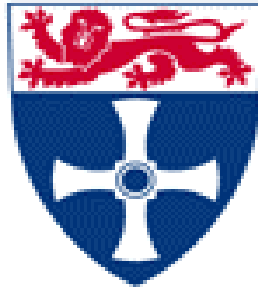


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**Needs assessment and uptake promotion of
rainwater harvesting research in Nigeria**

**Final Technical Report – Annex K
Overview of policy environment**

September 2005

OBAFEMI AWOLOWO UNIVERSITY
ILE-IFE



POLICY BRIEFING PAPER

ON

THE PROSPECT FOR UPTAKE PROMOTION OF RAIN WATER HARVESTING (RWH) IN NIGERIA

Report Prepared for
NRSP Project 8390

By

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EXECUTIVE SUMMARY

That Nigeria has the potential to become Africa's largest economy and a major player in the global economy by virtue of its rich human and material resource endowment should not be in doubt, except for the history of its wasted years. For example, the surface water resources potential is estimated at about 267.3 billion cubic metres of water per annum while the ground water resources potential is about 51.9 billion cubic metres of water per annum, whilst the country is also awash with oil, gas and other mineral resources. The country is implementing a National Economic Empowerment and Development Strategy (NEEDS), which encapsulates an objective assessment of her past, present situation and hopes for a better future. The first statement in the strategy document acknowledges Nigeria as an economic miracle that has already begun to unfold and went further to present NEEDS as a development strategy to consolidate on the gains of the past four years (during which growth in the agricultural sector has averaged 7%), unlock Nigeria's dormant potentials, and provide the base for sustained development of the country. That NEEDS signals a break with the past in terms of its grand conception, underlying philosophy of a government stimulated but a private sector-led competitive market economy, coordinative all inclusive implementation strategy, focus, goals and strategy. NEEDS is anchored on the triple objective of poverty reduction, wealth and employment creation and empowerment of the citizenry, especially the poor and vulnerable. A growth rate of the economy of 7 percent is targeted, and it is to be pro-poor. It is however submitted that it would make a fundamental difference whether growth is led by agriculture, small and medium scale enterprises and manufactures or by the mining and quarrying sector as is presently the case.

Thus, under NEEDS, priority is to be given to agriculture, especially improvement in the productivity of peasant farmers, and the continuing investment in water resources is not just only to provide water to the people as a social service, but to also provide water for irrigation to further enhance agricultural productivity. A key objective of the agricultural strategy under NEEDS is the promotion of all-season farming through rain-fed and irrigated farming with emphasis on fadama agriculture as well as implementation of the programme for massive production of tree crop seedlings. Also emphasis will now shift to developing small dams as a more cost effective way of utilizing water resources for irrigation in the country and rain water harvesting for irrigation agriculture was to be promoted where surface and underground water is not readily available. It is considered significant that RWH has a mention in this document, even though it would appear in reality that this is essentially cosmetic. Indeed, reference to RWH here says 'where other sources of water are not readily available', indicating the lack of adequate understanding of the essence of the multi-dimensional reasons for harnessing rain water by the authors of the strategy document.

Previous and current government programmes in the water sector have largely been centered on water resources development, while proper management and conservation of the resource was not given adequate attention. Hence, the nation's water sources are under serious threat from inadequate catchments management and widespread pollution, including the indiscriminate disposal of hazardous substances. There is limited groundwater availability in the areas of the country underlain by crystalline rocks. In the more productive sedimentary areas, groundwater exploitation is heavy and uncontrolled. In addition to above challenges, poor watershed management, deteriorating water quality, drought and desertification are inexorably increasing water scarcity. Scarcity threatens urban and rural development with rapidly rising water supply costs, reduced reliability of water supplies, prolonged droughts, flood and erosion and increasing costs of irrigated crop production. Though the Nigerian National Policy on Water Resources has not expressly made any reference to RWH as does the National Agricultural Policy, critical analyses indicate, albeit unconsciously, the embodiment of elements of and basis for RWH in several aspects. The overall indication is a very strong policy support despite the lack of the word "RWH", though faithful implementation is another thing entirely. The implication is that the policy environment can easily be persuaded as to the logic and benefits of an integrated land and water planning approach, which also emphasizes the efficient harnessing of rain as a natural resource.

1. INTRODUCTION

1.1 Nigeria's Development Challenges/ Background of NEEDS

Nigeria has just developed and is implementing a National economic empowerment and development strategy (NEEDS), which currently encapsulates an objective assessment of her past, present situation and hopes for a better future. The first statement in the strategy document acknowledges Nigeria as an economic miracle that has already begun to unfold, and averred that a solid foundation is already being laid especially since the new democratic transition in 1999. It went further to present NEEDS as a development strategy to consolidate on the gains of the past four years, unlock Nigeria's dormant potentials, and provide the base for sustained development of the country. That NEEDS signals a break with the past.

There is no doubt that Nigeria has the potential to become Africa's largest economy and a major player in the global economy by virtue of its rich human and material resource endowment. But much of its potentials (see Box 1) have remained untapped, and if previous trends continue, Nigeria runs the risk of not meeting the internationally agreed Millennium Development Goals (MDGs) by 2015. Nigeria has had lost decades of development due to negative-to-slow growth and has been one of the weakest growing economies in the world on a per capita basis especially for the period 1981- 2000. The GDP grew by an average of 2.8 percent in the 1990s (leaving per capital growth rate at zero), but the average growth rate for the 1999—2003 period was about 3.6 percent (with a per capita growth rate of 0.8 percent per annum which is far lower than the 4.2 percent per capita growth rate needed to significantly reduce poverty). Relative to its own history and in comparison with other countries in Africa and Asia, especially Indonesia which is comparable to Nigeria in most respects, its level of economic development over the decades becomes more disappointing. With a GDP of about \$45 billion in 2001, and a per capita income of about \$300, Nigeria has become one of the poorest countries in the world. As at 2000, Nigeria had earned approximately \$300 billion from oil exports since the mid 1970s, but its per capita income was 20% less than the 1975 level, and the country has become so heavily indebted (external and domestic debt amounts to about 70 percent of GDP) that it has serious difficulty servicing existing debt. There is great spatial and sectoral unevenness in terms of the share of GDP and growth performance: across regions and geo-political zones of the country. The real sector is still dominated by the primary production sector—agriculture (41%) which is predominantly peasantry with low and declining productivity, and crude oil (13%) while the secondary sector especially manufacturing has been stagnating (about 5 - 7% of GDP) thereby making Nigeria one of the least industrialized countries in Africa. The services sector has been the fastest growing since independence.

At about 5.3% annual growth rate, urbanization rate is one of the fastest in the world and with a stagnant secondary sector, the urban unemployment is acute with the attendant high level of crimes and socio-political tensions. As at March 1999, 23.2 percent of the rural labour force was unemployed while 12.4 percent of the urban dwellers were without job. In March 2003, rural unemployment rate had dropped to 12.3 percent and urban rate to 7.4 percent (giving a composite unemployment rate of 10.8 percent). These are large numbers given that the labour force is about 61 million in Nigeria.

The very low productivity/uncompetitiveness of the private sector and the lack of diversification of the economy are due mainly to the hostile business environment. The constraints to businesses include infrastructure deficiencies, poor security of lives and property, corruption and rent-seeking, low access and high cost of finance, weak institutions,

ill-defined property rights and enforcement of contracts, and unstable macro economic policies especially fiscal and trade policy. Although these conditions have begun to improve since 1999, there are significant obstacles to be addressed.

Despite efforts to promote private sector-led, competitive market economy framework, there is still the fundamental challenge of transition from statism and rent-seeking in an economy dominated by the public sector. The deep vested interests which profit from the system have proved resilient. The perception of an over-bloated and inefficient public service has become one of the key problems. Another is the evidence of weak institutions and persistent implementation failures.

1.2 Why the past failures?

The above features are legacies of decades of corruption and mismanagement especially during the military administrations. The old development models of import substitution industrialization (ISI) and statism - whereby government assumed the dominant role as producer and controller in the economy - produced perverse incentives, inefficiencies and waste. In the context of an oil producing economy (with rents from oil as easy source of government revenue), a culture of rent-seeking quickly developed. Government readily became an instrument for instant acquisition of wealth and therefore distorted the incentive to work and to create wealth in the private sector. With government as the major source of patronage and rent-seeking, the fight for public office became a matter of life and death. All these created an incentive framework that did not reward hard work, private enterprise, transparency and accountability. Frequent regime changes in governance and frequent changes in policy were the defining features of the past. Military dictatorships also meant that weak institutions endured. In summary, inappropriate development frameworks, poor and frequently changing policies and programmes, lack of clear development vision and commitment to the Nigerian project (as well as a citizenry that acquiesced to the patronage culture) were the major causes of Nigeria's failed past.

1.3 Poverty and Poverty Reduction in Nigeria

The social conditions in Nigeria present a startling paradox; in spite of a robust endowment in natural and human resources, the level of poverty of her people stands in contrast to the country's vast wealth. For decades, the country has struggled with the issue of socio-economic development, which has remained in decline in the face of increasing revenue from crude oil.

The deepening incidence and dynamics of poverty in Nigeria have stratified and polarized the Nigerian society between the haves and have-nots, between the north and the south, between the educated and uneducated; poor parents beget poor offsprings (creating a kind of dynasty of the poor). The resulting tensions and social conflicts have eroded the fabric that held society together. The resulting challenge of development is not only the need to reform the economy for enhanced economic growth, but also how to empower the citizenry as a means of revitalizing the weakened social pillar. This calls for the human rights approach to development planning, which places human beings at the center of development efforts. The added value provided by this approach is that the norms and values enshrined in it have the potential to empower the poor, since it is now widely recognized that effective poverty reduction is not possible without empowerment of the poor.

Poverty reduction is the most difficult challenge facing Nigeria and its citizens. It is also the major hurdle that must be overcome in the pursuit of sustainable socio-economic growth. Available statistics (Table 1) indicate that the poverty rate of the population increased from 27% in 1980 to about 70% by 1996. By 1999, it was estimated that more than 70% of Nigerians lived in poverty. Among other indicators, the gender composition of primary

school enrolment in Nigeria showed little or no change during the decade of the 1990s, with the female share being consistently below 50% though a modest improvement emerged in the year 2000. Life expectancy is unsatisfactorily low at 54 years. Infant mortality at 77 per 1000 and maternal mortality at 704 per 100,000 live births are among the highest in the world. Other available indicators reinforce this general picture. For example, over 90% of the rural population depend on the forest for livelihood and domestic energy, while up to 1.5 hours a day on average are spent by rural households to collect water and fuel wood, with household members working an average of one kilometer a day to collect water and fuel wood.

Qualitatively, poverty in Nigeria has many manifestations and dimensions, including joblessness, over-indebtedness, economic dependence at adult age, lack of freedom, and inability to provide the basic needs of life for self and family. Other characteristics include lack of access to land and credit, and inability to save or own assets. The poor tend to live in dirty localities that exert significant pressures on the physical environment, thereby contributing, however inadvertently, to environmental degradation. The poor, especially peasants, perceive their general economic circumstances to be excessively fraught with uncertainty, including those relating to the behaviour of primary commodity prices, the volume of rainfall, pest attacks, fire outbreaks, changes in soil conditions and social conflicts. However, lack of food is the most critical dimension of poverty, which is reflected in the popular local saying that “when hunger is excised from poverty, the burden of poverty is lightened”

2. PROSPECTS FOR THE FUTURE OF NIGERIA UNDER NEEDS

2.1 Development Scenarios

From the NEEDS document the following analysis can be borrowed, that from the foregoing diagnostics it is clear that the Nigerian economy faces enormous challenges and a bleak future if fundamental steps are not taken to redress the legacies of the past. Among the many requirements for rejuvenating the economy is rapid and broad based growth. It would require Nigeria doing things in fundamentally different ways than in the past to break away from the low growth-poverty traps. This is because, in the last 25 years or more, the highest average growth performance of about 5 percent per annum was recorded in the late 1980s and this is just the growth rate required to prevent poverty from worsening (and not good enough to reduce it). The average growth performance in the 1990s (2.8%) was just equal to the population growth rate leaving per capita growth rate at zero, while the average performance since the civilian transition in 1999 (1999-2003) was about 3.6 percent, with per capita growth rate at about 0.8 percent per annum.

Table 2 below illustrates the implications of alternative growth scenarios for per capita income and poverty in the medium to long run. The scenarios assume that the respective growth rates are maintained until 2030, with no demographic transition (i.e., constant population growth rate of 2.8%), and also constant urbanization growth rate of about 5% per annum.

- Scenario A considers the implications of Nigeria maintaining the average growth performance recorded in the last four years 1999- 2002 (about 3.5%) until 2030. Assuming that per capita income was \$300 in 2000, by 2015 it would have increased by just US\$23, and by 2030 by just \$48—leaving Nigeria as one of the poorest countries in the world if current trends in the rest of the world continue. Poverty obviously worsens and given the poverty-growth elasticity, the incidence could be as high as 80 percent in 2030.

