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The State of Document Deterioration in the National Archives of Ghana

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Abstract

A survey of the condition of documents in the National Archives of Ghana was conducted. A stratified proportionate sampling technique was used to select 600 documents from five repositories for examination. The results of the survey show that 63 per cent of the documents had pH values of below 5, 31 per cent were brittle, 77.3 per cent had fading texts, 94.3 per cent had turned brownish and 85.6 per cent had indications of fungus infestation. In all, 51.5 per cent of the documents were in need of urgent treatment. The study established that the situation resulted from a combination of factors, paramount being the unfavourable storage conditions. The implications of the findings of the study for Ghana were highlighted. Recommendations put forward include among others, mass deacidification of documents, sustained programme of fumigation, purpose-built archives for the regions, environmental monitoring and control measures, staff recruitment strategies and the institution of a comprehensive preservation and conservation policy.

Introduction

Ever since Barrow's (1959) study of book stock, several studies had been carried out to determine the state or condition of documents in several institutions, with revealing results. For example, in 1973 the Library of Congress estimated that 34 per cent of its total collection of 17 million books were either completely unusable or damaged (Harvey, 1992). The 1979 Stanford University survey concluded that 32.8 per cent of the Green Library Collection were in good condition; 40.8 per cent in moderate condition and 26.5 per cent in poor condition (Buchanan & Coleman,1979). The famous Yale Survey revealed that 37.1 per cent of the Yale Library system's collections were brittle; 82.6 per cent were acidic (pH under 5.4) and 25 per cent mutilated (Walker et.al, 1985). According to Alegbeleye (1996), statistics from these series of surveys may serve two purposes. They may console custodians who may otherwise have the erroneous impression that their problems were unique and secondly, they may spur other nations and institutions to carry out surveys on the condition or state of their collection as a stage in the direction of preserving them.

In more recent times, surveys conducted in the US have shown that 80 per cent of books in research collections were printed on acidic paper and 30 per cent were brittle beyond redemption (Bellagio Report, 1996). In England, a survey conducted by the Oxford University on the condition of collections at its 122 libraries and archives revealed that more than a quarter of a million volumes out of 9.7 million were estimated to have structural damage (Bellagio Report, 1996). Similarly, the results of a survey of a large number of Dutch collections conducted by the Advisory Council for Libraries and Archives found that at least three million books in the collection were in such poor condition that they would be lost if no

action was taken (Bellagio Report, 1996). Alegbeleye's survey of book deterioration at the University of Ibadan Library found out that 81 per cent of the collection was brittle (Alegbeleye, 1996). The trend from the surveys cited suggests that the deterioration of documentary materials is similar in nature and scale, varying only from country to country according to environmental factors, particularly climate. This article discusses the results of a survey of documents of the National Archives of Ghana.

The National Archives System

The National Archives of Ghana (NAG) derives its legal authority from the Public Records and Archives Administration Act that positions it as a division of the Public Records and Archives Administration Department (PRAAD) (Act. 535, 1997). The main function of the division, among others, is to exercise custodial responsibility for all public records of permanent value and make them physically and intellectually accessible to government officials, researchers and individuals within the regulatory framework. Article 14 of Act 535 specifically enjoins the Director of PRAAD to be responsible for the preservation of all public records of permanent value and to provide in the national and regional archival repositories, suitable conditions for the preservation of records and access for their consultation by the public. For the National Archives to be able to play its expected role, it is structured into seven regional offices and repositories all over the country with the headquarters in Accra.

The Objectives of the Survey

The study was designed to determine the state of deterioration of documentary materials in the National Archives of Ghana. Specifically, the survey investigated the following among, others the:

- level of acidity of documents
- level of brittleness
- extent of fading
- level of mouldiness of documents
- extent of mutilation
- security provision
- primary and secondary housing conditions.

Methodology

The survey covered the collections at the repositories of the Head Office in Accra; the Ashanti Regional Office and the Northern Regional Office. It concentrated on paper documents only to the exclusion of microforms, audio-visual and electronic records. These other categories of records were seen or presumed to have special and better endowed storage facility and environment.

Pilot Study

Due to the complex nature of collection surveys, the researcher placed a very high premium on a preliminary run-through of the survey on a small scale. A pilot study of 50 documents in one of the repositories in Accra was carried out. The pre-test helped to identify and eliminate problems such as ambiguous questions and duplications. The writer took advantage of the pilot study to organise training for the surveyors who were used to undertake the assessment. The surveyors were taken through the following among others:

- consistency in locating items
- detailed instructions on how to complete the survey forms.
- knowledge of document structure
- identification of damages
- conducting acidity test
- conducting fold endurance test.

