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The Evolution of Conservation and Disaster Planning in the Face of Disaster: Responses to the Florence flood of 1966 and to the 2005 flood in New Orleans

INTRODUCTION

A systematic approach to the conservation of library and archival materials is a relatively new phenomenon. Its genesis lay in the United States with the formation of The Council of Library Resources, Inc (CLR) in 1956.¹ While the organization became active in funding projects related to library conservation, it was not until the Florence flood of 1966 that awareness and activity in this area increased to a significant degree.² As well as instigating innovation in treatment protocols, the flood highlighted the need of a response to the large-scale salvaging of library and archival materials due to natural disasters such as floods and fires.³ The Florence flood also served as an impetus in the development of preservation programs, in which disaster-planning is a central component.⁴ Close to forty years later, when Hurricane Katrina caused the catastrophic flooding of New Orleans, measures for the large-scale salvaging of materials and in disaster-planning had evolved by a considerable extent. They proved, however, not to be adequate, demonstrating the need for refinements in disaster planning and responses.

1 Sherelyn Ogden, *A Study on the Impact of the Florence Flood on the Development of Library Conservation in the United States* (Chicago IL: University of Chicago, 1978), 17.

2 Ibid, 29.

3 Scott W. Devine, "The Florence Flood of 1966: A Report on the Current State of Preservation at the Libraries and Archives of Florence," *The Paper Conservator* 29 (2005): 15.

4 Ibid.

THE FLORENCE FLOOD OF 1966

When the Arno river overflowed on November 4, 1966, its water carried with it momentum for growth in the field of conservation.⁵ Over two millions books and documents and countless works of art were affected by floodwater that contained debris, mud, and oil from ruptured oil tanks.⁶ Institutions most affected were Florence's two main libraries and numerous smaller ones, which together have been said to contain "the most significant works of our scientific and literary heritage", and deemed to be of crucial importance to the history of mankind.⁷ Conservators who gathered to salvage these works were completely unprepared to deal with the immensity of the project.⁸ There were few universally-established guidelines to follow, and institutions that had likewise suffered disasters had not shared their experiences and restoration procedures through publishing in international journals. The lack of satisfactory methods for treating large numbers of damaged books and documents in an emergency situation lead to experimentation and innovation in treatment protocols, in which stabilization was the initial goal.⁹

To this end the first priority lay in drying damaged objects before mold set in. Many different drying materials and methods were used. While most books could not be freeze dried because Florence had a lack of refrigeration facilities, some were sent to the mountains above the snow line to be frozen and stored in sheds.¹⁰ Sawdust and talc were sprinkled on covers and pages to absorb moisture

5 Office of Public Affairs, "The Day Modern Art Conservation Was Born," 03 October 2006, <http://www.nyu.edu/public-affairs/releases/detail/1230> (accessed October 2006).

6 Carolyn Horton, "Saving the Libraries of Florence," *Wilson Library Review* 41 (1967): 1036; Devine, 15.

7 Ogden, 7-9.

8 Ibid, 72.

9 Devine, 20.

10 Ogden, 11.

after excess mud had been sponged off, although talc was found to obscure images and to be insufficiently effective as an absorbent. Books were stood upright with their leaves fanned out, or were interleaved with anything from mimeograph and blotting paper to cleaning tissues.¹¹ With the recognition that heat and moisture are ideal conditions for mold growth, an attempt was made to put the books out of harm's way by storing them in unheated well-ventilated rooms, in industrial drying establishments used to dry tobacco, grain, bricks, glue, and ceramics, and in specially constructed drying sheds.¹² All could not be dried quickly enough, however, and within days of the flood mold began to make its appearance on the outside of leather bindings and on the tops and edges of textblocks as well as on endpapers and flyleaves.¹³

