DIGITAL DATA CURATION: A TOOL FOR PRESERVING OUR NATURAL HERITAGE

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Abstract: The importance of preserving any giving people's heritage cannot be overemphasized. Hence the various means put in place to preserve the different types of heritage we have. This paper is an attempt to add to what are available as means of preserving our heritage by making case for the use of digital data curation to preserve our natural heritage. Since data is very relevant in almost all fields and could equally be collected in areas of human activities, the present work opines that the collection, proper storage and effective management of data concerning our natural heritage will be a sure way of preserving such heritage. Based on the findings of this work, the paper recommends, among others, that efforts should be channeled towards proper funding of data curation for proper digital documentation and curation of materials on natural heritage. This will help in preserving them for the present and future use.

Keywords: Archive, Digital, Geodiversity, Data, Curation, Heritage

INTRODUCTION:

The need to preserve our heritage for present and future generations has been long articulated. This has led to age long continued efforts in various ways to preserve our heritage through different means. As we have different types of heritage so do we have different ways of preserving each of the heritage type. But the common and most practiced way of preserving our heritage is collection and save keeping of items, objects and records of historic significance in a place known as museum. At the individual and family levels, heritage could and are preserved through family photos, records of events, molding of statues and other artistic designs kept in the homes for remembrance. All these means have yielded tremendous results in the preservation of our heritage. But the challenge those means of preserving heritage is faced with is longetivity. Durability of these items, objects, records and sculptures are in doubt because of some factors. The U S National Heritage Conservation (internet source) observed that, "all around us, the past is vanishing...family photos and heirlooms deteriorating in garages and artics. Artifacts slowly decaying from acid rain in town squares" This clearly indicates that the above means of preserving our heritage will fail us with the passage of time if care is not taking. This, therefore, calls for the provision of a better way and means of preserving our heritage that will stand the test of time and one of such means is data curation.

Secondly, as earlier mentioned, means and ways of preserving our heritage varies according to heritage type. For instance, the intangible cultural heritage can hardly be properly stored in the museum (Heritage Interpretation, Museology, Art Conservation and Restoration. (Internet source). It may not be out of place to state here that most of, if not all, the natural heritage which our topic is focusing on fall within the class of heritage type that can hardly be well preserved in a museum. Therefore an alternative means of preserving this heritage is inevitable, hence this work, which is aimed at highlighting how data curation could be used to preserve our natural heritage. Thanks to advancement in technology which has helped man in no small measure to proffer solutions to most of the hitherto intractable problems.

DEFINITIONS OF TERMS:
Digital

The term digital describes any system based on discontinuous data or events. Computers are digital machines because at their most basic level they can distinguish between just two values, 0 and 1, or off and on. There is no simple way to represent all the values in between, such as 0.35. All data that a computer processes must be encoded digitally, as a series of zeroes and ones.

It can be viewed as an electronic technology that generates, stores, and processes data in terms of two states: positive and non-positive. Positive is expressed or represented by the number 1 and non-positive by the number

0. Thus, data transmitted or stored with digital technology is expressed as a string of 0's and 1's. Each of these state digits is referred to as a bit.

Data

Hornby (2005) in *Oxford Advanced Learners Dictionary* defines data as, "facts and information, especially when examined and used to find out things or make decisions. It further states that data is, "information stored by a computer. Closely related to this definition is the position of The National Endowment for Humanities (internet source) which sees data as, 'any information that can exist in digital form'. It also looked at data in more detailed way and stated that, 'it is the representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. Any representation such as characters or analog quantities to which meaning is or might be assigned'. Furthermore, Houghton (2014) says that, 'data is that which is known about a specific subject or situation'. Looking at data from historical or etymological perspective, Madaan et al(2001) say that, 'data is the plural form of the Latin, datum, meaning an item of information. But they further explained that in practices, data is often used for the singular as well as the plural noun. From all the above submissions about the meaning of data, one common feature is that data is information that could lead to decision about something. Since data is information, information could be sourced or gathered about anything known to man. This implies that data could be applied in any field of human endeavor.

