

# THE EFFECTS OF CLIMATE CHANGE IN PRESERVING THE PAST AND ENHANCING THE FUTURE OF LEGAL DEPOSIT IN SOUTH AFRICA

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## **ABSTRACT**

With the current problems of global warming and climate change, preservationists are applying green construction principles to depositories and archival facilities (Henry 2008:3; Kim 2008; Nsibirwa 2012:73). Collections stewards, architects and engineers face design challenges to reduce greenhouse gas emissions and develop an adaptive response to climate trends (Henry 2008:3). A 2012 study by Nsibirwa (2012) of the preservation of, and access to, legal deposit materials found that climate change can affect the buildings that are the most important source of security to the materials stored in them.

One of the objectives of the doctoral study on which the article is based, was to find out what activities and strategies are used to preserve the materials, as well as to provide a way forward in the preservation of South Africa's cultural heritage. The units of analysis in this study were four legal deposit libraries and three official publications depositories. In this study the population comprised a total of 17 members of staff: three heads of libraries and 14 librarians. The survey of legal depositories found that preservation activities are generally underdeveloped as a result of various factors, including insufficient funding. Yet, there is a greater need than ever for preservation, since predictions are that temperatures, rising seas, rainfall and flooding will continue to increase due to climate change and global

warming. These conditions will lead to a shift in approaches to preservation, including looking at what poses the greatest threat when it comes to climate change. The study found that depositories may need to revert to some ancient as well as new sustainable approaches to offset the effects of climate change. The article puts forward a number of practical solutions to ensure that the environment in which materials are kept, is suitable.

## KEYWORDS

climate change, cultural heritage, legal deposit, preservation

## 1 INTRODUCTION

Various studies have been carried out in the area of preservation over the years, as the term evolved with the times (Cloonan 1994; Harris 2000; Smith 1999; Swartzburg 1980; Whiffin & Havermans). The meaning of preservation evolved from being the act of collecting materials to becoming the umbrella term for the total care of collections (Cloonan 2007:134). Past research on preservation has concentrated on proper collection storage, including biological factors, careless handling, natural and man-made disasters, inferior paper, acidic ink and the proximity of buildings to water bodies, industrial areas or military installations (Ngulube 2003; Nsibirwa 2007; Sahoo 2007). Yet, James Reilly (A.M.G. 2009:37) argues that before determining what sustainable protective procedures are needed for legal deposit materials, more data need to be collected on variables such as local climate and building structures. For instance, the degree of vulnerability of buildings, based on the strength of the wind, needs to be considered especially in areas prone to hurricanes, tornadoes and tsunamis. Against this background the purpose of the study was to investigate the activities and strategies used to preserve legal deposit materials. The units of analysis in this study were four legal deposit libraries, namely the National Library (in both Pretoria and Cape Town), the Mangaung Library Services (formerly Bloemfontein Public Library), Msunduzi Municipal Library (formerly the Natal Society Library) in Pietermaritzburg, as well as three official publications depositories (OPDs), namely the Constitutional Court Library, RJR Masiea Public Library and the North West Provincial Library Services.

Regardless of the importance of legal deposit which aims to provide access to cultural heritage, Lor (2005:66) states that it is ineffective in the majority of African countries due to a paucity of legislation, preservation activities, adequate funding, skilled staff and access to the collections. It is important to apply the principle of “prevention is better than cure”, as access cannot be assured without preservation and there is a need to strike a balance between the two. To balance access and preservation successfully, it is vital to draw up a long-term preservation policy with the aim of both preventing and slowing down the deterioration of documents and improving the preservation conditions

of collections or, at the very least, safeguarding content by creating surrogate documents (Abid 1998:123; Brandt-Grau 2009:1; Smith 1999).

The authors first present the statement of the problem and the objective, before reviewing the relevant literature, outlining the research methodology (including data analysis adopted and findings), and then concluding with the implications, recommendations and directions for further research.

