The Use of Information and Communication Technology in Libraries for Combating Global Warming in Nigeria

By

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Abstract
Global warming has been increasingly recognized as the greatest threat in Nigeria and other countries world over. It is a serious problem which directly affects human life and also destroys property. The causes of global warming in Nigeria could be attributed to human and natural factors such as deforestation, volcanoes, ocean currents, gases from burning fossil fuels for cars, trains, aircrafts or high concentration of greenhouse gases (GHGs) in atmospheres. The excessive emission of these GHGs causes the atmosphere to be in a polluted state which affects environment and human health directly or indirectly. One of the direct consequences of global warming to health includes cardiovascular respiratory disorder of elderly people, skin cancer, cholera and child and maternal health issues. These consequences of the global warming could be controlled, managed and mitigated with the effective use of Information and communication technology available in libraries. This is because libraries provide ICTs capable of providing relevant information that could be used to combat global warming in Nigeria. This paper highlights the concept and significance ICTs, types of ICTs available in libraries for mitigating global warming which include: internet, computers, databases, e-mail among others use to store, retrieve, transfer and disseminate information to combat global warming. The paper also examines the causes and effects of global warming as well as use of ICTs available in libraries to combat the global warming. The paper further discusses some of the identified challenges associated with the use of ICTs for combating global warming in Nigeria. The paper concludes that it is essential to note that libraries provide ICTs that will provide information about global warming, its causes, effects and possible measures to combat its menace in Nigeria.

Keywords: ICTs, Libraries, Global Warming

Introduction
Global warming has been increasingly recognized as the greatest threat of the century. It could be seen that of all the holocausts that have afflicted mankind such as plagues, earthquakes, tsunami, smallpox, HIV/AIDS among others, none has the greatest threat to wipe out lives on earth through either continuous flooding or permanent drought than global warming (Bloem and Kraemer,2010). It has been

projected that about 9 billion people will inhabit the earth by 2050, most of which live in developing countries like Nigeria (Perkins, 2010). Consequently, the world faces the most pronounced question over how our planet can sustain and feed this population due to climate change or global warming with its implications on health, food insecurity, access to clean water and the threat of an increased number of both natural and man-made disasters (Crowley, 2020). Scientists have tried to divide the causes into two broad categories, natural and human causes. The natural causes are many including earth's orbital changes, volcanic eruptions and ocean currents. The human causes include burning of fossil fuels, land-use and deforestation.

Similarly, Badru (2020) posits that global warming is a problem which directly affects human life and destroys property. It is the resultant effect of pollution of the atmosphere. When there is excessive emission of Green-HouseGases (GHG) into the atmosphere, it becomes polluted. The manifestation of these baleful effects of global warming, make Nigerian government to enforce laws to regulate the acts of individual citizens and industries which induce global warming. Therefore, these laws enforced by government must be documented and stored for use by individuals. As such, libraries as documentary centre play a vital role in documenting, processing, organizing and disseminating these laws and other relevant information to combat global warming particularly with the use of ICT facilities available in the libraries. These ICT facilities covers all forms of computer and communications equipment and software used to create, design, store, transmit, interpret and manipulate information in its various formats which could be used to mitigate global warming. Personal computers, laptops, televisions, and network technologies are just some examples of the diverse array of ICT tools made available in the libraries to provide relevant information to fight global warming.

The use of ICTs in combating global warming cannot be underscored since ICT enables optimum use and sharing of resources among individuals thereby reducing the operational costs and provide them with relevant information to satisfy their needs quickly and easily. As such,

Akinyemi and Afolabi (2023) stressed that the use of ICT in libraries has made information services easier for library personnel in the essence that it saves time, allows multiple users at a time, reduces space allocation, and provides access to information within and without library walls to fight global warming. Application of ICTs is an advantage for both the library personnel and the library users. Through ICT devices, large volumes of data or information are stored in a very compressed space which enables users fast and easy access to information resources to mitigate the menace of global warming in Nigeria at the right time.

ICT enables libraries to concentrate on other tasks such as research and consultancy to provide opportunities to deploy innovative methodologies to meet the dynamics needs of community seeking information to combat global warming. Consequently, Gabriel (2020) posits that the use of ICT resources in Nigeria has become increasingly very significant in retrieving and storing information related to global warming. ICT based resources and services enable the libraries to render services at accelerated pace. This is made possible through the use of web based resources and a variety of other ICTs by complementing the traditional methods of librarianship

that is characterized with prints collections and manual service delivery. To buttress this point, Benson (2016) explains that the use of ICTs by individuals or community have made research easier and interesting to fight global warming.