Curation

The word curation is missing in the dictionary. Even the red line under the word wherever it appears on the computer screen in a self-evidence that it is not provided for in the collection of known English words. The palpable guess for the reason behind the absence of curation in the dictionary is that the word is relatively new and highly restricted in usage; this means that the fields where this word operates are very few. Before delving into the definition or meaning of the word, therefore, it may be pertinent here to consider the derivation of the word. The word curation is derived from the noun, curator which of course is very popular but also restricted word. The word curator is a noun agent referring to a person that keeps custody or takes care of objects or works of art kept in a museum (Oxford Advance Learner's Dictionary of English Language, 2005). From the meaning of the word curator, it will be easy to deduce the meaning of curation which comes directly from curator. Simply put, curation means the process or activities involved in save keeping and maintaining objects and records kept in the museum or elsewhere that has historical relevance. Giving it more scholarly and expertise definition, curation refers to the long-term preservation and retention of heritage assets and to provide access to them in a variety of forms (Heritage Interpretation, Museology, Art Conservationand Restoration(Internet source). Considering curation from its types, Wikipedia submits that: 'curation may refere to: (i) Content Curation, collecting and sorting content, (ii) Data curation, management activities required to maintain research data long-term such that it is available for reuse and preservation. (iii) Digital Curation, the preservation and maintenance of digital assets'. It went further to say that, 'Curation may also be: -the work performed by a curator. – Archiving, historical record keeping. –Evidence management, indexing and cataloguing of evidence, -Cultural management, conservation of cultural sites and resources. –Healing, medical curing of illness'. Carole et al (2008), says that, 'curation is concerned with availability and future use of data, including the enhancement of data products for reuse beyond a single scholarly community.

Digital Data Curation

The attempts made above to separately define the concepts have, no doubt, given green light to what the phrase, digital data curation, should mean. Data Curation Education Programme (internet source), sees the phrase as, 'the active and ongoing management of data throughout its entire lifecycle of interest and usefulness to scholarship. This school of thought expanciated on the meaning of digital data curation as by showing the different between it and data curation which is another phrase closely related to it this way:

> *The focus of data curation is on the 'interest and usefulness' of data to*
> *scholarship and this emphasizes the traditional mission of research libraries*
> *to provide information to support research and the production of new knowledge.*
> *Digital data curation on the other hand, relates directly to data that is produced and*
> *used by scholarly communities, and it facilitates the reuse and repurposing of data*
> *to meet new research needs.*

In the same light, approaching data from its roles, Renear and Munoz (2011) observe that digital data curation addresses the challenge of maintaining digital information that is produced in the course of research in a manner that preserve its meaning and usefulness as a potential input for further research. Also on the scope of digital data curation, Zorich (1995) opines that it covers data quality, authentication, security, and associated documentation. But Carole et al(2008), in reaction to Zorich scope of digital data curation, posited that:

> *The concept of curation goes beyond the roles Zorich originally envisioned,*
> *attending to data quality, authentication, security, and associated document*
> *and tools. It is markedly more active and extend beyond assuring reliable*
> *data access, to adding value to support and advance research capabilities.*
> *Curation, is concerned with availability and future use of data, including*
> *the enhancement of data products for reuse beyond a single scholarly*
> *community. Data curation is part of the more global context of scholarly*
> *communication in which research libraries, publishers, and scholars have*
> *always been the primary actors and stakeholders.*

Sayeed (2010), on his part, sees digital data curation as, 'a means to collect, organize, validate, and preserve data so that scientists can find new ways to address the grand research challenge that face society. From the above definitions, one can confidently say that digital data curation will ensure effective performance of data for as long as the service of that data is needed.

Heritage

Oxford Advanced Learner's Dictionary sees heritage as, 'the history, tradition and qualities that a country or a society has had for many years and that are considered an important part of its character'. Rodney and Donnel (2012), define heritage as, 'that which is inherited from past generations, maintained in the present and bestowed to future generations'. It may be pertinent to mention here that there are different types of heritage. Some of them are: national heritage, natural heritage, and cultural heritage. Since our focus here is on natural heritage, we will not waste time in given attention to others; we shall therefore concentrate on natural heritage.

The Australian Natural Heritage Chapter (internet source) defines heritage as follows:

(1) natural features consisting of physical and biological formations or groups of such formations, which demonstrate natural significance

(2) geological and physiographical formation and precisely delineated areas that constitute the habitat of indigenous species of animals and plant, which demonstrate natural significance and or

(3) natural sites or precisely delineated natural areas which demonstrate natural significance from the point of view of science.

Rodney and Donnel (2012) in support of the above definition observe that, 'natural heritage refers to the sum total of the elements of biodiversity, including flora, fauna and ecosystem types together with associated geological structure and formations'. They went further to comment on the origin of the term this way, 'natural inheritance', derives from 'natural inhabitants pre-dates the term 'biodiversity' it is a less scientific term and more easily comprehended in some ways by the wider audience interested in conservation'.