Different methods of fumigation were experimented with in attempts to kill the mold.¹⁴ The first was formaldehyde gas, a fungicidal which proved too irritating to the eyes and upper respiratory tract to continue using. The next consisted of treatment with ethylene oxide gas, mixed with freon or carbon dioxide, while the books were in a vacuum chamber. Books were also treated with thymol gas, a phenol which is crystalline at room temperature and which sublimates to a vapour when heated above 120° Fahrenheit, and towards the end of the clean-up with orthophenyl phenol, a solid at room temperature and when mixed with an alcohol used as a spray application.¹⁵

Remarkably, these fumigation and drying methods ensured the survival of most of the texts affected by the flood.¹⁶ Leather bindings didn't fare as well as leather is very susceptible to mold and subsequent degradation. Many of the books needed to be rebound and restored, and were given a priority ranking for treatment based

11 Horton, 1036.

12 Ogden, 11.

13 Horton, 1039.

14 Ibid, 1043.

15 Solinet Preservation, "Leaflets," <http://www.bodley.ox.ac.uk/dept/preservation/training/mould/references/spore.htm>.

16 Horton, 1043.

on age, research value, and subject content.¹⁷ Book and paper conservators from all parts of the world shared their ideas and techniques.¹⁸ New treatment protocols were created based on the need for effective conservation methods when dealing with mass treatments. The first of these involved conservation binding structures, which focus on the preservation of the book by avoiding the use of adhesive and chemically unstable materials rather emphasizing durability or aesthetics.¹⁹ The use of Japanese tissue and rice starch paste to replace missing areas and guarding was another treatment, as was the use of an acrylic-based heat-set tissue, coated with a heat-sensitive adhesive, for mending tears and small losses.²⁰ A treatment philosophy of rare book conservation was better articulated, involving thoroughness of documentation and an understanding of the necessity to preserve as much as the original information as possible.²¹

PRESERVATION PROGRAMS AND PLANNED DISASTER RESPONSES

The potential loss of significant information and historical objects drew attention to the fact that conservation is central to libraries in terms of preservation and accessibility of knowledge.²² The desirability and usefulness of preservation programs became clear during the salvaging process, which served as the impetus in the development of such programs. A year after the flood, a Preservation Office was created at the Library of Congress in the United States.²³

17 Devine, 21.

18 Devine, 5.

19 Ogden, 13.

20 Jane Greenfield, *ABC of Bookbinding: A Unique Glossary with over 700 Illustrations for Collectors and Librarians* (Oak Knoll Press: New Castle, DE, 1998).

21 Devine, 22.

22 Ogden, 4.

23 Frazer G. Poole, "The Research Library and Book Conservation," *Bollettino dell'Istituto di Patologia del libro I-IV* (1970):102.

A preservation program addresses not only conservation treatment but issues such as collections storage and maintenance, environmental monitoring, pest management, research and training, and disaster response planning.²⁴ The latter is central to a well developed program.²⁵ By 1974 a comprehensive, practical guide was published addressing the issue, written by a conservator who had been present at the time of the flood. It deals with, among other things, the assessment of damage and planning for salvage, the freezing of books, the first procedures for salvage, the removal and packing of water-damaged materials, and cleaning and drying without freezing.²⁶

DISASTER PLANNING

By 1986 another guide had appeared, this time based on personal experiences in the salvaging of materials from the Dalhousie University Law Library fire of August 1985, and from the Roanoke Virginia flood of November 1985.²⁷ Significantly, along with updated disaster response information on the handling of damaged materials, cold storage alternatives, fumigation, mobile vacuum-freeze drying equipment, and a description of how the computer was used for the first time in reassembling large collections of materials, the guide deals with issues of disaster planning. One of these involves directives for the establishment of a disaster recovery team, acknowledging the importance of the delegation of authority and training of staff members in emergency situations. The book also includes a section called *Prepare Now for Your Disaster*, emphasizing the need of a prearranged disaster plan.²⁸ A model of a disaster plan in the form of a *Simple Disaster Recovery Checklist* is provided, listing what will be needed and what will need to be done in “packout, restoration, and

24 Devine, 18.

25 Devine, 22.

26 Peter Waters, *Procedures for Salvage of Water-Damaged Library Materials* (Washington: Library of Congress, 1975), v.

27 Eric G. Lundquist, *Salvage of Water Damaged Books, Documents, Micrographic and Magnetic Media* (San Francisco: Document Reprocessors of San Francisco, 1986), iv.