## **2 STATEMENT OF THE PROBLEM**

Libraries in 21<sup>st</sup> century face many challenges as regards their identity and purpose, amongst others. Mason (2007:202) argues that “cultural institutions need to be robust enough to absorb the uncertain and complex aspects of social and cultural change, and yet fluid enough to evolve correspondingly to support and present this change”. However, the role of most of the legal deposit libraries in South Africa includes functioning as a public library as well as a legal depository. This duality makes unclear the precise role of the public library, with regard to legal deposit, because the libraries often lack a clear focus for their activities and priorities (Brophy 2001:30; Kinnell & Sturges 1996:xiv). Although legal deposit libraries have plenty of work, Feather (2004:9) is of the opinion that with their obligation to <take><make?> a copy of every item published in the jurisdiction in which they are located, depositories can look forward to continuous and perhaps exponential growth, as the output of print materials continues to grow despite the even more rapid growth in the output of electronic and audio-visual media.

## **3 THE AIM AND OBJECTIVE OF THE STUDY**

One of the objectives of the study on which this article is based, was to find out what activities and strategies are used to preserve materials. This comprised looking at the preservation policies and means, as well as the environmental conditions in stack rooms (i.e. temperature, relative humidity and light). The related literature is reviewed hereunder with regard to public libraries in South Africa, preservation and climate change, as well as depository buildings and their surroundings.

## **4 PUBLIC LIBRARIES IN SOUTH AFRICA**

In comparison with most other African countries south of the Sahara, South Africa has a long public library history (McCook 2004:268; Mostert 1999). Public libraries in South Africa have, however, always been affected by politics (Mostert 1999; Lor, Van Helden & Bothma 2005:268). The public library is regarded as a social phenomenon and it needs to reflect this (Friis 1962:7; Stilwell 1995:12). Friis (1962:13) argues that “the

library provides [a] means to an end and invites people, pleads with them, entices them to make use of those means”.

In South Africa, as in many other African countries, public libraries face numerous problems, including a lack of funding, yet there is increased handling of materials (Ngulube & Magazi 2006:113). Leach (2006:123) emphasises that “public libraries both in South Africa and internationally are under financial pressure owing, in large part, to a decline in public (or government) funding”. The provision of local public libraries is supposedly the primary responsibility of local municipalities, according to the *Community Library and Information Services Bill* (2010). The bill, which is in its sixth draft, has not yet been passed, which is a significant factor in the current funding problem. According to Stilwell (2011:9), the bill addresses the Schedule 5 problem of the 1994 constitution which puts provinces in charge of legislature related to local authorities making provision for public libraries. As far back as 1988, when Zaaïman (1988:10) conducted an investigation entitled ‘The use of libraries for the development of South Africa’, he pointed out that many high-level government officials doubted whether public libraries could contribute to development.

Good intentions and general philosophies are no longer an acceptable basis for the allocation of funds when the need to combat poverty, starvation, unemployment and a lack of housing and schools compete with libraries for government support. (Zaaïman 1988:11)

The findings of a 1998 survey of public libraries, conducted by Leach (2006:127) showed that inadequate funding had a significant negative impact on important aspects of public library provision, and was the most frequently mentioned problem in survey responses.

According to the literature reviewed here, national libraries are the main institutions responsible for legal deposit in most countries, but other types of libraries and institutions are also used as depositories, for example, university, parliamentary, law and regional libraries, as well as the libraries of government ministries and archives (Jasion 1991:12; Larivière 2000:27). In South Africa, however, the national library is the main depository and the other depositories are public libraries which have the dual responsibility of being public libraries as well as depositories. Despite the importance of this dual responsibility, national legislation states that all documentary heritage should be collected by depositories/public libraries – despite the fact that they struggle with funding and face issues of dwindling resources.

Though it is known that documentary heritage needs to be sustained for the future, librarians and archivists need to engage in the process of adapting to climate change through energy reduction (Cassar 2011:6). This can be done by applying green building principles and, as far as possible, choosing natural (sustainable) buildings with a neutral ecological footprint.