Concept and Significance of Information and Communication Technology in Combating Global Warming

The concept of Information and Communication Technology (ICT) has been defined by different scholars in different perspectives. Adeleke and Olorunsola (2010) defined ICT as the incorporation of the range of technologies which includes computers and its associated components, communication technologies etc. that can be used to access, store, retrieve and disseminate information. This definition shows that, the concept of ICT involves the set of technologies which can be used in the libraries to acquire, store, retrieve and transfer the information to combat global warming. However, Essien, Abredu and Zotoo (2022) describes Information and Communication Technology as the use of computer system and telecommunications in the delivery and handling of information services. They identified three basic components of information and communication technology as electronic processing using the computer; transmission of information using telecommunication equipment and dissemination of information in multimedia. information and communication technology are those technologies that are used in handling, acquiring, processing, storing and disseminating information. Therefore, Information and communication technologies (ICTs) enhance the quality of research which its findings could be used to combat global warming in Nigeria.

According to Oghenetega, Umeji & Obue, (2014) Information and communication technology (ICT) is the application of computers and other technologies to the acquisition, organization, storage, retrieval and dissemination of information. However, in this context, information and communication technology is the use of electronic devices such as computers, telephones, internet, satellite system, to store, retrieve and disseminate information in the form of data, text image and others. Thus, Scanlon (2012) posited that there has recently been intense interest in the ways in which technology can be used to support research to fight global warming. It should be noted that with the world moving rapidly into digital media and information, the role of ICT in combating global warming is becoming more and more important.

Causes of Global Warming in Nigeria

The causes of global warming in Nigeria can be categorized into two: - natural and man-made causes (Crowley, 2018)

(a) Natural causes

The earth's climate is grossly influenced and changed through natural causes such as ocean current, volcanic eruptions, the earth's orbital changes and solar variations

i) Ocean current

The oceans have been shown to be the major component of the climate system. Ocean currents move vast amounts of heat across the world. Wind push horizontally against the sea surface and drive ocean current patterns. Interactions between the ocean and atmosphere can also produce phenomena called El- Nino which occurs

every 2 to 6 years. It has been shown that deep ocean circulation of cold water moves from the poles towards the equator and warm water from the equator back towards the poles. Without this movement the poles would be colder and the equator warmer. The oceans play an important role in determining the atmospheric concentration of CO_2. Changes in ocean circulation may affect the climate through the movement of CO_2 into or out of the atmosphere (Brown, 2010)

ii) Volcanic activities

Volcanic eruptions are known to throw out large volumes of sulphur dioxide (SO_2), water vapour, dust and ash into the atmosphere. It is known that large volumes of gases and ash can influence climate patterns for years by increasing planetary reflectivity, causing atmospheric cooling Tiny particles called aerosols are produced by volcanoes. Because these reflect solar energy back into space, they have a cooling effect on the earth's surface (Perkin.2010).

iii) Earth's orbital changes

The earth makes one revolution around the sun once a year, tilted at an angle of 23.50 to the perpendicular plane of its orbital path. Changes in the tilt of the earth can lead to small but climatically important changes in the strength of the seasons, more tilt means warmer summers and colder winters; less tilt means cooler summers and milder winters more heat.

(b) Human causes

Onoja, Dibua and Enete, (2013) observed that climate is changing due to man-made greenhouse gases from burning fossil fuels for electricity, cars, trains, aircrafts, homes, flaring of gas at the oil fields and deforestation.

(i) Burning of Fossil fuels

The components of fossil fuels are oil, coal and natural gas. The actual combusting of these components causes excessive carbon dioxide to flow into the atmosphere, thus, causing pollution of the atmosphere which inevitably results into global warming.

(ii) Gas Flaring

Gas in this content relates to the associated gas in oil production process. This associated gas could be harnessed to the benefit of the country when employed for domestic use and export. Unfortunately, in Nigeria, associated gas is extravagantly flared into the atmosphere, channelling ways for climate change to surface.

(iii) Deforestation

This is a process of clearing of forests, by cutting down or burning all the trees grown in such forest. Nigeria also leads the world in deforestation as the thick forests have been wantonly cleared for logging, timber export, wood fuel and agriculture. Sadly, these trees which are cut down serve as a major absorbent of carbon-dioxide (CO_2) through the process of photosynthesis. Thus, by the reckless removal of trees for economic and domestic utilization the atmosphere is substantially deprived of the instruments which should protect it against carbon-dioxide (CO_2) effects. A major effect of deforestation is desertification.