Table 1: Nigeria - Poverty Incidence Indicators, 1980-96¹
(The poor as a percentage of the total in the specified groups)

	1980	1985	1992	1996
National	28.1	46.3	42.7	65.6
Geo-Political Zones				
(i) North East	35.6	54.9	54	70.1
(ii) North West	37.7	52.1	36.5	77.2
(iii) North Central	32.2	50.8	46	64.3
(iv) South East	12.9	30.4	41	53.5
(v) South West	13.4	38.6	43.1	60.9
(vi) South South	13.2	45.7	40.8	58.2
Sector				
Urban	17.2	37.8	37.5	58.2
Rural	28.3	51.4	46	69.3
Gender of Head of Household				
Male	29.2	47.3	45.1	66.4
Female	26.9	38.6	39.9	58.5
Size of Household				
1 Person	2	7	29	13.1
2-4 Persons	8.8	19.3	19.3	59.3
5-9 Persons	30	50.5	51.5	74.8
10-20 Persons	51	71.3	66.1	88.5
20+	80.9	74.9	93.3	93.6
Education of Head of Household				
No Education	30.2	51.3	46.4	72.6
Primary	21.3	40.6	43.3	54.4
Secondary	7.6	27.2	30.3	52
Post-Secondary	24.3	24.4	25.8	49.2
Age of Head of Household				
15-24 Years	16.2	25.3	28.7	37.4
25-34 Years	17.8	33.4	28.5	52.7
35-44 Years	26.7	46	42.1	64.6
45-54 Years	27.1	49.7	45.7	71.3
55-64 Years	39.7	55.7	48.2	69.9
65+ Years	28.8	49.1	49.5	68
Source: Federal Office of Statistics				

- Scenario B considers the implications of re-enacting the average growth performance in the late 1980s (5%) - that is, growth rate required to prevent poverty from escalating but not enough to reduce it. In essence, poverty incidence stays constant at 70 percent even in 2030, while per capita income increases to \$416 in 2015 and \$576 in 2030—still leaving the average Nigerian very poor.
- Scenario C considers the implications of Nigeria fundamentally changing its strategy and achieving an average of 7 percent growth rate per annum—which is the growth

¹ As stated earlier, there is an ongoing nation-wide household survey by the Federal Office of Statistics. This will provide up to date statistics on the state of poverty in Nigeria.

rate compatible with the Millennium Development Goal (MDG) of reducing the incidence of poverty by half in 2015. This growth rate leads to the halving of the incidence of poverty in 2015, and leaves less than 20 percent of the population below the poverty line in 2030, provided growth is broad based and pro-poor.

A caveat to these scenarios is that the impact of the ‘average growth rate’ on poverty would significantly depend on the sources of the growth. Poverty incidence may not significantly come down (even with the 7 percent growth rate) if the growth process is not pro-poor (that is, not broad based or broadly shared). It is submitted that it would make a fundamental difference whether [growth is led by agriculture](#), small and medium scale enterprises and manufactures or by the mining and quarrying sector.

Table 2: Implications of Alternative Growth Scenarios for Key Development Indicators

		2000 Actual	2015	2030
A	Per capita Income average Growth performance (1999- 2002): <i>3.6% or 0.8% per capita</i>	\$300	\$328	\$352
	Poverty (assuming 3.6% annual growth)	70%	75%	80%
B	Per capita income assuming 5% annual growth	\$300	\$416	\$576
	Poverty Incidence (assuming 5% annual Growth)	70%	70%	70%
C	Per capita income assuming MDG-compatible Growth rate of 7% per annum	\$300	\$556	\$1031
	Poverty Incidence (assuming 7% annual Growth)	70%	35%	17%
D	Nigeria’s Population (with 2.8 annual growth rate)	120 million	182 million	275 million
E	Urbanization (with 5% annual rate of growth)	42 million (35%)	87 million (48%)	182 million (66%)

The rather gloomy scenarios A and B, which derive from Nigeria’s historical experience, are also in the context of a rather high population growth rate and high urbanization rate. If the population continues to grow at 2.8 percent per annum, there would be 275 million Nigerians by 2030, out of which 182 million or 66 percent of them would be in urban areas. If the secondary sector, especially manufacturing and the services sector do not grow sufficiently to absorb the surge of labor force to the urban areas and/or the rural areas sufficiently transformed to stem the rate of rural-urban migration, the prospective rate of urban unemployment could be chaotic.

Furthermore, all these are in the context of increasing desertification, land use intensification, and rain-fed agriculture with low productivity. If current trends continue, agriculture would increasingly not be able to support the economy both in terms of employment and income. The average age of the labor force in agriculture is about 48-60 years, and the growing food import bill (about 10% of total imports) attests to the potential food security crisis. The

natural resource base of the economy is depleting fast, and the process of diversification is very slow. The educational system is rapidly decaying with the result that an increasing proportion of the graduates are unemployable. All these have grave implications for poverty and unemployment, and hence grave consequences for crime, conflict and sustenance of democracy.

The size and strategic importance of Nigeria in Africa (especially in West Africa) is such that the stakes are very high. Nigeria is the source of stability in the West African region - having led a multilateral peacekeeping force to Liberia and Sierra Leone, and continuing peacekeeping role in the sub-region. On the economic front, Nigeria accounts for about 60 percent of the West African GDP. Thus, a vibrant and growing Nigerian economy will act as a strong growth pole for West and even Central Africa. Sub-Saharan Africa as a region cannot succeed in reducing poverty and it cannot reach the MDGs of 2015 unless Nigeria, with one-fifth of the African population, succeeds in its own economic development.

2.2 Potentials for a New and Strong Beginning Under NEEDS

NEEDS is premised upon an unprecedented optimism on the basis of Nigeria's abundant human and material resources, which is considered more than fertile to initiate and sustain high and broad-based growth and development (See Box 1). There are also opportunities offered by the globalization process (and prospects for leapfrogging) as well as the preferential and differential trade arrangements and concessions under the ECOWAS Treaty, the US-AGOA, the ACP-EU Cotonou Agreement and impending economic partnership agreements. If appropriate incentives are in place, the brain drain of Nigerians in Diaspora could be turned into brain gain - through increased remittances, technology transfer, and even return of capital flight (which could be up to \$2- 5 billion per annum). In other words, there are ample opportunities to jump-start faster growth—if the right strategy can be crafted and implemented.

There already appears to be some momentum for change since 1999, and this momentum can be increased and sustained. [For example, growth in the agricultural sector has averaged 7 %, while](#) foreign direct investment in the non-oil sector has run into billions of dollars since 1999 (from almost zero previously), capacity utilization in industry has doubled, unemployment rates are moderating, and GDP growth has improved moderately. There are now increasing number of Nigerians in Diaspora willing to return and contribute to the economy, and many of the donor agencies which hitherto boycotted Nigeria during the military era have returned.

The NEEDS signals a change in approach to planning and the subsequent reforms will properly harmonize the planning and budgeting framework and processes. [Implementation is a key element for success, and the President is personally leading the efforts at implementation.](#) The President personally chairs a weekly (90 minutes) meeting of the Economic Management Team - designed to monitor and coordinate implementation among key agencies and ministries. The agenda also is focused and selective, and there are aspects of it to be implemented by the private sector, NGOs and donor agencies.

The strategic intent of government is to diversify the productive base of the economy away from oil and foster a market-oriented private sector driven economic development with strong local participation. The overarching goal is to develop, in the process, an indigenous entrepreneurial class capable of competing in a global market where technology and skills play dominant role. As government continues to redefine its role, resources will be freed up and hence government is better focused to take up its primary role of providing basic infrastructure, security, defense, and other social services, which are necessary for creating a

competitive environment and for private-sector driven wealth creation and employment generation, on a sustainable basis. The private sector on its part will be encouraged to commit to genuine and responsible investment, good corporate governance and citizenship, subscribing to internationally acceptable standards of quality, business ethics and practices. It must also commit to transparent partnership with the public sector especially in the promotion and development of Small and Medium Enterprises.

It is in the above context that the various sector strategies of NEEDS are couched, first by identifying some of the peculiar sector specific issues, policy imperatives and then the selected strategies. Given the self-reinforcing and interdependent nature of the different sectors of the economy, it is obvious that for each priority sector, achieving the objective of creating a responsive, modern and globally competitive economy, will address the following cross-cutting issues which are restated for emphasis as they are considered critical to the effective growth and development of the private sector:

- Infrastructure inadequacy
- Finance/Funding gap
- Inappropriate and inadequate technology
- Unfair competition
- Inadequate institutional and legal framework, including bureaucratic and tedious procedures and practices.
- Policy inconsistency and lack of commitment and political will to implement accepted policies
- Inadequate human capital development
- Security, law and order as well as sanctity of contracts
- Sustained favorable environment for responsible private sector investment.

Box 1: Nigeria's Resource Endowments and Potential for Sustainable Development

Nigeria had an estimated population of 125 million in 2001— nearly one-quarter of Sub-Saharan Africa's population, and it is estimated that one in every six black persons in the world is a Nigerian. The country is composed of more than 200 ethnic groups, and more than 500 indigenous languages and dialects, with three major tribes--- Igbo (East), Hausa (North), and Yoruba (West). The area of Nigeria is 924,000 km² bordering the Gulf of Guinea, Republic of Cameroon, Republic of Benin, Niger and Chad. The topography ranges from mangrove swampland along the coast to tropical rain forest and savannah to the north. The Sahara desert encroaches upon the extreme northern part of the country while gully erosion threatens the carrying capacity of lands in the South. Some 10 percent of the land is covered with forest, and Nigeria's wood resources include large stands of mahogany, walnut, and Obeche. However, rapid deforestation has reduced Nigeria's forest by 50 percent in the last 15 years, and the potential for their future exploitation is extremely limited. The country's fishery resources are fairly small and are concentrated in the coastal area.

The importance of oil in the Nigerian economy notwithstanding, agriculture is the dominant economic activity in terms of employment and linkages with the rest of the economy. Roughly 75 percent (74 million hectares) of Nigeria's total land (98 million hectares) is arable and about 40% of this is cultivated--- leaving the remaining 60% of arable land idle. The United Nations Food and Agriculture Organization rates Nigeria's farmland from low to medium in productivity, but notes that most of the country's cultivable land would have medium to good productivity, if properly managed. Despite the existence of two major rivers, the Niger and the Benue, agriculture is predominantly rain fed. Yams, cassava, rice, maize, sorghum, and millet constitute the main food crops. The principal export crops are cocoa and rubber, which together account for nearly 60 percent of non-oil merchandise exports.

The country's proven oil reserves, located mainly in the southeast and south-south coastal area, amount to an estimated proven 32 billion barrels, sufficient to last for about 37 years at the current rate of production. With the production of 2 million barrels per day (mbd), Nigeria is the sixth largest producer in OPEC. Proven natural gas reserves are estimated at 174 trillion cubic feet (equivalent to 30 billion barrels of crude oil), with energy content slightly higher than the country's oil reserves. These reserves are comparable to those of Algeria, and will last for 110 years at current production levels. Nearly 80 percent of the natural gas produced is presently being flared and most of the remaining 20 percent is used for electricity generation although export of gas will become increasingly important. Nigeria's rivers also constitute a substantial energy resource, providing the country with nearly half of its electricity. Nigeria is also blessed with abundant solid minerals deposits including, coal, tin ore, kaolin, gypsum, columbite, gold, gemstones, barites, graphite, marble, tantalite, uranium, salt, soda, and sulphur. The main non-oil exports include: cocoa, coffee, copra, cotton, ginger, groundnut, groundnut oil, gum Arabic, palm oil, rubber, soya bean, and timber.

Nigeria has over 60 universities and boasts of an educated labour force. Limited information is available on the size and the quality of Nigeria's labour force other than what can be inferred from broad social indicators. Various independent estimates put the unemployment and underemployment figures at over 15 percent of the labour force—with a very high rate of graduate unemployment. The adult illiteracy rate is 49 percent. About 76 percent of children of primary school age attend school; the participation rate falls to 20 percent for children of secondary school age. Average life expectancy at birth is 54 years. Nigeria has a large domestic market—which could serve as a springboard for entering export markets in Africa and internationally.

2.3 Agriculture and Food Security under NEEDS

In spite of the dominant role of the petroleum sector as the major foreign exchange earner, agriculture remains the mainstay of the economy. Apart from contributing the largest share of GDP, it is the largest non-oil export earner, the largest employer of labour and a key contributor to wealth creation and poverty alleviation, as a large percentage of the population derive their income from agriculture and related activities.

However, over the years, the rate of growth in agricultural production has stagnated, and failed to keep pace with the needs of a rapidly growing population, resulting in a progressive rise in import bills for food and industrial raw materials. The potentials of the agri-business sector as a major employer of the growing labour force and earner of foreign exchange have also been undermined. As a result, a large majority of the population, many of whom live in the rural areas remain poor. Hence, under NEEDS, agricultural development shall be pursued vigorously with the aim of achieving sustained food security and poverty reduction.

