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THE IMPACT OF CLIMATE CHANGE ON THE PRESERVATION AND CONSERVATION OF LIBRARY RESOURCES IN SOUTH-EAST NIGERIA

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Abstract
Purpose: *This study investigated the impact of climate change on the preservation and conservation of library resources in South-East, Nigeria. The study focused on climate change as one of the biggest environmental and humanitarian challenge especially as it affects libraries in their provision of information service to the clientale. How the adverse climate conditions affects the state of information resources thereby leading to deterioration, decay and damage.*
Design/Methodology: *The study adopted descriptive survey that examined climate durational period of about thirty (30) years which ranges between 1982-2002. The examined climate variables include rainfall amount, average temperature, relative humidity and wind speed. Data collected were analyzed using coefficient of variability and bar chart. Besides the imperative for preservation and conservation of library and information resources were reviewed.*
Findings*: The study revealed that, provided low statistical coefficient of variability occurred predominantly with the climate variables that the impact of climate change on library resources might not have been significant, though the climate variables have been observed to be changing physically. The low coefficient of variability that predominated in all the climate variables studied implies that climate change has not been significant or possibly impact full in the South-East Nigeria may be as a result of low industrialization within the study area associated with reduced emission of greenhouse gases.*
Originality/Value: *In the face of serious climate change with its adverse effect on every creation, libraries and information centres are faced with challenges of strategies to be adopted for the preservation and conservation of information resources for both posterity, availability, accessibility for maximum utilization.*
Key Words: *Climate change, Preservation, Conservation, deterioration, information resources, rainfall, relative humidity, wind and temperature, South-East, Nigeria.*
Paper type: *Empirical.*

Introduction

In the beginning, God the creator made all things in such a perfect condition to the suitability and adaptability of both living and non-living things. According to God's original design, their functionality was to be without alteration and interruption, with a suitable climate condition to preserve and conserve the existence of creation, hence the assertion in Genesis 1:31 "God saw all that He had made, and it was very good".

However, with the advent of industrialization and modernization especially in the 21st century have distorted the divine order and human activities, which has brought about a great change in the climate condition of the globe. Suffice is to say "Since the arrow of God is no longer at ease, things fall apart". Today, climate is one of the biggest environmental and humanitarian challenge of our time, which is adversely affecting the economy, community, social lives, human health and educational system. Climate change describes the change (variability) or average state of the atmosphere over time scale ranging from a decade to millions of years (Intergovernmental Panel on Climate Change, IPCC, 2001. Broad scientific findings in existence today do agree that continuous accumulation of heat trapping "greenhouse" gases such as oxides of carbon, nitrous oxides in the atmosphere are contributing to the changes in the global climate, and in the climate of regions around the world. Climate change involves both natural and human-induced changes. For instance, human activities such as extraction and burning of mostly long term buried fossil fuel for energy and other related industrial uses have distorted natural climate regulating

processes like carbon cycle and nitrogen cycle with consequent release and accumulation of carbon (iv) oxide about global warming which is the increase in the average temperature of the earth's surface (NRC, 2009; IPCC, 2007). Climate factors or conditions are largely major determinants of the survival of library and information resources.

These adverse climatic conditions affect the state of information resources thereby leading to deterioration, decay and damage. Based on these adverse climatic conditions, deterioration sets in and manifests in the form of tear and wear, shrinkages, warping, brittleness, cracks, colouration, among others. The implication of this is the scarcity of information resources, thereby undermining the efforts of libraries and information centres in providing effective services in meeting the information needs of the clientele. Meanwhile, information resources are preserved, conserved for posterity, availability, accessibility for adequate utilization which is a major justification behind the existence of libraries and information centres.

To achieve this, effective approach and techniques are required to guarantee and sustain the longevity (life span) of these information resources. Williams (1981), stated in his publication "Exposing the print media to high temperature accelerates ageing as well as speed up the process of degradation". These threats posed by climate condition are a wake-up or clarion call on the libraries to adopt improved techniques of preservation and conservation of information resources so as to combat the increasing rate of degradation of library resources. Libraries and information centres must aggressively respond to the development, if they must fulfill their mission of providing effective and efficient information service delivery. Thus, this research study examines the distributed pattern and variability of some climate variables (i.e. rainfall), relative humidity, average temperature and wind speed and their possible impact on the preservation and conservation of library materials in South east, Nigeria.

