



**FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA**

**SUSTAINABLE WATER RESOURCES
MANAGEMENT IN NIGERIA**

By

PROF. ONEMAYIN DAVID JIMOH

*B.Eng. (Ilorin), M.Sc (ABU), Ph.D (Birmingham), MNSE, R.Eng (COREN)
Professor of Civil Engineering*

DEAN
Sch. of Sol. & Tech. Education
Federal University of Technology
Minna
INAUGURAL LECTURE SERIES 18
Date

11TH NOVEMBER, 2010



**FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA**

**SUSTAINABLE WATER RESOURCES
MANAGEMENT IN NIGERIA**

By

PROF. ONEMAYIN DAVID JIMOH

B.Eng. (Ilorin), M.Sc (ABU), Ph.D (Birmingham), MNSE, R.Eng (COREN)

Professor of Civil Engineering

INAUGURAL LECTURE SERIES

DEAN
Faculty of Sci. & Tech. Education
Federal University of Technology
Minna
Date

11TH NOVEMBER, 2010

© Copyright: **O. D. Jimoh**, 2010

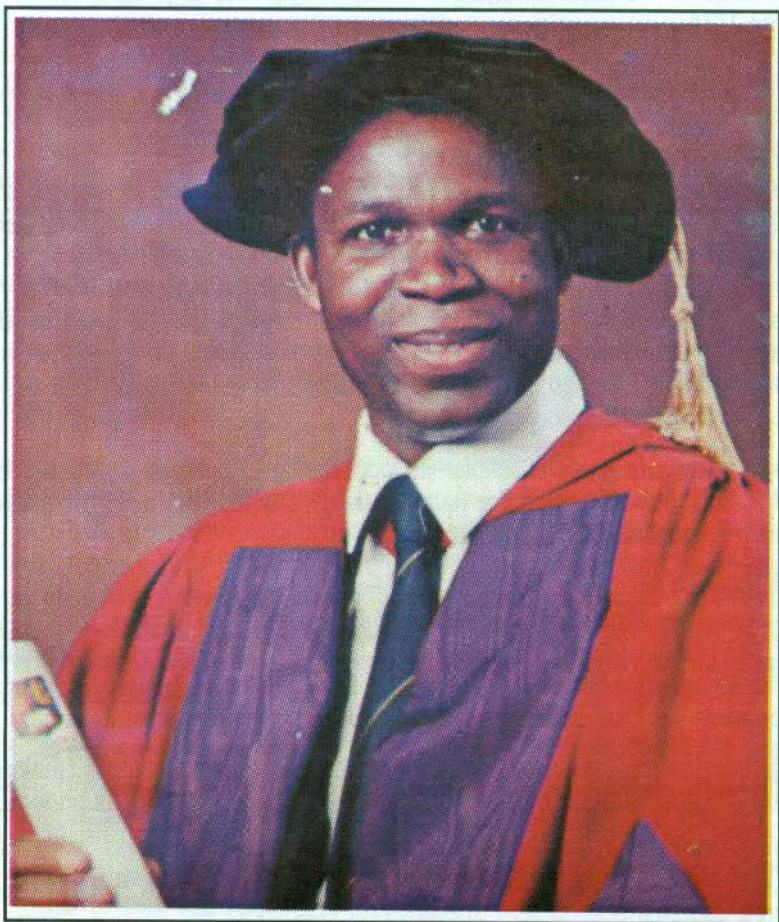
This 18th Inaugural Lecture was delivered under the Chairmanship of:

The Vice-Chancellor,
Prof. M. S. Audu, FMAN

Published by:
University Seminar and Colloquium Committee,
Federal University of Technology, Minna.

November, 2010

Design + Print:
Global Links Communications, Nigeria
☎: 08056074844, 07036446818, 08080255301



ONEMAYIN DAVID JIMOH

B.Eng. (Ilorin), M.Sc (ABU), Ph.D (Birmingham), MNSE, R.Eng (COREN)

Professor of Civil Engineering

A handwritten signature in black ink, located in the bottom right corner of the page. The signature is stylized and appears to be the name of the person whose portrait is shown above.

SUSTAINABLE WATER RESOURCES MANAGEMENT IN NIGERIA

I would like to begin this lecture with a quote from Rutherford Aris (September 15, 1929 – November 2, 2005) a British born Mathematician and Chemical Engineer who was Regents Professor Emeritus of Chemical Engineering at the University of Minnesota, USA.

"If you don't do the best with what you have happened to have got, you will never do the best with what you should have had".

This quote forms the basis of dynamic programming, a method for solving complex problems by breaking them down into simpler steps. Life is complex and only God gives grace to follow it step by step. This has been my experience for the past 19 years when I joined the University. I did not know that after 17 years, including four and a half years of study fellowship I will be recommended for promotion to the full professorial rank. Encouragement, frustration and disappointment were experienced during the period. To come thus far therefore calls for thanksgiving to God for guidance, protection, wisdom and love. To Him be all the glory.

An Inaugural Lecture gives a scholar an opportunity to present his contributions to knowledge and their relevance for national development. This lecture highlights my contribution to knowledge on the chosen theme.

1. INTRODUCTION

It is with a great sense of humility that I stand this day, the 11th November, 2010 to present the 18th Inaugural Lecture of the Federal University of Technology, Minna titled: 'Sustainable Water Resources Management in Nigeria'. This is the first inaugural lecture in the Department of Civil Engineering, Federal University of Technology, Minna.