As such, Perkin (2010) stressed that the main cause of global change in Nigeria has been attributed to high concentration of greenhouse gases (GHGs) in her atmospheres. The excessive emission of these GHGs causes the atmosphere to be in a polluted state.

Effects of Global Warming in Nigeria
When climate change surfaces, there is a sudden change in health condition, rainfall patterns, wind patterns and also increase in temperature amongst others which result inevitably to natural disasters like flood, drought, desertification etc.

(i) Health Condition
Global warming affects human health directly or indirectly. According to the World Health Organization, global warming is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050. As global temperature rises, so do the number of fatalities and illnesses from heat stress, heat stroke and cardiovascular and kidney disease. Omoruyi and Onafalujo explained that, one of the direct consequences of global change in Nigeria includes cerebraspinal meningitis, cardiovascular respiratory disorder of elderly people, skin cancer, high blood pressure, malaria, cholera and child and maternal health issues.
However, Onoja, Dibua and Enete, (2013) stressed that IPCC report of 2017 has succinctly identified the most effect global warming such as changes in conditions, temperature, rainfall, humidity, and wind likely to alter the intensity and geographical distribution of extreme weather events, raise water levels in coastal regions, alter the distribution of vector insects and mammals, exacerbate health relevant air pollution, intensify the existing burden of malnutrition, and increase human exposure to toxic substances due to the deterioration of natural and man-made environment (Graciano, 2010).

Types of ICTs available in Libraries to Combat Global Warming
According to Gabriel (2018) Information and Communication Technology (ICT) can be broadly classified into the following types and attributes:

Communication Technologies: These are equipment that enable information to be transferred from the source to user. It also tries to overcome natural barriers to information transfer like speed and distance. Some of these include: facsimile machine (fax), telecommunication system, telephone, electronic mail, teleconferencing, electronic bulletin board among other. These technologies could be provided by libraries for use among users to retrieve information related to global warming.

Display Technologies: These are output devises that form the interface between the sensing, communication and analysing technologies and human user. They include computer screen, printer, television among other. Therefore, computers could be used by library users to generate and store and use information to fight global warming.

Analysis Technologies: These are the methods that assist in data investigation or question, study and in-depth inquiry for answers in testing procedures for basic to complex phenomenon. A micro, nano, mainframe or super scamper could be a complete ensemble of computer devises use to generate and store information that could be important in dealing with the global warming.

Digital archives: are an essential resource for researchers, scholars and other information seekers who must access primary materials for their research in various areas including global warming.

Library websites: A medium of communication for libraries to their users. It is also used to promote the library and publicise it to provide information on politics, socio-economic, culture, climate change among others.

Databases: Databases are collections of information that are organized and searchable. Libraries subscribe to *databases* for their patrons, providing access to information on various areas.

However, Osunda (2013) stressed that the following are the types of ICTs available in libraries.

Computer: This is one of the most dramatic advances in communication, potential data communication. They often found in libraries to assist information seekers to retrieve information to fight global warming. Since the first development of the modern electronic digital computers in the 1940s, computerization has infiltrated almost every society.

Internet: - This means international networks; the use of internet has revolutionized access to information dissemination and retrieval in libraries and educational centers. Individual believed that it is an important tool for global information retrieval and it plays a vital role in combating global warming.

CD ROM: may be a pre-pressed optical disk that contains information. The name is Associate in nursing word form that stands for "Compact Disc Read-Only Memory". Therefore, CD ROMs are used to store information to foster research in bringing solutions to global warming.

Online Sources: Online sources are materials that are available online. It will be a web newspaper, magazine or television website such as NBC or CNN. Peer-reviewed journals, Web pages, forums and blogs are also online sources. These are very useful ICT resources which many libraries are now making available to provide information related to climate change and other human day to day activities.

Use of ICTs available in Libraries in Combating Global Warming
Samuel (2014) posited that there has been intense interest in the way in technology is used to support research in day to day human activities. It should be noted that with the world moving rapidly into digital media and information, the role of ICT in mitigating global warming is becoming more and more important. According to Springer (2017) now a day, all schools, colleges, universities and other research institutes are using information and communication technology to store, retrieve and

disseminate information to promote research activities. With the help of this, research institutes strive to retrieve information for fighting against the menace of global warming.