What are Information Resources

The medium through which information is received is referred to as 'resource'. The resource through which information is presented gives rise to information resources. Aliyu (2006) posits that information resources are made up of a variety of materials in which information could be stored, retrieved and disseminated. Information resource is that resource, instrument or equipment that carried, contain and purveys information itself. In other words, it is the carrier of information. It is in these resources that information are contained or domiciled. Akanwa and Udo-Anyanwu (2017) see information resources as all forms of information carriers that can be used to satisfy the information needs of man and invariably bring him welfare. The resource may be in the print or non-print form, depending on the library audience or use made of it. Information resources are divided into two major groups, namely.

a. Book or print resources
b. Non-book resources / materials

Book or print resources: These are book or printed materials or resources, just as the name implies, they include:

- Textbooks
- Reference sources – encyclopedia, dictionaries, atlas etc.
- Manuscript
- Gray literature

Non – Book resources: Non - book or non – print materials are such in the format that can be perceived visually or that can be heard or listened to. They are commonly referred to as: audiovisuals, multimedia, information communication technology, teaching aids, instructional materials, instructional media etc. Non – book materials can be classified into three sub-headings, Visuals , Audios and Audio – visuals

Visuals: These are information resources that the content can be perceived visually or through human eyes, only. It can only appeal to the eyes and as result is only relevant to those who have sight. Examples of visuals include books, posters, charts, models, hand bills, filmstrips, transparencies, micro-filmstrips, transparencies, micro-films, pictures, photographs etc.

Audios: These are information resources whose information contents are received through the

sense of hearing. This form of resource has brought about solution to individuals with sight impediments. Audio resources produce sound information which includes radio, phonographic discs or records, audio tapes, cassette players etc.

Audio-visuals: This is the most recent and latest category of information resources. It's also referred to as the most sophisticated given to the emergence of information and communication technology (ICT). The interesting part of this resource is that it is a combination of the previous two, which means it can be seen and heard at the same time.

Audio-visuals make powerful and indelible marks in the mind of information users. They make perception clear and understandable. It is mostly used to communicate to a large audience at a time and over a long distance. Examples of audio – visual includes: television sets, computer, VCD machines and other recent ICT facilities of media that belong to this category. It is worthy of note that libraries cater for all categories of users and they acquire and stock different information materials for wider interest coverage.

Imperatives for Preservation of Information Resources

Considering the threatening climatic conditions and its effect on these information resources, it becomes highly imperative for libraries and information professionals to give utmost attention to the preservation and conservation of information resources owing to the following reasons.

Posterity: Posterity here implies sustaining the availability and accessibility of such materials or resources for a long period of time. The functionality of a library depends on its ability to provide the users with materials that will meet or satisfy their information needs, and this not just for the immediate, but for future. While the content of the material is considered to bring about this, the container which is the purveyor or carrier of the content should be given much attention too, hence in preserving the container, the content as well is preserved.

Scarce Resources: Owing to the fact that funding is a major contending factor especially in the present circumstance of recessive economic situation especially in Nigeria. Book vote is dwindling coupled with financial recklessness and mismanagement by authorities who allocate these resources. The axiom "if five can consume a tortoise with an iron cont, what happens to a fool with a faded gown". Which implies that if there is scarcity of fund before now, what would happen now that there is no money to pay even workers' salary. If proper attention is not paid to the conservation of the already existing resources, the library may be heading for a doom of irrelevance in the present era.

Deterioration: Deterioration is the gradual reduction and loss of quality in information resources which adversely affects the ability of such material to perform its intended function. It has to do with the interaction between information resources and the agents of destruction leading to change in the original state of the materials. This effect is reflected in wear and tear, shrinkages, cracks, brittleness, abrasion, hole, warping, discoloration, bio-infestation and dirt accumulation.

