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Bridging the Gap between Research and Practice: The Natural Hazards Research and Applications Information Center

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Integrating the hazards research and practitioner communities is the main goal of the Natural Hazards Research and Applications Information Center. Founded in 1975 at the University of Colorado, the center works toward its goal with four main activities: dissemination of hazards information through publication of a bi-monthly newsletter and other forms of reports, and operation of an electronic newsletter; provision of information services through maintenance of a large library and data base on natural hazards; conduct of a modest research program; and sponsorship of an annual workshop. This paper describes these activities and shows how these activities can bridge the gap between researcher and practitioner.

Introduction

The Natural Hazards Research and Applications Information Center is a national clearinghouse for research data on the social, economic, political, and behavioral aspects of natural disasters and programs to reduce damages from them. In other words, the center collects and shares information on how society prepares for, responds to, recovers from, and mitigates disasters.

This paper provides a brief history of the Natural Hazards Research and Applications Information Center, explains what it is the center does, and then suggests how the transfer of hazards data and the integration of research into practice might be improved. Finally, this paper advocates a better integration of research and practice. Researchers must present their material succinctly, and recognize the context in which their results may be applied. Practitioners need to clearly define their problems for researchers. Practitioners should also take advantage of all the existing resources available to them.

History

The concept of the Natural Hazards Center originated from a research project carried out from 1972 to 1974 by a group of social scientists at the University of Colorado. The project (which was supported by the National Science Foundation) involved an extensive analysis of the state of natural hazards research in the United States. The project had two broad aims. One was to provide a more balanced and comprehensive basis for spending taxpayer dollars on hazard reduction programs. The second was to be more systematic in identifying research needs related to hazards. Thus, the project attempted to determine why the measures this country was taking to cope with disasters were not yielding the expected returns. Specifically, economic losses from disasters continued to rise. The researchers were also aware that people responsible for emergency or hazard management had little communication with scientists carrying out research on basic hazards problems. In particular, little transfer of information or advice developed among people dealing with distinct hazards (e.g., floodplain managers and earthquake specialists did not share ideas or information).

The assessment project examined hurricanes, floods, thunderstorms, lightning, tornadoes, hail, windstorms, blizzards and snow storms, earthquakes and tsunamis, landslides, avalanches, coastal erosion, drought, and volcanoes, and resulted in a score of books published in 1975 outlining the dimension of the problem for each of these hazards. It also listed recommendations for constructive research and better hazards management.

Regarding research, the authors called for a new research direction. Specifically, they recommended a research program that balanced the emphasis on technological and structural solutions to hazards with a similar focus on, "the social, economic, and political factors which lead to nonadoption of technological findings, or which indicate that proposed steps would not work or would only tend to perpetuate and increase the problem" (White and Haas 1975, p. 1). In terms of management, they also recognized that "along with redirected research efforts must come a system for making the findings available to public officials and agencies so they are prepared to take administrative or legislative action once a disaster makes such actions propitious" (White and Haas 1975, p. 4). The authors identified a clear need for communication both among persons conducting research on hazards and between those researchers and the people who could put the research findings to practical use. The latter recommendation spurred the creation of a clearinghouse service—a simple method to facilitate rapid and wide circulation of information among the producers and users of research on natural hazards. (White and Haas 1975, pp. 10, 12-13). With the aid and

support of the National Science Foundations and a consortium of other federal agencies, Gilbert White, one of the principal authors of the two year study, founded the Natural Hazards Research and Applications Information Center at the University of Colorado in 1975. Though Colorado based, the center is national in scope.

Form

The Hazards Center has been a markedly stable institution since its founding. Its structure and major efforts have changed little. Currently, the center is funded by 10 federal agencies including the National Science Foundation, Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, U.S. Geological Survey, Tennessee Valley Authority, U.S. Army Corps of Engineers, U.S. Department of Agriculture, U.S. Environmental Protection Agency, U.S. Bureau of Reclamation, and National Institute of Mental Health. The agencies contribute funds to the National Science Foundation (NSF) which, on an annual basis, awards a grant to the University of Colorado to operate and maintain the center.

The center has a core staff of seven persons—a half-time director, a project manager, two editors, a librarian, and two support staff, as well as a changing company of graduate students who act as the center's research assistants. An advisory committee, made up of representatives of the funding agencies and other key participants in hazards research and management in the U.S., guides the center. It helps set center priorities, brings new ideas, and keeps staff informed about current issues and developments pertaining to all phases of natural hazards programs.

