

Disaster: Prevention, Preparedness and Action

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CONSERVATION OF LIBRARY AND ARCHIVAL materials embraces a broad spectrum of problems and concerns. As librarians try to grapple with poor paper, brittle collections, mutilation, insects, hostile environment, air pollution, and lack of funds, there is the ever-present danger that disaster may affect the collections they have been trying to build and maintain. Thus, disaster prevention and preparedness become part of conservation concern.

But the field of disaster prevention and action is not one in which much experimentation has happened. Nor is it one where difficult problems can be tested in practice often enough to devise sound methods of operation. In the aftermath of the Florence flood in 1966, in the frantic need to dry massive numbers of valuable items, several experimental drying methods were tried—most proved to be unsuccessful. But one conclusion seemed clear. An organized approach to disaster prevention and action would save more material than a haphazard one. In the intervening years there have been enough library disasters with enough losses to emphasize this point. This paper will reiterate what has been learned (to the extent that it seems appropriate to state anything). These points seem applicable to large or small collections, in libraries and archives, with a concern to be prepared for any eventuality.

A disaster is described by Webster as a “sudden calamitous event bringing great damage, loss, or destruction.” For libraries and archives the disaster can be devastating and irreversible to the fragile contents of their collections. The results of the Florence flood emphasize again the

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impermanence of the records of man's history and culture. Through articles by Waters, Tribolet, Horton, and Ogden,¹ the library world was made cognizant of the need to consider the possibility of disaster and to make plans as part of sound fiscal and collection management. In the past decade there have been numerous library disasters in the United States. The Corning Museum flood,² the Klein Library fire,³ the damage from Hurricane Agnes to scores of libraries,⁴ the flood at Case Western Reserve University,⁵ and the water damage at University of Corpus Christi⁶ and at Stanford University⁷ all emphasize that disasters do happen in massive ways.* But even small incidents can be devastating to smaller libraries or collections, or to unique items. The telephone log book at the Conservation Office at the Stanford University Library attests to the weekly calamities which befall collections. The awareness stimulated by well-publicized disasters has resulted in the development of prevention and preparedness plans and in better techniques for coping responsibly if the worst happens.

Prevention

Obviously, the great natural disasters cannot be prevented, but plans to reduce the effects if such disasters strike can be most effective. In addition, steps may be taken which can, in fact, eliminate or reduce the possibility of trouble. Because of the many calls for help, it appears that more prevention is in order for libraries and archives in the United States.

If libraries are situated in severe weather areas where hurricanes, tornadoes, or earthquakes are a possibility, understanding ways to reduce stress on buildings or the contents of buildings is important. Flood gates and sandbagging techniques can help in flood-prone areas. Libraries in hurricane or tornado areas should understand the dynamics of air pressure and high winds, those stresses on buildings, and what may be done to alleviate the stresses. Libraries in earthquake country should understand what happens to book ranges even in a mild quake, and consider bracing shelves, both top and bottom, so they will ride with the quake and not twist and buckle, dumping books to the floor. If equipment like flood doors is provided, management must make sure that they are available for use, and will be used, at the first sign of

*As evidence that even those who have disaster plans can suffer more than once, Stanford University Library on March 9, 1981, experienced another water pipe break, probably due to the recent small earthquakes producing stress on old plumbing. Eight thousand bound dissertations were wet; and at the time this was written, 5000 were air-drying, and 3000 were being dried by Lockheed in its vacuum chamber.

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trouble, no matter how inconvenient to staff. The Hurricane Agnes accounts offer graphic evidence of damage caused by hurricanes or great storms. Allen Veaner has written about earthquake damage after the earthquake which hit the University of Santa Barbara recently.⁸

Both national and local civil defense agencies offer a wealth of helpful ideas for protecting people and the contents of buildings. The American National Standards Institute and state and national fire protection agencies also have published prevention materials.⁹ Understanding the natural hazards of an area, anticipating problems, and maintaining buildings and grounds to withstand disaster may make a difference between total loss and damage. The hazards of some areas of the country are so great as to increase the possibility of disaster. Being realistically prepared will save collections if the worst happens.