However, Ardies, Gijbels & van (2016) observed that ICTs may also be used to replace the traditional library services delivery in universities and traditional classroom lecture. A number of courses are being developed in which portions of the course or the entire courseware offered via the internet. The instructor may place course notes on web pages, may create a video recording of a live lecture for viewing on the internet, or use combinations of these ideas. Loundon (2015) discussed several methods of preparing courses for the internet including facilitating the use of video clips on web pages as well as the use of forms and other graphics on web pages. ICTs like internet is now widely used as a medium of communication among researchers to combat global warming. For instance, Stephen (2016) reported that most of the links between universities home pages were associated with information about research on global warming.

In the same vein, Springer (2017) opined that internet and computer usage has impacted positively on critical thinking, problem solving, prompt feedback and networking. The strength of internet lies on the unprecedented growth of its network world wide and its ability to connect computers and several individuals without the barrier of geographical space. The use of the internet in fighting against global warming allows a wide range of international resources to be accessed. Resources can be very well organized on the internet, which allow for easy information access and exchange (Simon, 2017).

However, Ashra and Bisht (2015) stressed that one of the most basic uses ICTs in libraries by information seekers is to search for sources and information to complete research activities to mitigate the effects of global warming. The network`s ability to provide information seekers quick access to scholarly publications to retrieve information help to address the effects of global warming.

Challenges Associated with the use of ICTs available in Libraries in combating Global Warming

While new technologies have added value to provision of information and library services by presenting new modes of collecting and retrieving information. These technologies have brought new challenges and aggravated some of the challenges that faced libraries before (Oghenetega, Umeji & Obue, 2014). Thus, Oghenetega, Ebele and Nkechi (2018) identified the following challenges associated with the use of ICTs.

Poor maintenance culture

Most of the equipment procured for the information technology was purchased from foreign countries and as a result of the nation's backwardness. In the use of ICT facilities, they lack information and experience library personnel to effect repairs on the system during breaking down. Also when complains are passed to higher

quarters or the government for consideration it goes through as long bureaucratic process, which in turn may affect their frequent use to mitigate climate change.

Poor networking

When facilities are reluctantly switched on, the rate of downloading information are normally slow and in most case foil, when information is being shared from a far network. This could frustrate library users searching for information related to global warming.

Environmental and Climate Problems: Environmental and climatic problems are compounding the problem of the effectiveness and efficiency of ICT to combat global warming. Certain geographical locations are difficult to locate networks, especially in some areas where libraries are established, and climatic conditions of a given area will predispose it to clarity of network in ICT programmes. Stormy weather may bring about serious destructions to telecommunication masts and antennae, which may require time and money to replace.

Erratic power supply

Effective use of information and communication technology in libraries to fight global warming depends largely on effective and constant power supply. This is so, because cannot function effectively. It is therefore necessary that the institution or external system that wish to operate these technologies should make adequate provision for constant electricity supply since the electricity corporation (NEPA) now known as PHCN has become so epileptic. A generating set should be made available to supplement (PHCN) irregular supply.

Illiteracy

There is no gain saying the fact that illiteracy affects the effective use of information and communication technology (ICT) available in libraries. This ascertain is evident in the fact that some information seekers have little or no idea about these modern technologies and because of their lack of awareness they tend to discard it use on the ground that these technologies can be done electronically, they can also be done manually. It is therefore imperative that these set of people should be given lesson on how operate and use these technologies for combat global warming.

Conclusion

Global warming is a problem which directly affects human life and destroys property. It brings changes in conditions, temperature, rainfall, humidity, exacerbate health relevant air pollution, intensify the existing burden of malnutrition, and increase human exposure to toxic substances due to the deterioration of natural and man-made environment. Such effects caused by global warming could easily be managed and mitigated with the use of ICT facilities acquired and made available for use by libraries.

Recommendations

1) Sufficient fund should be provided to libraries on regular basis for the provision of relevant and current ICTs gadgets that provoke the interest of 21th century and to members of community for use to mitigate global warming.
2) Relevant and current ICT facilities should be provided frequently by libraries to information seekers so as to retrieve relevant information to control global warming.
3) Uninterrupted internet access and other relevant ICT facilities should be provided by libraries particularly public libraries for effective service delivery to meet the information needs of the users by providing them with information about global warming, its causes, effects and measures taken to mitigate its menace.

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