Survey Implementation

The collection survey was carried out almost immediately after the pilot survey. This was done to ensure that the knowledge the surveyors acquired during the pilot stage was freshly carried to the field (repositories).

Six archives assistants of the National Archives of Ghana and ten second-year diploma students of the Department of Information Studies were used to carry out the survey in the five repositories. These two categories of people were selected and trained as surveyors to carry out the survey because they had been exposed to some level of knowledge in preservation of documents during their training programme at the University of Ghana. In addition, the archives assistants also had varying degrees of experience in the field. These qualities facilitated the success of the survey.

Prior to this, climatic data (temperature and relative humidity) in the three repositories in Accra were collected over a period of one year. Unfortunately, due to the inadequacy of equipment and some other logistic problems, readings could not be taken from the Kumasi and Tamale repositories.

Findings

In all, a sample of 600 items were proportionately selected from the five repositories that were surveyed. In general the findings were very revealing because most of them confirmed previous results and estimates of the scope of collection deterioration and preservation problems all over the world. In other cases, the findings provided new information for further work.

Types and Structure of Documents Surveyed

The National Archives of Ghana holds a varied range of documentary materials, including paper and film base materials. A greater part of the sample is made up of paper files (55.1 per cent). Reports and newspapers constitute 4 per cent each with maps 1.7 per cent, photographic materials 0.8 per cent and manuscripts 0.7 per cent, constituting insignificant components of the sample.

Also, in the sample of 600 (the selection process was such that no document was missed), 40.5 per cent were found to be bound, thus making them more secure structurally, while 59.5 per cent were unbound. A cross-tabulation of item type by item structure (table 1) reveals that 87.5 per cent of newspapers, 99 per cent of the books, and 83.3 per cent of reports were bound, while 99.7 per cent of files were unbound. This categorisation of the structure of items in the sample relative to the type of document is very relevant for the subsequent detailed analysis of the condition of the collection.

Table 1: Categorisation by Item Type and Structure

Item Type	Bound	Unbound	Total	%
Newspaper	21	3	24	4.0
Photographic Material	-	5	5	0.8
Manuscript	-	4	4	0.7
Map	1	9	10	1.7
File	1	330	331	55.1
Book	200	2	202	33.7
Report	20	4	24	4.0
Total	243	357	600	100

Accommodation, Protection and Security

The storage facility and environment is very critical to the longevity of archival documents. In addition, the secondary protection such as bindings, wrappers, boxes and envelopes cannot be ignored. They contribute to the longevity of documents. The analysis of data revealed that 74.8 per cent of the items surveyed had protection in the form of boxes or wrappers. About a quarter (25.2 per cent) had no protection, implying that they were stored bare on the shelves and thereby leaving them at the mercy of the direct impact of the storage environmental agents such as dust, dampness, heat, insects and micro-organisms. A follow-up observation in the repositories revealed that most of the unprotected documents were bound items such as newspapers and books, particularly very bulky court record books.

Table 2: Structures and Status of Primary Protection

			Structural Damage: Folder binding intact?		Total
			Yes	No	
Item Structure	Bound	Count	188	55	243
		Row %	77.4%	22.6%	100.0%
		Column%	39.4%	44.7%	40.5%
	Unbound	Count %	289	68	357
		Row %	81.0%	19.0%	100.0%
		Column %	60.6%	55.3%	59.5%
Total		Count	477	123	600
		Row %	79.5%	20.5%	100.0%
		Column %	100.0%	100.0%	100.0%

Interesting revelations came out of the analysis of cross-tabulations of the structure of document and the status of primary protection. Contrary to expectations, higher proportions of bound items (22.6 per cent) had their bindings detached as compared to 19 per cent for unbound items (Table 2).

This should, however, be viewed against the background that bound items constituted only 40.5 per cent of the sample. The findings however point to a relationship between secondary protection (boxes, wrappers, etc) and primary protection (folders, bindings, etc.)

Types and Extent of Damage

Most archival materials are organic in nature and for that reason will ultimately deteriorate. According to Harvey (1992), the rate at which materials deteriorate is determined by two factors. These are the inherent chemical stability of the material, and the external actions that affect the material. One major objective of the collection survey was to identify and quantify the structural, chemical and biological damages to the collection of the National Archives, using the sample.

