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Perceived Effect of Climate Change on Library Resources in Universities in Edo State, Nigeria

Aba, Jane Igie*
Department of Library & Information Science,
Faculty of Education, *Ambrose Alli University,*
Ekpoma, Edo State, Nigeria
abajane@auuekpoma.edu.ng

Makinde, Osasu Theresa
Ambrose Alli University Library,
Ekpoma, Edo State, NIGERIA
makindetheresa023@gmail.com

Omigie, Christopher Agbeniaru
Department of Library & Information Science,
Faculty of Education, *Ambrose Alli University,*
Ekpoma, Edo State, Nigeria
cvchris72@gmail.com

Ademola, Adeniran
Department of Library & Information Science,
Faculty of Education, *Ambrose Alli University,*
Ekpoma, Edo State, Nigeria

Abstract
Climate change is a menace to the universe, resulting from both human activity and uncontrollable natural factors. The effects of climate change are harmful and have a severe impact on library resources. The primary objective of this study is to examine the perceived effects of climate change on library resources in universities in Edo State, Nigeria. Data was collected using a descriptive survey design. The population was 115 library staff from three (3) University libraries in Edo State. Data collected were analyzed using frequency counts, percentages (%), mean ($\bar{X}$) and Standard Deviation (SD). Result reveals that perceived effects of climate change on library resources include temperature, relative humidity, pests, pollutants, and light, which damage library structures and furnishings, decrease library usage during rainy season, and raise users frustration in university libraries in Edo State, Nigeria. Climate change-related variables are threats that have a direct or indirect impact on library resources. It is expected that librarians should receive ongoing training on the physical and chemical nature of resources, and significant efforts by library administration, employees, and parent institutions are required to address the threat of climate change on library resources in universities in Edo State, Nigeria.

Keywords: Climate Change, Global Warming, Library Resources, Effect, Library materials and Universities

Introduction

University libraries are established to provide resources for users' specific and timely information needs. Despite the benefits of these resources to improve teaching, learning, and research for community development, much is still desired due to the adverse effects of climate change as a result of ignorance of increased moisture, temperature, solar radiation, air movement and pressure, precipitation, chemical and biochemical attack, and intrusion of microscopic organisms (Abubakar, 2011). Library resources deteriorate and lose originality because of unfavourable climate conditions. Climate change also affects the safety of buildings, collections, equipment, and systems, which could lead to a dearth of current and relevant resources for improving teaching, learning, and research for community development. In addition to high impact of industrial waste on library resources and lack of knowledge about carbon emissions, developing countries are vulnerable to the effects of climate change. As a result, the researchers' preliminary findings suggest that limited availability of resources in university libraries may be attributed to lack of awareness of the effects of climate change hazards that affect human survival, survival of the universe, humanity and uncontrollable environmental phenomena. Besides, reading shelves are left unused to search for information resources, especially textbooks, journals, and electronic resources.

Significantly, climate change is the cyclical modification of planet's temperature caused by changes in atmosphere and interactions between geologic, chemical, biological, and geographic components of ecological systems (Stephen, 2011). Climate change is responsible for long-term global patterns including rising sea levels, melting sea ice and catastrophic storms. On the contrary, global warming refers to universal warming of the earth based on average temperature (Boykoff 2016). Generally, there seems to be symbiotic relationship between climate change and global warming, which is characterized by increase in average air temperature across the globe. Therefore, climate change and global warming are synonymous (Akpomu & Vipene 2016). Librarians perceived effects of climate change on library resources determine awareness of weather conditions, which include temperature, sunshine, humidity, wind speed, and precipitation that affect library resources. The term perceive refers to perception or comparison between experience or what the sensory organs receive from physical stimulation (Gross, 2010). This implies that librarians' perceived effects of climate change are experiences encountered by

librarians which could be positive or negative on library resources. It is important to be aware of how climate change affects library resources in order to avert destruction. Consequently, libraries plays an essential role in disseminating information on climate change in societies (Egbule 2010). Furthermore, Odeku (2013) claims that climate change causes destructive weather conditions that affect library resources as excessive industrial waste and carbon emissions has made the entire universe vulnerable to effects of climate change. However, libraries are developing eco-friendly library activities to counteract global warming (McElrath & Sutherland 2015).

In light of the aforementioned, this study seeks to provide an objective assessment of perceived effect of climate change on library resources in universities in Edo State, Nigeria.