Major constraints inhibiting private sector participation in the transformation of agricultural production include:

- a. The rapid shift of population from rural to urban areas and the perceptible shift in consumption patterns from local to imported food items – rice, poultry, etc
- b. Lack of funds, Inadequate processing and storage facilities as well as inefficiencies in input supply and distribution
- c. Oil boom, policy inconsistency and decline in political commitment to agricultural and rural development
- d. Inadequate incentive framework and pervasive distortions in the macro economy
- e. Absence of price support mechanism and pervasive distortions in macroeconomic and sectoral policies including misaligned exchange rates, heavy explicit taxation of agricultural exports.
- f. [Continued dependence on rain-fed agriculture](#) and the absence of economies of scale.
- g. Land tenure system that inhibits the acquisition of land for mechanized farming.
- h. Inadequate Agricultural Extension Services and lack of indigenous capacity or technologies responsive to local conditions.

2.3.1 The Nigerian Agricultural Extension system

The concept of agricultural extension in Nigeria dates back to the late 19th century, and it has had a checkered history. The latest conception is dubbed Research-Extension-Farmer-Input Linkage System (REFILS), which is essentially a four-legged technology transfer system over the so-called technology triangle extension system involving research, farmers and extension. It is important to trace the evolution and significance of REFILS. At Nigeria's independence in 1960, the agricultural extension service was based on the top down or linear approach of extension in which information flows from researchers to farmers through the extension system. Feedback from farmers to researchers was minimal. This approach was noted to have served the colonial system well at the time, as some successes were achieved in the production of cash crops such as cocoa, oil palm, groundnuts and cotton whose production was promoted by the colonial masters as raw materials for factories in Europe and America (Dwafang and Arokoyo, 1999). By 1970, when oil became the main export commodity, and emphasis on agricultural production shifted from cash to food crops, the linear extension model became inadequate to meet the needs of the small-scale resource-poor farmers who are responsible for producing over 90% of the country's food needs. Hence, by 1980 it was noted that results from the pioneering work of Norman and associates at Ahmadu

Bello University of Zaire on Farming Systems Research provided insights into the farming systems of such farmers, and recommended that farmers' total farming system must be taken into account. Furthermore, it was also recommended that the farmer should be involved in decisions regarding what technologies to disseminate and also how such could be utilized for optimum results. By 1982, research-extension-linkage practitioners modified the linear model to make it a Farming Systems Research and Extension Approach (FSRE), which emphasizes a bottom-up technology generation and transfer system, which some authors have described as the technology triangle. Olowu and Windapo (1995) thus identified research, extension agents and farmers as the sub-systems of agricultural production system in Nigeria, but emphasized that the relationship is a complex one in which there are relational overlaps. Such areas of overlap are linkage points between the individual groups, underscoring the fact that none of the three can function independently.

In 1987, farming systems research mandates were designed for all national agricultural development projects (ADPs) which began in 1974 on a pilot scale. By 1986, the ADPs became the main agency for agricultural extension in all the states of the federation. The adoption of the Training and Visit system (T&V) of extension management by the ADP's greatly strengthened the FSRE linkages. A major weakness of the system however was that while World Bank funding enabled the ADP to have a strong extension programme, dwindling financial support for agricultural research meant that there were no commensurate developments in technology generation to match the pace of extension delivery by the ADPs. This led the Federal Government of Nigeria to seek World Bank assistance to strengthen the National Agricultural Research System (NARS), through the National Agricultural Research Project (NARP), launched in 1991, though it effectively took off in 1993. It was found expedient to integrate the FRSE with the T & V system, as it was also considered imperative to broaden the conception of farm collaboration to include the supply of farm inputs, which had been identified as a critical bottleneck to agricultural productivity in the Nigerian context, to evolve the concept of research-extension-farmer-input-linkage-system (REFILS). The REFILS concept in essence, recognizes input supply as the fourth important component upon which successful farming depends. It posits that individually, without the others, each of the four components will be ineffective whereas an effective linkage between them will result in productive activities that will bring about the desired self-sufficiency in agricultural production (Omolehin and Olukosi, 1995, Dwafang and Arokoyo, 1999).

Input supply is a very important aspect of technology adoption because inputs (seeds, chemicals, mechanization, veterinary services etc) are very critical to successful farming, and the logistics of their supply should not be taken for granted in the Nigerian context. In its overall conception, NARP was designed to address the following objectives:

- a. make research staff in Farming Systems Research (FSR) and Agricultural Extension Research Liaison Service (AERLS) programmes more mobile in order to ensure their participation in On-Farm Adaptive Research (OFAR) programmes and Monthly Technology Review Meetings (MTRM);
- b. improve capabilities to analyse trial data through provision of required equipment;
- c. disseminate back log of research information to end users; and
- d. participate in some specially designed pilot production and demonstration activities.

Institutional arrangements were then put into place to achieve the set objectives. The National Agricultural Research Institutes (NARIs) were divided into three broad groups with specific functions as follows:

- a. National Coordinating Research Institutes: These include Institute of Agricultural Research (IAR), Institute of Agricultural Research and Training (IAR&T), Lake

Chad Research Institute (LCRI), National Cereals Research Institute (NCRI) and National Root Crops Research Institute (NRCRI), which were given the mandate to coordinate the different ecological zones in the country.

- b. National Agricultural Extension and Research Liaison Services (NAERLS), which was mandated to carry out extension research in the country.
- c. Non- Coordinating Research Institutes, including the National Institute for Oil Palm Research (NIFOR), National Institute for Fresh Water Fisheries Research (NIFFR), Federal Institute of Industrial Research Oshodi (FIIRO), Cocoa Research Institute of Nigeria (CRIN), Nigerian Stored Products Research Institute (NSPRI) etc. who were all to have specific mandates.

All the Institutes were to participate in the five research extension linkage activities: training workshops for extension staff, on-farm adaptive research, monthly technology review meetings, diagnostic surveys and publications.

By 1999 however, it had become obvious that the uncoordinated sector-wide operation of REFILS had undermined its laudable conception as noted in the review by Dafwang and Arokoyo (1999), they submitted that an effective REFILS with farmers rightly, genuinely and committedly allowed to be in the driving seat and being the ‘beginning and the end of extension communication’ is indispensable to rapid agricultural development in Nigeria.

2.3.2 Policy Thrust for Agriculture under NEEDS:

Given the dominant role of agriculture in the economy, prospects for food security, supply of industrial raw materials and overall economic growth are critically dependent on what happens in this sector. Accordingly, Government is committed to increased investment in food and agricultural production with the following as its policy thrust:

- a. Providing the right policy environment and vigorously targeted incentives for private sector investment in the sector: Government will implement a new agricultural and rural development policy aimed at addressing the foregoing constraints,
- b. Fostering effective linkage with industry to achieve maximum value addition/processing for export
- c. Creation of more agricultural and rural employment opportunities to increase the income of farmers and rural dwellers through the modernization of production and creation of an agricultural sector that is responsive to the demands and realities of the Nigerian economy.
- d. Reverse the trend in import of food, (which stood at 14.5% of total imports at end 2001), through a progressive programme for agricultural expansion. Government is committed to reducing the growing food import bill to stem the rising trade imbalance as well as diversify the foreign exchange earning base of the economy.
- e. Strive towards food security and generate surplus for the export market.

2.3.3 Targets

The objective of NEEDS is to restore agriculture to its former status as a leading sector in the economy in terms of its contribution to GDP, supply of raw materials, employment generation, source of export, local consumption and hence food security.

In specific terms therefore, agricultural polices under NEEDS will target the following:

1. Achieving minimum annual growth rate of 6% per annum in agriculture;
2. Achieving \$3 billion in agricultural exports, a major component of which will be cassava

by 2007;

3. Drastically reduce food imports from 14.5% of total imports to 5% by 2007;
4. Developing and implementing a scheme of land preparation services to increase cultivable arable land by 10% annually and foster private sector participation through incentive schemes.

2.3.4 Strategies

To achieve these targets, the following strategies will be employed

1. Vigorous implementation of the Presidential Initiatives on Cassava, Rice, Vegetable oil, sugar, livestock, tree crops and cereals. Under this initiative, Nigeria hopes to generate as much as N3 billion annually from the export of agricultural products.
2. Taking advantage of the various concessionary arrangements within the WTO, EU-ACP, and the AGOA, NEPAD and the huge market in the West African Region sub region
3. Strengthening of agricultural research and revitalization of the agricultural training and streamlining the extension delivery system including the involvement of non-governmental organizations (NGOs) and opinion leaders in extension delivery through capacity building and promotion of improved technologies that are appropriate to the needs of farmers
4. A review of the agricultural input supply and distribution system with a view to developing effective and sustainable private sector-led input supply and distribution system.
5. Promotion of integrated rural development involving agricultural and non-agricultural activities and including the provision of physical infrastructure such as feeder roads, rural water supply, rural communications etc.
6. Encouraging states to develop projects of model rural communities and farm settlement adequately provided with feeder roads, boreholes, vocational training, simple farm tools and equipment, alternative energy source and communication centers for a wholesome life to reduce rural-urban drift
7. Adequate capitalization of the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) to provide soft agricultural credit and rural finance; the NACRDB has been restructured and its mandate expanded to include full financial intermediation
8. Refurbishment of the eight functional silo complexes and phased completion of the remaining ones to improve and increase the capacity of the food reserve programme as a step to food security. These would be leased out to farmers either on individual or group basis
9. Promotion of joint-venture private sector managed multi-commodity development and marketing companies to guarantee remunerative prices for farmers, stabilize consumer prices and provide alternative market for farm produce through buyer-of-last-resort mechanism
10. Promotion of all season farming through rain-fed and irrigated farming with emphasis on fadama agriculture as well as implementation of the programme for the massive production of tree crop seedlings.

2.4 Water Resources Development under NEEDS

Arising from years of neglect, a large proportion of the water infrastructure in Nigeria had been in a terrible state of disrepair and would require colossal sums of resources for their rehabilitation and reactivation. As a result of this situation, some of the issues of concern in the sector include:

- Portable water as a basic necessity is not available to vast majority of the populace;

only about 30% of rural dwellers and 50% of urban dwellers have access to potable water.

- Water supply situation for irrigation remains critical.
- High cost of materials such as drilling equipment and cost of chemicals

2.4.1 Policy Thrust under NEEDS

Government's policy direction is predicated on its commitment to eradicate the scourge of water-borne diseases and improve the supply and management for other productive economic activities. The recent launching of a National Water Supply and Sanitation Policy further defines the thrust, which includes among other things:

- Access to safe drinking water for at least, 60% of the populace;
- Implementation of a coordinated national water policy that delineates the roles of the different tiers of government ; and
- Facilitates the participation of the private sector.

2.4.2 Strategies

To achieve government's policy objectives, the following strategies would be adopted:

- Develop and implement a system of quality assurance consistent with WHO standards especially the completion of hydro geological mapping of the country and the establishment of water quality laboratories;
- Intensify the rehabilitation and reactivation of the River Basin Development Authority and existing urban water development schemes;
- Encourage private sector participation in the development and supply of water;
- Expand and improve rural water supply across the country.

2.5 Environmental Protection and Conservation

A number of human activities and/or natural disasters have the effect of degrading fragile or critical ecosystems, with clearly adverse effects on the nation's economy. The Ministry of Environment was created in 1999 to underscore the importance that Government attaches to the integration of environmental considerations into our national development efforts. The critical issues in this sector include:

- Geometric production of waste by the populace especially in our cities;
- Lack of proper management of wastes including industrial waste;
- Uncontrolled development without regard for waste management and pollution control;
- Absence of significant private sector involvement in the sector;
- Desertification, deforestation, erosion and flood disasters;
- Impact of oil and gas development on the environment and unsustainable use of land;
- Poor enforcement of environmental laws;
- Urban decay, pollution and biodiversity loss.

2.5.1 Policy Thrust

The focus of NEEDS on the environment is to ensure a safe and healthy environment that secures the economic and social well being of Nigerians on a sustainable basis. The specifics of the agenda are enunciated in the "Environmental Renewal and Development Initiative" the primary objectives of which are: "to take full inventory of Nigeria's natural resources, assess the level of environmental damage as well as design and implement restoration and rejuvenation measures aimed at halting further degradation of our environment"

2.5.2 Targets

- Bring environment and waste pollution in our cities and urban centers under control;
- Foster private sector participation in environmental protection;
- Achieve international standards in the process of control and monitoring of our environment;
- Promote local manufacture of equipment and raw materials for environmental protection and conservation;
- Comply with international safety and health and environmental standards as they relate to specific industries and sectors of the economy.

2.5.3 Strategies

Government's strategic intent is defined by the following:

- Establishment of a central self-sustaining regulatory agency responsible for environmental enforcement, compliance monitoring, environmental auditing, impact assessment and setting of standards;
- Strengthen the machinery of desertification and erosion control agency;
- Promotion of synergy in the implementation of environmental conventions;
- Utilize space-based research for environmental management;
- Evolve a private public sector partnership scheme to address increasing waste management;
- Promote a programme for private sector investment in waste-to-wealth management in our cities and urban centers.

It is clear from the foregoing that, from the government's view point, NEEDS seeks to represent a break with the past in terms of its grand conception, underlying philosophy of a government stimulated but a private sector-led competitive market economy, coordinative all inclusive implementation strategy, focus, goals and strategy. NEEDS is a 2003/2004 expression of a national re-birth for Nigeria. Sectoral strategies and plans are to be brought in line with this new thinking. It is thus necessary to examine some of the existing/emerging sectoral policies, including the National agricultural policy (2001) and the Federal policy on water resources (2004) vis-à-vis their subsisting strategic underpinning and prospects.