Physical Damages

The abuse and mismanagement of documentary materials are major contributors to physical degradation. These include, among others, careless handling, insecure stacking, excessive photocopying, and flicking documents over. The results of the survey revealed a very low degree of physical damages to the collection. In the first place, in the sample of 600 items, 39.2 per cent were found to have creasing or torn leaves whilst 60.8 per cent had their leaves intact. In addition, it was found that a majority (74.3 per cent) of the documents had their leaves firmly held together and only 25.7 per cent had loose and protruding fragments of leaves. To cap it all, majority (70.8 per cent) of the items were found not to have any signs of mutilation, leaving only 29.2 per cent with mutilation traits. On the whole, the problem of physical deterioration was found to be moderate. This compares favourably with the findings of Walker, et al (1985) and Alegbeleye (1996).

In the case of the National Archives of Ghana, the low rate of physical damage and mutilation can be explained by the low level of access and use of the collection. The analysis revealed that only 2.3 per cent of the sample of 600 had heavy demand; followed by 13.9 per cent with medium demand and the majority (83.8 per cent) having low demand and use. A cross-tabulation of demand by item, paints a better picture of the levels of use of items, (see Table 3).

Table 3: Item Type and Its Demand

Item Type	Demand for Item			Total	Percentage
	Low	Medium	Heavy		
Newspaper	15	9	-	24	4.0
Photographic Material	5	-	-	5	0.8
Manuscript	4	-	-	4	0.7
Map	10	-	-	10	1.7
File	295	28	8	331	55.1
Book	152	44	6	202	33.7
Report	22	2	-	24	4.0
Total	503	83	14	600	100

Table 3 reveals medium demand for newspapers and low demand for photographic materials, and manuscripts, reports and map items within the sample. Files and book items also had relatively low demand (2.4 per cent and 3 per cent respectively).

Chemical Damages

For the purpose of this article, chemical damages refer to the degradation of documentary materials resulting from the impact of factors such as temperature, relative humidity, light and pollution within the environment.

Acidity/Alkalinity of Documents

There is no doubt about the fact that excessive acidity is the single most serious cause of paper degradation.). The pH value is a very reliable measure of acidity. pH is a measure of the hydrogen ion concentration of a substance. Acids have pH below 7 (1 – 6), while alkaline have pH values above 7 (8 – 14).

According to Walker et al. (1985), pH establishes a direct correlation between paper acidity and longevity. The more acidic the paper, the more short-lived it is. While expressing the difficulty in specifying an exact limit of pH value below which rapid acidic deterioration may take place, Alegbeleye (1996) agrees with other investigators that for permanence, pH should not be below 5.4 (Walker et al. 1985). In other words, pH of 5.4 and below is considered as being very acidic. There are varying methods of determining the pH of paper documents. It could be measured through the use of bromocresol green chemical, as was in the case of the famous Yale Survey (Walker et al. 1985), or through the use of indicator strips, as in the case of the University of Ibadan book deterioration survey (Alegbeleye, 1996). In addition, pH metres could also be used.

For the purpose of this survey, the indicator strip approach was adopted. The advantage this has over the bromocresol green approach is that it leaves no stain on the document. BDH laboratory indicator strips were used. The fourth page of every document was tested. If the item was a single sheet such as a map, the single sheet was tested. In situations where the item had multiple pages but not up to four pages, the last page of the document was tested. Even though earlier studies selected pH 5.4 as the benchmark for determining excessive acidity, this work selected pH 5 because of the difficulty in determining decimals since the colour chart did not make allowance for decimals. Consequently, results obtained were cautiously approached. Nevertheless, the results compare fairly with similar findings in other studies.

The results of the survey revealed that 63 per cent of items tested had pH below 5, indicating high acidity. This corroborates findings in the University of Ibadan book survey; the Wellesley library survey and the Yale survey, where 67 per cent, 65 per cent and 82 per cent of items respectively were found to be highly acidic. Mwangi (1994) also found out in a survey of bibliographic materials in selected libraries in Kenya that 73.3 per cent of the sample was very acidic with pH of below 4.