Good building maintenance and surveys can be important ways to prevent problems.¹⁰ Proper cleaning of storm drains, sewer lines, and roof areas will prevent leaks. Steam and water lines should be checked regularly and have pressure alarms to indicate trouble. Drips or unusual condensation should be reported and dealt with before they become symptoms of a greater problem. Fire extinguishers must be checked regularly, and staff should be trained how to use them properly. Trash and flammable materials must be kept cleaned up and out of storage closets and basement areas where air circulation is poor.

Practical prevention can be achieved by storing more valuable materials on upper shelves or upper floors to avoid water damage. If materials must be stored temporarily in basements or lower levels, raising them on bricks and boards off the floor is a sensible precautionary measure. Fragile items such as phonograph discs may require elastic cords across the fronts of shelves to help prevent loss during earthquake, flood, or storms.

In older buildings, plumbing and wiring are often hazardous and should be inspected. Repairmen and contractors must understand the need for care when they work with pipes, welding equipment, and flammable materials. Cigarette use by staff and public must be carefully controlled. The great fire at the University of Texas Library was caused by a welder's torch, or at least by the contracting work going on in the building.¹¹ An intelligent assessment of potential problems can often prevent terrible results. The disaster prevention plan published by Hilda Bohem's committee for the University of California system and the one published by Cornell University are examples of the approach preventive hazard surveys can take.¹²

Fire prevention for libraries is an extremely important consideration. Fire not only destroys books, but introduces the possibility of massive volumes of water. In addition, heat and smoke may destroy books fire does not even reach, due to the high temperatures of modern fires fueled by plastics and man-made fibers. As always, prevention is the best alternative. But fire prevention in libraries introduces the old controversy of taking the risk versus the introduction of water or chemicals into the library environment. The National Fire Prevention Agency and most insurance underwriters have current statistics indicating the alarming incidence of arson in this country. Libraries are not exempt from this hazard. The San Diego Aerospace Museum and Library were totally destroyed by an arson fire in 1978.¹³ These sobering facts coupled with a number of recent disastrous library fires will point out the wisdom of careful prevention plans geared to a library's contents, needs and finances.¹⁴ Two of the best resources in this consideration are the ALA publication "Protecting the Library and Its Resources" and *Managing the Library Fire Risk* by John Morris.¹⁵ The latter publication contains a fine bibliography of resources for library fire prevention and information.

Keyes Metcalf in *Planning Academic and Research Library Buildings* says: "The removal or lessening of hazards will not stop fires altogether. The question of fire detection, alarm, and extinguishing must be considered."¹⁶ There are a variety of heat- or smoke-detection and alarm systems available to a library. The best ones are wired into a central fire alarm which is monitored by fire or facilities personnel. A self-contained alarm is effective only if there is someone around to hear it.

A number of automatic systems for putting out fires are available on the market and serve a variety of needs and purposes. No longer do all sprinkler heads go off when fire is detected. The failure rate of sprinkler heads is now one per million installed.¹⁷ Increasing sophistication in the industry can provide wet or dry pipe systems, pre-action systems, pre-action "Firecycle" systems, on-off, and gas systems. All of these options are fully explained in *Managing the Library Fire Risk*.¹⁸ It is important for librarians and archivists to realize that even tightly packed books will burn and will be heavily damaged by smoke and soot. If a fire starts and it must be put out by a fire department, as much as 11,000 gallons of water per minute can be poured into a library. The possibility of coping with such a disaster makes the prospect of dealing with several hundred books wet by a sprinkler head almost insignificant.

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Just as smoke-detection systems can alert authorities to the presence of fire, so can water-detection systems be tied into alarm mechanisms. These warning devices are simply constructed and may even have self-contained alarms if they cannot be wired into a central system. Basically, they detect the presence of an unusual amount of water before it can harm library materials. The alarms are marketed by several firms for use in libraries, archives and computer facilities.