## 5 PRESERVATION AND CLIMATE CHANGE

A proper preservation environment for different cultural materials such as paper, photographs, audio-visual materials and electronic publications is important, and requires a high level of protection against factors such as air pollution, humidity, sunlight, insects, animals, fire, flooding, theft, vandalism, and improper storage and handling. Also, over the past decade there has been a rise in temperatures which may be linked to global warming (United Nations Conference of Parties 17 [COP17] 2011). Climate change refers to any significant change in <the measures of?> climate which lasts for an extended period of time. In other words, climate change includes major changes in temperature, rainfall or wind patterns, amongst others, that occur over several decades or longer (United States Environmental Protection Agency 2012). The South African Weather Service (2011) states that it is natural for climate to change or vary from one decade to another, but human industry and development have led to changes over and above natural variations. Henry (2008:1) and COP17 (2011) emphasise that among the projected climate trends are

- the virtual certainty of an increase in average temperatures and high temperature excursions;
- a likely increase in the frequency of extraordinary rainfall events; and
- the likely certainty of rising sea levels and coastal flooding.

The current climate change and effects of global warming can affect buildings and the materials stored in those buildings, if they are not taken care of properly. South Africa's Environmental Affairs Department (2010) states that temperature trends indicate a net drying on the western two-thirds of the subcontinent, a significant increase in rainfall in the East coast regions, shorter rainfall seasons in the Western Cape, an increase in temperatures across the country, as well as greater risk of floods, droughts and more frequent temperature inversions in addition to exacerbated air pollution. Thus, climate change and global warming make the preservation of materials even more important, because these factors also affect the building in which materials are stored.

A study by Nsibirwa (2007:98) found that a particular local depository building was custom-built in the mid-70s, when many institutions had just begun to understand that preservation was not only about conservation. The building had not been designed for preventative preservation. Despite this, Banks (2000:125) states that a number of strategies can be employed to reduce the effects of outdoor temperature on internal temperature and humidity, including

- using a mass of older buildings that envelope the depository/archive to provide a measure of thermal inertia, in approximate inverse ratio to the number of windows in a building (fenestration);
- creating a double wall structure around the building;
- storing collections in internal spaces, with staff and other functions positioned around the perimeter of the building;
- storing materials underground, if ground water can be effectively controlled.

Sahoo (2007:110) emphasises that even the soil on which the building is constructed has an impact on environmental conditions inside the library. A great many considerations come into play in ensuring that a building is suitable for preservation. For stack rooms, these include the following: avoid having windows and piping in stack areas; avoid leading piping over stack rooms, do not position shelving against exterior walls (condensation); beware of insect infestation and mildew; carpeting, which can emit pollutants, can disguise infestations and retain water in a flood, and beware of dropped ceilings which hide leaks and make maintenance difficult (see Banks 2000:126).

With the current problems of global warming and climate change, preservationists have begun to think about employing green construction when building depositories and archival facilities. Due to climate change, collections stewards, architects and engineers (interdisciplinary collaboration) are faced with design challenges that were not even considered a few decades ago, namely to reduce greenhouse gas emissions and develop an adaptive response to climate trends and their implications (Henry 2008:3). Meeting these challenges will help to create an interior environment which benefits the longevity of collections. The situation does not lend itself to prescriptive solutions or the naïve application of scoring systems in order to find a solution (Henry 2008:3). Lull (2008:1), a consultant dealing with preservation (and special buildings in particular), disagrees with Henry (2008) and emphasises that most of the green construction movement's efforts to reduce energy use in buildings is simply a rediscovery of techniques used over 20 years ago. Some such techniques, like using daylight to save energy, are not suitable for preservation purposes, as the buildings attract more heat and the light damages materials: one example is the Miami University Art Museum, built in the mid-1970s (Lull 2008:4). Preservationists are currently weighing up the pros and cons of green construction and what is suitable for their own archival facilities, with the hope of reducing energy consumption and greenhouse gas emissions (see Table 1).

Different regions should use different green building approaches that take into account the particular region's climate, the availability of materials, and building methods. Kim (2008) emphasises that "as technology is developed and social demands increase, diverse cutting-edge sustainable approaches to improve the green elements of buildings are under examination". Not all approaches to green buildings are suitable for libraries and preservation purposes. Approaches that are beneficial to a library may also have

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risks associated with them <example?>. The following sustainable approaches are beneficial and do not pose any risks to the collections.

