Proceedings of the 8th Annual
Federal Depository Library Conference

April 12 - 15, 1999

Disasters: Plans, Clean-up, and Recovery at Stanford University Libraries

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Two natural disasters within the last 11 years at Stanford University damaged the campus facilities and furniture/equipment, disrupted services, stressed and relocated staff, and in the case of the ’98 flood, damaged library materials.

Generally I have a memory of the extensive volunteer help we had during these disasters. Staff were called on to work beyond their daily responsibilities and many did so in poor work environments. Faculty and students responded with patience even though papers were coming due. Local library staff were of great positive assistance, and staff and student volunteers made it possible to resume business in a shorter than expected time. We had over 400 student volunteers during the days following the earthquake.

Loma Prieta Earthquake, October, 1989

The Stanford University Campus appears to have a long history of natural disasters, the best known being the 1906 8.3 San Francisco earthquake, which happened on April 18th at 5:13 a.m., and also struck and seriously damaged the Stanford campus. The 1906 quake lasted 47 seconds with violent shaking. It was more powerful than the October 17, 1989 7.0 quake and released 10 times more ground motion. The ground motion in the ’89 quake was double that which was anticipated, but it caused far less destruction than was wrought in 1906 when 2 persons were killed by falling chimneys, and the press reported the campus to be in total ruin.

There were no deaths and only minor injuries in the ’89 quake, despite there being a larger campus population and considering the hour of the quake. It hit at the end of the work day.

While rumbling continued we left our places from under desks and door jambs and moved out of the building through fallen glass. The government documents staff met at the appointed place and counted heads. We were all there. Generally, there was a variety of behavior in the library, both in leaving safely and in returning for possessions before safety had been assured, even though the library did provide a publication on what to do in the event of a major earthquake. The University had also distributed handouts, including Emergency Preparedness for Students, Faculty, Staff, and Visitors, with a section on earthquakes, prepared by the Environmental Health & Safety Office; the loose leaf Stanford

University Emergency Plans, prepared by the Stanford University Emergency Preparedness Planning Steering Committee, with sections for department additions, and an additional publication, Are You Ready for an Earthquake?

In March, 1989, we also received a nine page memo listing assembly points for each library, earthquake behavior information, and a list of emergency supplies.

Of the 50 buildings on the campus in 1906, one half could not be entered, and the campus came to an almost complete stand still until August of the same year. In 1989, 1,100 students were displaced mostly in residences, and 140 classes were canceled.

Of the approximately 240 major buildings on the present campus, 24 were closed indefinitely and 34 had restricted access for periods. One half of the classrooms were available by two days after the quake. It was difficult to count the number of staff, as many continued to work in other buildings or at home.

Leland Stanford, an engineer, was aware of earthquake dangers and insisted that buildings receive extra wide foundations as well as careful construction methods. The campus opened in 1891, and Leland Stanford died in 1893. Following his death, his wife, Jane, continued the building, but with less care regarding the engineering. Fourteen months after Jane Stanford's death, all of the buildings she had had constructed were destroyed by the 1906 quake. Stanford's original buildings remained. The main library was destroyed but housed no books at the time. It sat on the present site of the Graduate School of Business, which was significantly damaged in 1989.

Most of the shelving toppled, and three floors of the Graduate School of Business School were closed for a long period of time due to damage by leaking water pipes and asbestos problems. Although the San Andreas fault runs across the Stanford Linear Accelerator, it and the SLAC Library were undamaged. The Food Research Institute Library was permanently closed. The Stanford Law School Library basement stacks fell to the ground in a domino fashion. These basement stacks were the only stacks not braced at the time. The Hoover Institution was undamaged except for wall cracks. In 1933, following the Long Beach, California, quake, the State of California adopted a building code relating to seismic safety for all access buildings built before 1934. Stanford had upgraded many of its buildings based on a priorities list and had established the Risk Assessment Program for evaluating the campus buildings.

By the late '50s, most upgrades were completed, and as predicted, those buildings survived. Those not upgraded were seriously damaged. The upgrading for the present Green West or main library, built in 1919, included a stack bracing completed a few months before the '89 quake.