Therefore, we are going to consider some aspects of cultural heritage as part of natural heritage in this discussion. Cultural heritage is divided into two broad types; the tangible culture and the intangible culture (Heritage Interpretation, Museology, Art Conservation and Restoration. Internet source). Tangible cultural heritage includes the tangible culture such as, buildings, monuments, landscapes, books, works of art, and artifacts. The intangible cultural heritage consist of non–physical aspects of a particular culture like folklore, traditions, language, and knowledge. The cultural heritage could also be looked at from the point of movable and immovable ones. Immovable cultural heritage includes: buildings, (which themselves may include installed art such as organs, stained glass windows and frescos), large industrial installations or other historical places and monuments. Movable heritage includes books, machines, clothing and other artifacts, that are considered worthy of preservation for future. These include objects significant to the archaeology, architecture, science, or technology of a specified culture.

HERITAGE PRESERVATION

We have earlier observed in this work that different types of heritage have various ways of preserving them. In this subsection, attempt will be made to discuss efforts made so far in different climes to preserve our heritage. Heritage preservation has long received global attention. Ekwelem et al, (internet source) observe that, 'efforts to preserve resources on cultural heritage have gained new momentum throughout the world nowadays'.

Championing the preservation of our heritage, especially cultural heritage at the global level is The United Nation Education, Scientific and Cultural Organization (UNESCO). UNESCO has been extremely active in identifying world heritage sites all over the world. These sites are considered to be important for world cultural or natural heritage. The essence was to keep-up-to-date and publish a world Heritage List of cultural and natural properties submitted by member states that are considered to be of universal value (Ekwelem et al). Some articles have addressed the preservation of cultural heritage usually housed in museum and libraries. Feather (1989) has called attention to the proper handling of library materials by all of those involved as a sort of inexpensive measure by any library or archive to begin its program of preservation, which can, at least, prevent damage to materials which would have been caused by simple ignorance. Ogden (1993), observes that, 'traditionally, libraries and archives independently have undertaken activities to preserve their collections by providing proper housing, protection from mutilation and theft, library binding and occasional repairs and restoration.

Ojo-Igbinoba (1993) in his writing on indigenous methods of preservation in Africa, stressed that 'apart from fungi, the libraries suffer inconveniences from termite, cockroaches, silverfish, firebrats, bookworms, booklice, moths, spiders, beetles, mud wasps and rodents'. He goes further to state that, 'most of the indigenous methods for combating fungal and insect attacks in the libraries were first formulated by expatriate libations, and the formulates were based on mercuric chloride, phenol, 'Ogogoros' (as alcohol) and methylamines sprays'. Seekler (2001), who worked on the processes of heritage preservation, observes that, 'There are many ways in which a cultural identity is formed and maintained. Much of the process has to do with the intangible cultural heritage of a body of traditions and usages, rites, poetry, songs, and dance. A great deal of these are passed on orally through generations. Consequently, its survival is always threatened…' On heritage preservation through digitalization, Jones(2001) observes that, 'digitalization converts materials from formats that can be read by people (analog) to a format that can be read only by a machines (digital), such as read-only scanner, digital cameras, planetary cameras and a number of other devices which can be used to digitalize cultural heritage materials'. Heritage Preservation Programs Transition to FAIC (internet source) reports the advancement Turkey is making in heritage preservation this ways, 'Turkey is lucky in that it has a richness and variety in cultural and natural resources and the preservation and development of these have been stipulated by law. Many organizations have been set up in connection with this subject and preservation has now become a subject that concerns many organizations, institutions and peoples. Turkey has approximately 2,700 historical ruins, some dating back to prehistoric time and 41,000 works of culture'. The report also shows that in the UNESCO 'World Heritage List' Turkey has contributed 15 Heritage sites out of the 1031 properties (as at July 2015) around the world (802 cultural, 197 natural and 32 mixed properties in 163 countries). Kentucky State Natural Preservation Commission (2011) gives a brief account of its effort in natural heritage preservation this way, 'KSNPC's staff botanists, zoologists, ecologists, and land managers and data managers work with others to protect our natural heritage and educate Kentuckians about its importance. Information on rare and sensitive plants, animals, ecological communities and other natural features of Kentucky is maintained as part of a computer data management system known as the Kentucky National Heritage Program (KYNHP). The KYNHP works in partnership with Nature Serve, an international natural heritage network. This network includes Natural Heritage Programs and Conservation Data Centers across Canada, the United States and Latin America, all building on the same data collection methodology. These program and data Centers collectively represent the largest ongoing effort to collect standard data on endangered plants, animals and ecosystem. Kentucky's database is updated continuously and is used to set state, national and global priorities for the preservation of natural diversity. Biological and Ecological field studies are conducted to gather information about the distribution, abundance and life history of flora, fauna and natural communities in Kentucky.