Objectives

This study focuses on perceived effects of climate change on library resources in universities in Edo State, Nigeria. The specific research objectives are to:

a) to identify types of library resources on climate change available in universities in Edo State, Nigeria

b). examine the perceived effects of climate change on library resources in universities in Edo State, Nigeria

To achieve these objectives, two research questions were developed for the study:

a) what are the types of library resources on climate change available in universities in Edo State, Nigeria?

b) what are the perceived effects of climate change on library resources in universities in Edo State, Nigeria?

Literature Review

Overview of Library Resources

The library is a repository of knowledge of past and contemporary thinkers. It is also a social and intellectual institution that disseminate information resources without discrimination. Therefore, the holdings of libraries are a priceless inheritance of humanity that include facts, ideas, thoughts, accomplishments and evidences of human development in numerous areas. Library

resources refers to basic information materials that are acquired, processed, stored and accessible to users (Popoola & Haliso 2009). Aina (2004) describes library resources as information carriers that include prints and non prints required to improve knowledge, research and reflect excellent quality of an institution. Library resources also include manuscripts, books, journals, paintings, drawings, charts, maps, and electronic resources, that are vital to both the present and future generations. Besides, majority of the contents of library resources are organic in nature and sensitive to decomposition process and deterioration. Hence, these resources require protection from extreme weather conditions such as precipitation, humidity, temperature, and extreme weather.

Concept of Climate Change

The term "climate change" and "global warming" are often used interchangeably. Global warming is the increase in global average surface temperature which is an aspect of climate change (Matthew & Yonatan 2021). Thus, climate change is a significant modification in long-lasting environmental conditions that may be caused by both human and nonhuman activities. Human causes include deforestation, oil spills, bush burning, faulty electrical appliances and gas flaring, while natural causes include waves and volcanic eruptions, earthquakes, wild fire and mudslides (Medugu 2009). Thus, climate change activities are results of both human activities and uncontrollable natural occurrences. The climate of Edo State is characterized by great aridity during harmattan season (a cool, dry breeze that blows from the northeast or east in the western Sahara) and extreme humidity during the rainy season. Similarly, the burning of farmlands in preparation for farming seasons produce biomass, wind-borne dust and substantial quantities of aerosols. These particles reflect radiation, influencing the cooling that traps heat and contributes to negatively to greenhouse effect. Dust can also diminish and encourage rainfall. In low clouds, the attachment of water to dust particles prevents droplets from developing into heavy precipitation, whereas in high clouds, dust particles over wetter regions may provide surfaces for ice crystals to form, leading to higher rainfall (Mahowald & Kiehl 2003). Climate change is also caused by population size, economic activity, lifestyle, power consumption, land use patterns, technology, and climate policy. Akpan, Anorue & Ukonu (2012) observed that climate change-related issues include adverse effect on human life through significant changes in temperature,

precipitation, and wind patterns that occur over decades. These activities can lead to climate-related threats and risks, which have significant impact on physical and social environment of libraries. In essence, the variance of typical weather conditions over several decades can become warmer, wetter, or drier as a result of natural weather variability leading to classification of the environment into three parts namely: The first part consists of living organisms such as plants, animals and humans. Second, the physical environment includes air, water and land. The third part consists of Assam, located in northeastern India and is characterized by abundant summer rains, winter drought, high humidity and comparatively low temperatures. It also shows geographic fluctuation of climate pattern (Barua Gunaviram Assam Buranji, 2008). Assam's climate has a significant impact on library resources. Similarly, changes in daytime and nighttime temperatures in tropical and subtropical climates accelerate decomposition of organic compounds found in most library resources (Chaudhury 2013).

Perceived Effect of Climate Change on Library Resources

Perception is the awareness of processes used to generate meaningful interpretation of sensations through cognitive input and explanation for behavior (Akande, 2010 and Naire, 2009). The perceived climate elements that affect library resources are temperature, relative humidity, pests, pollutants and light. Besides, extreme climate change has devastating effect on events and society (Udenyi 2010). For instance, floods might damage infrastructure such as water supply, transportation, and electricity services, which would have a negative impact on the national economy. Furthermore, Nigeria is susceptible to climate change due to densely populated, low-lying coastline with large concentration of Gross Domestic Product (GDP) for generating businesses and infrastructure (Akpodiogaga & Odjugo 2010). Moreover, various sectors and activities of the Nigerian economy, including agriculture (crops and livestock), forests, biodiversity, health and sanitation, human settlement and housing, energy, transport and communications, libraries, industry, and commerce, disaster, migration, and security, and livelihoods are also affected by risks associated with climate change(BNRCC 2011; NASPA 2011, Filho, Icaza, Neht, Klavins & Morgan 2018 and Ngigi 2009. Consequently, perceived effect of climate change on human health results in greater temperatures, humidity, increased flooding, decreased freshwater availability, an increase in the number of pests and breeding grounds,