Most of the campus libraries reopened for business within three days of the 1989 earthquake. On Thursday the 19th, when they were declared safe, they were staffed with volunteers who with staff picked up more than 750,000 books which had been tossed from the shelves.

The main library (Green) reopened on Friday the 20th, following reshelving of some 350,000

books. Shelf reading was to follow months later and required volunteer hours plus $38,000 of hourly labor for 6,000 sections. A sample showed about 5% of the shelved books out of place. All libraries depended on volunteers, mostly staff members who added to their own jobs, and many students. As of October 20th, there were 400 student volunteers. Students were positive, willing, and eager to help and continually asked what needed to be done.

The library at present includes old and new sections connected. The new addition built in the seventies is earthquake safe, but the older building is not, except for the stacks. Paradoxically, thousands of books were thrown off the shelves in the new addition, but not in the original building. In some cases this may have been because of the earthquake's direction.

The main library housed the Jonsson Library of Government Documents and the Technical Services units on the first floor and the Special Collections Department on the upper floors. The Technical Services units were moved to trailers with materials in several places for a period. The Special Collections area was permanently closed because of serious damage. The services and staff were moved to another part of the library, using faculty office space. We depended on personal communications and did not use e-mail to any extent.

The Jonsson Library of Government Documents was closed and did not open until after the Thanksgiving recess, but it was destined to return to its old quarters eventually and then to a basement area of another building.

During this period there was no direct access to the collections, but an interim reference/referral desk was set up near the entrance in the new library. Referrals were made to other campus libraries, depository and public libraries in the area, and to the California State Library collections. We provided signs and handouts with information and notified the libraries of our closing. These libraries were extremely helpful to our community and in some cases loaned to our students and faculty on site. For most of this time our collections were not available for paging because of building dangers.

One of the interesting situations was the lack of awareness in the general public community regarding the earthquake and flood damage to the libraries. There was a lack of patience in not being able to get information, although this community was also included in the paging process.

We did have delays in processing materials for some time, and space was very difficult. The Jonsson Library reopened following the Thanksgiving recess in its old area with walls covered with knotty pine plywood, minus any offices or an elevator. Stack entrances consisted of small cuts in the wood. Student shelvers had to carry the books to be reshelved up and town narrow stairs to the three stack levels.

The stack upgrading in this building included a bracing lattice of heavy steel beams painted red, which ties together all the shelves on each floor. This lattice extends to the ground and is designed to keep shelves from toppling. If this work had not been done, 700,000 books would have been in a pile at the bottom of the basement, because the structure would not have held. Possibly water pipes would have ruptured. Only two to three percent of books fell off these shelves. The stack levels were shared by government documents and the special

collections.

The structural framework and reinforced concrete of the library appeared in good condition, but the brick and hollow tiles were shattered and dangerous in both staff room and reading room. The offices were damaged and permanently closed as was the elevator for the three stack levels. Some of the microfiche cabinets fell forward and drawers opened, bending the drawer mechanism and dumping the fiche on the floor. Eventually the cabinets were replaced with earthquake-proof drawers, and the fiche was refiled by Law School student volunteers.

The University has been self insured since 1985, when the commercial insurer canceled the earthquake insurance. As of August, 1989, the University had $3.4 million in earthquake reserve and $3.6 million in property reserve for fires and floods. Stanford University was eligible for $5 million from the State of California through a one quarter per cent sales tax imposed on citizens until December 1990.

The Federal Emergency Management Administration (FEMA) paid for 75 percent of the assessed damage to the occupied campus buildings, with the State of California making up the difference. FEMA paid for bringing buildings up to the building code, with the exception of two vacant buildings and the Memorial Church. There was a $160 million in damages quote to bring up to code.

Proper building construction is essential, stack/bookcase/cabinet bracing (anything over 4 feet) is essential, staff emergency preparedness, including emergency reporting lines and regular staff drills, are essential, and collective team work following the quake is very helpful to lessen injury to people and damage to facilities.