Disaster prevention makes sound fiscal sense and helps alert staff to the need for vigilance and care. In the event of disaster, the steps taken to prevent trouble will at least help lessen the effects.

Preparedness

Preparedness by its very definition indicates thoughtful planning and decisions in advance about how emergencies will be handled. Assigning specific tasks, knowing sources of supplies and how to obtain them even on holidays, and having correct lists of phone numbers for police, fire services, and library personnel are an integral part of disaster strategy. Stanford University now has two emergency trailers fully equipped to handle the immediate needs in a fire or water disaster. They can be pulled on site at any time, and are summoned through a 24-hour emergency number. Examples of preparedness plans are numerous and offer a variety of approaches for specialized collections.¹⁹

Preplanning also includes establishing priorities for materials to be saved first and those to be abandoned if necessary. In establishing priorities, catalogs and shelf lists should be considered. Loss of records will add to the confusion of recovery if large numbers of materials are affected. In addition, preplanning includes decisions about whether particular collections are important because of intellectual value only or artifactual value also. Preserving the intellectual content of books is much less expensive than restoring the books.²⁰ The alternatives of microfilming, photocopying and replacement are often practical solutions for many collections. But understanding that, with care and expert advice, much material can be saved with relatively little cost is also important. The cost of one large-scale operation may be seen in the report from Stanford about its flood recovery. There, 50,000 moderately wet books were put back on the shelves at an average cost of \$4.90 per book.²¹ The people who will be involved in making decisions about salvage efforts should be aware of options open to them or whom to call to obtain advice.

A general plan for the proper handling of fire- or water-damaged materials is advisable, at least for the personnel assigned to a disaster team. Peter Waters's *Procedures for Salvage of Water-Damaged Materials* is an invaluable resource in this respect, as is Willman Spawn's "After the Water Comes."²² Also, as part of preparing wisely, one person should be designated to receive the disaster call, assess the situation, and initiate the proper procedures if necessary.

Finally, consideration should be given to the finances of a recovery operation if that becomes necessary. Librarians should be aware of the insurance on the building and its collections, and what restrictions there may be when disaster strikes. Often, insurance companies want to be notified immediately so that they may assess the situation as it is, before cleanup starts. If the library or archive has no insurance coverage, some thought needs to be given to the source from which financial help will come for disaster recovery. If there seems to be no resource, then responsible management should consider whether the risk of no insurance as opposed to the premiums is worth it. Some large libraries are self-insured up to a point in order to be able to afford insurance. Smaller libraries may find their insurance is not expensive, or may be covered by state or local insurance funds. More and more, insurance companies are insisting that libraries have fire protection systems or the library will not be insured, or the large body of the college or university will not be insured. In some counties or states tough new fire regulations will demand fire protection systems in new buildings or in remodeled ones. This may reduce insurance premiums and thus pay for the system in savings in a few years.²³

Action

When disaster strikes a library, fire or water are almost always involved. Knowing what action to take will save time, personnel, costs and contents.

In case of fire, firemen will take charge, and ideally will have been apprised of the library's priorities, concerns and needs. Whenever possible, ranges should be covered with salvage tarps to help lessen water damage to peripheral areas. Libraries should have on hand rolls of plastic sheet which can be thrown over ranges where heat is not a problem to protect books from unexpected water damage, often quite far from the actual fire or water problem. When premises are finally safe, fire experts will allow inspection. In a large fire this may not happen for twenty-four to forty-eight hours after the fire is extinguished. A graphic

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description of fire damage may be read in accounts of the Jewish Theological Seminary Library fire and of the University of Toronto Fleming Library fire.²⁴ These same accounts also give evidence of the water damage accompanying a fire. For the effects of major water damage, there are the accounts mentioned earlier in this article.