Function

The main goal of the center is to strengthen communication among researchers, and the individuals, organizations, and agencies concerned with individual and public actions to reduce damages from disasters. The center carries out its work in four major operational areas: information dissemination, information or library services, research, and an annual workshop.

Information Dissemination Program

The information dissemination program has three distinct parts. One is the publication and distribution of a newsletter, the *Natural Hazards Observer*. A second is the publication of monographs, working papers,

bibliographies, and other special reports. The third is operation of an electronic newsletter called Disaster Research.

The *Natural Hazards Observer*

The *Observer* is a 20 page newsletter which carries current information on hazards research and policy to over 10,000 subscribers in the U.S. and abroad, six times a year. Subscriptions in the U.S. are free, and are $15 annually outside the country. As the center's most visible and highly regarded activity, the *Observer* provides briefings on current research, new publications, congressional activities, agency programs and upcoming conferences. It concentrates on news of human response to all natural hazards and provides a forum for key hazards players to express opinions and generate new ideas through the "On the Line" column, and featured lead articles in the "Invited Comment." A "Decade Page" provides a similar forum for persons interested in the International Decade for Natural Disaster Reduction.

Publications Program

Central to the purpose of the center is the improved exchange and application of research findings. One means of increasing the distribution of information is, of course, through the *Natural Hazards Observer*. Also, the center edits and distributes many other types of materials. These range from fulllength research studies (monographs), to research-in-progress or article-length discussions of a specific problem (working papers), bibliographies, quick response research reports, and other special publications. We design these materials to provide information to a wide range of readers. Thus, our editors carefully edit and produce these materials in nontechnical language.

Monographs

The monograph series currently has 27 titles in print (with another 25 available from NTIS) on subjects ranging from computer applications in hazards management to the effects of ethnicity on disaster recovery. A recent monograph, for example, is *Disabled Persons and Earthquake Hazards* by Kathleen J. Tierney, William Petak, and Harlan Hahn. The book describes the special problems faced by people with physical handicaps who are at risk to earthquakes. It resulted from extensive research done by the authors following earthquakes in southern California, and offers solid recommendations for local, state, and federal policy makers alike who are

charged with the responsibility for preparation of plans to respond to, recover from, and mitigate damages to life and property for all citizens.

Working Papers

The Natural Hazards Research Working Papers series presents research in progress in the field of human adjustments to natural hazards. The papers present initial results of research efforts, and identify important policy issues related to hazards mitigation and management. For example, one recent working paper deals with recovery aspects for the state of South Carolina following Hurricane Hugo. Other recent papers include a comparison of flood insurance and relief in the U.S. and Great Britain, a study of media response to Hurricane Gilbert, an examination of some of the legal implications of using the mortgage finance and insurance industries to induce the procurement of earthquake insurance, a study of the implications of the greenhouse effect for water resource managers, and a comparison of psychological impacts of Hurricane Hugo and the Loma Prieta earthquake on victims and disaster relief workers. The latter sheds some insight on how relief agencies can best prepare to carry out their programs to reduce the emotional stress experienced by disaster victims.

Special Publications

In 1981, the center established a series of special publications representing valuable research or policy statements that deserved broad circulation, but did not fit into the monograph or working paper formats. Materials in this series often include proceedings of national conferences, collections of data resources, handbooks of hazards management techniques, or historical or case study descriptions of hazards management. The center's most recent special publications are the *Proceedings of the Association of State Floodplain Manager's Annual Conference* held in Asheville, North Carolina, in 1990, and *The Natural Hazards Data Resources Directory*—a 250-page compilation that lists data resources for hazards and hazard response. The book is indexed according to agency, subject, and geographic location, and contains an extensive list of U.S. federal and state offices dealing with hazards.

Bibliographies

Annotated bibliographies have been issued by the Natural Hazards Center each year since 1975. The bibliographies (which are now available on diskette) are the most comprehensive natural disaster data base in

existence and form the core of the center's computerized data base known as HAZBIB.

The center also publishes topical bibliographies on specific subjects. Often, the bibliographies are part of the center's modest research program. In other instances the bibliographies are prepared based on a need perceived by staff because of the number of information requests received on a particular topic or at the specific request of an agency or organization. For example, work is underway to update a bibliography on the social and economic impact of climate and weather hazards at the request of the National Oceanic and Atmospheric Administration.