El Nino Flood, February 1998

At the time of the El Nino flood, the Jonsson Library of Government Documents was housed in the basement of the Meyer Library as a result of the Loma Prieta earthquake. The Special Collections Department was also still housed in its temporary quarters following extensive damage in its permanent quarters. It has taken 11 years to establish funding to rebuild the main library, and in October of this year it will open with services, materials, and staff in place in the Green Research Library, which includes both the 1919 building and the 1976 building. Both buildings will have been retrofitted.

In the early hours of February 2-3 following the heavy El Nino winds and rain, the Stanford campus experienced serious floods in three of the library buildings--main, Meyer basement, education, and music due to drains being unable to accept and move the water. The water was forced through walls into the basement areas of these buildings. In the case of the government documents Meyer basement area, water came in from two directions.

The floods are not new experiences for the Stanford libraries. There have been several water-related conditions which have caused materials damage. The most dramatic flood came in 1978, when an 8 inch water main broke in the middle of the night, causing $300,000 in damage to 50,000 books in 24 minutes before it was turned off. Volunteers pulled the books from water and mud and had the books put into the Lockheed vacuum chamber at

Moffett Field where space suits were tested. This process worked, but many of the water swollen books needed rebinding and reflattening on their return. Following this flood, it took an equivalent of eight full-time people and a total of nine months to complete repair following the freezing. In the ‘70s the Law Library had 7,000 books damaged by a water system, and in 1981 a water pipe burst to damage 5,000 doctoral dissertations in the main library basement.

The El Nino flood dumped 3.7 inches of rain on the campus within 24 hours and damaged 75,000 books in the libraries. Sometime between midnight and 1:00 a.m. water burst through a wall separating the new library from the old one now under construction. It appears that the heavy rains caused the drains to overflow all over the campus. This water also entered basements in the music and education buildings. The Music Library lost over 10,000 wet LP records. These libraries were closed for about a week and opened in various stages.

These flood experiences may be some of the reasons that the Stanford Libraries have encouraged and supported such well trained, experienced, and dedicated staff in the areas of conservation and preservation. Their training, experience, planning, and organization skills were demonstrated in outstanding fashion during and following the El Nino flood. The Preservation Department maintains and actively updates on an established time schedule the Collections Emergency Response Plan.

From the time flooding was discovered, this plan went into action, by first calling those on the Emergency Phone List in the manual and then using the tree system to notify others. The two disasters differed somewhat in that earthquakes mean initially looking out for personal safety as well as the safety of colleagues needing help, getting safely out of the building and doing a head count, providing building security and inspection for possible re-entrance, resettling people and services in other areas if necessary, and planning for the restoration of the facilities. Floods involving library materials require fast action to get the materials into some protection to avoid added damage like mold, drying out, or sticking together, etc., followed by planning for the future handling of the materials.

A generator providing power to the main library was damaged and remained out for a week. Until replaced by temporary gas and mobile generators, the library had no light or computers. This flood damaged the buildings, basement level furniture (not the computers), carpets, and the moveable stacks as well as the collections themselves.

We have existed to this time with minimum borrowed furniture, and the moveable shelving will not be repaired. The microfilm housed on these shelves was moved to another area of the library. The carpet in the main library basement was soaked and removed. Faculty and graduate student study offices were flooded, including their research if left on the floor. These areas had to be repaired. Commercial cleaners were hired to remove thick piles of mud and water from the floors, and new carpet was eventually laid in both basement areas.

All of the bottom shelves in the basements were removed, sent out for cleaning, and returned. During the cleaning the stacks were covered and taped with heavy plastic to keep the materials cleaned. The government documents were all removed and cleaned, and during this time the area was closed. A reference operation was set up in the upper levels with other activities like video, reserves, and student meeting areas. We brought reference

materials to the desk, paged several times a day, and never seemed to have the right reference documents. The reference service was very, very difficult, the staff worked hard and were extremely helpful and patient, and the students were patient. During this time dehumidifiers were kept on all hours so that the materials would not mold, etc.

Sometime between midnight and 2 a.m. people began responding to the call for help--initially about 70 people, staff and students. Some had no idea of the depth of the water and waded in minus shoes. Early arrivals found about 8 inches of water around the bottom shelves in the basements. The early students called in replacements as they left for classes, and in the first 15 hours 4,000 boxes of books and papers were packed and sent to cold storage for freezing. Books need to be frozen within the first 36 hours of water damage to prevent additional damage like mold.