Production Composition: The production components of these information resources comprises of both organic and chemical composition. The principle of decay constant applies to this in the sense that the acidity and alkalinity content of these materials determines the longevity. High acid or alkaline content in the material causes brittleness of papers. Brittleness is as a result of weak molecular structures due to excess acid or alkaline.

Climatic Conditions: This has to do with the prevailing climatic conditions surrounding the information resources and their storage facilities. The atmospheric condition in particular have effects on information resources and must be considered by libraries and information centres in respect to storage conditions and facilities. The information resources are bound to react to environmental conditions which has effect on the information which, is the content more especially electronic resources. Some of these climatic factors are sunlight (ultra violet rays), heat (high temperature), rainfall (flooding), relative humidity (atmospheric moisture), dust, dirt etc. However, the climatic factors considered in this

study are rainfall, average temperature, relative humidity and wind speed.

The distribution of rainfall and average temperature of South-east, Nigeria for 30 years (1982 - 2012) is shown in Table 1 below.

Table 1: Rainfall amount, relative Humidity, Wind speed and Average temperature of Abia State

	Rainfall (mm)	Relative humidity (%)	Wind speed (m/s2)	Average temperature (%)
1982	234.7	-	-	-
1983	1648.7	-	-	26.40
1984	1661.9	-	-	26.90
CV	21.23	-	-	86.61
1985	2333.2	-	-	26.70
1986	1983.3	-	-	26.60
1987	1897.4	-	-	26.30
CV	11.15	-	-	0.782
1988	2362.0	-	-	27.00
1989	2296.7	-	-	26.90
1990	2038.0	-	-	26.30
CV	7.68	-	-	1.42
1991	1898.8	-	-	27.00
1992	2190.8	-	-	26.60
1993	1980.0	-	-	26.60
CV	7.45	-	-	0.86
1994	2140.9	-	-	26.80
1995	2480.9	-	-	26.60
1996	2810.0	-	-	26.40
CV	13.505	-	-	0.75
1997	2261.4	-	-	26.60
1998	1982.1	-	-	26.90
1999	2699.2	-	-	27.60
CV	15.62	-	-	1.89
2000	1680.60	-	-	26.90
2001	2189.60	-	-	27.70
2002	2452.40	-	-	27.40
CV	18.62	-	-	1.48
2003	1980.9	72.00	3.80	27.00
2004	2140.9	74.00	3.80	27.30
2005	2480.9	73.00	3.40	27.20
CV	11.602	1.37	6.29	0.57
2006	2038.2	71.50	3.10	27.30
2007	2420.7	69.50	3.30	27.10
2008	2395.2	70.50	3.70	27.10
CV	9.36	1.42	9.07	0.43
2009	2029.2	70.50	3.20	27.00
2010	2038.7	70.50	3.40	27.30
2011	2177.7	70.50	3.30	27.70
2012	2092.0	71.00	38	27.50
CV	3.265	0.35	144.89	1.09

Sources: NIMET, (2012) Umudike, Abia State, Nigeria.

Thus, the long term distribution of rainfall of south-eastern, Nigeria have been predominantly low which may imply that climate change based on rainfall is not yet common.

This low variability in rainfall over many years may be due to insufficient time (30 yrs.) period

duration involved with this study. Change in climate usually takes place over a long period of time, at least 150 years with clear and permanent increase in the amount of rainfall especially from 1996-2009, rainfall amount have predominantly maintained above 2000 mm per annum to be compared to previous years (1982-1995), where rainfall amount per year have be relatively lower. Timmos (1976), viewed that high temperature (heat), heavy rainfall, bright sunshine and high humidity are the environmental factors which causes information resources to deteriorate.