The first step after access is gained to a building is to assess the damage as precisely and completely as possible. Librarians or bibliographers familiar with the collections should assist in damage evaluation. Careful notes and photographs will aid in planning and in insurance settlements. Be sure to notify the insurance carrier, or the risk management office. The building must be well ventilated, with heat turned off and everything possible done to reduce temperature and humidity. (Preplanning will have identified sources for fans, pumps, dehumidifiers, wet-dry vacuums and other first-step cleanup supplies.) Exposed materials should be covered if roof areas are missing or if water is draining through the building. Plans to provide temporary protection against the weather should be put into effect. Protection of property should be arranged with security. Then, from a designated command post, all disaster action plans can be initiated.

Wet paper tears easily, swells rapidly, and distorts. Wet leather and vellum swell, split, and may turn black. Glues wash out, boards and covers disintegrate. Wet books continue to swell until stabilized, and if not removed from shelves within a few hours, will expand and wedge so tightly they are almost impossible to remove without damage. Stanford University Library reported problems with this during its flood cleanup.²⁵ After forty-eight hours there is danger of mold development. Temperatures and humidity must be kept under 70°F and 70 percent relative humidity to prevent mildew infestation.²⁶ Wet material must be removed from the area as soon as possible to facilitate drying.

Instructions for handling charred or wet material may be found in Cunha and Cunha and in Waters.²⁷ Charred paper must be supported on a flat card or paper to protect it. Burned film or photographs are usually irretrievable, but wet ones can often be saved. The Rochester Institute of Technology can give advice in this matter. Sources to check are the newsletter *PhotographiConservation*, the Corning Museum flood report, and *Preservation of Photographs*.²⁸ Wet film may be soaked in clean water and sent to a Kodak processing laboratory notified ahead of time. It is important not to let wet film dry in a roll or stack.

There are several ways to dry wet paper material. If the amount is relatively small, and if the exposure to water is slight to moderate, air-drying can be successful. A word of caution is needed. Coated paper,

often used in journals and art books, must not be allowed to dry without special attention or it will stick permanently; Cunha, Waters and Spawn describe this method.²⁹ Extreme care must be exercised to avoid mildew.

However, if space is limited or material must be held for decisions, it is best to freeze it at -15°F or colder. Freezing does not harm paper, and will retard chemical and biological deterioration. Then the appropriate drying technique may be employed. Basically, freezing provides time to investigate alternatives and costs.

Besides air-drying, there are several other techniques which have been tried with greater or lesser success. The Corning report mentions dielectric drying as one means which helped their recovery.³⁰ Thomas and Flink report in *Restaurator* on microwave drying tests.³¹ Fischer writes about dielectric and microwave experiments in drying books.³² Koesterer and Geating, Corning, McDonnell Douglas, and Stanford University all report on tests and experience with vacuum drying.³³ The vacuum-dry process involves subjecting frozen books to a high vacuum in the presence of heat. This causes the physical process known as sublimation, which means that ice crystals turn to vapor without first melting and rewetting the books. At the present time, the vacuum-dry technique seems to be the most efficient and economical way to dry large numbers (two thousand or more) of wet books. Lockheed, General Electric and McDonnell Douglas have all been involved in testing this process. The special restrictions for each process, as well as any instructions for preparation of the materials, are included in the articles mentioned.

There are currently at least two private firms who employ vacuum-dry techniques for drying books and records. One of these firms has the ability to move its equipment on site to avoid shipping damage to fragile material.

As disaster action continues with removal of damaged items, control of environment must be monitored by sling psychrometer or hygrothermograph. This monitoring indicates the temperature and humidity conditions over time, and whether other steps need to be taken. If mildew appears in the damage area, fumigation must be undertaken by a professional service. Thymol is one chemical which has been employed successfully. If mildew appears in large numbers of water-damaged books, fumigation in a vacuum chamber such as a Vacudyne is advisable.³⁴ Individual interleaving with thymol-impregnated sheets may be done with a moderate number of books if mold is suspected. The technique is clearly explained in Waters's booklet. Fischer also writes

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about sterilization and fumigation in *Preservation of Paper and Textiles of Historic and Artistic Value*.³⁵

After damaged material has been removed, the remaining collections must be watched carefully for several months to ensure that mold growth will not be a problem. Keeping temperatures cool (65°F) and humidity low (40 percent) will lessen the probability of infestation.