Back home, the National Film Archives, a subsidiary of Nigeria Film Cooperation, (internet source) reports of its work on a documentary heritage titled, 'Nigeria Black Heritage –Kanta of Kebbi' thus, 'Black Heritage: documentary on FESTAC'77, a gathering of Africans from all over the world to show and share their similarities, in culture and artistic made by the black and African…it is a realistic record of the actual event of the Second Black and African Festival of Art and Culture held in Lagos, Nigeria on 15th January 1977… from the film trims cutting, are arts and crafts, dancers, structure, and costumes. It shows the various cultural and artistic heritage of the Black and African people from antiquity, thereby showing their contribution to world civilization. Kanta Kebbi: The film displays the history and culture of the former Kebbi kingdom and the life and times of its historic figure, the Kanta of Kebbi, and the relationship between Kebbi and her neighbors (Mali, Ghana, Sudan), at a time when different kingdoms engaged in military warfare in order to expand territories'.

THE IMPORTANCE OF HERITAGE PRESERVATION

Preserving our heritage, no doubt, has a lot of values to humanity. Some scholars have therefore, given attention to the benefits of preserving our heritage to mankind. The benefits of preserving our heritage could be classified into two: the scholarship benefits and the social benefits. One of the most important benefits of preserving our heritage is that it makes handing over of such heritage to the future generation possible (Heritage Preservation Program… internet source). Closely related to this, is the need to prevent some of this cultural or natural heritage from going into extinct. Sigmund (1992) observes that our planet is suffering from two main losses: a loss of life forms and a loss of nature types. Ekwelem et al (internet source) observe that, 'There is no doubt that preservation of Nigeria's heritage resources is very important to the development of the various cultures. It is a witness to where we have come from and where we are.
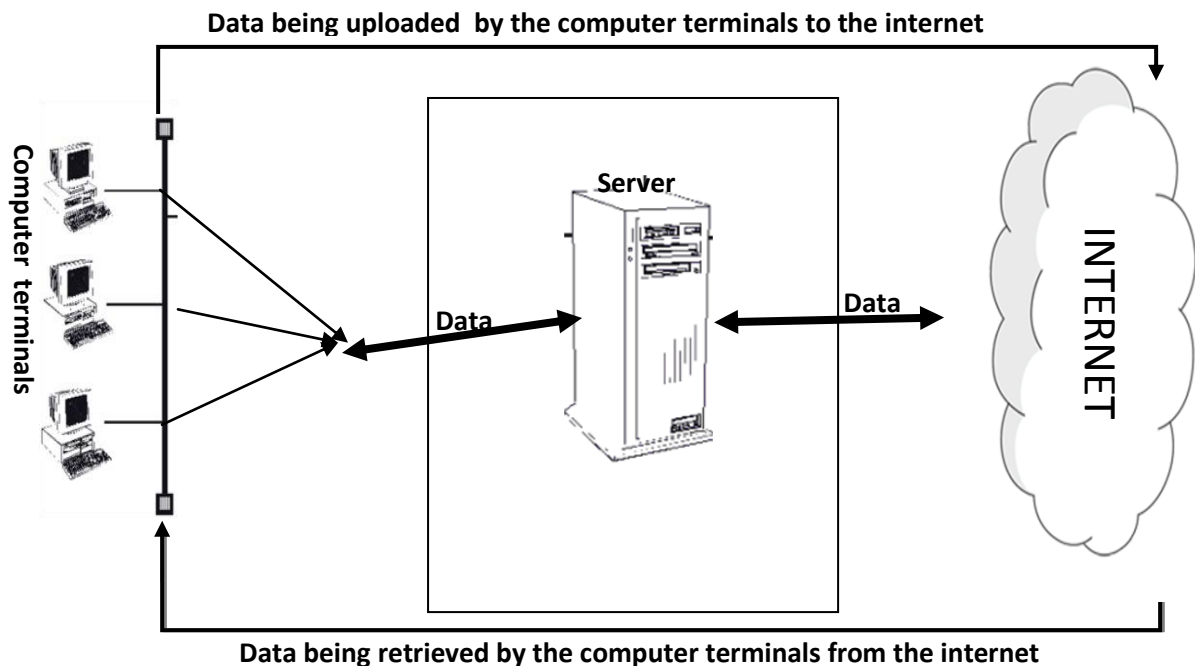
On empowerment and economic gains from heritage preservation, Williams (2001) says, 'preservation of cultural heritage resources is essential to sustainable development. It recognizes the importance of cultural continuity and of human history in nourishing social cohesion, a sense of belonging, and of place in a context within which to understand the past and to contemplate the future. Preservation of heritage could enhance the projection of a country to the outside world. The National Film Archives observed that the preservation of the Black and African heritage showcased at FESTAC'77 through the documentary heritage titled, 'Nigeria-Black Heritage-Kanta of Kebbi' shows the contributions of the Black and Africa to the world's civilization.