3. THE NIGERIA AGRICULTURAL POLICY

Nigeria's agricultural policy, developed in 2001, is the synthesis of the framework and action plans of the government designed to achieve overall agricultural growth and development. The policy aims at the attainment of self sustaining growth in all sub-sectors of agriculture and the structural transformation necessary for the overall socio-economic development of the country as well as the improvement in the quality of life of Nigerians.

3.1 The Broad Policy Objectives

- (i) attainment of self-sufficiency in basic food commodities with particular reference to those which consume considerable shares of Nigeria's foreign exchange and which the country has comparative advantage in local production,
- (ii) increase in production of agricultural raw materials to meet the growth of an expanding industrial sector,
- (iii) increase in production and processing of exportable commodities with a view to increasing their foreign exchange earning capacity and further diversifying the country's export base and sources of foreign exchange earnings,
- (iv) modernization of agricultural production, processing, storage and distribution through the infusion of improved technologies and management so that agriculture

- (v) can be more responsive to the demands of other sectors of the Nigeria economy, creation of more agricultural and rural employment opportunities to increase the income of farmers and rural dwellers and to productively absorb an increasing labour force in the nation,
- (vi) protection and improvement of agricultural land resources and preservation of the environment for sustainable agricultural production,
- (vii) establishment of appropriate institutions and creation of administrative organs to facilitate the integrated development and realization of the country's agricultural potentials.

3.2 Features of the Policy

The main features of the policy include the evolution of strategies that will ensure self-sufficiency and the improvement of the level of technical and economical efficiency in food production. This is to be achieved through the introduction and adoption of improved seeds and seed stock, husbandry and appropriate machinery and equipment, efficient utilization of resources, encouragement of ecological specialization and recognition of the roles and potentials of small scale farmers as the major producers of food in the country. Reduction in risks and uncertainties were to be achieved through the introduction of the agricultural insurance scheme to reduce natural hazard factors militating against agricultural production and security of credit outlay through indemnity of sustained losses. A nationwide, unified and all-inclusive extension delivery system under the Agricultural Development Programme (ADP) was put in place in a joint Federal and State Government collaborative effort. Agro-allied industries were actively promoted. Other incentives such as rural infrastructure, rural banking, primary health care, cottage industries etc. were provided to encourage agricultural and rural development and attract youths, including school leavers to go back to the land. The agricultural development policy is supported by sub-policies that facilitate the growth of the sector. The sub-policies cover issues of labour, capital and land whose prices affect profitability of production systems; crops, fisheries, livestock and land use; input supply, pest control and mechanization; water resources and rural infrastructure; agricultural extension, research, technology development and transfer; agricultural produce storage, processing, marketing, credit and insurance; cooperatives, training and manpower development, agricultural statistics and information management.

Implementation of agricultural policy is, however, moderated by the macro-economic policies which provide the enabling environment for agriculture to grow *pari passu* with other sectors. These policies usually have major impact on profitability of the agricultural systems and the welfare of farmers as they affect the flow of funds to the sector in terms of budgetary allocation, credit, subsidies, taxes etc. and therefore must be in harmony and mutually reinforcing with the agricultural policy. The macro policies comprise the fiscal, monetary, budgetary policies and other policies that govern macro-prices. To actualize the new policy direction there was a clear definition of the complementary and mutually reinforcing roles of all stakeholders comprising the three tiers of government and the private and informal sectors.

3.3 Appraisal of the Impact of the Agricultural Policy

The agricultural policy was designed to stimulate the growth and development of agriculture so as to positively impact on the overall growth of the Nigerian economy. The response of the sector to various policy measures has been mixed. Between 1970-1982, agriculture growth rate stagnated at less than 1% with sharp decline in production of export crops. Per capita calorific declined from surpluses in the 1960s to a deficit of 38% in 1982, while Nigeria turned a net importer of vegetable oil, meat, dairy products, fish and grains, notably rice, wheat and maize with the food import bills rising astronomically. Some factors at work

included increasing rate of urbanization, high population growth rate, impact of civil war and unfavourable external environment.

The performance of the sector was undermined by disincentive created by the macro economic environment. The Economic Stabilization Act of 1982 affected expenditures on agriculture and restricted imports of agricultural products and inputs. The trade policy which placed bans on imports of some foods and the provision of some other incentives induced marginal improvement in the performance of the sector. The minimum administrative control of economic activities and the wide-scope for free market forces in the economy attendant on the 1986-88 Structural Adjustment Programme (SAP) led to policy shifts relating to agricultural pricing, trade, investment, production, extension and technology transfer as well as credit. It was in this period that the first formal and deliberate agricultural policy was formulated and launched in 1988 with the strategies for its implementation. Under SAP, the tariff structure was adjusted to encourage local production and to protect agricultural and local industries from unfair international competition. The marketing boards for scheduled crops were abolished. Bans were replaced on the importation of a number of food items including most livestock products, rice, maize, wheat and vegetable oils. Agricultural input subsidies were phased out. A number of new institutions were created for agricultural and rural development namely; the Directorate of Food, Road and Rural Infrastructure (DFRRI) and the National Directorate of Employment (NDE). Some existing institutions were also reorganized (e.g. the River Basin Development Authorities), while most public owned agricultural enterprises were privatized or commercialized.

These SAP measures to some extent had positive impact on the agricultural sector due mainly to price increase as a result of devaluation of the currency and ban of importation of wheat, rice and maize. The ban placed on the importation of some food items increased the output of local production especially rice. However poultry and fishery production became less profitable because of the resultant exorbitant cost of inputs attendants on SAP. Sharp rises in imported inputs such as fertilizers and agro-chemicals etc. were also witnessed while the cost of providing large scale irrigation rose because of the high cost of foreign components. The increase in the cost of import component of equipment for research and technology development stultified their further growth. Although SAP substantially addressed problems of price distortions to farmers, new problems were created by the effects of the changes in macro-economic policies. Implementation bottlenecks arising from scarcity of basic farm inputs and slower rate of adoption of new technologies also contributed their quota in impeding achievement of policy objectives. These reduced the expected benefits of yield increases accruable from the adoption and use of modern farm inputs such as improved variety of seeds. The withdrawal of subsidies which increased production costs substantially reduced the profitability of agricultural activities leading to reduction in size of farm holdings and enterprises. The problem of inefficient marketing persisted as a result of existence of imperfection in the markets, dwindling marketing infrastructures and limited availability of storage facilities.

Despite the problems enumerated above, the performance of agriculture in the post SAP era 1989-1997 was one of steady positive progress in production, growth rate and contribution to the Gross Domestic Product (GDP). From a food deficit situation of the late 1970s and early 1980s the country recorded significant improvements in agriculture through 1990s. The percentage contribution of agriculture to the GDP was 38.0% in 1994, 38.2% in 1995, 39.0% in 1996, 39.2% in 1997, 40.4% in 1998 and 41.3% in 1999. The average growth rate from 1990-1999 was 4.0%. Agriculture accounts for 88% of the non-oil foreign exchange earnings and employs about 70% of the active labour force of the population. The sector is a catalyst and major source of raw material for the industrial sector and provides most of the staple food

consumed by the 120 million Nigerians. With the exception of a few commodities, the period of 1999-2000 witnessed a rising trend in agricultural output generally. Table 3 shows the output of some major food commodities.

Table 3: Output of some major agricultural commodities 1998-2000 ('000 tonnes)

Commodity	1998	1999	2000
Maize	5127	5476	4107
Rice	3275	3277	4298
Sorghum	7516	7520	7711
Millet	5956	5960	6105
Cassava	32695	32697	33854
Yam	24768	25873	26201
Cowpea	2055	2148	2150
Ground nut	2534	2894	2941
Palm oil	845	896	899
Beef	226	228	230
Goat-meat	141	144	147
Mutton	90	92	94
Pork	463	487	511
Poultry-meat	250	268	273
Fish	483	477	482

Total food output increased from 54.76 million tonnes grain-equivalent in 1998 to 57.11 million tonnes in 1999 and to 57.70 million tonnes grains equivalent in 2000. The aggregate index of agricultural production rose by 4% in 1999 and 2.5% in 2000 which is about 3.3% on the average during the two-year period. All the sub-sectors of agriculture contributed to the increase. Using 100 for 1984 as the base year, the index of crop production rose from 288 in 1998 to 298.8 in 1999 and 3.1% between 1999 and 2000, averaging 3.4%. In the livestock sub-sector, the percentage increases in the index were 2.4% and 3.8% with an average of 3.4%.

The experience gained in the implementation of the agricultural policy over the years and the recent trends in agricultural development world wide have necessitated the formulation of more focused sub-sectoral policies. The most current effort in this direction are the land resources policy which will guide sustainable use of agricultural lands, National Agricultural Mechanization Policy, National Cooperative Development Policy and the National Seed Policy which assigns primary responsibility for commercial seed supply to the private sector while Government shall be responsible for foundation and breeder seed development, seed certification and quality control and certification while providing the enabling environment for seed industry development. The National Policy on Integrated Rural Development will integrate the rural economy into the mainstream of the national development process to ensure its effective coordination and management and make rural areas more in tune with the urban areas so as to moderate the rural-urban drift, redress the past neglect through provision of critical rural infrastructure and empowerment of the rural population to create wealth and eradicate rural poverty. These are prelude to the general review of the entire body of the national agricultural and rural development policy which is now due.

3.4 Constraints to Achievement of Policy Objectives

A close look at the Nigerian landscape reveals certain fundamental weaknesses which impede policy and programme effectiveness. These fundamental issues which hamstring the realization of the full potentials of the sector have to be tackled before agricultural policies

and programmes can have the expected meaningful impact on the country's agricultural economy. The constraints include:

- Non-conducive enabling environment where macro-economic policies and agricultural policy are in disharmony thus resulting in escalating costs of production and reduced purchasing power of farmers.
- Inconsistency and instability in macro-economic policies which do not engender confidence in the economy and tend to discourage medium and long term investments in agriculture.
- Poor harnessing and conservation of natural resources especially land, forestry, fisheries and water resources.
- Poor state of rural infrastructure which makes the rural environment unattractive to the younger generation.
- Poor funding of agricultural developmental activities both in quantum and release pattern.
- Lack of appropriate technology to reduce the drudgery in agricultural production and processing activities.
- Inadequate availability of inputs especially improved seeds, seedlings brood stock, fingerlings, etc, credit, fertilizers, agro-chemical and farm machinery.
- Poor targeting of beneficiaries resulting in the capture of Government-provided production incentives by unintended beneficiaries.
- Weak agricultural extension delivery service resulting, ineffective dissemination of modern farming technologies and poor feedback mechanism for research to respond to farmer's needs.
- Low capacity of the organized farmer groups in service delivery.
- Ineffective control of pests and diseases.
- Inadequate database for policy formulation, monitoring and evaluation as well as impact assessment.

Agriculture has also suffered from **implementation failures** which are traceable to one or a combination of the following factors:

- (i) poor translation and articulation of policy prescription into implementable programmes,
- (ii) poor targeting of programmes and objects,
- (iii) poor budgeting,
- (iv) inadequate attention to monitoring, evaluation and impact assessment parameters in project design,
- (v) lack of involvement of beneficiaries in programme design, monitoring and evaluation and implementation arising from the underrating of the knowledge, ability, capability and sensitivity of the small scale farmers,
- (vi) neglect of gender consideration in programme implementation,
- (vii) poor managerial capability,
- (viii) lag between project cost and budgetary provision resulting in sub-optimal allocation,
- (ix) untimely release of usually inadequate funds,
- (x) inadequate attention to project gestation period,
- (xi) use political/social consideration rather technical/economic viability criteria in programme choice and location,
- (xii) contract syndrome in determining project to be executed rather than the identified need of would-be beneficiaries leading to procurement of non-priority goods and provision un-utilizable or unpatronised facilities,
- (xiii) abandonment of projects mid-stream for political reasons.
- (xiv) downturn in the nation economy affecting availability of financial resources for

- funding promontory activities of Government such as support to extension service, subsidy on input especially fertilizer, land development and agricultural machinery and operation of buyer at last resort mechanism,
- (xv) absence of genuine and sustained investment of private commercial producers in agricultural production,
 - (xvi) increase in production largely through expansion of land under cultivation rather than in productivity of land using improved technology.

3.5 Water Management

The agricultural policy document touches on water management, even though water and water use related issues now fall under the Federal Ministry of Water Resources, and no longer under the Federal Ministry of Agriculture. The document notes that Nigeria is blessed with abundant water resources, the potential of which are yet to be fully tapped. Currently large dams constructed in the country have impounded a lot of water with high fisheries and duck farming potentials and having the capacity for irrigation in agriculture. The completion of the outstanding downstream irrigation infrastructures of the already completed large dams in the country will be accorded top priority in order to make them useful to the farmers and to maximize the huge investments already incurred in constructing them. Emphasis will now shift to developing small dams as a more cost effective way of utilizing water resources for irrigation in the country. The maintenance of the existing large dams will continue to be the responsibility of the Federal Government while collaborative efforts of the Water Resources and Agriculture and Rural Development sectors of the economy will be promoted for better use of available water resources and in the supply of farming inputs to the water users of the irrigation projects. **In addition, rain harvesting for irrigation agriculture is to be promoted where surface and underground water is not readily available.** It is significant that RWH has a mention in this document, even though it would appear in reality that reference to it is essentially cosmetic. The document of the mainline Ministry of Water Resources, where no such mention is made to RWH lends credence to this assertion. Also the reference to RWH here says where other sources of water are not readily available, indicating the lack of adequate understanding of the essence of the multi-dimensional reasons for harnessing rain water by the authors of the policy.