On arrival, teams were quickly in place to take the books off the basement shelves and move them by hand to the upper floor/lobby. At the top of the stairs empty book trucks waited to be filled. Once filled, the trucks were moved to a box area where empty boxes waited. Books were put into the boxes--only one layer--and stacked for pickup by another team which put them on the waiting trucks. The teamwork was superb due in a large part to the conservation staff who worked and managed at the same time, keeping eyes on the moving process. A separate team made up the flat boxes and taped them so they could be filled faster.

The boxes were numbered for identification for the various library stacks and the private papers from the study offices. In the government documents stacks the documents were moved from the bottom shelves to upper level shelves or taken by hand to upper stack levels. There was no elevator use. Damage on the bottom shelves as well as bottom drawers of microfiche cabinets varied because of the uneven basement floor. The early volumes of the Congressional Serial Set shelved on the bottom shelves were damaged and were moved to the upper stack level, placed on end, and fans turned on them. The volumes dried for several days and were then sent for special binding. Some remained water marked. There were 725 volumes bound for a total cost of $31,000. On return, these early volumes were sent to Special Collections since the library also has the volumes in microfiche. They were beautifully bound and here is a sample.

The bottom reference shelves got wet, but most of the materials were salvaged, and also some volumes were replaced with gifts from other depository libraries. We replaced 700 reels of microfilm and 140 inches of microfiche for a total cost of $158,000. A lesson learned was that there needs to be attention paid to microforms as well as to books in these disasters. It is true that they can be replaced, but at a high cost because of vendor replacement policies. These policies will often require replacing more microforms than required by the library.

Government Documents lost several years of several titles of microfiche filed in bottom drawers. These were replaced or the records deleted depending on titles. For the most part the classification P and Z were damaged, as well as classifications in the sorting areas ready to be shelved. Microfilm reels awaiting shelving were also damaged.

Stanford lost a full collection of Army Department regulations because they were filed in

cabinets. The bottom drawer materials were soaked, and the upper drawer materials quickly began to mold so were not retained. The microfiche in the government documents area was placed in cold water tubs. The GPO fiche survived well but was weeded or replaced, as there was a fear of a contamination of other fiche. All of the wet silver halide had to be replaced, and all of the wet microfilm reels were replaced.

Stanford contracted with the company Document Reprocessors to freeze and then dry damaged books, rather do the work in-house. The books were sent to a cold storage facility nearby and frozen. This process kept the frozen books on open shelves in a vacuum chamber, which was then pumped to a low vacuum. When complete, the books were dry and stayed in the exact size and shape as when they were frozen. If the books were swollen or warped before they were frozen, they came out in the same shape. This company has developed and patented a version of the Thermaline Process which combines the freeze drying and pressing stages. The vacuum chambers are operated at a higher pressure than that used by other freeze dry operators and are heated to 32 degrees Fahrenheit.

In this drying process the books are put between aluminum plates, held tightly in place, and compressed while they dry. This is a feature unique to the patented Thermoline Process. The books emerge completely dry but no pressing is needed. They then re-humidify naturally within a week. The cost is about six dollars to dry and clean each book.

Since most of the materials except for government documents had been barcoded, the library created temporary "flood" records for the materials sent to the freezer. Since we did not know what went to the freezer, the staff identified the last barcode on the shelf above the bottom shelf and the barcode volume on the top shelf. The books in sort rooms awaiting reshelving could not be identified.

During this time interlibrary loans were used for missing items. The books were returned in groups of 8,000, the number dried at a time. From April until June, the library received 8,000 checked out books per week. The shelf-ready were discharged and shelved. Those books needing additional work were placed in a work area and reviewed by Preservation staff.

The final statistics are: of the 75,000 books sent for recovery, 2,432, or 3 percent, required commercial rebinding; 1188, or 2 percent, required in house repair, and 400 volumes, or 1 percent, were beyond repair and were withdrawn or in some cases replaced. The library established a replacement account number for all materials. Some of the replacements are still in process, particularly for foreign publications. Well-organized preparation, caring staff, quick action, and many inside and outside volunteers allowed us to save as many items as we did.