**Table 1: Green construction for archival facilities**

<b>Green application</b>	<b>Benefits for archives</b>
Utilise renewable energy resources (solar/wind/hydro/biomass energy)	Save on energy bill. Support sustainable energy supply, especially for increasing demand on electronic equipment.
Use renewable construction materials	Less direct benefit for archives, but helpful in reducing solid waste disposal fees.
Plant local, drought- and pest-resistant plants when landscaping	Reduce water consumption and toxic insect control material. Can help reduce heat gain by mitigating urban heat island effects.

Source: Kim 2007:1

A German archive which is being built in phases, the Berlin Federal Archive (Bundesarchiv) in Berlin-Lichterfelde, has specific ecological requirements (low energy building), relies on ecological power generation and is a sustainable construction, according to Barteleit (2007:8), who highlights the importance of climatic conditions for stored archives:

Following the concept of passive climatisation, the new repository will reach optimal climatic storage conditions with temperatures between 18 and 21°C and a relative humidity of 45 to 55% as a result of architectural measures. However, a small air-conditioning unit is also planned in order to manage extraordinary variations in temperature.

The first phase of construction was completed in April 2009, the second phase is underway, and a third phase is planned for completion by 2018 (Bundesarchiv 2012).

## 6 RESEARCH METHODOLOGY

The present study was conducted using a survey. The study population consisted of 14 professional library staff (principal librarians and librarians) working in the OPDs and legal deposit sections of the libraries, and the three heads (national librarian and library managers) of the libraries. An earlier study conducted by one of the researchers (Nsibirwa 2007:109) found that the non-professional library staff lacked knowledge of the preservation of materials, and they were therefore excluded from the current study. The 14 professional staff were surveyed using a self-administered questionnaire, while a semi-structured interview was used to gather data from the three library heads. The heads of OPDs were not interviewed, as the OPDs have not been in existence and

functional for a long time. Also, decisions about managerial issues pertaining to the OPDs are made by the legal deposit committee. Sampling for the questionnaire was not necessary because the population was small. Non-probability sampling in the form of purposive sampling was used to select a sample of the population to be interviewed, based on the researcher's knowledge of the population.

Mainly quantitative techniques were employed in this study. Statistical analysis using SPSS was used to organise and analyse data collected from the self-administered questionnaire. Conceptual content analysis was used to analyse the content from the open-ended questions of the questionnaire and the interview schedule. Descriptive statistics were used to summarise the data and to present a visual overview of tables and pie charts.

## **7 FINDINGS**

The questions in the questionnaire as well as the interview schedule focused on preservation policies, preservation means and environmental conditions in stack rooms. Of the 14 copies of the questionnaire distributed 11 were returned, yielding a response rate of 78.6 per cent. According to Babbie and Mouton (2003:261), '[o]verall response rate is a guide to the representativeness of the sample respondents. If a high response rate is achieved, there is less chance of significant response bias than in a low rate.'

As a rule of thumb, the results of a study can only be generalised if the rate of non-response is below 30 per cent (Schutt 2006:142). However, Babbie and Mouton (2003:261) state that from a review of survey literature, a response rate of 50 per cent is adequate for analysis and reporting purposes, 60 per cent is good and 70 per cent is very good. The interviews yielded a response rate of 66.7 per cent. The questionnaire results are presented next and the interview results follow.

### **7.1 PRESERVATION POLICIES**

Table 2 shows that 10 (90.9%) respondents mentioned that their libraries did not have a policy to improve preservation conditions, while one (9.1%) respondent said they had such a policy. Nine (81.8%) respondents said they did not have a policy for developing conservation facilities, and only two (18.2%) said they had such a policy. Four respondents (36.4%) had a policy for recruiting and training staff, six (54.5%) did not have a policy and one (9.1%) was unsure whether their library had such a policy. Yet, preservation policies provide frameworks for the present as well as the future, and ensure that access to information is guaranteed.