On the scholarship front, the benefit of proper collection and preservation of our heritage are innumerable. But central to all is, enabling research and discovery. Carole et al (internet source) agree no less to this position as they observe that, 'Collection have always been central to librarianship and archive science, and their importance will continue as the stores of data grow and become increasingly searchable and browsable. They will be essential units for planning and implementing curation objectives and resources, for supporting research communications, and supporting the reuse and repurposing of data. Collection development and collection description are formative curation activities that add value for scholarly inquiry at both the collection and (larger) aggregation level'. Talking about contribution of digitalization to proper preservation and its importance, Ekwelem et al (internet source) submit that, 'digitization contributes to the conservation and preservation of heritage and scientific resources, creates new educational opportunities, can be used to encourage tourism and provides ways of improving access by the citizens to their patrimonies. In the same vain, The USA Natural Heritage for Conservation (internet source), posits that natural heritage has high potential for tourism attraction as it observe that, '…these heritage sites often serve as an important component in a country's tourist industry, attracting many visitors from abroad as well as locally'.

DIGITAL DATA CURATION AND NATURAL HERITAGE PRESERVATION

When we talk about heritage preservation, our attention will quickly go to related archives in museums and other places where such materials are kept. This is true because most of the heritage to be discussed here have been collected in one way or the other and kept in the museum. This therefore means that we will concentrate on the archives in the museum and other places. No wonder, Gray (2002) specifies that archiving is needed for curation. This does not mean that we will not beam our search light on natural heritage hidden in some parts of the country unnoticed by even the owners. If not for any reason, highlight the existence of such natural heritage. But be that as it may, the fact that most of the materials we are going to touch here are already kept somewhere clearly shows that a kind of preservation activities must have been going on upon these materials but the levels of success is what is in doubt. This work has earlier demonstrated that data curation is concerned with effective functioning of data throughout its life span. This means is that from the stage of collection to any other time in the lifecycle of the said data, consideration should be given to ensuring its fitness for use and even for a change when necessary. Gray (2002) observes that, 'data curation is activity of managing and promoting the use of data from its point of creation, to ensure it is fit for contemporary purpose, and available for discovery and re-use'. From the provisions of data curation highlighted here, it will not be out of place to posit that applying data curation in the preservation of our natural heritage would imply using all the standard procedures in data curation in collection and management of natural heritage as found in archives in museums and elsewhere. Before we delve into considering some of the procedures or methods of data curation and how they can apply to natural heritage preservation, let us briefly throw light on some of these natural heritage we want to discuss how best to preserve them using data curation.

DDC ARCHITECTURE

Data being uploaded by the computer terminals to the internet

Data being retrieved by the computer terminals from the internet

Digital Data Curator (DDC) architecture represented by the figure above explains the process of how national heritage (Data) is curated digitally and retrieved by users who need them through the computer terminals. The data to be curated is first of all transformed into digital format. It is then transmitted to the server or uploaded to the internet. The server transmits same to the internet and vice versa. Retrieving and uploading data to the server can be done online or offline depending on the services available to an individual. The internet makes it possible for the data to be remotely accessed.

NATURAL HERITAGE TYPES

The USA Natural Heritage for Conservation (internet source) observes that, 'natural heritage is also an important part of a society's heritage, encompassing the countryside and natural environment, including flora and fauna, scientifically known as biodiversity, (as well as geological, geomorphological paleontological, etc), scientifically known as geodiversity. …Aspects of the preservation and conservation of natural heritage include: rare breeds conservation, heirloom plants'. This submission here indicates that natural heritage comprises of rare plants, rare animals, significant and attractive natural formations like forest, hills and mountains, rocks, valleys, water. Let us, loosely, say here that Scientists gave these natural heritage components the names mentioned above while social scientists labeled them natural communities. New York Natural Heritage Program (internet source) defines natural communities as, 'recurring assemblages of plants and animals found in a particular physical environment'.