Decade Series

In 1989, the center began a new series of publications devoted to the International Decade for Natural Disaster Reduction. The "Decade" offers a unique opportunity for the hazards community by increasing awareness of mitigation activities and calling for long term planning to achieve the goal of disaster damage reduction. The center, by offering a special publications series, will facilitate the exchange of ideas among hazards researchers and practitioners. By the year 2000, the series should be a solid collection of ideas that can be used reflectively to judge the progress made in hazard mitigation in the 1990s.

All of the center's publications are modestly priced as the goal is to distribute information, not generate income. The monographs are $10, working papers $4.50, and the special publications and bibliographies average $10.

Disaster Research

The third part of the center's information dissemination program is the operation of an electronic newsletter, known as Disaster Research (DR). Originally started by the Disaster Research Center at the University of Delaware, DR's operation has been a Hazards Center function since November 1989. It is operated through the University's electronic mail system, but is available on a variety of electronic networks and bulletin boards throughout the country and globe. For example, it is available on the electronic bulletin board run by FEMA for state and local emergency managers (SALEMDUG), as well as networks in Australia, Canada, and Europe. DR is issued about twice a month, and is a less formal information tool for the exchange of ideas than is the *Observer*. The popularity of DR is growing. It is particularly interesting to note the number of international

contacts that have been established via this medium. The DR subscription list includes people from Argentina, India, the Soviet Union, and Australia.

Information Library Services Program

The main purpose of the center is to improve and expand the exchange of information on human response to extreme natural events, with the intention of reducing the impacts of these events. At the heart of the center are its information clearinghouse activities, which involve maintaining a large library on natural hazards and responding to requests for information.

The Natural Hazards Library holds more than 10,000 books, articles, reports, journals, and other documents. It is, perhaps, the most extensive library resource on the social, economic, and behavioral aspects of natural disasters in the country. It also forms the core of the center's clearinghouse activities. The holdings are catalogued in a computerized, bibliographic data base known as HAZBIB, about one-third of which is annotated. HAZBIB is searchable by author, title, key word, or full text. When staff receive an information request, HAZBIB is often the first place they go to fill it. New additions to HAZBIB are made at a rate of about 250 items per year.

Center staff respond to requests for information from federal, state, and local officials, researchers, members of private and nonprofit organizations, and others. The requests come in written form, by personal visit, over the telephone, or via the electronic newsletter.

People pose a number of different types of requests to the center. For example, requests come from researchers interested in knowing what the latest material on a particular subject, federal agencies looking for specific hazards data, or local agencies needing help in emergency planning, risk analysis, ordinance requests and more. For example, center staff provided a list of appropriate documents and contact people in other large cities to the Minneapolis Emergency Planner who was looking for help on developing a plan for the City's new convention center. Staff also put him in touch with other emergency managers who had done risk analyses for water supply systems.

Center staff also work with individuals—mothers looking for material on hazards for their children; businesses—for example, the Sears Roebuck Co. was provided information on developing a corporate emergency preparedness plan; the media—the center was a source of data for the recent PBS series on the "Rim of Fire"—a four part documentary that chronicled the hazards associated with living on the Pacific Rim; and organizations—

we provided to the National Conference of State Legislatures information about the status of state legislation on emergency management.

Other typical requests include one from a South Carolina State legislator seeking advice on mitigation programs following Hurricane Hugo; another from a staff member at the San Francisco Division of Mental Health interested in learning more about substance abuse following disasters; one from a researcher in Illinois who was starting a project to study disaster preparedness of social service agencies in the area; and one from a Denver Post reporter looking for material to write a feature article on the 15th anniversary of the Big Thompson flood.

The center also operates a special data base on floodplain management in cooperation with the Association of State Floodplain Managers (ASFPM). The system is designed to screen the data that is entered carefully to ensure it represents the best prepared, most informative pieces.

Research

The center plays a modest role in basic research on the social and economic aspects of natural hazards. There are two formats in which this is done.

In-House

The in-house research program allows the Director, other University of Colorado researchers, and students to carry out small study projects. Generally, the center's research projects focus on answering basic questions about social aspects of natural disasters such as what constraints exist on hazard mitigation programs at the local level, how hazards information can be better communicated to the public, and how climate change might affect hazard frequency and magnitude, and hazard systems like flood control. Current research underway includes analysis of human response to prediction of geologic hazards (e.g., the response of people to the Iben Browning prediction that a large earthquake in the New Madrid seismic zone would occur in December 1990—it did not occur). Staff are also updating a bibliography on the social and economic impacts of climate and weather hazards and are surveying state emergency management agencies on the frequency of technological emergencies which result from natural disasters.