28 Ibid, 87.

relocation” phases.²⁹

With this guide the conservation of water-damaged library and archival materials and disaster planning had become interlinked. Mass salvaging had evolved to include prevention, preparedness, response, and recovery, as well as salvage operations.³⁰ The May 1997 issue of the WAAC (Western Association for Art Conservation) newsletter, with the printing of an updated *Salvage Operations for Water Damaged Archival Collections: A Second Glance* took this to a higher level. Different levels of flood emergencies to prepare against are classified into categories of minor, moderate, major, and major-catastrophic. Alongside each category are lists of appropriate responses, in terms of materials, utilities, and operations affected, and the staff mobilizations, resources, and facilities required. Included are very comprehensive and updated methods for the packing and recovery (conservation) of all sorts of media that can be found in archival collections, as well as methods for the rehabilitation of storage areas and collections, and a post-disaster review.

TESTING OF DISASTER PLANNING: THE FLOODING OF NEW ORLEANS

It was this guide that was posted on the Conservation OnLine website dedicated to emergency information and resources in the wake of the flooding caused by Hurricane Katrina in August of 2005.³¹ Its comprehensiveness would suggest that it would be an ideal tool with which to salvage materials from Louisiana's flooded libraries and archives. Similar to the Florence flood, which has been called “one of the most devastating disasters in modern history”, in regards to the damage of cultural property, the wreckage caused by Katrina can be said to be amongst the worst catastrophes in United States history because of the fact that the majority of New Orleans and surrounding areas remained

29 Ibid, 97.

30 Betty Walsh, “Salvage Operations for Water Damaged Archival Collections: A Second Glance,” *WAAC Newsletter* (19 May 1997), <http://palimpsest.stanford.edu/waac/html>.

31 Conservation OnLine, “Hurricane Katrina: Emergency Information and Resources,” <http://palimpsest.stanford.edu/bytopic/disasters/katrina.html>.

flooded for an extended period of time.³² A significant difference, however, was that the water in the Florence flood had subsided in the course of a day, while the water in New Orleans remained stagnant. Flooded areas were below sea level; it was levees that had kept the water at bay and they had failed in the hurricane.

This difference played a part in the ineffectiveness of disaster planning procedures, including those detailed in the major-catastrophic classification of the *Salvage Operations* guide. One of the first rules laid out as an emergency response is to remove materials from water-damaged areas in forty-eight hours to prevent mold growth.³³ Mold grows quickly: it appears in warm and humid environments, or in any kind of environment if the area is not well ventilated, within forty-eight hours. Affected materials must be reached within this timeframe to prevent either their destruction, damage leading to restoration costs, or situations where the cost of restoration makes replacing the object, if possible, a more viable option.

Although paper is not particularly favoured by mold, it will support its growth. One type of damage to paper is akin to that of dry rot fungus on wood.³⁴ All materials of a book - paper, cloth, leather, vellum, and parchment - can be affected by organic acids produced as mold is growing, stained by coloured species of the organism, and take on the musty odour associated with mold growth. Leather and vellum bindings, parchment, and coated paper - which will be irreversibly bonded if wet and left to dry - are materials highly susceptible to mold. Other kinds of damage involve parchment and vellum's inability to tolerate water, including water vapour present in the air in high humidity conditions. Their quick rescue is necessary because with saturation the untanned animal skin relaxes and returns to its original, irregular, pre-stretched state. Its ruin is most apparent when it subsequently dries: it becomes a

32 Devine, 16; Dan Swenson, "Flash Flood: Hurricane Katrina's Inundation of New Orleans, August 29, 2005", www.nola.com/katrina/graphics/flashflood.swf.

