

Mitigating and Dealing with Disasters: The Task of the Newly Employed Information Manager in Knowledge Preservation

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Abstract

The growing volume of literature in library disasters preparedness and management has in the past two decades majorly concerned with the need to protect education materials in the web. Yet despite the delight in online materials and the ease with which materials can be retrieved, library users still crave for print journal copies. This paper argues that we still have a big proportion of library users who rely on the traditional library for their research needs, and hence time is not yet for researchers exploring the question of mitigating and dealing with library disasters to abandon research on protecting the physical library. The paper highlights the features of both the physical and digital libraries, the notable library disasters around the world in modern history and also explores the role of the modern librarian in mitigating and dealing with library disasters. The paper concludes that it is important that sites offering training on either preservation of physical library or digital library, to emphasize on both aspects.

Keywords: Physical Library, Digital Library, Disaster preparedness, Disaster management, Knowledge preservation

1.0 Introduction

A casual internet perusal these days on literature dealing with mitigating and dealing with library disasters returns results that emphasize only on the importance of protecting materials in the web as if the modern library has seized to stock print materials for their users yet nearly all important national and academic libraries are still collecting print materials in their numbers.

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We cannot deny that there has been dramatic change of reading habits among students, academics and the general public since the internet revolution, but as Bruce and Mertens (2015) point in their commentary regarding a recent survey by Jisc and RLUK's on 3,500 UK academics, much as academics in UK spend less time in the physical library than in the virtual one, they primarily look to the physical library to provide the journals and books necessary to their teaching and research.

According to Bruce and Mertens (2015) around 90% of academics who responded to the Jisc and RLUK's survey saw the main role of the university library as a purchaser of content, while 45% described themselves as very dependent on their library for their work, with only 2% of academics saying that they start their research with a visit to the library building. Among the nearly 90% academic respondents, the library's collections and subscriptions are the most important source for material used in teaching and research; followed by the freely available online materials (Bruce, R. & Mertens, M., 2015). Thus, academics will continue to inhabit a hybrid world of digital and print materials for some time to come and even where print has largely been supplanted, the need for continued access to print copies (local or otherwise) is still crucial (Guardian Professional, 2010).

We don't know whether it is a case where old habits die hard, but research by Lincoln, Y.S. et. al., (2005) confirmed that despite the delight in online journals, and the ease with which materials can be retrieved online, faculty members still want access to print journal copies. Their findings indicate that faculty members still want, need, and appreciate the traditional functions and symbolic meanings of a library: the value of a good collection, the access to a good variety of contemporary thought in their field primarily via journals. Kirk (2015), herself no longer a hardcopy reader, admits that books are unique. She contends that the printed word, the sensory delight, the smell and feel of a new copy, are tangible advantages over the ebook as a format.

She adds that readers attach romanticized sentiments to buying a book: browsing the shelves of our local bookstore or visiting a beloved library, serendipitously finding the next great read. For these reasons, she says, this is why the physical book will never be entirely supplanted by the ebook; the two formats can only ever be symbiotic.

However, Kirk also observes that though faculty members want access to print resources, they consistently ask for more and more online availability, and sing the praises of e-Docs and other desktop delivery services of required research materials. She adds that the faculty has been swift to recognize that speedy acquisition of such materials enhances their work, and permits greater productivity in a shorter timeframe. She quotes psychologists Val Hooper and Channa Herath, who have conducted a long train of studies which suggest that people read the internet differently than they read print. "We skim and scan for the information we want, rather than starting at the beginning and ploughing through to the end. Our eyes jump around, magnetized to links – they imply authority and importance – and short lines cocooned in white space. We'll scroll if we have to, but we'd prefer not to. We read faster. 'People tend not to read online in the traditional sense but rather to skim read, hop from one source to another, and 'power browse'" (Kirk, C: 2015), but in-depth research and reading is still done using print resources, (Bruce, R. & Mertens, M. 2015).

The significance of the use of print resources is brought forth by Katy Waldman in her write up in the *The Australian Financial Review*, 2015 when she observes that when volunteers were asked to write an essay on a narrative they'd consumed either online or on paper, those who had received tangible books crafted superior responses. She adds that people who are above 17 years find it much harder to concentrate when they read online. She cites a study by National Literary Trust of the same year which says that email, IM, social media and spiral-arms of alluring content are a click away, and once a user picks a page, ads and hyperlinks beckon, to distract one.