increased exposure to vector-borne (e.g. malaria) and water-borne (e.g. cholera) illnesses, increased heat stress mortality and malnutrition (due to food insecurity and shortages or famine). The rise of malaria also negatively affect annual growth rate of the GDP. Similarly, climate change causes severe flooding and storms, which destroy infrastructure such as transport routes, communication networks, libraries, buildings, as well as energy distribution network. In addition, decreased precipitation affect production of hydroelectricity and frequent blackouts, low agricultural output and loss of welfare (Olayide & Alabi 2018 and Adeoye & Popoola 2011). Nonetheless, climate change has affected human interactions, human development and library resources. Climate change has also exacerbated and affected all aspects of life, notably economic education, and health, etc. It has the potential to disrupt world growth and human development. Although, poorest countries in the world experience severe effects of climate change despite modest contribution to emissions of greenhouse gases (Louis & Hess 2008). Changes in climate conditions have negative effect on biological, chemical, and physical nature of resources, which can cause deterioration of library resources (Sesana, Gagnon, Betolin & Hughes 2018). Moreover, extinction of library resources could be due to climate change disasters and the preservation of these intellectual and cultural heritage is crucial ensure availability of library materials (Agarwal & Bucheli, 2011).

Ultimately, the rate of resource deterioration due to climate change present significant global crisis for libraries. As these resources consist of biological components susceptible to decomposition of organic materials (National Library of Australia 2004). Moreover, Alegbeleye (2008) and Walker (2013) found that internal and external deterioration also affects library materials. The internal deterioration consists of wear and tear, shrinkage, cracks, brittleness, warping, bioinfestation, discoloration, abrasion, hole, dust and dirt accumulation. While the external factors contribute to degradation of library resources through improper handling or storage, theft or vandalism, fire and flood, pests, pollution, light and temperatures that are either too hot or cold in relation to the humidity level. This suggests that environmental factors such as climate, local meteorological characteristics, biological and chemical processes, contaminants, and natural elements from the environment can cause deterioration of resources (Olayide & Alabi 2018). Additionally, moisture, temperature, sun radiation, air movement and pressure, precipitation, chemical, biological attack and the invasion of micro- and macro-organisms are

among important natural environmental variables that destroy library resources. Likewise, thermal expansion and contraction of library materials may be affected by temperature variation, which is dependent on exterior environment during severe solar radiation exposure. Hug (2008) found that global warming or climate change is caused by sun rays discharged onto the earth's surface and converted into infra-red rays that affect atmosphere. This implies that these rays are absorbed by clouds and water vapour, which stabilizes the earth's temperature and contributes to accumulation of GHGs emitted by human activities. These gases absorb earth's terrestrial radiations and radiate heat back to the planet, resulting in an increase in temperature that can be hazardous to both print and non-print resources. Similarly, precipitation, fog and wind can lead to volume variations due to differential water content. Different dimensional changes caused by change in moisture content can also be noticed in library materials. Furthermore, dampness hastens decomposition of organic materials and promotes growth of mildew and insects such as silverfish, termites and white ants, among others (Hug, 2008). Besides, moisture content absorbed by the exterior surface of library buildings as a result of precipitation has effect on resources. Ngigi (2009) notes that climate with temperature fluctuations that exceed the freezing point can also damage library resources, as the degradation process is dependent on saturation of water and freezing cycles, which can affect the elastic properties, strength and pore structure of library resources. Boko et al. (2007) found that salt, metal oxides and plant fibers in the surrounding environment affect oxidation of library resources. These interactions vary based on reactivity, intercepting surface composition and extreme exposure to pollutants. Nevertheless, perceived effects of heat on chemical reactions are amplified due to chemical reactions with increased temperature. Therefore, majority of chemical damage to library materials occurs in warm and humid areas such Edo State, Nigeria. Moreover, climate conditions and meteorological factors that include mechanical stress, evaporation, earth's crust scale, deterioration and cracking also affect library resources. Therefore, library materials are vulnerable to mechanical destruction if moisture level is not controlled. If the environment is too humid, the material will swell and warp, causing cockling and other physical deterioration. These dimensional alterations impair physical bonding reduce the lifespan of most materials. Similarly, when the weather is excessively dry, materials become brittle and susceptible to cracking during handling. Thus, library resources are susceptible to high and relative humidity, which suggests that the amount of water vapor in the atmosphere at a given temperature stimulates microbial

contamination and infestations. While low relative humidity causes materials to become rigid (Prajapati 2015)**.**