4. NATIONAL POLICY ON WATER RESOURCES

4.1 Background: Water Resources in Nigeria

Water is life. Adequate supply of water is central to life and civilization. Of the five basic human needs (water, food, health, education, peace) water is a common factor to the other four. Food production, as well as most of other socio-economic activities, depends on availability of water. Furthermore, the efficiency of food production is currently measured on the basis of a unit increase in the volume of production per unit volume of water. Water has been a very important factor in settlement development in any country where it usually serves as human settlement boundaries.

Nigeria is considered to be abundantly blessed with water resources. The surface water resources potential is estimated at about 267.3 billion cubic metres of water per annum while the ground water resources potential is about 51.9 billion cubic metres of water per annum. However, there is temporal and spatial variation in water availability, the north with low precipitation of only about 500mm in the northeastern corner, and the south with precipitation of over 4,000mm per annum in the southeast. This high variability of rainfall in time and space is a significant characteristic of the tropical climatic belt, especially the Sahelian part of

the continent, in which the country is located and this needs to be factored into water resources management in the country. The Nigerian Sahelian belt is at the southern border of the Sahara desert and it is here that the country faces the challenges of high variability in precipitation which has been manifested in the form of persistent drought in the past three decades with its attendant impact on reduction in the extent of wetlands in the Hadejia-Nguru area and the almost complete loss of the Lake Chad.

Nigeria is drained mainly by the River Niger, the River Benue and their main and other numerous minor tributaries as well as by the Lake Chad and the rivers that discharge into it. There are several other perennial rivers, such as Gongola, Hadejia-Jama'are, Kaduna, Cross River, Sokoto, Ogun, Osun, and Imo. Total surface runoff is large. [Annual runoff at the Lokoja gauging station on River Niger has been recorded as up to 165.80 billion cubic meters](#). Volume of available groundwater is also considerable in large sedimentary basins (the Sokoto and the Chad basins) which lie along the country's international boundaries. Nigeria has a land area of about 924,000 sq km and it is located within the tropics where the climate is semi-arid in the North gradually becoming humid in the South.

For the water resources assessment of the country, automated hydrometric stations have been established in the 8 hydrological areas of the country while some existing primary stations have been upgraded to meet WMO (standards). The Ministry's National Hydrological Programme has the objective of having 486 hydrological stations to constitute the basic primary network.

Nigeria has a total of 3.14 million hectares of irrigable land which consists of:

- 2.04 million hectares for formal farmer owned and managed schemes based on conjunctive use of surface water and shallow fadama aquifers; and
- 1.1 million hectares for formal public irrigation projects.

During the oil boom days of the 1970s and early 1980s, the country invested heavily in water resources development, particularly in the construction of multipurpose dams. The dams were meant to control flood, provide water for domestic and industrial uses, control riparian rights releases and for environmental management, hydro-power generation, fishing, livestock, inland waterways and irrigated agriculture, amongst others. Nigeria today has 200 dams storing up to 31 billion cubic metres of water. Out of these, 11 billion cubic metres are meant to command up to 340,000 hectares of irrigated land. So far, about 100,000 hectares of land have been equipped with the necessary irrigation infrastructure, while only about 60,000 hectares are actually irrigated. About 240,000 hectares of land that can be commanded by the water stored so far need to have the full complement of irrigation facilities in order for the country to derive the benefits fully.

A large percentage of the country's population does not have access to potable water yet. The Ministry has been collaborating with other sectors that are associated with water resources activities such as Federal Ministries of Agriculture, Environment, Power and Steel; National Inland Waterways Authority (NIWA) and Nigerian Meteorological Services Agency for joint development of the country's water resources. The institutional arrangement for water resources development and management are such that all tiers of government, that is Federal, States and Local Governments are involved. To boost manpower supply for the water resources sector, the National Water Resources Institute (NWRI), Kaduna was established in 1979. It runs certificate, remedial and National Diploma and Higher National Diploma and professional post graduate courses in water resources. The Institute also runs a Data Bank with data from the eight (8) hydrological areas of the country. The Data Bank also has meteorological data from about 222 stations nationwide.

Operation and Maintenance

The operation and maintenance of water resources infrastructure has been very poor and the government has become increasingly concerned by this poor level of Operation and Maintenance. The National Council on Water Resources during its 16th Meeting in Asaba in 2002 set up a National Committee to recommend ways and policy initiatives to address the problem in order to make water resources infrastructure sustainable. The safety of all water resources infrastructure should be paramount in order to reap maximum benefits. For instance, large dams and reservoirs must be protected at all times since dam failures with huge uncontrolled releases of water from the reservoirs could result in both destruction of lives and properties downstream of such infrastructure. There is therefore need for adequate and sustainable operation, maintenance and management of the nation's water resources infrastructure.

Monitoring and Evaluation

Monitoring and evaluation is key to the success of all water resources programmes. However, due mainly to inadequate funding, monitoring and evaluation of the projects of the sector have not been carried out on regular basis.

Legal Framework

Water resources development is guided by laws and rules such as the following Statutory laws: Water Resources Act 101 of 1993; Minerals Act of 1990; NIWA Act 13 of 1997; RBDAs Act of 1987 and State Water Edicts. These laws are relevant in the development and management of the nation's water resources. Other Acts associated with water resources are those of NEPA, FME and the 1978 Land Use Act.

Funding and Financing

The sector has been under-funded because it is almost left to the Government and there is need for active private sector participation. However, the collaboration with External Support Agencies has been encouraging and appreciated.

Conservation and Integrated Management/Coordination

Previous and current government programmes in the water sector have been centred on water resources development, while proper management and conservation of the resource was not given adequate attention. The previous approach to water resources development and management involved treating water as a public social good. It is centralized and entails top-down, command and control mechanisms.

There have been numerous activities in the area of water resources development in dam construction, urban water supply, irrigation and power generation. Each of these sub-sectors has developed water resources without adequate consultation with other stakeholders which has resulted in underutilization of the facilities provided.

4.2 Challenges of Water Resources Development and Management in Nigeria

The country had made considerable investment in water schemes and related activities, in addition to being blessed with abundant water resources; the desire to improve access to this resource was becoming more and more elusive because of the rapidly increasing demand for water. This rise in demand that was outstripping supply is consequent upon high population growth rate coupled with increasing urbanization, and rising living condition as a result of economic growth. Other challenges facing Nigeria with respect to managing its water resources are shortages of water in urban and rural areas, competing water uses, lower level of irrigation, degrading watersheds and water courses, fragmented and uncoordinated water resources development, poor data and lack of cooperation on co-riparian use of international

waters.

The nation's water sources are under serious threat from inadequate catchments management and widespread pollution, including the indiscriminate disposal of hazardous substances. There is limited groundwater availability in the areas of the country underlain by crystalline rocks. In the more productive sedimentary areas, groundwater exploitation is heavy and uncontrolled. In addition to above challenges, poor watershed management, deteriorating water quality, drought and desertification are inexorably increasing water scarcity. Scarcity threatens urban and rural development with rapidly rising water supply costs, reduced reliability of water supplies, prolonged droughts, flood and erosion and increasing costs of irrigated crop production. Water-related diseases are a major cause of morbidity and mortality, with malaria, diarrhoea, schistosomiasis, onchocerciasis and guinea worm all posing serious threats to public health.

The threats to the nation's water resources are symptoms of poor and uncoordinated management of the resource. Federal and state governments assume greater responsibility for overall management of the nation's water resources. In most cases, stakeholders are not consulted or otherwise involved in planning, development and management of the nation's water resources. The result has been a vicious cycle of unreliable projects that provide services that do not meet consumers' needs and for which the consumers are unable to pay.

The absence of financial discipline and accountability, along with political interference in decisions about allocations and pricing are reflected in a litany of problems: inefficient operations, inadequate maintenance, financial losses and unreliable service delivery. All these have resulted in highly subsidized water in irrigation, industry and domestic water use for the rich. This is financially burdensome to both the federal and state governments that are already faced with diminishing revenue base and must therefore have a higher proportion of their water resources financing derived from external sources.

Nigeria being located downstream of Rivers Niger and Benue, activities upstream of the river systems adversely affect water resources development and management of the country. Water is on the concurrent legislative list which poses a challenge to coordination and definition of roles. The National Policy on Water Resources would provide a framework for addressing these challenges in order to achieve the following:

- Clear and coherent regulation.
- Clear definitions of the functions and relationship of sector institutions.
- Find solution to the problem of dwindling funds.
- Reliable and adequate data for planning and projections.
- Decentralization in order to boost efficiency, performance and sustainability.
- Autonomy of water supply agencies.
- Regard water as both economic and social good.
- Create public awareness about water conservation and management.
- Provision of stable and adequate power supply.
- Accountability.
- Technical and financial capacity building to efficiently manage water delivery system.
- Human resource development.

Detailed extract from the Policy is presented in Annex A, while the policy is appraised in Section 6.

5. HISTORICAL BACKGROUND TO WATER RESOURCE AND FORMAL IRRIGATION DEVELOPMENT IN NIGERIA

Water resource development in Nigeria could be traced back to 1908 when a gauge station was established in Jebba and other gauge stations in 1914 at Baro, Lokoja, Idah and Onitsha along the Niger and at Yola, Ibi, and Makurdi along the Benue (The Netherlands Engineering Consultants (NEDECO), 1959). Singh and Maruya (1979) reported that the first recorded survey of irrigation potential along Sokoto-Rima and Zamfara valley systems, and water impounded at Wurno for irrigation was carried out in 1918 and that by the year 1929, a scheme was developed covering 243 hectares for irrigation along Shella River, but these were later destroyed by floods.

In 1949, the first irrigation division was established in the then Northern region. The Division identified four areas, Wurno, Hadejia, Yobe and Gamboru, for small projects based on pumping. After independence, the Government identified lack of irrigation as a constraint to agricultural development and the 1962-68 National Development Plan recommended more involvement in water resource and irrigation development. The first modern irrigation project at the Bacita Sugar Estate was established in 1964 on the flood plain of the Niger River.

In 1963, the FAO reviewed the disappointing history of small-scale projects along the Sokoto-Rima Rivers and prepared feasibility studies for the expansion of irrigation through dam construction. On the request of the Chad Basin Commission, FAO and United Nations Economic and Scientific Commission (UNESCO) in 1965 conducted a study of the water resources in the Chad Basin. Similarly, the US Bureau of Reclamation studied the Hadejia-Jama'are River systems in 1965. The FAO and USAID studies and survey identified attractive sites for large-scale irrigation development along Sokoto-Rima Rivers and Hadejia-Jama'are Rivers. Subsequent reviews of these studies marked a turning point for Nigeria's irrigation development and large irrigation projects (formal irrigation) were constructed in 1970s and 11 River Basin Development Authorities (RBDA's) covering the whole country were established in 1976. Most of the irrigation activities are in the north simply because of the seasonality of the rivers and the existence of large human population near alluvial plains. In 1971, based on the FAO proposals, the Federal Government embarked on the construction of Bakolori Irrigation Project. Similarly, the South Chad Irrigation Project was established in the mid 70's. By the early 80's, there were numerous formal irrigation projects in the country, however criticisms abound as the projects performed below expectations, with so much environmental implications (from the dams), water resource conflicts between farmers and pastoralists, etc. Conscious of the criticisms and coupled with budgetary difficulties, the country witnessed a slow pace in development of large projects in the decade that followed (1980 to 1990), with renewed and increased interest in small-scale irrigation. The investments in irrigation development have been enormous and have produced many types of technologies in irrigation. The final results are far-reaching, while some painful and bitter lessons have been learnt. In particular, the absence of processing, storage, and marketing infrastructure of irrigated vegetables causes huge loss to farmers.

5.1 Informal Fadama Irrigation Development

In the late 70's to early 80's the Agricultural Development Projects (ADPs) were established with the main thrusts of agricultural extension and improvement. During the late 80's incidental to the creation of the ADPs, the Federal Government took interest in small-scale irrigation. Different water lifting technologies were tested and the small petrol engine pumps were adopted. This

formed the basis for the National Fadama Development Program (NFDP). In addition to this is the crop production in the flood plains and inland valleys, mainly rice under natural flood and controlled flooding, and vegetables as recess farming. Noticing the traditional irrigation using the shadof, the ADPs identified the potential of the shallow groundwater in the river valleys for irrigation. Various Asian techniques for exploiting were tested and finally the small petrol engine pump became more popular. Based on this success, the World Bank funded a separate programme, the National Fadama Development Programme, under which small engine pumps (owned by individuals) were used to draw water from streams and shallow water tables. Tube wells and wash bores were used as the technique for access to the shallow groundwater.