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**Table 2: Existence of library policies (N=11)**

Policy	No		Yes		Unsure		Non-response		Total	
	%	count	%	count	%	count	%	count	%	Count
To improve preservation conditions	90.9	10	9.1	1	0	0	0	0	100	11
To develop conservation facilities	81.8	9	18.2	2	0	0	0	0	100	11
To train and recruit staff	54.5	6	36.4	4	9.1	1	0	0	100	11

## 7.2 TEMPERATURE AND RELATIVE HUMIDITY

Respondents were asked whether their libraries had heating, ventilation and air-conditioning (HVAC) in their stack rooms. Four (36.4%) of the 11 respondents confirmed they had HVAC in the stack rooms, while seven (63.6%) did not. This indicates that most did not have any control over the stack environmental climate, and one can therefore infer that materials are subject to the climatic conditions prevailing in the geographical area.

The respondents who confirmed that their stack rooms had HVAC were asked how old the system was, whether it was on all the time, how often the system was serviced, and whether it provided constant climate control throughout the year.

The question about the age of the HVAC applied to only four (36.4%) respondents. The results are shown in Table 3.

**Table 3: Age of heating, ventilation and air conditioning system (N=11)**

Age of HVAC	Count	%
Less than 1 year	0	0
1 to 3 years	1	9.1
4 to 10 years	0	0
More than 10 years	2	18.2
Unsure	1	9.1
N/A	7	63.6
Total	11	100

## ABOUT THE AUTHORS

The following questions solicited information on whether the HVAC was kept on all the time and provided a constant controlled temperature throughout the year. Only three (27.3%) respondents stated that it was on all the time, one (9.1%) said the HVAC was not kept on consistently. These questions were not applicable to the seven (63.3%) respondents who did not have HVACs in their stack rooms.

An open-ended question was used to establish how often the HVAC system was serviced. Regular servicing and maintenance are important, because as the systems age their ducts fill with particles and they emit dust and gaseous components that create poor air quality in the stack rooms. One (9.1%) respondent stated that it was only serviced when it did not work, implying that the HVAC was not serviced regularly but was only repaired when it malfunctioned. Three (27.3%) respondents stated that it was serviced every six months. Again, the question was not applicable to the seven (63.6%) who did not have HVACs in their stack rooms.

The respondents who did not have HVACs in their stack rooms were then asked how they achieved optimum levels of heating, ventilation and cooling in their stack rooms. Such control is especially important, given the effects of global warming (harsh conditions, fluctuating temperatures) on the depository building and stack rooms. This question was not applicable to the four (36.4%) respondents who had HVACs. The results are shown in Table 4.

**Table 4: Achievement of heating, ventilation and cooling (N=11)**

Achievement of heating, ventilation and cooling	Count	%
Not achieved	5	45.4
N/A	4	36.4
No response	1	9.1
Using rock and water system	1	9.1
Total	11	100

Three respondents (27.3%) did not have an HVAC system, but achieved cooling by opening windows, a further three (27.3%) respondents specified that cooling was not achieved. Respondents in the former group were not aware that they were doing more harm than good by exposing materials to outside climatic conditions, as well as to dust and gaseous components in the air. One (9.1%) respondent stated that cooling was achieved using a rock and water system (see Table 5).

**Table 5: Achievement of cooling conditions in stack rooms (N=11)**

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Achievement of cooling	Count	%
N/A	4	36.4
Not achieved	3	27.3
Open windows	3	27.3
Using rock and water system	1	9.1
<b>Total</b>	<b>11</b>	<b>100</b>

The respondents who had an HVAC or another environmental control system were asked to specify whether their systems for the stack rooms were separate from that of the offices and reading room. If the HVAC system was not separate, the temperature would be set to suit people's needs rather than that of the legal deposit materials. Of the four (36.4%) respondents, only one (9.1%) respondent's environmental control system was separate from that of the offices, one (9.1%) respondent said it was not separate, and another two (18.2%) were not sure whether the system was separate. This question was not applicable to seven (63.6%) respondents.

An open-ended question was asked to establish the average temperature of the building, stack rooms and reading rooms (see Table 6). Six (54.5%) of the respondents specified that the average temperature in the building was 22°C, five (45.5%) were not sure. Seven (63.6%) were not sure what the temperature in the stack rooms was, thus indicating that that temperature is not monitored at all.