The average temperature which is the mean value of the minimum and maximum temperature shown high coefficient of variability in 1982-1984, while 1985-2012 had low coefficient of variability. This is similar to the result obtained with rainfall. The duration period of this study (30 years) is supposed to have been the cause of the predominant low variability in average temperature as recorded. This is in spite of the clear difference in the value of average temperature between the years as studied. Over the last century there have has been evidence of average global temperature which is about 150 oC to increase by 0.5 – 0.7 oC and scientists have predicted further warming of 1.5 – 5.8 oC by the year, 2100. By implication, since the coefficient of average temperature was high between 1982-1994 indicates the tendency of much deterioration of library resources than within 1985-2012 when the coefficient of variability was low. Williams (1981), had stated that the print media that are exposed to high temperature accelerates ageing and as well as speed up the process of degradation.

Though, based on the available documented relative humidity of South-eastern Nigeria (2003-2015,) low coefficient of variability featured throughout the year periods (2003-2005, 2006-2008 and 2009-2012). Despite the short period involved, the result of the relative humidity did not follow the trend already noticed with rainfall and average temperature. This may entail that, the impact of climate change through relative humidity is not common within the recent time and may not cause deterioration of library resources though, Timmos (1976), viewed high temperature (heat), heavy rainfall, bright sunshine and relative humidity as environmental factors which cause deterioration of information resources.

Considering the available result of wind speed also, conformed to the pattern with rainfall, average temperature and relative humidity. Meanwhile, between the years 2003-2005, 2006-2008 were low coefficient of variability occurred with speed, it suddenly rose abruptly to high coefficient of variability between 2009-2012.

Generally, the low coefficient of variability that predominated in all the climate factors studied (rainfall, average temperature, relative humidity and wind speed) implies that, climate change have not been significant or possibly impact full in the South-Eastern Nigeria. Such results, may be as a result of low industrialization within the study area associated with reduced emission of greenhouse gases (NO2-, N20, CO, CO2) into the atmosphere. Also, high population density of tree plants that traps harmful atmospheric gases could as well be the cause. The intergovernmental panel on climate change (IPCC, 2007), defined climate change as the change in climate over time, either due to natural variability or as a result of human activity. Also, climate change is therefore a significant and lasting change in the statistical distribution of weather patterns over ranging from decades to millions of years.

Preservation and Conservation Strategies

In the face of serious climatic changes with its adverse effect on every creation, libraries and information centres are faced with the challenge of strategies to be adopted for improved preservation and conservation of information resources for posterity, availability, accessibility and maximum utilization. The strategies to be adopted are hereby discussed.

i. Proper location of libraries: libraries should be properly located in areas that are not prone to adverse climatic conditions and disaster. Libraries should have a good architectural design that will meet the required standard of a modern and functional library.

ii. Installation of facilities: Installation of fully air-conditioned system with corresponding and suitable facilities in libraries is an effective strategy of sustaining the life-span of information resources. This creates a favourable environment that preserves both human and material resources by purifying the air, regulating the temperature and humidity thereby preventing deterioration and damage.

iii. Disaster control plan: This is an essential element of preservation that deals with a written documentation specifying all actions, programs and projects as well as resources mobilization to prevent the occurrence of disaster and recovery in the eventuality of such occurrence. Libraries should develop this plan alongside resource acquisition and development plan and policies. The disaster control plan should comprise of the pre-disaster preparedness and post disaster phase which includes:-risk assessment, prevention, preliminary system development, final system design, testing and approval.

iv. Treatment measures: Libraries should adopt cleansing measures and disinfection of both materials and environment against microorganisms. This treatment extends to remove patches. In crustations, / stains, chemicals for treating damage caused by adhesives and organic solvents can be applied to greasy and similar substances.

v. Proper housing / storage: Electronic, cartographic, photographic and similar materials should be carefully handed and stored in a conducive atmosphere. There is every need to keep information resources away from direct sunlight heaters, or radiators and out of automobile glove compartments. They should be stored in an environmental condition with low temperature. The electronic resources should be used with compatible mechanism.

vi. Staff Mobilization: The business of preservation and conservation of information resources requires highly skilled and technical personnel that are well grounded. This involves both the training and re-training of staff through seminars and workshops with appropriate facilities and appropriate facilities to acquire the adequate skills and strategies in keeping abreast with current trends and challenges in preservation in the face of recent climatic changes.

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