Quick Response

A larger research function is the Hazards Center's "quick response" research program. Begun with a pilot project from 1978-80, and reinstituted in 1982, the program facilitates quick access to disaster sites in the immediate postimpact period. The purpose is to allow social scientists to collect perishable data that might otherwise be lost.

The program operates like in the following manner. Each fall, we solicit brief proposals from researchers around the country who are interested in conducting studies right after a disaster. These proposals are reviewed and, if approved, kept on file at the center. When an appropriate disaster occurs, and the researcher wishes to enter the field, he/she contacts the center. If funds are still available, the project is authorized. Essentially, the grant buys the researcher(s) a plane ticket, covers expenses in the field, and pays for modest data collection costs. Salaries and overhead are not eligible for reimbursement. Grants average between $2,000 and $3,000. In order to ensure the information gleaned from quick response studies is made available, the center requires grantees to submit brief final reports on their projects, which are then distributed via announcement in the *Observer* and on the electronic network.

The types of projects funded through the Quick Response program range widely. In the past year, for example, this program supported the research presented in a recent monograph, *The Loma Prieta Earthquake: Studies of Short-Term Impacts*. A total of 14 researchers were sponsored by the center to study that disaster. In the past few years quick response researchers have also studied Hurricane Hugo, the Exxon Valdez oil spill, and the Armenia earthquake.

Annual Workshop

To strengthen the link between the research and applications communities, the Natural Hazards Center convenes a workshop each summer in Boulder to bring these groups together to establish contacts and share hazard-related problems as well as ideas for their solutions. The workshop is unique in that it brings together people in a setting unlike other conferences which they attend. Normally, conferences are attended by people of like discipline, organization, and mind, and there is little opportunity for interchange among disciplines and different levels of organizations. The Boulder workshop is structured specifically to provide that opportunity—to give people a chance to learn how their work impacts others, and vice versa.

The workshop serves several purposes. It:

- provides a forum for the presentation and stimulation of new research ideas;
- identifies problems to which existing research or practical experience can be applied;
- provides agencies feedback on new programs and policies from state and local officials and others;
- allows participants to learn of new research underway; and
- gives researchers the opportunity to exchange ideas with practitioners and take their perspectives into account early in the research process.

The workshop is designed to facilitate networking and easy communication among participants. It avoids the format of most conferences, in that lengthy plenary addresses and papers are avoided while more informal concurrent sessions addressing a wide range of significant issues are featured. Thus, the workshop is structured specifically to provide all members of the broad hazards community an opportunity to exchange knowledge and needs, questions and answers. In short, it is an opportunity for the community of persons involved in hazards to become closer.

Other Activities

In addition to these core functions, the Hazards Center is active in a wide range of projects that serve to link the hazards research and applications communities. For example, staff participates in a variety of meetings and helps conference organizers identify relevant topics and speakers. Staff conducts program evaluations, reviews research proposals, and hosts special workshops and meetings. For example, in 1988, the center hosted a two day retreat for 40 members of the hazards community to discuss ideas for a U.S. Decade program. In 1989, a meeting of the National Review Committee that was formed to critically assess a draft report on the status of floodplain management activities in this country was organized. The center also welcomes both researchers and practitioners to the center itself. For example, the State Hazard Mitigation officer of South Carolina spent a few days in the center library before he finished the 180 day report required by FEMA following Hurricane Hugo. In short, the center tries to remain flexible in responding to the needs of those whom it serves.

Integrating Research and Practice

Despite all the center's activities described above, serious questions remain: Is the information really being transferred from the people who have it to the people who need it? And if so, is it making a difference? These are difficult questions to answer. Those of us who work at the center like to think we are making a difference, and certainly the constant feedback from the users of the center's services indicate those services are valuable. Ironically, the founder of the center, Gilbert White, has said that he hoped to create a self-destructing system. That is, he hoped the center would succeed to such an extent that by this time it would no longer be needed to facilitate linkages between the research and practical sides of hazards management.

Unfortunately, this is not the case. The demand for the center's services continue to grow at a constant rate. Subscriptions to the *Observer* climb at an average of 9% a year; information requests have increased on average 30% a year for the past three years; people continually submit manuscripts for the publications series, and others continue to purchase them. These numbers alone might suggest that a difference is being made. After all, if the services weren't useful, would they be in such demand? Optimistically, we like to think they are useful. Unfortunately, evidence reveal that damages from disasters in the U.S. continue to rise, despite society's knowledge of how to deal with them. What then is the problem?