5.2 Natural Flood Systems

By far the most common method of irrigation in the fadama wetlands of the north and the inland valley of the south is through flooding mainly in rice production. This system, carried out by farmers acting as individuals, covers more land than the developed formal and fadama irrigation put together. Only of recent controlled flooding is being introduced using simple techniques aimed at (1) increasing temporary water storage (small bunds and dykes) and (2) as more permanent storage (control gates etc). Rice varieties that grow in proportion to flood depths are available, and the key requirement is proper planting time before the flood. After rice harvest, vegetable crops are usually grown as recess farming.

6. AN APPRAISAL OF NEEDS, THE NATIONAL POLICIES ON AGRICULTURE AND WATER RESOURCES AND THE OVERALL WATER RESOURCES DEVELOPMENT STRATEGY OF NIGERIA

While one may agree with the philosophy and sentiments of NEEDS in general terms, and commend some of its radically bold initiatives, particularly the need to fight corruption and enthrone transparency and eradicate rent-seeking, we need to look very closely at its adoption of an integrated rural development (IRD) strategy to address poverty reduction at the rural interface. Though IRD has had its time in development history, it is now a dead concept (Faborode, 2005). One other major worry is how shall sectoral planning be coordinated and harmonised? For example, integrating land and water resources planning for agriculture and rural development – transportation, energy, electricity, communication, water supply, etc in an economically and environmentally sustainable way, which though is the global best-practice, is not apparent in the strategy document. Lastly and most importantly, there doesn't seem to be a technological base for NEEDS and no effort is made to create one. Curiously, NEEDS has not made “technology” and its critical success ingredients – education and research - the centre piece of the strategy for development”, and this omission is considered to be fatally flawed, considering what one technology alone, ICT, has done to space and time, and hence human livelihoods.

Though the Nigerian National Policy on Water Resources has not expressly made any reference to RWH as does the National Agricultural Policy (see Section 3.5), a critical analysis indicates, albeit unconsciously, the embodiment of elements of and basis for RWH in several aspects as follows:

a. Historical evidence:

- Total surface runoff is large
- Regret of past heavy investment in multipurpose dams
- Concern about poor watershed management leading to degradation

b. Enunciated Policy Strategies:

- Effective flood damage reduction through a special ecological fund
- Water transfer

- Awareness raising on water conservation
- Integrated management of surface and ground water
- Use of catchments as a basis for land and water resources development
- Emphasis on the building of small and medium dams
- Involvement and encouragement of owners and user communities in the operation and management of schemes
- Adaptation of catchments management approach to planning irrigation development

The overall indication is a very strong policy support despite the lack of the word “RWH”, though faithful implementation is another thing entirely. The implication is that the policy environment can easily be persuaded as to the logic and benefits of an integrated land and water planning approach, which also emphasizes the efficient harnessing of rain as a natural resource.

7. OSUN STATE AGRICULTURAL POLICY

Some extracts from the Osun State Agricultural Policy are hereby presented, since this is the site for the RWH project.

7.1 Current Status of Agriculture in Osun State

Osun state has a population of about 2.2 million by the 1991 census figures. It also has a total land area of 888,250 hectares (8882.5 km²). The land available for cultivation out of this is 710,603 hectares (80%) while only 363,749 hectares (or 51.2%) is annually put to arable crops cultivation and 82,783 hectares (or 12.0%) to tree crops production. 82,757 hectares is mainly actual forest and established plantation of indigenous and exotic tree species. Osun state is predominantly agrarian economy. Major crops grown vary from one zone to the other depending on the prevailing vegetation, soil type and climatic factors. Two vegetation regions are predominant; they are the rain forest which is found mostly in Ife/Ijesa and part of Iwo zones and the forest savannah mosaic (derived savannah) featuring partly Iwo and Osogbo zones. The climate of the state is tropical with distinct wet and dry seasons. The wet (rainy) season starts in late March and ends in October and the dry season stretches from November to early March. Agriculture in Osun State is predominantly rain-fed with small-scale irrigation limited to Fadama farming in the wetlands. In the forest region with higher rainfall and relative humidity, tree crops such as cocoa, kola, oil palm and citrus are grown. Equally grown are arable crops such as maize, yam, rice, cassava, tomato and pepper. On the other hand, the derived savannah region has mainly arable crops with tree crops grown in patches.

In the area of livestock production, poultry is the commonest stock of animals in the state with an estimated population of close to twelve million birds. They are kept as free-range animals mostly by peasant farmers residing in schools, and farm settlements and cooperative farms. Professionals and medium scale farmers such as schools, farm settlers and cooperative farmers keep poultry under intensive system for commercial purposes. Other stocks of animals in the state include cattle, goats, sheep, pigs and rabbits with goats having largest estimated population of about 2.5 million heads. There are also about 1,135,580 cattle, 1962,580 sheep and 864,878 pigs.

Osun state is landlocked. Thus, fish production activities in the state are limited to aquaculture and artisanal sub sectors. The State Government has five (5) demonstration fish farms with a total of 16 production ponds of one hectare each and 20 nursery and breeding ponds, all constituting 3490 hectares. There are about 773 private fish ponds covering about 754.5 hectares. As for artisanal fisheries, there are about 1000 fisher folks with majority of them being migrant and itinerant type.

7.2 Problems of the Agricultural Sector in Osun State

The problems and constraints of the agricultural sector can be grouped into four categories; these are:

- (i) Technical problems:
 - a. inadequate quantity and quality of farm inputs e.g. seeds, agrochemicals, etc
 - b. Low level of agricultural technology;
 - c. Inadequate infrastructural facilities.
- (ii) Socio-economic problems
 - a. prohibitive wage rates for hired farm labour
 - b. low rates of returns from most agricultural investments;
 - c. high risks usually associated with investments in agriculture
- (iii) Organisational problems and
- (iv) Institutional problems

7.3 Overall Goals of Osun State Agricultural Policy

The overall goals of the agricultural policy of Osun state shall be the attainment of self-sustaining growth in all sub-sectors of agriculture and structural transformation of rural areas.

In order to articulate this goal, the policy objectives shall be:

- (i) attainment of self-sufficiency in arable and tree crops production
- (ii) attainment of increased production of various livestock breeds
- (iii) attainment of increased domestic fish production on sustainable basis;
- (iv) afforestation and reforestation to be aggressively pursued
- (v) achievement of self-sufficiency in wood-products
- (vi) conservation of wildlife;
- (vii) ensuring that our agricultural produce conform with acceptable global standards;
- (viii) creation of increased rural employment opportunities
- (ix) attainment of an improved quality of life of rural dwellers through provision of social amenities.

In particular, in attaining self-sufficiency in arable and tree crops production, government will focus its assistance on selected arable crops e.g. maize, cassava and rice; tree crops (cocoa, oil palm, kola and cashew).

7.4 Agricultural Infrastructure Development

Agricultural infrastructural development will include:

- (a) Provision and maintenance of rural roads, wells, mini-earth dams and irrigation facilities for agricultural development and
- (b) The provision of farm service centers and farm settlements.

ANNEX A

A4. EXTRACTS FROM THE NATIONAL POLICY ON WATER RESOURCES, 2004

A4.1 Overview of the Policy Development Process

Consequent upon the enactment of Water Act 101 of 1993 and the preparation of the National Water Resources Master Plan in 1995, the Water Resources Management Reform Programme commenced in 1997. This programme carried out a Water Sector review in Legal and Regulatory Framework, Institutional Framework and Participatory Approach, Information and Water Resources Data Base, Water Resources Economics and Financing, Environment and Resource Sustainability, Water Resources Infrastructure, Assets and Assets Management and International Waters. The report of these reviews provided inputs into the formulation of the National Policy on Water Resources, principles and strategies as presented herewith.

A4.2 The Policy

The Millennium Development Goals (MDGs), the objectives of the New Partnership for Africa's Development (NEPAD) and resolutions of various conferences, conventions and meetings listed below, provided the bases for the formulation of this National Policy on Water Resources.

- * Copenhagen, 1991
- * Dublin, 1992
- * United Nations Conference on the Environment and Development, UNCED, Rio, 1992 (Agenda 21, Chapter 18 and 8)
- * Noordwijk, Meeting of Ministers, 1994
- * Development Assistance Committee Meeting on Water Resource Management, OECD/DAC, 1994
- * OECD/DAC, 1995
- * The International Convention to Combat Desertification, INCD, adopted 1994
- * The Rome Declaration on Food Security, 1996
- * Ramsar Convention, 1975.
- * Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes, Helsinki, 1992.
- * UN Convention on the Law of the Non-navigational Uses of International Watercourses, 1998. (UN Convention)
- * World Summit on Sustainable Development (WSSD)
- * World Water Forum (WWF)

A4.2.1 Objectives

The overall objectives of the National Policy on Water Resources are to:

- * Optimise the use of Nigeria's water resources at all times, for present generation to live, without compromising the existence of the future

generations.

- * Manage the resources for the purpose of eradicating poverty.
- * Enhance and improve public health.
- * Protect the nation's environment for a balanced social and economic development.
- * Involve all stakeholders in the sustainable development of the nation's water resources, through coordinated management and utilization of the resources in a holistic manner.
- * Ensure the development and management of water resources in an integrated manner.
- * Prevent the occurrence of water crises.

A4.2.2 **Principles**

The guiding principles of the National Policy on Water Resources are:

- * Nigeria's water resource is a national asset.
- * The riparian principle of access shall apply.
- * Water resources shall be assessed, developed, apportioned and managed in such a manner as to enable all users to have equitable access, taking into account the sustainability of the resources.
- * Both the social and economic value of water shall be recognised.
- * Development of water resources shall be demand-driven.
- * The planning and management of Nigeria's water resources shall take place within a framework which facilitates awareness and participation among all stakeholders at all levels.
- * Reliable water resources management information systems shall be developed and be accessible to the public.
- * The operational management of water resources and services shall be decentralized to the lowest practicable level.
- * The management of water resources shall seek to harmonize human and environmental requirements, recognizing the role of water in supporting the ecosystems.
- * Water quality management options shall include the use of economic incentives and penalties to reduce pollution.
- * Environmental degradation shall be discouraged.
- * Surface and groundwater resources are part of the hydrological cycle and shall be managed in an integrated manner.
- * Institutional functions and roles shall be clearly defined with no overlap or conflicts.
- * Where water services are provided in a monopoly situation, the interests of the individual consumer and the wider public shall be protected.
- * Private Sector Participation shall be encouraged.
- * Nigeria shall strive to promote equitable and beneficial use of international water courses, based on existing conventions and treaties and generally accepted principles of International laws.
- * Environmental Impact Assessment shall be carried out prior to project development.

A4.3 **Water Resources Assessment**

A4.3.1 **Policy Objectives**

The main policy objectives of Water Resources Assessment are the :

- * acquisition, collation, management and dissemination of all hydrological, hydrogeological, hydrometeorological and isotopic information with respect to national waters and international waters between Nigeria and her neighbours by installation of adequate number of monitoring networks;
- * determination of all available reserves including boundary conditions of both surface and underground waters, quantitatively and qualitatively for equitable distribution, abstraction, return/recharge, and apportionment for sustainable development of all sources for the socio-economic welfare of Nigerians to provide for the following:
 - * Promotion of orderly, integrated and comprehensive development, conjunctive use of surface and groundwater, and conservation of all waters.
 - * Promotion of inter-agency and inter-state cooperation in cases of shared resources through judicious apportionment and utilization of such waters thereby removing present and future conflicts.
- * Effective flood damage reduction, conservation and development of surface and groundwater reserves for municipal, rural, industrial and agricultural uses, development of recreational facilities in relation to reservoirs, lakes and streams, development of fisheries and game, promotion and encouragement of forestry, soil conservation and watershed management practices, hydroelectric power development and improved navigational facilities.
- * Control of salt water intrusion, aquifer mining, surface and groundwater contamination, etc. by all users to ensure environmentally sound management of water resources.
- * Identification of catchment/basin of surplus water for transfer to catchments of deficit.
- * Improved realtime forecasting of hydrological phenomena that will aid contingency plans for the reduction of adverse effects of drought and flood.

A4.3.2 **Principles**

- * The National River Systems within Nigeria's territorial boundaries discharge enough annual flow which can meet the requirements of the present and future populations of Nigeria if managed sustainably.
- * The Sedimentary Basins contain vast reserves of groundwater which complement the surface water.
- * The Basement Complex contains limited but exploitable quantities of water.
- * The exploration, exploitation and management of these vast sources of water shall be carried out in a coordinated manner.
- * Water from those sources shall be estimated (quantity and quality) and developed in a manner that shall yield the maximum benefits derivable on a sustainable basis for the nation's socio-economic development.
- * The management of hydrological risks and vulnerabilities shall be hinged on an effective water resources assessment programme.

A4.3.3 **Strategies**

- * Water Resources exploration shall be carried out using all available scientific techniques and tools.