In any case, the amount of digitized materials is quite scanty, and serious research has to contend with shuffling very many databases online before establishing concrete cases. And although some authorities in favour of digital libraries argue that it is not inconceivable to have a localised database comprising all books (estimated not to exceed one billion since printing began), photographs, legislative material, court decisions, museum objects, recorded music, theatrical performances, including opera and ballet, speeches movies and videotape, we also cannot envisage the magnitude of the problem that would arise if such a database – possibly in excess of one billion megabytes assuming that on average a book occupies 500 pages at 2,000 characters per page, was attacked by hackers, especially when we consider that library users are still keen on using the printed materials for their research.

Moreover, such a voluminous task would be bogged down by the kind of negotiations that would arise as the project developers try to go through matters pertaining to copyright issues of previously published works. A research by Kinya (2011) on several aspects of library use among members of the Kenya National Library Services (KNLS) in Kenya established that the distance to library is not a barrier for library users in need of library services, even at this age of the internet (Kenya internet penetration stands at 54.9% at 2015 count).

The study found that 34.85% users lived within 1 kilometer from the library, 33.10% lived between 1-3 kilometers while 32.05% lived more than 3 kilometers away from the library. Further 27.82% were members of other libraries like in the universities, technical institutions, colleges, and high school where they were affiliated. The research further revealed that 33.47% users visited the library daily, 49.64% visited the library either twice a week or once a week, and 12.28% visited the library either fortnightly or monthly, while only 4.23% visited the library once after three months.

Though we agree that the emergence of the digital library as a tool facilitating intellectual activities across spatial, temporal, and personal boundaries (Chowdhury, G. 2009) has considerable change in the behaviour on how people are accessing information across the internet, results by Gudo, et. al. (2011) show that faculty members and students in African public universities may be completely disadvantaged in accessing the web. Their research on the expansion of higher education in Kenya showed that while 100% private universities perceived adequacy of internet facilities in their libraries, only 40.00% of librarians in public universities felt that internet facilities in the libraries were satisfactory.

2.0 The Characteristics of a Modern Library

Although there have been a lot of changes in the management of a library since the onset of computer revolution with many functions being handled at the front of a computer workstation, most modern libraries incorporate both traditional library and the digital library. Typically, the distinction between a traditional library and a digital library is that the former lays emphasis on storage and preservation of physical items, particularly books and periodicals.

It catalogues at a high level rather than one of detail like author and subject indexes as opposed to full text. Browsing is based on physical proximity of related materials, e.g., books on sociology are near one another on the shelves, and information is physically assembled in one place, meaning that users must travel to the library to learn what is there and make use of it.

By contrast, a digital library differs from the traditional library in the sense that it lays emphasis on access to digitized materials wherever they may be located, with digitization eliminating the need to own or store a physical item. Second, cataloging is carried out down to individual words or glyphs. Third, browsing is based on hyperlinks, keyword, or any defined measure of relatedness, and materials on the same subject do not need to be near one another in any physical sense. Finally, it uses what we refer as broadcast technology and users need not visit a digital library except electronically and they can access it from home, school, office, or in a car.

Given that most modern libraries may constitute both the traditional and some digital aspects, this is sufficient reason why researchers on the twin question of mitigating and dealing with library disasters ought to concentrate on both aspects of protection more so because the circumstances that have led to library disasters in the course of history are still prevalent today, the only difference being that the community tasked in the preservation of reading materials is more prepared than before. Otherwise, we still have to confront the effects of rain and windstorms, floods, biological agents, earthquakes, volcanic eruptions, acts of war and terrorism, student riots, water damage from broken pipes, leaking roofs, blocked drainage, and unattended fire extinguishing devices, which can affect both the traditional library as well as the digital library.

Hence disaster planning and recovery advice for libraries and historical societies offered to librarians, records managers, curators and the general public by such agencies as the Federal Library and Information Center Committee (FLICC) Preservation & Bindery Working Group in [Disaster Recovery Contract](#) that give help and specify what service a vendor does to help in recovery from a major disaster, the [Before the storm: the countdown](#) from LYRASIS which outlines the steps for the beginning of the hurricane season in America, when and which hurricane to watch and so forth, and [Disaster preparedness and response](#) from Conservation On Line are still very relevant to the knowledge and information managers in this epoch.

The materials were uploaded to guide all stakeholders in the information industry due to many natural and man-made disasters in the course of history that rendered numerous libraries and archives to waste.

2.1 Library and Archive Disasters in History

The catalogue of the number of natural and man-made disasters that have affected libraries and national archives is all over the web, and for the purposes of this paper we shall only highlight a few just to illustrate the significance of the need for the library manager to constitute task forces that can effectively deal with both the traditional and digital libraries within their mandates.