Civil engineering is a profession that deals with the design, construction and maintenance of the physical and naturally built environment, including works such as bridges, roads, canals, dams and buildings. It is the oldest engineering discipline after military engineering. The sub-disciplines of civil engineering are:-

- Structural Engineering
- Highway Engineering
- Water Resources Engineering
- Environmental Engineering
- Construction Engineering
- Coastal Engineering

The role of water resources engineer entails estimating the amount of water available, design physical and non-physical infrastructure needed to meet water needs, operate and manage the infrastructure. Water resources engineers are required in the following services:

- (a) Water Distribution System;
- (b) Wastewater and Storm Water Sewer Systems and Analysis;
- (c) Irrigation Engineering and Drainage Canals;
- (d) Hydraulic Structures (reservoir, floodway, dam, spillway and channel);
- (e) Groundwater and Well design, Surface run-off Analysis;
- (f) Extreme Event Planning and Analysis

Hydrology is an earth science studying the circulation and distribution of global water. Initially, the observers of the hydrological phenomena were few and made up of scientists who were engaged in studying the natural phenomena. This stage was considered as the Geographical Hydrology stage. With the progressive demand for water for human society and the progress of science and technology, the ability to control and manage water in the natural world was increasing. Then the appearance of hydraulic engineering structures stimulated engineers to study hydrological phenomena not only for description and characterization, but also for quantitative estimation and prediction. This was referred to as "Applied Hydrology" or "Engineering Hydrology". Now, Hydrology encompasses elements of other disciplines, such as geology, geophysics, meteorology and climatology, ecology and engineering.

Engineering Hydrology, which is a subject of water resources engineering, grew rapidly due to the need to control water, and is occupying a principal position in hydrology, bringing with it the development of hydrometric networks and techniques. It established the different kinds of empirical correlations, formulae, models and approaches with primitively genetic and inferential ideas. Together with the application of mathematical and statistical methods in hydrological analysis, all these ideas were aimed at planning, design, construction and operation of water projects and this turned hydrology into a technical science (Jiaqi, 1987).

Water is the lifeblood of our planet. It is fundamental to the biochemistry of all living organisms. The planet's ecosystems are linked and maintained by water, and it drives plant growth, provides a permanent habitat or breeding ground for many species. Water is also a universal solvent and provides the major pathway for the flow of sediment, nutrients and pollutants. Through erosion, transportation and deposition by rivers, glaciers, and ice sheets, water shapes the landscape and through evaporation it drives the energy exchange between land and the atmosphere, thus controlling the Earth's climate. Water is an essential resource for life and environment (Acreman, 1998). We need water for domestic activities and plants need the right quantity of water at the right time, we also need water for navigation and hydroelectric power generation. The loss of 20% of body water can cause death. It is possible to survive for various weeks without food, but it is not possible to survive more than a few days without water. Water is life. Access to safe and affordable water is critical to a nation's development. A short dry spell during the growing season can devastate crops in the world's poorest regions, while floods threaten infrastructure and exacerbate disease.

The 20th century has witnessed unprecedented rises in human populations, from 2.8 billion in 1955 to 5.3 billion in 1990 and is expected to reach between 7.9 and 9.1 billion by 2025 (Engelman and LeRoy, 1993). Consequently, human demands for water, for domestic, industrial and agricultural purposes, are also increasing rapidly. The amount of water that people use varies, but tends to rise with living standards. In the United States, each individual typically uses 560 litres per day for domestic tasks (drinking, cooking and washing), whilst in France, it is 280 litres per day, UK has 150 litres per day, Senegal, the average use is 29 litres per day and in Nigeria, it is 35 litres per day (UNDP, 2006).

The increase in the world population and the economic and social progress of various countries has put serious pressures on water, which has led to a very serious situation of water crisis and water poverty. Some 1.1 billion people (18% of the world population) do not have access to safe drinking water, and some 2.2 Million people (most of them children, 1.8 millions) die of waterborne diseases yearly. It is also estimated that 50% world population is subjected to water stress and in the year 2025 this figure will be 65%. More than 800 million people suffer hunger and malnutrition (Falkenmark, 1989). Loss of lives and properties due to flooding is an annual occurrence in many parts of the world. Thus, there is a water crisis. The crisis is not only about having too little water to satisfy our needs, but managing water so badly that millions of people and the environment suffer badly.

The United Nations General Assembly at its 58th session in December 2003 proclaimed the years 2005 to 2015 as "Water for Life Decade". The declaration which focused on undertaking real and effective measures to meet the millennium targets included reduction by half the population that is currently completely lacking in the essential water supply and sanitation services, and energy. On 28th July 2010; the UN declared access to water as a human right. It is defined as the right to equal and non-discriminatory access to a sufficient amount of safe drinking water for personal and domestic uses (drinking, personal sanitation, washing of clothes, food preparation and personal and household hygiene) to sustain life and health. It further declared that States should prioritize these personal and domestic uses over other water uses and should take steps to ensure that this sufficient amount is of good quality, affordable for all and can be collected within a reasonable distance from a person's home. We are now at the middle of the Decade. What have we achieved? Are we prepared for the UN 2010 declaration?

This lecture provides a review of water resources potential and demand in the country, the status of water resources development and the challenges militating against sustainable delivery of the resource to users in Nigeria. The lecture also highlights my focus in research with case studies, contribution to knowledge in the field of water resources management, and proffer suggestions on how to attain sustainable water resources management in Nigeria.