- * Establishment of adequate number of primary hydrological and hydrogeological monitoring networks and their proper operation and maintenance.
- * Environmental isotope techniques for surface and groundwater investigations shall be used to complement conventional methods.
- * Collection, collation, processing, storage and dissemination through publication of all data generated from the networks for multipurpose use.
- * Presentation of hydrological/hydrogeological information on maps of various scales in accordance with UNESCO standard for the production of such maps and continuous review and update of the maps from time to time.
- * Co-ordinating and encouraging inter-agency flow of hydrometeorological information as well as rendering technical support to other agencies involved in the nation's water resources assessment and development.
- * Technical co-operation and collaboration with agencies such as WMO, JICA, UNESCO, UNICEF, USAID, etc., as well as, bilateral and multilateral relations with other countries and regional cooperation with organizations such as LCBC, NBA, NNJC, etc will be pursued with vigour.
- * Local manufacture of hydrological equipment such as manual gauges, depth sounders, etc., shall be promoted, while instrumentation at our hydrological stations shall be standardized.
- * Considering the scarcity of professionally qualified staff, professionalism shall be enhanced through training programme in cooperation with national and international institutions.
- * The role of the Water Resources Act 101 of 1993 in the exploration, development and management of our water resources cannot be overstated. All its provisions shall be put into operation for sustainable water budgeting for the various uses enumerated above.
- * Use of the established 8 hydrological areas (HA) as the basic units of water resources management in Nigeria.
Implementation of a National Water Resources Plan that will be regularly reviewed and updated.

A4.4 **Conservation and Integrated Management/Coordination**

- * Previous and current government programmes in the water sector have been centred on water resources development, while proper management and conservation of the resource was not given adequate attention. The previous approach to water resources development and management involved treating water as a public social good. It is centralized and entails top-down, command and control mechanisms.
- * There have been numerous activities in the area of water resources development in dam construction, urban water supply, irrigation and power generation. Each of these sub-sectors has developed water resources without adequate consultation with other stakeholders which has resulted in underutilization of the facilities provided.

A4.4.1 **Policy Objectives**

- * To conserve, and restore where necessary, and avoid further depletion of the nation's water resources.
- * To manage demand for water.
- * To protect water resources from pollution and over-abstraction.
- * To raise public awareness and to gain public acceptance about the need for

water conservation and promote changes in water use behaviour.

- * To manage water resources in an integrated and sustainable manner.
- * To improve existing reservoirs, formulate a reservoir operations policy for existing dams in line with the National Water Resources Master Plan

A4.4.2 **Principles**

- * Nigeria's water resources shall be exploited, developed and managed in such a way as to promote equitable and sustainable socio-economic development, without jeopardizing the benefits and opportunities of future generations.
- * Water is public property, a limited natural resource which has economic value
- * The resource base shall be protected against any kind of pollution. The protection measures shall be based on both regulatory and market-oriented approach to waste management, applying the "polluter pays" principle.
- * Development of water resources shall be demand-driven.
- * Efficient water use to achieve water savings.
- * The management of water resources shall strive to allow for its multipurpose use.
- * The planning and management of Nigeria's water resources and water services shall be participatory.
- * The operational management of water resources and services shall be decentralized to the lowest practicable level.
- * Water quality management options shall include the use of economic incentives and penalties to reduce pollution.

A4.4.3 **Strategies**

- * Establishment of economic incentives to save water, including introduction of abstraction fees, enactment of regulations concerning metering and reporting obligations for large surface and groundwater withdrawals and regulations concerning pollution prevention.
- * Social marketing of water saving devices, reduction of unaccounted-for-water through proper maintenance of water supply and distribution systems shall be adopted.
- * Putting in place an institutional arrangement which will ensure equity in the allocation and utilization of the water resources of each river basin.
- * Adoption of cross-sectoral/multi-sectoral approach to the development of surface and ground water.
- * Use of catchments as a basis for land use and water resources development.
- * Make provision for downstream releases for the environment and other uses.
- * Promotion of extension services and public awareness campaigns to sensitize the public on the limited nature and economic value of water and the need for its conservation.

A4.5 **Dams and Reservoirs**

A4.5.1 **Policy Objectives**

- * To ensure proper harnessing and utilization of the vast water resources of the nation.
- * To de-emphasize the building of large dams because of high cost of downstream infrastructural facilities as well as high environmental consequences.
- * To ensure that water impounded behind dams is fully utilized for its intended purposes.
- * To emphasize the building of small and medium dams, in locations where

feasible, with its low capital costs, easy to maintain and cheaper to manage attributes compared to large dams.

- * To continuously monitor and inspect the dams in accordance with the laid down rules and regulations.

A4.5.2 **Principles**

- * Small and medium dams shall be favoured in the light of their recognized comparative advantage over large dams such as costs, short period of construction, relatively low compensation and settlement costs as well as environmental consequences.
- * To involve and encourage owners and user communities in the operation and maintenance of small/medium dams.
- * To provide enabling environment for private sector participation

A4.5.3 **Strategies**

- * The enforcement of the Water Resources Act 101 of 1993 as it relates to construction, operation and maintenance of dams.
- * Proper operation and management of Dams and Reservoirs in accordance with the operational manual and engineering standards.
- * Construction of Small and Medium Dams in accordance with the guidelines provided in the National Water Resources Master Plan.
- * Interbasin Water Transfer studies shall be undertaken for possible water transfer schemes from areas of surplus to areas of need.

A4.6 **Irrigation and Drainage**

A4.6.1 **Policy Objectives**

- * Optimisation of crop production per hectare of land and litre of water utilised in irrigation schemes;
- * To slow down, stop or reverse the rates of environmental degradation in these schemes;
- * To ensure the sustainability of irrigation and drainage schemes
- * To optimise the use of water and land resources to enhance production

A4.6.2 **Principles**

- * To stabilise agricultural production and ensure food security;
- * To stabilise prices of agricultural products
- * To increase farmers' income, reduce poverty and create employment;
- * To encourage coordinated development and management
- * Involvement of farmers and Water Users Associations in essential stages of irrigation development and management for sustainability;
- * To create enabling environment for effective private sector participation;
- * Adoption of costs recovery principles in order to remove distortion in allocation of resources;
- * Proper and regular operation and maintenance of infrastructure
- * Collaboration with external support agencies
- * More emphasis shall be placed on drainage and reclamation schemes
- * Increase the development of small scale/fadama irrigation projects

A4.6.3 **Strategies**

- * Adoption of best practice in irrigation development and management
- * To encourage the use of indigenous tested and proven technology
- * Adoption of the catchment management planning approach to irrigation and

- drainage development in preference to project-by-project approach
- * To ensure sustainable financial autonomy through cost recovery, with the ultimate aim of achieving financial autonomy for the managing agencies;
- * Rehabilitation of existing schemes, where applicable, would be fully supported by government prior to the introduction of financial autonomy;
- To encourage the formation and strengthening of Water Users Associations with a view to achieving Participatory Irrigation Management (PIM);
- * Improvement in the billing and collection of service charges by the irrigation agencies or through Water Users Associations;
- * To ensure integration of irrigated agriculture into the national agricultural production system through improved inter-sectoral linkage between Water Resources and Agriculture;
- * To encourage and support manpower development.
- * To encourage and support irrigation research and use of research findings.

A4.7 **Water Supply and Sanitation**

The National Water Supply and Sanitation Policy (2000) emphasizes the provision of sufficient potable water and adequate sanitation to all Nigerians in an affordable and sustainable way through participatory investment by the three tiers of government, the private sector and the beneficiaries.

A4.7.1 **Policy Objectives**

- * To increase service coverage for water supply and sanitation nationwide to meet the level of socio-economic demand of the nation in the sector.
- * To ensure that good quality standards are maintained by water supply undertakings.
- * To ensure the affordability of water supply and sanitation services for the citizens.
- * To guarantee affordable access for the poor to basic human need level of water supply and sanitation services.
- * To enhance national capacity in the operation and management of water supply and sanitation undertakings.
- * To privatise water supply and wastewater services (where feasible) with adequate protection for the poor.
- * To monitor the performance of the sector for sound policy adjustment and development for water supply and sanitation.
- * To provide legislation, regulations and standards for water supply and sanitation.
- * To reform water supply and sanitation sector to attain and maintain internationally acceptable standards.

A4.7.2 **Principles**

- * Access to adequate water supply and sanitation is a basic necessity.
- * The achievement of sustainable and financially viable water supply and sanitation services must be pursued by service providers.
- * Water shall be considered as an economic good while guaranteeing affordable access for the poor to basic human need level of water supply and sanitation services.
- * Management of water and sanitation services shall be decentralized to the lowest possible level.
- * Water and Sanitation services shall be managed using a participatory approach.

A4.7.3 **Strategies**

- ! Compilation of baseline data on water supply and sanitation
- ! Rehabilitation, modernization and expansion of existing schemes and embarking on reforms to make the schemes efficient.
- ! Extension of distribution network.
- * Adoption of WHO drinking water quality standards.
- * Establishment of national water quality reference laboratory.
- * Protection of water sources.
- * Adoption of water supply and sanitation services, cost reduction, management and tariff reforms.
- * To encourage research and development.
- * To encourage private and community ownership of water supply and sanitation facilities.
- * To encourage local manufacture of water supply and sanitation equipment and treatment chemicals.
- * Strengthening of water supply and sanitation training institutions.
- * Granting of autonomy to water supply and sanitation agencies.
- * Adoption of cost sharing formulae for capital investment and for operation and maintenance as proposed in the National Water Supply and Sanitation Policy (2000) for the three tiers of government and the community.

A4.8 **Manpower Development and Capacity Building**

A4.8.1 **Policy Objectives**

- * To focus on the development of competent and skilled manpower towards meeting the National requirements in the water sector.
- * To train lower and middle level manpower through the formal training scheme, while senior level manpower shall acquire training through participation in courses, conferences, study tours and workshops.
- * To strengthen the NWRI to carry out its mandates in the areas of manpower development and capacity building.

A4.8.2 **Principles**

- * Manpower development and capacity building shall be continuous and shall involve public and private sectors as well as NGOs and Communities.
- * It shall be based on Gender balancing.
- * Promotion of community based training programme.

A4.8.3 **Strategies**

- * To ensure access to training and development for all workers irrespective of gender and rank
- * To empower communities with skills and knowledge required for management of water resources schemes.
- * To develop infrastructural training facilities for on-the-job training
- * To plan and implement training programmes
- * To ensure adequate mix in both software and hardware (engineering) aspects of water resources management
- * To conduct periodic training needs analyses
- * To strengthen the NWRI to provide coordination for manpower development in the lower and middle level areas
- * To establish training network centers in various states of the country under the

A4.9 **Data and Information Management**

A4.9.1 **Policy Objectives**

- * To provide the nation with sets of coordinated, comprehensive, timely and reliable data and information in the water resources sector;
- * To create an organizational structure that inspires innovation and adapt evolving techno-economic changes in the 21st century.
- * To apply Information Technology as tools for the generation, collection, organisation, storage, retrieval and dissemination of information.

A4.9.2 **Principles**

- * Continuous modernization of water resources data and information management shall be pursued.
- * Information Technology (IT) shall be used for water resources sector planning, design and implementation.

A4.9.3 **Strategies**

- * Deployment of modern techniques of water data banking techniques towards the conservation and management of the nation's water resources in an integrated manner
- * Establishment of both Local Area Network (LAN) and Wide Area Network (WAN) in the water resources sector.

A4.10 **Operation and Maintenance**

A4.10.1 **Policy Objectives**

- * To ensure that all water resources infrastructure are properly operated, adequately maintained and rehabilitated as and when necessary in order to ensure their sustainability and service delivery.

A4.10.2 **Principles**

- * Operation and maintenance shall be achieved through the decentralization of responsibilities.
- * Operation and maintenance shall form part of the overall project cycle from conception through construction, monitoring and evaluation.

A4.10.3 **Strategies**

- * Provision of adequate data on project design and construction
- * Adoption of standard construction procedures
- * To encourage the use of high quality materials
- * To ensure stakeholder participation in operation and maintenance
- * Use of skilled manpower for operation and maintenance
- * Training and retraining of operation and maintenance staff
- * To ensure the production of operation and maintenance manual by the contractors after the completion of projects
- * Contract agreement shall contain provisions for twelve months defective maintenance period.

A4.11 **Trans-boundary Waters**

A4.11.1 **Policy Objectives**

- * To promote rational and optimal use of the shared water resources for the development of Nigeria;
- * To strengthen co-operation among riparian states in their efforts to finding solutions to development problems, thereby promoting cordial relationship among the people of the border regions to live as good neighbours
- * To improve the living conditions among the people of shared river basins in order to avoid cross border exodus.

A4.11.2 **Principles**

- * Nigeria shall strive to promote equitable and beneficial use of shared water resources based on generally acceptable principles of international law.
- * Nigeria will seek to cooperate with other riparian countries for the development, optimum use and protection of trans-boundary waters wherever possible and in her national interest without compromising her sovereignty.
- * Shared water resources among riparian countries shall be used to strengthen socio-economic and political relations.
- * Nigeria shall respect all clauses of all international agreements reached on management of shared river basins and shall be guided by international conventions and treaties that are in force.