One of the major problems after water damage is with coated paper sticking badly. Corning found that wetting, refreezing and vacuum-drying helped.³⁶ Stanford tried several other techniques, and had some success with microwaves.³⁷ A more exotic but apparently successful approach is reported with the use of enzymes by Segal and Cooper,³⁸ and by Wendelbo and Fosse.³⁹ The use of enzymes is expensive and tricky, and should be handled only by trained paper conservators.

The organization and staff required for a major disaster cleanup is critical. A carefully planned program for the cleaning, repair, re-binding, restoration, and reshelving of materials is essential if a timely termination and outcome is to be expected. Seeking advice from conservators who have had experience with library disasters will aid with recovery. Librarians who have dealt with disaster are also a gold mine of information and advice. Disaster action, then, includes assessment, protection, decision and choice of alternatives, supervised execution, on-going evaluation and change, and finally, an analysis of the whole project with modifications needed for the disaster plan.

Current News

Due to the growing awareness of the need for readiness in case of disaster, and the publicity afforded disasters in the last ten years, there has been a great deal of activity in disaster planning, prevention and action. The Library of Congress published Waters's booklet, Corning Glass Museum and Library published its detailed report, Stanford University Library issued a flood report, and many libraries and archives have published their own detailed disaster plans.

The Special Libraries Association Chapter of Princeton-Trenton, New Jersey, sponsored a seminar in 1979 which addressed disaster prevention among other issues. Stanford University Library held a two-day conference about disaster prevention and coping in May 1980. In April 1980, the University of Oklahoma Library and School of Library Science organized a conservation colloquium which addressed disaster prevention and action as one critical aspect of conservation. The Western States Materials Conservation Project surveyed with grant

help the western regional states' needs in conservation to discover that help with disaster prevention and action was a high priority. As a result, several western states are providing workshops and training sessions for librarians and archivists.⁴⁰ In March 1981, Utah held such a workshop, supported by the Utah Museum Association, Conference of Intermountain Archivists, and the Special Libraries Section of the Utah State Library Association. The Bibliographical Center for Research, Inc., held a two-day workshop in May 1981 to train representatives from each of the seven mountain-plain states it serves in disaster prevention and recovery. They will then return to their states and hold a series of workshops to train others. There are several organizations offering disaster recovery assistance, including the regional Northeast Document Conservation Center. The Society of American Archivists has a grant to hold a series of conservation training workshops, including disaster prevention and action. The American Association of State and Local History has produced in its series a technical leaflet about disaster prevention.⁴¹ The Systems and Procedures Exchange Center (SPEC), operated by Association of Research Libraries Office of Management Studies, has a three-year grant for conservation. As part of this grant, it has produced SPEC Kit No. 69: *Preparing for Emergencies and Disasters*.⁴²

Many libraries and archives are realizing that disaster prevention and action planning is a relatively easy and cost-free conservation activity which can reap big benefits if disaster strikes. Fine plans have been written in Wyoming, Idaho, Arizona, at the libraries of Cornell, New York Public and Rochester, University of California at Berkeley, University of Toronto, Houston, and for the National Library of Medicine. Many more are written, or are being written, as the result of growing awareness of the need. Each of these is different, is geared to the library's needs, and is practical. There are also individual efforts by conservators to educate those responsible for library and archival management. Jack Thompson in the Pacific Northwest has offered such regional workshops in the past three years.

Gradually, as conservators, librarians and archivists share experiences, innovations and experiments, the body of literature available in the field to aid in disaster prevention, preparedness and action is growing. New techniques and ideas are implemented, and recovery from disaster becomes not only a possibility but a probability. Since the Florence flood, enlightened caretakers of the treasures of man's mind have taken more time and care to plan carefully so that the greatest proportion of their collections can be saved in case of disaster.

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