33 Waters, 1.

34 Norris, Debra Hess, Richard Pearce-Moses, and David Carmicheal, "Report of Hurricane Damage Assessment," September 21, 2005, http://www.archivists.org/news/katrina_DamageReport.pdf.

hard sheet similar in character to rawhide.³⁵

None of the literature on the salvage of water-damaged materials addresses the issue of what is to be done, and what conservation methods should be followed, when materials cannot be reached quickly or within the requisite forty-eight hours. This was the situation confronting libraries and archives in New Orleans. Many buildings were not readily accessible. If not submerged in water, access was controlled by law enforcement or military personnel.³⁶ Fifteen days after the hurricane, stability had not yet been established, and some areas had not yet been cleared even for members of the Red Cross.³⁷ In buildings that were accessible, hazardous conditions prevented an immediate response. It was unsafe to breathe in many structures due to the proliferation of molds and bacteria and it was recommended, when staff and volunteers did reach wet and damaged materials, that they wear masks and gloves and get Hepatitis A and B, and cholera shots.³⁸

In many cases, more than four weeks after the storm, people were still being prevented from accessing their collections.³⁹ When they did, often the news was not good. A member of the New York ZAKA Rescue and Recovery Organization, who, almost three weeks after the hurricane, waded through waist deep water to rescue six Torah scrolls from a synagogue, found that only two of them were restorable, with the remaining being blackened by toxic water and severely damaged.⁴⁰ “How long can the many important documents, photographs, and sound recordings documenting our nation’s history and culture sit alone, unairconditioned, possibly wet, before they rot beyond any hope for recovery?”, asked the immediate past president of the Society of Southwest

35 Etherington and Roberts, “Bookbinding and the Conservation of Books: A Dictionary of Descriptive Terminology,” <http://palimpsest.stanford.edu/don/dt/dt2234.html>.

36 Ibid, dt2487.html

37 *Conservation DistList*, Sept 11, 2005, <http://palimpsest.stanford.edu/byform/mailling-lists/cdl>.

38 Ibid.

39 Norris et al.

40 *Conservation DistList*, Sept 16, 2005.

Archivists, in a letter to the editors of major newspapers.⁴¹

The situation was made worse by inadequate governmental preparation for and response to the flooding, an event whose severity had been predicted by weather forecasts and whose occurrence had been forewarned for years.⁴² A lack of organization, coordination, and situational awareness, inadequate planning, and the failure of communication systems between different levels of government prevented the necessary clean-up from occurring more rapidly.⁴³

Yet another factor that hindered responses was an absence of personnel to carry out salvage work. As stipulated in the *Salvage Operations* guide, duties should be delegated amongst staff ahead of time in the event of an emergency and staff should be trained to deal with emergency situations. This directive, however, assumes that staff will be present to deal with the situation. In the case of the New Orleans flood, many staff were displaced or too preoccupied with their own needs to respond to the situation.⁴⁴ In other cases, library staff who were making recovery efforts were pulled from their work and assigned jobs of a higher priority, such as unloading and distributing food at various locations.⁴⁵ Or, as was the case with the New Orleans Public Library which had not been severely affected by the flood, many of its staff were laid off.⁴⁶ Public servants cannot be paid when there is no money coming in through taxes to support them.

41 Shelly Henley Kelly, "Salon.com article on SSA Letter on damage to archives," Sept 10, 2005, <http://palimpsest.stanford.edu/byform/mailling-lists/ncen/2005/09/msg00011.html>.

42 United States House of Representatives, "A Failure of Initiative: Final Report to the Select Bipartisan Committee to Investigate the Preparation For and Response to Hurricane Katrina," p. ix and xi, <http://www.gpoaccess.gov/katrinareport/fullreport.pdf>.

43 United States Government, "The Federal Response to Hurricane Katrina: Lessons Learned," February 2006, p.50, <http://www.whitehouse.gov/reports/katrina-lessons-learned.pdf>.