A4.11.3 **Strategies**

- * To establish an effective dispute resolution mechanism in consultation with co-riparian States within the regional commission and authority.
- * To establish comprehensive monitoring system for water resources in collaboration with co-riparian States in all its boundary basins for essential data collection with a uniform format to be collated, analyzed and shared.
- * The review of all International Treaties and Agreements on shared river basins to reflect the key issues raised in the United Nations (UN) Convention.
- * To support the regional bodies and exert enough influence to ensure protection of Nigeria's interest as a vulnerable downstream riparian state.

A4.12 **Institutional Arrangements**

A4.12.1 **Policy Objectives**

- * To ensure proper co-ordination and collaboration among stakeholders and harmonization of activities in water resources development and management.
- * To ensure a multi-disciplinary and inter-sectoral approach to water resources development and management.
- * To define clearly the functions and responsibilities of each tier of Governments and Institutions set up to implement various activities in the water resources sector.

A4.12.2 **Principles**

- * The following institutions shall be involved in the development and management of water resources in Nigeria:
- * At the Federal Level – the Ministry responsible for Water Resources and its Agencies.
- * At the States Levels – the Ministries responsible for Water Resources and their Agencies.
- * At the Local level – the Department responsible for Water Resources.
- * At the Community level – Relevant Community Based Organizations responsible for water resources.

- * The Federal Government shall be responsible for policy formulation, macro planning, regulation, setting standards, monitoring and evaluation, coordination and collaboration with national and international organizations.
- * State Governments shall be responsible at a lower level for policy formulation, macro planning, regulation, setting standards, monitoring and evaluation, coordination and collaboration with national and international organizations within their catchments.
- * Local Governments shall exercise similar responsibilities like the States within their areas of authority
- * Communities shall carry out their functions and responsibilities with the authority and the support of the Local Governments.
- * The Agencies set up by the Federal Government shall be responsible for project implementation, training and research.
- * The Federal Government shall be responsible for the coordination of manpower development, capacity building and financing.

A4.12.3 **Strategies**

- * Establishment of a regular forum of all stakeholder agencies in all water resources matters in order to harmonize their activities and remove areas of conflict and duplication
- * Involvement of relevant stakeholders at all levels of project inception, execution and management
- * Strengthening the water resources data bank to carry out its functions
- * To strengthen and empower the government implementing Agencies.

A4.13 **Economics and Financing of Water Resources**

A4.13.1 **Policy Objectives**

- * Water shall be considered as both economic and social good.
- * For economic efficiency, water charges shall be set at opportunity cost while guaranteeing affordable access to the very poor.
- * Government shall regulate the pricing of water services in consultation with other stakeholders.
- * Timely and adequate budgetary allocations.
- * To allow private sector to participate in the development and management of water resources.

A4.13.2 **Principles**

- * Government shall provide an enabling environment for private sector participation in water resources development and management.
- ! As far as possible, the financing of operation and maintenance shall be the responsibility of the Community.
- ! Government shall continue to finance human resources development in water resources sector.
- ! Government shall continue to finance research and development in water resources sector.
- ! Government as a matter of urgency, shall finance adequately the data collection activities in the water sector.

A4.13.3 **Strategies**

- ! Governments shall grant some level of autonomy to their water agencies to ensure high level of efficiency.

- ! To ensure prompt and adequate releases of budgetary allocations to water resources institutions
- ! To encourage financial institutions to provide financial assistance to the water sector.
- ! To encourage Private Sector Participation in financing water resources activities
- ! To enforce water rate payments through effective monitoring system
- ! To ensure metering and graduating rates especially in the urban centers

A4.14 **Research and Development**

A4.14.1 **Policy Objectives**

- ! To reduce the cost of development, operation and maintenance of water resources infrastructure.
- ! To produce appropriate and low cost technology for the sector
- ! To improve standard of service delivery generally.
- ! To promote best practices for technical and environmental sustainability.

A4.14.2 **Principles**

- ! Innovations in the field of water resources for the growth of the sector
- ! To ensure self-reliance
- ! To conserve foreign exchange by relying on our local materials.

A4.14.3 **Strategies**

- ! To encourage establishment of Sectoral Research section at the Federal and State levels
- ! Establishment of Operation and Management Research (OMR) section at State and Federal level
- ! Apply the result of OMR to design the efficiency target for each organization and occupational groups within the sector.
- ! To ensure cooperation and collaboration amongst all the research bodies within the sector.
- ! Guaranteed coordination by the highest policy making body.

A4.15 **Private Sector Participation**

A4.15.1 **Policy Objectives:**

- ! To achieve optimum coverage in water resources service delivery
- ! To use the private sector as an important source of financing water resources activities in view of competing sectoral demands for government fund.
- ! To increase efficiency in the sector through cooperation.
- ! To boost managerial and technical know-how
- ! To minimize public sector bureaucracy in operation and investment
- ! To restructure ailing public enterprises

A4.15.2 **Principles**

- ! To create enabling environment for efficient services delivery
- ! To provide additional funding to the sector
- ! To improve service coverage to grass root

A4.15.3 **Strategies**

- ! To create enabling environment for Private Sector Participation (PSP) in water resources sector
- ! To regulate the activities of water service providers to guarantee adequate protection

of consumers.

- ! Embarking on necessary reforms to attract private sector participation.
- ! Introduction of various forms of participation through instruments such as Build, Operate and Own (BOO), Build, Operate and Transfer (BOT), Lease Contract, Financial Management Contracts etc.

A4.16 **Monitoring and Evaluation**

A4.16.1 **Policy Objectives**

- * To measure output of water resources delivery against the investment
- ! To measure the impact of the programmes and projects on the life of the people.
- ! To measure the effect of the water resources programmes/projects on the life of the people and environment
- ! To keep plan on course in order to avoid derailment.
- ! To ensure judicious use of the nation's resources
- ! To improve transparency and accountability in the sector.
- ! To assist in determining the continuity of similar project elsewhere.

A4.16.2 **Principles**

- ! To assist in the timely execution of projects.
- ! To encourage quality of service delivery.
- ! To assist in maintaining discipline in project execution and disbursement of funds.
- ! To assist in ensuring sustainability of projects.

A4.16.3 **Strategies**

- ! carry out monitoring and evaluation on a regular basis.
- ! design guidelines for monitoring and data collection.
- ! organise workshops, seminars and conferences on performance monitoring and evaluation and disseminate relevant outcomes to all stakeholders;
- ! develop a comprehensive data bank on water resources projects to facilitate data handling, exchange and utilization for policy formulation and forward planning;
- ! promote public awareness and inculcate positive attitude towards efficient handling of project facilities by all stakeholders;
- ! prepare relevant reports to guide decision making in the sector.

A4.17 **Legal/Regulatory Framework**

A4.17.1 **Policy Objectives**

- ! To facilitate Government ownership and control of the entire national resource base as stipulated in Act 101 of 1993
- ! To underscore the basic policy decisions for the control of water resources to enable an equitable distribution and efficient use for sustainable development.
- ! To enhance the health and integrity of the population while preserving the environment.
- ! To establish a mechanism for the appropriate management of conflicts and dispute resolution.

A4.17.2 **Strategies**

- ! Ownership of the entire resource base shall be clearly and irrevocably vested in the State in accordance with Act 101 of 1993.

- ! The review of existing legislation for the control and management of water resources in an integrated manner for its conservation, equitable distribution and allocation within stringent rules and controls.
- ! The regulation shall further introduce stringent controls in the areas of subsidiary legislation for water quantity and quality particularly in pollution control mechanisms, quality standards for potable water, discharge of effluents and wastewater by industries and responsibility to take precautionary actions in the course of discharge.
- ! Since the current legislation (Act 101 of 1993) is devoid of effective rules and regulations, the inadequacies need to be addressed. To this effect, there should be subsidiary legislation to the main legislation
- ! To provide for procedures for water quality management in the areas of groundwater abstraction through the use of boreholes, wells, etc., in order to manage ground water effectively, and also in the zoning of groundwater areas with respect to their vulnerability to protect groundwater resources from over-exploitation, depletion and pollution.
- ! In respect of complaints arising on all water issues with regard to distribution, uses, and tariffs, there shall be established regulatory body for Appeals and dispute resolution which would operate according to laid down rules and regulations.
- ! Nothing in this policy presentation will run contrary to any existing or intended law of private partnership.

A4.18 **Water and the Environment**

A4.18.1 **Policy Objectives**

- ! To conserve and protect the environment from degradation.
- ! To prevent uncontrolled exploitation of water as a natural resource.
- ! To encourage proper water-shed management.
- ! To carry out Environmental Impact Assessment (EIA) and Environmental Audit (EA) for mitigation measures.
- ! To assist in resettlement and determination of compensation.

A4.18.2 **Principles**

- ! The study of EIA shall assist to determine positive and negative effects on the environment.
- ! To ensure the sustainability and preservation of the environment.
- ! To address possible areas of conflicts among the stakeholders.

A4.18.3 **Strategies**

- ! To carry out Environmental Impact Assessment (EIA) and Environmental Audit (EA) on all water resources programmes and projects.
- ! To ensure sustainable access to water through good environmental management practices
- ! Ensure implementation of resettlement and compensation programmes during main project execution.
- ! Sanctions shall be imposed to control environmental degradation.

A4.19 Other Uses

A4.19.1 Hydropower Generation

- * As far back as 1995, aggregate capacity of installed power plants under NEPA was 6,000 MW (1,900 of hydro and 4,100 of thermal). Out of the 6,000 MW capacity, only about 4,000 MW has been made available due to major breakdowns in plants, machinery and equipment.
- * Quite often, hydropower plants of Kainji and Jebba on the Niger River suffer from decreases in reservoir inflows due to the effect of Sahelian drought and anticipated use by upstream riparian countries as well as invasion by water hyacinth.
- * Balancing, Modernization and Rehabilitation works on all the existing hydro power plants must be encouraged.
- * The present privatization and commercialization of some aspects of NEPA hydro power installations shall be pursued with vigor.
- * To encourage the development of major hydro power plants on Build, Operate and Transfer (BOT) policy.
- * A series of proposed multipurpose medium and small dams, (1,084 dams within 20 years) and potential mini-hydro sites will be identified for isolated rural electrification involving State Rural Electrification Boards under the coordination of NEPA, RBDAs, private sector and the Energy Commission of Nigeria.
- * It is also expected that five multipurpose large scale dam projects are to be studied on the left side of Benue River within the next twenty years.

A4.19.2 Inland Navigation

- * National Inland Waterways Authority (NIWA) which was established in 1956 to take charge of inland navigation had in the past provided the main communication routes and access from coast to the hinterland and has accounted for more than 30 percent of our transportation.
- * Since 1966, the flow patterns and conditions along the Rivers Niger and Benue have deteriorated with more eroded sediments from watershed and flow reduction by upstream withdrawal.
- * To redress the adverse situations on our large rivers, significant modifications by way of provision of capital, maintenance and dredging must be pursued by National Inland Waterways Authority (NIWA).
- * Government should pursue the privatization and commercialization policy in this sub-sector of the economy to improve the effectiveness and efficiency of inland navigation.
- * The Water Resources Act 101 of 1993 shall be harmonized with the 1988 Navigable Waterways law so that there is no overlapping of responsibilities of Federal Ministry of Water Resources with those of NIWA.
- * Studies shall be carried out on the Lower Niger River so as to provide barges for navigability of the Lower Niger Area.
- * River channel management shall be undertaken including hydrological and morphological observations and study to a limited extent for the dredging of local critical parts and bed - regulations by groynes, training walls and bank stabilization for difficult crossings and flats.
- * Discharge regulations from Jebba and Shiroro dams, under the management of NEPA in cooperation with Federal Ministry of Water Resources. From past records, NIWA

has been carrying out hydrological monitoring works for rivers Niger and Benue and some of their tributaries.

A4.19.3 **Fisheries and Livestock**

- * On fisheries development, the current level of per capita annual fish consumption is about 4 kg which is lower than Africa's average of 9 kg and the minimum requirement of 11.5 kilograms as recommended by FAO. There is an increasing contribution from import and the domestic production has proportionately decreased.
- * Nigeria is generally endowed with very large bodies of natural water in wetlands, rivers and lakes. Much has not been done towards harnessing the aquatic resources in our reservoirs.
- * Many large rivers have been dammed without provision for fish ladders.
- * Studies should be carried out in the pre-impoundment of dams to protect the ecology of reservoirs.
- * Self sufficiency in fish production is possible through appropriate water resources development. Effort shall be made to liaise, on this aspect of fish development, with the Federal Ministry of Agriculture and Rural Development. This will be made possible through the plan to build a series of medium and small dams for multipurpose uses.
- * Enough water shall be released through our dams to satisfy the downstream requirements for livestock production.

A2.19.4 **Recreation & Tourism**

- * Values can be assigned to water in dams for specific purposes.
- * The pressure on water resources especially in dam construction increased considerably in the last several decades. Growth in world population, economic development, urbanization and improved standard of living have made it imperative for increasing water based recreational facilities.
- * Stored water in dams has aesthetic values for relaxation and recreation. Government shall therefore encourage tourism by constructing dams specifically for recreation.
- * Tourism encourages cross cultural development and therefore minimizes violence and ignorance. It uplifts peoples perception about other cultures thereby promoting unity, understanding and peace.
- * Facilities shall be provided in all dams for recreational purposes and tourism, which will generate employment opportunities and foreign exchange earnings.