Furthermore, climate change knowledge among Nigeria's professionals is currently at low ebb, which is likely to persist if intervention measures are not taken (Beyioku 2016 and UNDP 2010). Olorunfemi (2009) discovered that lack of awareness about the menace of climate change has significant impact on the solutions employed in Nigeria. There is also lack of government policy about the country's level of readiness and commitment to promote climate change adaptation strategies, as most Nigerians are unaware of the threat that climate change poses to library resources, which affect research for national development. Besides, the degree of awareness of climate change effect is not encouraging and more is still desired from librarians. Hence, community and national growth can flourish through research when librarians provide necessary information that mitigate effect of climate change to preserve resources for teaching, learning and research. However, being aware of the effects of climate change does not necessarily equate to having the skills necessary to utilize existing resources to mitigate or address hazards of climate change. Consequently, library plays crucial role in the diffusion of information about climate change (Egbule 2010). Similarly, users' resilience to climate change is bolstered by high-quality and easy accessibility to information resources. This resonates in university libraries in Edo State, Nigeria not been able to survive if their patrons are not aware of the risks associated with adapting to menace of climate change. Conversely, the duration of sunshine, temperature fluctuations, air movement/pressure, rain intensity and frequency, local soil hydrology and varied seasons contribute to the effect of climate change on library resources in universities in Edo state, Nigeria.

Research Methodology

The study adopted a survey research design, which is a systematic strategy for gathering data in order to determine respondents' opinions. Total enumeration method of the entire population of 115 library staff from three (3) University libraries in Edo State, Nigeria was used for the study. Research instruments include check list and structured questionnaire titled "Questionnaire on Perceived Effect of Climate Change on Library Resources in Universities in

Edo State, Nigeria (QPECCFLRUED)". The values of reliability estimates range from (r=0.65) to (r=0.80) indicates that the questionnaire was reliable and used for data collection.

Results

Table 1: Frequencies and Percentages of Types of Library Resources on Climate Change Available in Universities in Edo State (N=100)

S/N	Types of Library Resources	*AVA Freq(%)	NA Freq(%)	Remark
1	Journals	100(100%)	-	AVA
2	Books	100(100%)	-	AVA
3	Reference resources	100(100%)	-	AVA
4	Serials publications	100 (1000%)	20(20%)	AVA
5	Cartographic materials	90 (90%)	10(10%)	AVA
6	Bulletins	100(100%)	-	AVA
7	Transaction and proceedings	100(100%)	-	AVA
8	Research monographs	100(100%)	-	AVA
9	Research reports	100(100%)	-	AVA
10	Patents	100(100%)	-	AVA
11	Technical bulletin/report	100(100%)	-	AVA
12	Encyclopedias	100(100%)	-	AVA
13	Data sheets	100(100%)	-	AVA
14	Dissertations	100(100%)	-	AVA
15	Theses	100(100%)	-	AVA
16	News letters	95(95%)	5(5%)	AVA
17	Grey literature	70(70%)	30(30%)	AVA
18	Audio visual materials	75 (75%)	25(25%)	AVA
19	Dairies	90(90%)	10(10%)	AVA
20	Memoranda	100 (100%)	-	AVA
21	Electronic resources	100(100%)	-	AVA
22	Biographies	100(100%)	-	AVA
	Total/Average Availability of Library Resources	**95.5 (95%)**	**4.5(5%)**	**AVA**

***AVA-Available, NA-Not Available**

The decision rule states that: items with percentages ranging from 50% and above were regarded as Available (AVA). While, items with percentages ranging from 49% and below were regarded as Not Available (NA). Table 1 presents frequencies and percentages of responses on types of library resources available in Universities in Edo State, Nigeria. Result reveals that library

resources are available in Universities in Edo State with 95.5(95%) availability while Not-available is with percentage of 4.5(5%). This implies that library resources on climate are available in Universities in Edo State, Nigeria.