**Table 6: Average temperature of building, stack rooms and reading rooms (N=11)**

Temperature	<20	20<25	25<	Unsure	Total
	%	%	%	%	%
Building	0	54.5	0	45.5	100
Stack room	27.3	0	9.1	63.6	100
Reading room	0	54.5	0	45.5	100

Questions were asked to solicit information about the monitoring of temperature and the relative humidity level of the stack rooms. All 11 (100%) respondents stated that the monitoring of temperature and relative humidity level in the stack rooms was not done.

## 7.4 LIGHT

Respondents were asked for how many hours materials were exposed to artificial light. The results show that four respondents (36.4%) were unsure, three (27.3%) stated eight hours, another three specified ten hours (with varying conditions for different venues or stack rooms) and one (9.1%) stated 24 hours, due to the fact that emergency lights were left on. Further information was solicited to find out whether lights were turned off in the stack rooms when not in use. Seven respondents (63.6%) said the lights were

turned off, two (18.2%) stated they were not turned off and one (9.1%) was unsure. One respondent (9.1%) did not respond to the question. The respondents were asked for more information with regard to lighting – specifically, whether the lighting in the storage areas was controlled by sensors. Eight respondents (72.7%), specified it was not controlled by sensors, and only two (18.2%) said their stack room lights were controlled by sensors. One respondent (9.1%) was not sure.

## 7.5 INTERVIEW RESULTS

The interviews were intended to supplement the questionnaire by gathering in-depth information on preservation policies, budgets/alternate funding and disaster preparedness strategies. Three main questions were asked during the interviews, focusing on preservation policies, preservation means and disaster management strategies. The interviewees were asked whether their libraries had policies to improve preservation conditions, to develop conservation facilities, and train and recruit staff. Both respondents specified that they did not have the first two such policies, but one respondent stated they had a policy for training and recruiting qualified personnel.

The next question solicited information about whether the institutions had preservation policies – both respondents stated that they did not. They therefore did not respond to the two follow-up questions that sought information on the overall success of the institution's preservation policy/strategy in terms of achieving its preservation goals.

Information was sought about the financial resources the institutions have for preservation purposes. The institutions' overall annual budgets were requested. The results showed a vast difference due to the fact that the libraries fell under different local government authorities. One institution had an overall budget of approximately R22 400 000 per annum, while another shared a budget of R18 140 000 per annum with nine other libraries. One respondent was unsure what percentage of the budget was allocated to the legal deposit function of the library. The other did not respond to the question regarding budgetary allocation to the legal deposit function. However, both respondents indicated that the allocation was not sufficient. A follow-up question was posed to clarify why the allocation was not sufficient. One respondent indicated: "It only covers staff salaries."

The function of the operation of the legal deposit libraries is a national function given to the local authorities without the funds from the national budget to carry it, in other words, it is an unfunded mandate by the national government to the local authorities. This forces the local authorities to absorb the costs of this function into its responsibilities because no one wants to lose the privilege of having a place of legal deposit in its area of responsibility. (Second respondent)

To find out more about the institutions' financial situation, respondents were asked about any alternative funding they received. Both indicated they received alternative

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funding in the form of a conditional grant.<sup>1</sup> However, one respondent stated that the grant was <a result of a policy> from the National Library of South Africa, provided by the national government. The second respondent stated that it was provided by the provincial government. The first respondent reported that the grant was used to buy books, and for information communication technologies and capacity building, while in 2012 a portion would go towards salaries. The second respondent specified that the grant had been of help for the past three years, adding that it was used to appoint professional and non-professional staff to carry out any library functions, including the appointment of legal deposit staff. The first respondent noted that the institution had also received a grant from the Carnegie Corporation.

Next, the heads of legal deposit libraries were asked whether their institutions were prepared in the event of a disaster. It is essential to take preventive measures to avoid unnecessary human-made disasters, and to be prepared for natural disasters. Information about recovery plans were also solicited. One respondent stated they had a disaster plan, while another indicated that they did not have such a plan, therefore the section was not applicable to him/her. The respondent who specified they did have a disaster plan indicated that it targeted the safety of people as well as the building, but only that. It was a municipal disaster plan that did not cover library issues – it mainly listed the contact details of individuals to contact in the event of an emergency. The plan did not distinguish between natural and human-made disasters. The plan had never been tested and the respondent did not respond to the question about when it had last been reviewed. Although the second respondent stated they did not have a disaster plan, the respondent indicated that they had alarm systems and book security systems in place to prevent theft and vandalism (i.e. human causes of disasters).