Alegbeleye (1993) catalogues many disasters that have hit many parts of Africa in modern history and advises that, whether we are talking about a person, a family, a community, or a public institution such as a public library, advance planning is the key to survival, emphasising that disaster management should be a major concern for any public library that wants to survive.

He states that valuable records relating to Nairobi city were destroyed when fire gutted the Secretarial Office in Nairobi, Kenya, in 1939, consuming a vital portion of the central government records. Alegbeleye (1993) has also highlighted other disasters within the West African region that include the 250,000 government records were lost to fire in Pujchum town in Sierra Leone; the fire at the library of the Nigeria Institute of Policy and Strategic Studies, in Jos; the 1988 arson by students at the Nigeria Forestry Research Institute Library; and the destruction of documents in the National Library of Nigeria in 1990.

Issa, et. al., (2006) have documented library disasters in other parts of Africa including the Pretoria City Council, South Africa where records dating back to the 1920s were lost in a fire at its Munitoria building in March 1997.

The same research also highlights the hurricane that destroyed valuable records and private manuscripts at the National Archives of Swaziland in 1984; and the flash floods that hit Mozambique's districts of Xai-Xai, Chokwe and Guija in 2000 and destroyed all records held in those administrative districts.

The authors also quote studies by Pepra (1998) and Adinku (2005) as saying that Ghana has experienced a series of floods, earthquake, fire and arson related disasters over the years including the earthquake of 1939 that destroyed the Aglion Library, and the fires that engulfed Agricultural Development Bank Head Office and the Ghana Broadcasting Corporation in 1984 and 1989 respectively.

In South Asia, the 2004 Indian Ocean earthquake that resulted into tsunamis devastated public, private, academic, museum, and school libraries and archives across India, The Maldives, Sri Lanka, Thailand, Malaysia, and Sumatra with millions of priceless texts gone forever. Again, in 2005 Hurricane Katrina wrecked America's Gulf Coast and records indicate that nearly every public library in its path sustained some form of damage, with some branches (like Martin Luther King in the Lower 9th Ward) completely destroyed. The incident wiped out 90 percent of the combined staff jobs in the months succeeding Katrina. The situation was salvaged by the establishment of temporary libraries to provide services as the entire New Orleans Public Library System could only come back to regular hours in 2011.

The complete destruction of the cultural artifacts in Mosul, Northern Iraq in 2015 by the Islamic State and the Levant is the latest man-made disaster that has attracted the attention of the whole world. The United Nations Education Scientific and Cultural Organization (UNESCO) and other organizations concerned in the preservation of world heritage sites have expressed a lot of outrage at the action and cautioned that if such madness is allowed to continue the future generation may lose touch with past history. All those who condemned ISIL dismissed the assertion by the terror group that they were bringing the statues down to combat idol worship in line with the teachings of Prophet Mohammed.

3.0 The Tasks of Knowledge Manager in Mitigating and Dealing with Disasters

Research on disaster planning as an essential component of the overall management plan for a library or archive emphasizes on the need to develop an effective disaster plan and incorporating it into the day-to-day management of the physical institution (Lyll, 1993). Such position is informed by the fact that libraries or archives are vulnerable to disasters yet are the only institutions that act as a hub for the exchange of ideas for they are a custodian to print, microform, audiovisual collections, and electronic information.

It is regrettable if a library were to suffer damage to its buildings or furnishings, and even more catastrophic for its information resources to be destroyed (Wooden, 2015).

However, advances in computer technology have aided the growth of the digital library making considerable information users to turn to the internet for research. This means that an information or knowledge manager tasked in the preservation of information must plan on how to mitigate and deal with disasters that may affect the library must consider setting up two teams: one to deal with the traditional library and the other to deal with the digital library.

3.1 Planning for Disasters in a Physical Library

The Library of Congress revised page on Emergency Preparedness, Response & Recovery (2005) recommends every librarian to make sure that their library is ready for disaster. Further, scholarship dealing with research on mitigating and dealing with library disasters advises on the need for drawing preventive, preparedness, response and recovery plans, giving priority attention to such areas like personnel including staff, users and visitors; collections and records including all categories of archival records, serials, monographs, manuscripts, maps, sound recordings, computer discs, optical and video discs, pictorial materials, and their related catalogues; protection of the institution's vital records, like legal documents, essential files and financial records; and building and equipment including electronic equipment, air conditioning plant, plumbing, electrical services and computers (Lyll, 1993).