Table 3: Mean and Standard Deviation of Perceived Effects of Climate Change on Library Resources in universities in Edo State (N= 100)

S/N	Effects of Climate Change on Library Resources	*SA	A	D	SD	Mean	SD	Remark
1	Damage of library building	90	10	-	-	3.9	11.4	Agreed
2	Destruction of library resources (Print and Non-print)	85	15	-	-	3.85	11.1	Agreed
3	Affects library furniture	8	20	-	-	3.8	10.8	Agreed
4	Reduces patronage of the library during raining season	10	90	-	-	3.1	6.6	Agreed
5	Increases users frustration	88	12	-		3.88	11.28	Agreed
6	uncontrolled humidity levels causes mechanical damage to library resources	90	10	-	-	3.9	11.4	Agreed
7	Leads to complete closure of library	90	10	-	-	3.9	11.4	Agreed
8	Causes harm to library staff and users	70	26	4	-	3.66	10.04	Agreed

9	Reduces library resources	65	30	5	-	3.6	9.7	Agreed
10	Mutilation of library resources	20	50	30	-	2.9	6	Agreed
11	Dry conditions cause brittleness and cracking of library resources	75	20	5	-	3.7	10.3	Agreed
12	Disruption of library activities	90	10		-	3.9	11.4	Agreed
13	High humidity encourages mold growth and infestations.	50	30	20	-	3.3	8.2	Agreed
14	Decomposition of books	30	70		-	3.3	7.8	Agreed
15	Solid particles: dirt dust, carbon stoot, tar	40	50	10	-	3.3	8	Agreed
	Grand Mean	**64.9(64.9%)**	**30.2(30.2%)**	**4.93(4.9%)**	**0**	**3.5**	**9.69**	**Agreed**

***SA-Strongly Agree, A-Agree, D-Disagree, SD-Strongly Disagree**

Table 3 shows responses on perceived effects of climate change on library resources in Universities in Edo State. Results revealed that effects of climate change on library resources in Universities was ($\overline{X}$=3.5, SD=9.69) which ranges from ($\overline{X}$=2.9-3.9 and SD=6.6-11.4). This shows that ($\overline{X}$=3.5) is greater than the criterion mean of ($\overline{X}$= 2.50). This implies that perceived effect of climate change is a threat that negatively affects library resources

Discussion of Findings

Results from this study revealed that there are various types of library resources on climate change available in University Libraries in Edo State, Nigeria. These include print and non print publications namely: journals, books, references resources, serials publications**,** cartographic

materials and electronic resources among others. This study's findings concur with those of Adeoye & Popoola (2001) that library resources are information-bearing materials in diverse sizes and formats divided into two broad categories: print and non-print materials. This suggests that a well-stocked university library is a repository of information on recorded human experiences for the advancement of nations. The findings also confirm Obi (2013) findings that the strength of any library depends on the information resources and services provided for users. As a result, the ability of libraries to provide information resources that satisfy the demands of its patrons will be used to determine whether or not the library resources is current and relevant.

Furthermore, the findings revealed that climate change negatively affect library resources in Edo State, Nigerian universities. This implies climate factors such as temperature, relative humidity, pests, pollutants, and light that damages library building, resources (Print and Non-print), furniture, reduces library patronage during rainy season, increases user frustration and uncontrolled humidity levels cause mechanical damage to library resources that leads to library closure due to effect on library staff and users. This study's results corroborate with those of Adudu, Aba & Ugah (2018) that there are numerous types of disasters that could occur in libraries which include flood, rain storm, rippling tornado, fire, dampness, and leaking roof. This study's findings also support Udenyi (2010) that weather patterns, such as sun's rays striking the earth's surface contribute to global warming and climate change. The findings of this study is also corroborate with Beyioku (2016). that pollutants from the surrounding environment, such as salt, metal oxides, and plant fibre, can affect the oxidation of library resources. Material and natural elements, contaminants and the amount of water present may contribute to the deterioration of library materials. This study confirms the findings of Walker (2013) that air, fungi, insects, and pests have a significant impact on library resources. It must be emphasized that perceived effects of climate change on library resources are unpredictable and dependent on annual and seasonal variability, which affect the duration of sunlight, temperature fluctuations, air flow/pressure, rain intensity and frequency and local soil hydrology.

Conclusion

Based on the results of this study, effect of climate change is real. There is a significant threat that directly or indirectly affect the preservation and conservation of library resources. Therefore, the effect of climate change on library resources will enable universities in Edo State, Nigeria to find last solution that would ameliorate the menace of climate change and restore library materials. Consequently, perceived effect of climate change is a global phenomenon that must be aggressively addressed in order to meet the information needs of library users in university libraries in Edo State, Nigeria.

Recommendations

Based on the study's findings, the following recommendations have been made:

1. Regular awareness programmes on the effects of climate change on university library resources should be organized for librarians.
2. Furthermore, when library staff are continuously trained to deal with effect of climate change on library resources, this will mitigate and boost library resources for teaching, learning and research for community development. Therefore, significant efforts by library administration, employees, and parent institutions are required to address the threat of climate change on library resources in universities in Edo State, Nigeria.

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