## 8 DISCUSSION OF RESULTS

Environmental conditions have a significant impact on the life of legal deposit material. Appropriate buildings and suitable conditions include factors such as temperature, relative humidity, light and pest control, all of which require managing to prolong the life of the materials. Although it is often said that the securing and preservation of documents begin with the buildings in which they are stored, there is also a need to consider the geographical area and the external environment of the building. There is a greater need for preservation than ever before, since predictions are that temperatures will rise while rainfall and flooding will increase due to climate change (COP17 2011). The effects of climate change and global warming will increasingly affect buildings as well as the materials stored in those buildings, which makes preservation a vital concern.

To determine the correct basis for setting environmental specifications, and for finding solutions is that all parties to the specification process should have a basic understanding of how collections deteriorate (Reilly 2008:3). Therefore, whether a building is purpose built or adapted, efforts need to be made to protect it against the elements. As discussed earlier, the development of 'green' building technology and other more sustainable approaches is aimed at offsetting the effects of climate change and helping to preserve archival documents. One can anticipate a shift from looking at the ideal environmental conditions, to looking at what poses the greatest threat to the collections – especially as regards climate change and global warming.

As noted, the current complications of global warming and climate change have made preservationists think about applying green solutions to depositories and archival facilities. Some green construction applications for sustainable temperature control include placing berms (raised barriers separating two areas) against walls, and planting trees around buildings. However, these bring different risks to the collections, for example, berm can cause water leakage and thus increase humidity, while trees may attract insects and animals.

Notably, Germany and Japan have taken architectural measures that will result in archives with optimal climatic storage conditions. Apart from using green construction, more information needs to be collected about the variables relating to the local climate and building structures (AMG 2009:37). The International Standards Organisation (ISO) (2003:2), in the ISO 11799, requires depositories and archives to construct or renovate buildings to protect against external threats. Nearly all the depositories in South Africa are housed in buildings adapted for preservation, except for the National Library; hence efforts need to be made in defending buildings against the elements. There are various ways and means of reducing the effects of outdoor temperature on the internal temperature and humidity, such as using thermal inertia, a double-wall structure, underground storage and internal spaces for stack rooms. The Library and Archives Canada building, for example, uses the land mass around it to create thermal inertia (Kim 2008).

Depositories should plan to upgrade or replace their HVAC systems, as equipment usually becomes out-of-date after ten or so years. Of the few respondents who had HVACs, two stated that theirs were more than ten years old. In this regard, Ngulube's study (2003:291) revealed that most archival institutions in South Africa had HVAC systems. Those depositories with HVACs kept them on to provide constant climate control throughout the year.

The constant use and infrequent servicing of HVACs can lead to mould growth and dust, as well as the production of aggressive gases from the ducts, leading to poor indoor air quality, especially if the equipment is old (Green Building Council of South Africa 2008:123; Pfeiffer 2008:4). In the current study, two depositories serviced their HVAC system regularly and at one depository the HVAC was repaired when it broke down.

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This implies that the HVACs were not working optimally and could be doing more harm than good.

The 24-hour use of HVACs for preservation increases energy consumption and therefore adds to the global warming which manifests as harsh and fluctuating conditions. One depository revealed that they used a sustainable resource, the rock and water system (a central heating/cooling system that uses the ground to heat/cool a building). This is a good way of reducing operational costs, but for depositories and archives a decentralised system would be more suited to the purposes of preservation.

Another way to reduce energy costs is to apply green or sustainable construction to depositories by using renewable energy sources such as solar energy to run the HVACs. This approach is important, because since 2008 South Africa has been faced with loadshedding, and depositories experienced power shortages. In addition, South Africa is experiencing rising electricity costs due to the need to build additional power stations to meet increasing demand. As a result, the national power service provider, Eskom, is constantly asking consumers to reduce their power consumption. In the archival world the use of sustainable energy sources is a possible solution.