The high percentage of items with frightening levels of acidity is not surprising, given the fact that the storage environment of the archives is "hostile" and conducive to progressive acidification of paper documents. Between the mid-1970s and the early 1990s, the air-conditioning facility in the repositories at the headquarters was non-functional. Since the early 1990s, even though the situation got rectified, the performance of the facility has been very erratic, resulting in fluctuations in the temperature and relative humidity regimes.

The situations in the Kumasi and Tamale repositories were no better. Continuous exposure to acidic gases from automobiles and industrial plants further accelerates the acidification process. In addition, it is likely that the secondary protectors of the documents (boxes and wrappers) may not be acid-free, and hence, transferring acid to the documents on contact.

Brittleness of Documents

Research has confirmed that brittle paper documents are very difficult to repair or bind and, most often, cannot withstand photocopying and heavy use. Brittleness may result from desiccation caused by high temperatures among others. According to Walker et. al (1985), the test for brittleness is fairly simple and objective. Alegbeleye (1996) refers to it as the fold endurance test, which considers the number of double folding as a measure of brittleness. This approach was adopted for this study. The top corner of the fourth page of every item was folded back and forth for four times (two double folds). If the corner of the paper broke off before or on two double folds, then the document was considered brittle. If it survived, then it was regarded as not being brittle. Similar to the method used in the pH determination, should an item within the sample have less than four pages, the last page was tested.

The analysis revealed that only 31.3 per cent of items within the 600 sample were found to be brittle, while the majority (68.7 per cent) survived the two double fold tests. The 31.3 per cent result compares favourably with the findings of the Yale Survey (37.1 per cent), and findings in the United States, where a survey of library collections found out that 30 per cent of volumes were brittle beyond redemption, (Bellagio Report, 1996).

It has been indicated that there is some relationship between high temperatures and high levels of acidity on one hand and the brittleness of paper documents on the other. While it is easier to appreciate the correlation between temperature and brittleness, most collection surveys have failed to confirm a one-to -one relationship with acidity. This study has found that while 63 per cent of items in a sample of 600 were acidic, only 31.3 per cent were found to be brittle. This is not surprising since the findings of a number of surveys corroborate the results.

The Yale survey found that 37.1 per cent of books sampled had brittle paper while 82.6 per cent were acidic. The University of Ibadan survey also found 67 per cent of items surveyed to be acidic and yet less than 2 per cent were found to be brittle. The findings are further confirmed by the library collection survey in the US that came up with 80 per cent acidic items with only 30 per cent being brittle in the sample surveyed. (Bellagio Report, 1996). Further analysis of cross tabulations or intersections of the variables revealed interesting results. (See Table 4). It was found that 92 per cent of items identified to be brittle were acidic, while only 49.8 per cent of non-brittle items were acidic. Similar results were obtained in the Yale survey where it was found that more than 99 per cent of brittle books were acidic, whereas only 80 per cent of non-brittle books were acidic. These results are not surprising, given the geographical location of Ghana (in the tropics) and the resultant harsh storage environmental conditions.

Table 4: Brittleness and Acidity

			Is the paper of the item acidic? (pH reading of below 5)		Total
			Yes	No	
Is the item (paper) very brittle? (does the corner of a page break off after two double folds?)	Yes	Count	173	15	188
		Row %	92.0%	8.0%	100.0%
		Column %	45.8%	6.8%	29.7%
	No	Count	205	207	412
		Row %	49.8%	50.2%	100.0%
		Column %	54.2%	93.2%	70.3%
Total		Count	378	222	600
		Row %	63.0%	37.0%	100.0%
		Column %	100.0%	100.0%	100.0%

Corrosive Inks and Fading of Documents

Ink is one of the key ingredients of paper documents. Earlier inks made from carbon were more permanent than contemporary inks made of iron gall and dyes. These are very volatile. Some of them are water-soluble and feather under the pressure of high humidity, some are light-sensitive, whilst others can be corrosive, burning images out of paper documents.

The collection survey sought to find whether there was any degradation of the text of the collection which could hamper legibility. It was found that 38 per cent of the sample had corrosive inks burning or eating the text or image out of the documents. It was further found that 77.3 per cent of items had fading texts. This finding is in contrast to the results obtained in the University of Ibadan survey where only 30 per cent of books were found to show signs of fading. The disparity in the findings may be

explained by the age of documents and the level of exposure to unfiltered light.

A majority of the documents with corroding text belonged to the court record books collection. These were mainly hand-written, bound proceedings and judgement books, dating back to the mid 19th Century. The implication of this is that the legibility of the collection of the National Archives of Ghana, the national heritage is gradually on the decline, and thus may result in the eventual loss of content.