44 Norris et al.

45 "Library Damage Reports, 2006," <http://www.ala.org/ala/cro/katrina/katrinadamage.htm>.

46 News, "ALA leaders tour Gulf Coast Libraries; find spirit of rebuilding, much work still to be done," April 05, 2006, <http://www.ala.org/Template.cfm>.

When the author of the guide in the 1997 WAAC newsletter wrote that “in the chaos of a real disaster, events will unfold in an unpredictable way”, she was not mistaken. Devastation to New Orleans was so complete that traditional response plans were not equal to the event.⁴⁷ Many of the New Orleans public libraries were almost completely decimated, with every one of the thirteen buildings damaged in one way or another.⁴⁸ Out of the one hundred and twenty-six schools, eighty were completely destroyed, thirty-eight were damaged but repairable, and eight remained in relatively good shape. University libraries were hard hit. The first floor of the Southern University Library was left flooded for three weeks, and collections including African-American History, reference, and all books from A-G were lost. Similarly the basement of Tulane University was flooded, entailing the loss of almost its entire collection of government documents.

Widely distributed disaster recovery publications, distributed in areas affected by the flooding, were found to be irrelevant.⁴⁹ What did work were improvised actions, at institutions large and small, as conditions permitted. At some places workers were found laying out documents to dry or boxing them for eventual shipment to freezers. Some documents were successfully retrieved and kept frozen until the National Archives and Records Administration had time to inspect them.⁵⁰ Many organizations, such FEMA (Federal Emergency Management Agency), the Heritage Emergency National Task Force, the American Association for State and Local History, the Institute of Museum and Library Services, the National Park Service cultural resource teams, and the Society of American Archivists, offered help in terms of funding, information dissemination, and working with collections.⁵¹

47 Norris et al.

48 “Library Damage Reports”.

49 Norris et al.

50 “Highlights from the Conference Call on October 27, 2005,” Task Force Responds to Hurricanes, <http://www.heritagepreservation.org/programs/KatrinaTF.htm>.

51 “Highlights from the Conference Call on September 22, 2005”.

NEW STRATEGIES FOR DISASTER PLANNING

The loss of books, documents, and records, despite carefully drafted preventive measures, demonstrates the need for a new type of disaster plan that encompasses disasters of great magnitude. New strategies are further necessitated by what seems like an increasing occurrence of natural disasters of this type. Movement began stirring in this direction soon after the hurricane. By the third week of the flooding members of the Council of State Archivists (CoSA), the Society of American Archivists (SAA), and of Heritage Preservation toured the Gulf Coast area (in particular Mississippi, which had also been affected by the hurricane) to assess the impact of Katrina on record-keeping facilities.⁵² Significantly, not only did the group identify numerous actions that were immediately required to assist in the preservation of records, but a new type of disaster response plan was being formulated in the identification of short-term actions and long-term goals that needed to be undertaken to make a successful response to a disaster of the magnitude of that caused by Hurricane Katrina in the future.

The six short-term actions included: the institution of an 'emergency preparation day' in which archivists would focus on a few but critical aspects of emergency planning (updating, verifying, and disseminating essential information, conducting a disaster drill, and ensuring an adequate amount of emergency response supplies); a request to Congress for the allocation of block grants to assist with emergency planning and training in the preservation of archival records; amending FEMA legislation to include vital and historical records in its legislated responsibilities; developing placards detailing any recovery recommendations and providing contact information to be used by archives and other assessment authorities during the initial assessment of preservation sites; creating and updating a directory and/or database of vendors, and lastly, to review widely used disaster material to ensure that the information is relevant.

⁵² Norris et al.

Additionally, long-term goals were cited: archives must recognize and place greater emphasis on duplication and off-site storage as the only preservation tool adequate to a catastrophic disaster; the institution of a 'buddy system' where institutions in different states would store copies of vital records for each other; making practical, current disaster preparedness a top priority and prioritizing the would-be salvaging of materials based on which are the most essential; ensuring that state agencies know where both public and private records are held *before* a disaster strikes; the development of a brochure and website for the public that identifies and describes essential records that must be kept; the development of a response and recovery laboratory that could immediately go to any site of a disaster, and the development of rapid response contracts with private companies for the provision of freezer trucks within days of the disaster.