For such tasks, Lyll (1993) suggests that a manager in charge of a library or an archive should set up a team to prepare such plans as they would apply to the building and all its contents, including people, collections, records, and equipment. He adds that for such plans to succeed, they must involve five main steps: conducting a risk analysis; identification of existing preventive and preparedness procedures; making recommendations to implement additional preventive and preparedness procedures; allocating responsibilities; and devising procedures to respond and recover from disasters. Such plans would come in handy in the event of a disaster "as the value of the material, physical and human resources which may arise from a disaster may be immense" (King'ori & Otike).

Such plans are even crucial in Africa where university education is expanding at an astronomical speed. In the new campuses that have mushroomed in nearly all urban centers, those setting libraries are only picking 'ideal' rooms and erecting shelves to carry books even without the input of library managers in terms of disaster preparedness.

As such the library manager does not determine the construction materials for the facility, and determine whether they are prone to fire or not, or whether the buildings are satisfactory electrically wired, and whether such aspects like fire extinguisher points, drainage system, ventilation, storage space, and the safety of ICT equipment, meet the standards.

3.2 Planning for Disasters that May Affect a Digital Library

From electrical storms that shut down servers and fry hard drives to floods that corrupt data and destroy preserved archives, disasters can cause a variety of problems for digital collections. As such a library requires a plan that covers the preservation of digital collections. Experienced library managers are in agreement that every institution ought to establish a disaster prevention program that caters for digital libraries.

Marchionini (1999) observes that digital libraries are the logical extensions and augmentations of physical libraries in the electronic information society. The author adds that extensions amplify existing resources and services and augmentations enable new kinds of human problem solving and expression. As such, digital libraries offer new levels of access to broader audiences of users and new opportunities for the library and information science field to advance both theory and practice. Chowdhury (2009) adds that there are two important points that researchers should be aware of regarding the emerging digital libraries: first a digital library is becoming a person-centric system as opposed to a generic collection and service, and second its goal is now to facilitate communication, collaboration and interactions, and not just providing access to digital information.

Thus depending on the source, digital libraries include anything from simple repositories of huge volumes of homogeneous electronic data with primitive access services to the electronic extensions of the world's most prominent libraries.

Specialized digital libraries provide renderings for single medium objects such as images, statistical data, sound recordings, or silent films. Determining which formats to use is one challenge for such collections (Chowdhury, 2009).

This has been found to be the case in Western region of India where a recent survey by Zaveri (2015) on some 276 libraries to determine the kind of protection measures they had put in place to protect digital data found that most lacked knowledge about digital data handling and did not have adequate digital infrastructure setup, and that chances of losing digital data in these organizations was high.

Zaveri (2015) found that all these libraries relied on manual data backup for their digital materials. This is in spite that digital data preservation is a key aspect of all research projects, as some research data are unique and cannot be replaced if destroyed or lost, yet research is only judged as sound if it contains references with verifiable data. Without good practices in place, the scientific record and documentary heritage created in digital form will remain at risk from digital obsolescence and also from the fragilities inherent to digital media. The Digital Disaster Recovery Team urges that any plan to preserve digital assets that have been entrusted to a library should encompass well grounded supporting systems, through preparation, planning, and developed recovery schemes.

Marchionini (1999) points out that a digital library is dependent on and driven by several general purpose technologies such as computer hardware, high-speed networking, security, and interoperability. Hence, in disaster prevention, library operations should be identified together with IT components used to support each operation (Li and Banach, 2011; Chowdhury, 2009). IT infrastructure components may include the following: application software; servers and operating systems; data and data storage systems; local and wide area networks; and client systems including PCs, thin client devices and terminals, as well as key peripheral devices such as printers. When the concept of digital library became a reality, many knowledge managers were concerned about the costs of undertaking such projects. However, the declining costs of electronic equipments has made digital libraries to benefit from cheaper, faster, more powerful CPUs and higher-density storage devices. In fact, the workstations in the market today can serve thousands of users per hour on information streamed as video, real-time collaborative experiences and as discrete files.

But that said, library managers still face the challenge of preserving digital materials. Unlike in the case of print information which is relatively simple to preserve since paper is a durable format when made properly and stored under the proper conditions, preserving information in digital format is a more complex task. Digital information is fragile and faces many threats including technological obsolescence and the deterioration of digital storage media (Li and Banach, 2011; Chowdhury, 2009). Li and Banach (2011) quote several authorities who maintain that the rate of change in computing technologies is such that information can be rendered inaccessible within a decade.

Before we delve on the necessary steps that a library manager need to undertake to preserve digital materials, it would be wise if we identify the kind of threats that are common in a digital library. King'ori & Otike (2004) quote Tiogo (2003:47) as having identified that hardware or system malfunction is responsible of 44% of the threats, compared to human error at 32%, software corruption or program malfunction at 14%, and computer malware at 7% and natural disasters at 3%. This position may have since changed due to our increased knowledge in the use of software and hardware devices.

