicator 1: Number of vehicles: Cars, trucks and buses.  |
|                                      | Indicator 2: Number of km of railroads lines.   |
|                                      | Indicator 3: Number of kilometers of roads by category/ KM2 of land (opening up of land).   |

|   |   |
|---|---|
|   | Indicator 4: Number of dry ports.   |
|   | Indicator 5: Existence of a system to manage the risks associated with the transport of hazardous materials.                                      |
| 18.<br>Domestic Uses<br>and<br>Urbanization | Indicator 1: Urban Population rate (Rural exodus)   |
|   | Indicator 2: Rate of occupation of urban areas by agricultural activities   |
|   | Indicator 3: rate of access to drinking water   |
|   | Indicator 4: Rate of servicing / population supplied with treated water   |
|   | Indicator 5: Rate of population drinking water need met.  |
|   | Indicator 6: Population with access to sanitation   |
| 19.<br>Industrial<br>Uses                   | Indicator 1: Discharge into fresh water by hospitals, crafts industries (training, dyeing etc.), Slaughterhouses and dairy plants: SS and BOD.    |
|   | Indicator 2: Existence and level of performance of household and industrial waste collection, treatment and storage systems in major urban areas. |
| 20.<br>Hydro-Electric Uses<br>and Energy    | Indicator 1: Number of dams, by category.   |
|   | Indicator 2: Land area dedicated to energy crops (bicarbon).  |
|   | Indicator 3: Demand for fuel wood.  |
|   | Indicator 4: Proportion of renewable energies in primary energy consumption.  |
|   | Indicator 5: Rural electrification rate.  |
|   | Indicator 6: Number of projects and programs implemented to promote renewable energies.   |
|   | Indicator 7: Rate of distribution of energy efficiency materials and equipments.  |
| 21.<br>Hydro-Agricultural<br>Uses           | Indicator 1: Number of hydro-agricultural works completed.  |
|   | Indicator 2: Capacity for preventing and managing food insecurity.  |
| 22.<br>River Uses                           | Indicator 1: Degree of minimization of environmental impacts associated with river terminals.   |
| 23.<br>Institutional<br>Frameworks          | Indicator 1: Existence and degree of application of an environmental and socioeconomic regulatory framework.                                      |
|   | Indicator 2: Existence of standards for discharge of certain contaminants products.   |
|   | Indicator 3: Degree of consideration of ratified regional and international agreements, in the national policies of the Niger basin.              |
|   | Indicator 4: Level of involvements of local populations and other players in the sustainable management of natural resources.                     |

#### **Annex 4: Nigeria's environmental policy and strategy documents and relevant literature**

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