During the aftermath of the hurricane, it became apparent that treatment protocols were needed for the handling of contaminated collections, and for library and archival materials that were not able to be rescued within the forty-eight hour time frame.⁵³ Two archivists who had been working to save recovered documents anticipated that a new set of document preservation procedures would rise from the state of records that were moldy and mildewed.⁵⁴ Said one: "All the sources we know of on a national level (pertaining) to records recovery for conservation when things are wet say to do (certain things) within the first forty-eight hours," "Well, our records have been wet for forty-eight days or more, and there is no playbook for this." The decision this archivist made was to send the records to Louisiana State University to undergo a procedure that freezes documents at minus-20° Fahrenheit for seventy-two hours to kill the mold, after which the records were cleaned and then preserved on microfilm. Said the archivist "...when this is over, we will be able to talk at national meetings about what we did...it will create an entirely new chapter in restoration guides."

53 "Highlights from the Conference Call on September 22, 2005".

54 Ron Brocato, "Catholic News Service: Archivists Work to Save Parish Sacramental Records from Mold, Mildew," Catholic News Service, <http://palimpsest.stanford.edu/byform/mailling-lists/ncen/2005/10/msg00018.htm>.

Unlike the Florence flood where fumigants used to eradicate mold had been part of rescue measures, by the time of Katrina, forty years later, their use had lessened in frequency. Fungicides have become recognized as potentially dangerous chemicals - dangerous to the object as well as to the person who handles it through application, cleaning, and use. Ethylene oxide gas, as used in 1966, is dangerous and thymol gas poisonous.⁵⁵ Many fungicides contain chlorine, which can't be washed out of paper and whose breakdown products contain hydrochloric acid, which even in minute amounts is harmful to paper. Other substances such as iron, manganese, and copper, which are frequently found in paper, will react with chlorine to accelerate its breakdown. Lack of information on the interaction of other chemicals contained in fungicides with the materials into which it is introduced, and practicalities like the need for special equipment such as air-tight chambers, also make fungicide use problematic. Most importantly, a focus on preventive conservation and a philosophy of non-intervention where keeping the object as closely as possible in its original state has foremost priority in treatment decisions. This by extension discourages the introduction of foreign materials into the object's make-up. Present convention dictates that when a fungicide must be used, it has to be extractable, inert, safe to use, and it must not interfere with future treatment and analysis.⁵⁶

CONCLUSION

Would the outcome for the library and archival materials of New Orleans have been different had the aforementioned recommendations been in place before the disaster? Yes, but as history has repeatedly shown, it usually takes an unfortunate event to spur action to resolve the problem of what caused the event. The Florence flood was beneficial to conservation in the sense that it instigated interest and action in the mass conservation of water damaged materials, and

55 Etherington and Roberts, dt3129.html.

56 Conservation DistList, November 16, 1998.

launched an international implementation of preservation programs and disaster response plans. Lessons taught by Hurricane Katrina have the possibility of similarly moving things forward.

In the end, some of the responsibility for damages incurred by the floods lies with those in positions of responsibility at the governmental level. It was a known possibility that floodwaters would reach Florence, but few were given warning.⁵⁷ Blame has been placed on the Italian government as well for its long-term failure to give adequate funding and support for the National Library and other cultural institutions.⁵⁸ To this date, little has been done in terms of disaster planning in Italy.⁵⁹ In the case of the New Orleans flood, appropriate preparation was minimal and response was delayed. A later congressional investigation placed responsibility for the disaster on all three levels of government, leading to the suggestion that these administrations must work on improving their own disaster planning.

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57 Horton, 1036.

58 Devine, 18.

59 Ibid, 22.

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