There are several steps that a knowledge manager should follow when planning for any risks. There are many sites in the web which catalogue the procedures that a knowledge manager should follow to mitigate and deal with digital library disasters but for the purposes of this article, we shall only consider the plan by The Digital Disaster Recovery Team.

The Team advises that upon identifying the library operations and their IT resources, the person tasked with disaster prevention should measure the impact of unplanned interruption. The Team adds that the manager should also analyse the list of threats to be used as a guide during the implementation of the control plan. Secondly, the manager should from the beginning form a Digital Preservation Committee whose goal should be to carry out the necessary tasks to mitigate the loss and corruption of library digital assets now and in the future. The committee members should be responsible for monitoring the long-term maintenance of the digital assets created by the library and/or hosted by the library on behalf of the depositors and for the benefit of current and future users (The Digital Disaster Recovery Team).

The Digital Disaster Recovery Team further advises that the knowledge manager should also constitute a Digital Disaster Committee whose purpose and goal should be to provide leadership and immediate action required during a crisis situation so that losses are mitigated and normal operations are resumed as quickly as possible. During a medium- or large-scale disaster, the Digital Disaster Recovery Team should act as a sub-group for the library's general Disaster Recovery Team.

Some of the tasks and responsibilities that should be entrusted to the team include: to notify appropriate staff members when an issue is identified; to follow the developed recovery scenarios, or create new methods as necessary, to recover data; to check and ensure digital objects have been recovered completely without corruption; to document the issue where appropriate staff can access the information; to inform appropriate staff members that the data has been recovered and services have resumed; to communicate with the university's community about service availability and digital content access as necessary; and to keep a physical and digital copy of this plan in an accessible place.

4.0 Conclusion

This paper has shown that libraries and archives all over the world have been lost to catastrophic events like hurricanes, earthquakes, and tsunamis, in the course of history. Other libraries have been destroyed by minor storms, over-flowing drainage systems, arsons and pipe bursts. Most of these accidents have occurred in university libraries where materials have been accumulated for decades or centuries and have been very difficult to replace.

Traditionally libraries have played a key role in the continuum of knowledge as they have captured and organised the information resources created in the past, for use by the current generation and be accessed by future generation users. The long life of conventionally printed and published materials within a controlled climate of temperature and humidity (Chowdhury, 2009), has ensured the storage of the resources. Physical libraries also offer users a good environment to read, print, or consult web materials.

However, the number of users turning to the digital library across the globe cannot be underestimated. Many commentators on this matter have repeatedly stated that good traditional libraries will only maintain their status if they offer digital services alongside print services. On the positive, there is concerted effort in making research findings more widely available online and keeping them available over time (Chowdhury, 2009). And within the last decade, efforts have been made to satisfy content contributors on matters pertaining to copyright issues as libraries continue to archive previously published works, and collections have shifted from physical to digital forms, though not necessarily uniformly. This shift has reshaped many aspects of how libraries operate, with profound implications not only for how they provide access to materials but, especially, in how these digital collections will be preserved for future generations (Chowdhury, 2009).

But if these are the trends, where does this leave the future of the physical library? In the course of developing this paper we interviewed some 10 doctoral students at the University of Nairobi who candidly said that it is possible to carry out 90 percent of doctoral research from the web. Though we did not take statistics on how the digital library has affected the library book borrowing especially with the increasing population of the university students, we also found that the number of likes on websites that aggregate research content have grown exponentially, most e-book readers expressed similar opinion to Kirk that there is a good feel and connection with the author when one reads a print material.

The choice is not therefore between preserving either print or digital materials but putting in place plans that would mitigate disasters and ensure a rapid recovery once disasters hit the libraries. A knowledge manager of this epoch is thereby called to instill his/her organization on the value of information, and suggest ways of educating his/her management team to accept both physical and digital disaster management as part of management procedure in the organization, because through lack of preparedness, disasters can overtake a library in a pace of a few hours but the damage caused, where it is recoverable, can take years to put right (Lancaster, 1987). Hence sites like The Artifact Research Center, Baltimore Academic Library Consortium (BALC), Colorado Preservation Alliance and many others that emphasize on the preservation of print copies and archaeological and archived materials from dangers that may arise from vandalism, tornadoes, molds, floods, fires, earthquakes and bombs may also consider uploading materials that teach information stakeholders on how to preserve digital materials from natural and man-made disasters.

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