It is interesting to note here that while most developed countries of the world have and talk more about flora and fauna as their natural heritage, having little of special and attractive geographical formations, African countries, especially Nigeria, have little of flora and fauna as natural heritage but pride in abundance of very significant and attractive geographical formations (geodiversity). Some of the natural heritage in Nigeria as found in Heritage of Nigeria (internet source) are: Osun Osogbo Sacred Grove; Oben Hills, Korup; Eggon Hills, Kwiambana or Ningi; Niger Delta Mangroves, etc. Having considered some of the components of natural heritage, let us now move to looking at how the archives on these natural heritage could be preserved through data curation,

PROCEDURES FOR PRESERVING NATURAL HERITAGE THROUGH DIGITAL DATA CURATION

The ultimate goal of data curation is to ensure that the material curated maintains its status in all ramifications throughout its lifecycle. It is pertinent to reiterate here that natural heritage materials to be regarded as data for curation here are archives on these natural heritage in museums and other places. Archives, as we know, are records and documents on the life and history of a given society. With what to be curated at the back of our mind, the first step is to consider the best way or means of gathering or collecting the materials which of course is the initial stage of curation. Carole et al (internet source) observe that, 'collection development and collection description are formative curation activities that add value for scholarly inquiry at both the collection and (larger) aggregation level'. Materials or information on natural heritage to be kept as archives could be gathered through film recording, photographs and other documentations. For storage, some of the materials to use are: Acid-free paper, (this is an acid-free archive quality papers that will last hundreds of years), Acid-free storage boxes and envelops (The University of Illinois' Graduate School of Library and Information Science. Internet source). For proper curation, (management and maintenance) of data (natural heritage materials).

THE ADVATANGES OF PRESERVING OUR NATURAL HERITAGE THROUGH DIGITAL DATA CURATION

The preservation of our natural heritage through data curation has so many advantages over other means of preservation. One major advantage is constant standard quality of the archival materials on the natural heritage which is achieved through regular maintenance of this materials or documents as provided for by data curation; being the preservation method in use. The National Film Archives of Nigeria (internet source) reports the routine daily activities being carried out to ensure that the materials on, 'Black Heritage? and Kanta Kebbi' documentaries on FESTAC'77 and the life and time a notable Kebbi king and his kingdom respectively, are preserved in a standard and best quality status. The traditional ways of preserving our natural heritage has proven to be unable to withstand the test of time due to so many factors. Another important advantage is making access to these archives very easy. The use of digitization, for example, will make the materials or data very easy to be accessed by so many people at will. Another important advantage of preserving our natural heritage through data curation is the possibility of adjusting the data according the prevailing need of the time.

CHALLENGES OF PRESERVING OF NATURAL HERITAGE THROUGH DATA CURATION

Data curation as the surest way of preserving our natural heritage has been proven beyond doubt. However, effective use of data curation for the preservation of our natural heritage especially in this clime will be hampered by some factors. One of such factors is lack of commitment by government to ensure the provision of the required facilities for data curation in the area of preserving our natural heritage. Data curation generally is capital intensive because of the type of equipments required for effective curation. Ekwelem et al (internet source) report that out the 5 Universities they conducted research on in the Southeast of Nigeria, only two have attempted the digitization of some aspects of their library activities. Another factor is lack of adequate professionals or qualified personnel in this business of data curation. The findings of Jahnke, et al (internet source) attest to thus, 'None of the researchers interviewed for this study have received formal training in data management practices, nor do they express satisfaction with their level of expertise…'

CONCLUSION

The paper has attempted to show that data curation is a sure way of preserving our natural heritage. Effort was made to show what heritage is. Types of heritage was also discussed. The work then, dwelled on the natural heritage: its meaning and components or types; ways of preserving this natural heritage and why the use of data curation is the best means of preserving our heritage. It is our hope that all stake holders will rise up to their responsibilities to ensure that our past and symbols of who we are, are not allowed to disappear from the face of the earth.

RECOMMENDATION

-It is the opinion of this work that if we really want most of our natural heritage not to go into extinct as a result of neglect, adequate fund should be made available for the preservation of these natural heritage through data curation.
-The retraining of professionals in this field must be made a priority.

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