Discolouration and Staining

Paper documents, over time, get discoloured as a result of the interplay of several factors. The most prominent cause is the reaction of radiant energy with lignin if present in the paper. This darkens the colour of the paper, turning it brownish or yellowish. Discolouration results in the reduction of legibility and makes reproduction fairly difficult.

Analysis of data revealed that an overwhelming proportion (94.3 per cent) of the sample had turned brownish. This is possibly a pointer to the poor quality of paper used to create these documents and their exposure to unfiltered light. This situation is critical in the light of the proportion of items with fading text. In addition to the discolouration, the analysis revealed that 48 per cent of the items sampled had rust stains resulting from the metallic ends of treasury tags, pins and clips.

Biological Damages

Biological agents are a major cause of deterioration of documentary materials particularly in the tropics. Such agents as fungus, insects and rodents thrive in conditions where there is dust, inadequate ventilation, poor lighting, high temperature and relative humidity. They cause considerable damage through weakening of paper, staining, tearing and chewing up of documents. Some of these damages are irreversible. The collection survey sought to find out the state of biological degradation of documents in the National Archives. Field assistants were specifically asked to observe and record signs of stain, fungi presence and mutilation by insects and rodents. The results revealed that only 18.5 per cent of items within the sample exhibited symptoms of mould. More important was that 85.7 per cent of the items had brownish patches, indicative of foxing resulting from previous mould attacks.

The writer is aware that repository number one at the headquarters of the Archives is periodically plagued with mould infestation and the corresponding treatments had never been thorough. This had always resulted in cases of relapse for some time now. Successive mould attacks on paper documents as is the case of the National Archives of Ghana, apart from the health risk to both custodians and searchers, weaken the documents and could ultimately result in content loss. There was very little evidence of mutilation by insects and rodents. This could be attributed to the cleanliness of the premises and the strict regulations regarding non-eating in the repositories.

Conclusion and Recommendations

One of the cardinal discoveries of this study is the fact that the documentary heritage of Ghana in the National Archives is under the threat of deterioration. The quantum and the level of deterioration are frightening, with 51.1 per cent of documents surveyed in urgent need of treatment while the rest are at various levels of deterioration. A majority of the documents are acidic and brittle, with some of them fading, while some others were turning brownish. These are potent ingredients for decay. To salvage this situation, the following are recommended.

- *Mass Deacidification of NAG* – Immediate steps need to be taken by the National Archives of Ghana (NAG) to deacidify its paper document collection in order to halt further progression of acid decay. There are different methods of deacidification. Given the quantum of the problem, it is recommended that the NAG adopts a mass deacidification method using ammonia gas to neutralise the acid in the documents. This method may not be the best, since it does not prevent re-acidification as compared to the aqueous method. Nevertheless, the precarious nature of the situation calls for the mass method as against the single-sheet wet method that will take the NAG several years to accomplish.
- *Strengthening of Documents* – It is obvious that after deacidification, the NAG must proceed to strengthen the documents. The writer concedes that, given the volume of documents involved, it would be an uphill task. However, some selective

lamination of extremely brittle documents with intrinsic value could be undertaken, while preservation microfilming and digitising technologies could be used to reformat the mass of fragile documents. These technologies are expensive, but in the current situation where Ghana stands a very high risk of losing its documentary heritage, there is no other alternative of safeguarding the intellectual content of the documents.

- *Mass Fumigation Programme of Documents* – It is recommended that in view of the fact that the survey identified symptoms of fungi infestation, the NAG should put together a sustained programme of mass fumigation of documents to forestall further infestation. In the long run, the NAG should be able to ensure a sustained conducive storage environment for its collection.
- *Improved Environment* – PRAAD with the support of the Government of Ghana should, as a matter of priority, construct purpose-built archival repositories for all the regions with facilities and equipment, to control and monitor environmental elements such as temperature, relative humidity, atmospheric pollution and light intensity among others.
- *Staff Recruitment Strategies* – It is further recommended that the NAG re-examines its staff recruitment strategies, taking cognisance of the importance of preservation and conservation in the equation. Preservation administrators and conservators with attractive motivational packages need to be employed and retained.
- *The Need for Preservation Policy*- NAG should put together a comprehensive preservation policy to ensure a more systematic and progressive approach to the preservation problem.

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