The study revealed that staff of the 63.3 per cent of the depositories which did not have environmental control systems thought they achieved cooling and ventilation by opening the windows of the stack rooms. This response shows that they lack knowledge of preservation, by taking actions that do more harm than good. Opening windows actually exposes materials to external climatic conditions, sunlight, dust, gaseous components and pests. In addition, collections naturally emit volatiles which can be considered a form of air pollution. These emissions rise with high temperatures, and without HVACs or with ill-suited air purification systems they pollute the environment.

In addition to having suitable tools or using the various methods of green construction to control storage conditions, monitoring the storage environment is very important. Ngulube (2003:292) emphasises that “monitoring is the most dependable tool for decision-making and it holds the most promise for providing conditions favourable to the long-term survival of records and archives”. In the current study none of the legal depositories monitored the temperature and relative humidity. This finding is not surprising, given the statement by the Image Permanence Institute (IPI) (2011) that libraries and archives have long been without adequate tools and procedures for reviewing and managing collection storage. The IPI has developed advanced tools for environmental monitoring and data analysis, including both hardware and software.

## 9 CONCLUSION

Preservation activities were generally undeveloped in most depositories. Legal deposit materials are not being properly preserved due to a lack of policies related to preservation, failure to develop conservation facilities, and neglect in training and

recruiting staff. Legal depositories in South Africa have mission statements that support the vision and goals of a public library, but do not articulate any content with regard to the preservation of cultural heritage. In addition, preservation activities are undeveloped due to a lack of monitoring and control of the stack room environment – this, in addition to organisational structures being weak.

Most preservation activities in the study were generally undeveloped due to a lack of funds, equipment, knowledge and skills. The budgets for legal depositories varied greatly and did not cover preservation-related activities, only legal deposit staff salaries. Legal depositories received alternative funding in the form of conditional grants that did not cover preservation costs or access to legal deposit. Maintaining a proper preservation environment is essential, especially because of the effects of climate change and global warming. The different legal deposit materials require a high level of protection against various environmental factors including air pollution, humidity, sunlight, insects, animals, fire, flooding, improper storage and handling. As a result, materials in the depositories are affected by climate change and the effects of global warming, and are in danger of deteriorating at an alarming rate.

## 10 RECOMMENDATIONS

A properly controlled environment will prolong the life of the materials by reducing the rate of deterioration. This study recommends the following:

Depositories require equipment to control and monitor environmental conditions. Such equipment includes HVACs, light motion sensors, ultraviolet (UV) filters, thermometers, humidifiers/dehumidifiers and hygrothermographs;

An in-depth preservation assessment survey needs to be carried out to identify the strengths and weaknesses of each depository. Such a survey would establish what preservation standards exist, so that weaknesses can be addressed;

Various aspects of green building that are suitable for archives may also be considered:

Renewable energy resources – the use of solar panels to help cut electricity costs.

Renewable construction material such as stone can keep buildings cool.

There is a need for increased funding and budgeting for preservation and access of legal deposit materials. Funding is essential to the success of preservation activities. Legislation needs to back funding, as legal deposit is not seen as a priority – especially in the current economic situation. The depositories' budgets should clearly define how much money is set aside for preservation activities, and should ring-fence this amount of expenditure from staff salaries;

The review of legislation currently in the pipeline is a positive step and will remove OPDs from resorting under the *Public Entities Act*, 93 of 1992, to serve in terms of the



*Public Finance Management Act*, 1 of 1999, which will hopefully enable OPDs to obtain financial support from national government. Increased funding would help support the growth and development of OPDs. An increase in funding for legal depositories would also help enhance preservation activities.

Finally, the study found that legal depositories have insufficient budgets, which affects preservation-related activities. A study to assess the various ways and means of funding legal depositories may bring to light underlying issues, and may highlight a way forward for obtaining funding and garnering support to preserve our cultural heritage.

## NOTE

- 1 With conditional grants the government specifies the purpose, conditions (or both) under which the recipient should use the grants

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