Many people have suggested ways to improve hazard management and the integration of research into practice. For example, Walt Hays with the U.S. Geological Survey concludes that how well risk management works in a community depends on seven factors: a perceived need for risk reduction, informed internal advisors, strong external champions, credible products, user-friendly products, balanced political, legal, and economic considerations, and a window of opportunity (Hays 1988, pp. 100-101). Many of these factors require translation of research data to practitioners or individuals. For example, a "perceived need for risk reduction" implies that scientists must be able to relate the risk of the hazard to local residents in a manner that will cause them to realize the need to do something about it. "User-friendly products" means that tools for hazard reduction must be available and they must easily understood and used by local officials. For example, if a psychologist's research report describes the types of emotional stress disaster victims and workers are subject to following a disaster, but does not explain what improvements could be made in disaster relief programs to alleviate some of that stress, then you have a product, in my view, that is not "user-friendly."

In order to improve upon the integration of research into practice, I suggest four activities: two are geared toward the researcher, and two toward the practitioner.

The first for the researcher is this: Keep information succinct and to the point. A massive amount of paper crosses everyone's desk, and the need for brevity is becoming more and more critical all the time. Brief statements of research findings in a clear format, and works that integrate findings, will be of great use to practitioners. Prepare simple summary statements that present findings, and then recommendations for actions. The practitioner does not have the time or desire to read and interpret theoretical discourses and research methodologies.

For example, I recently reviewed the draft report of an NSF funded project designed to identify a uniform way to assess damages from disasters. The report, if read closely, described what damages should be counted. Also, it took until page 16 to get the first glimmer of that key point. The report also suggested various ways to count them but did not recommend one way over the other. The report had very valuable information, but it was not readily discerned. It would be much more useful if the authors prepared a simpler, easier to understand summary which included their recommendation for the best way to count damages for distribution to practitioners.

Second, many researchers do honest, sincere, important work, but they do it in a vacuum. This can cause their work not to be adopted at the practitioner level because it ignores the basic fact of life that the real world does not enjoy the sterile conditions of a laboratory. People who actually try to implement hazard and emergency management programs do so within the confines of a community which is subject to innumerable outside influencing factors, and competing goals and objectives. While one can certainly appreciate the need for scientific research where conditions are controlled, the results from that type of research—unless later modified to fit the situation to where it might be applied—is quite useless to the practitioner community.

The message here is twofold. First, research should describe how best to overcome obstacles when trying to implement hazard reduction programs. Second, research reports must be presented in a fashion that clearly explains some of the biases of the report, and that recommends ways to recognize potential conflicts for applying this research and possible ways to resolve them. Researchers, I believe, have a responsibility to put their work into context—to help the practitioner interpret results and apply them at home. In order for research results to be translated into policy and action, they must be delivered with a message that is credible. If that message does

not recognize competing demands at the local level, then it will not be convincing.

The final two points are for the practitioner. First, practitioners must work hard to identify and isolate specific problems, so that researchers can design projects that address the needs of users. In other words, the information flow must not be one-way. If researchers focus on problems pointed out by local hazards managers as critical, their results are much more likely to be read and used. In addition, practitioners should not be intimidated by academics. Be willing to work with the research community, seek their advice, but don't believe everything they say. Question their methodologies and results. Don't let them get away without really helping you with your problem. If you work together, the research will be much more useful.

Second, go out and find the information you need. It is probably there, but it takes some leg work. Don't expect the answers to your problems to be delivered in the morning mail. There are literally hundreds of sources of information on hazards and emergency management. It is not necessary to reinvent the wheel with every new project. Look elsewhere for examples or case studies. For example, call the staff at the Hazards Center, the experts here at the University of North Texas, or at the Hazard Reduction and Recovery Center at Texas A&M for advice. Pick up the phone, go to the library. People are willing and able to help.

In closing, let me borrow an insight from David Butler (1991), a Hazards Center editor, in a paper he wrote. Underlying the many issues discussed at this conference, is perhaps one fundamental lesson. Keep in mind that mitigation and effective hazard reduction are the result of human action—reports written, research conducted, and information transferred do not get the job done alone. One of the basic beliefs of our time is that with sufficient information, we can always deduce the correct answer. Perhaps a fear of failure delays working with many real-world problems. Rather, decisions are postponed in order to seek more information or do more research. This can be a danger. Please remember that communication remains a means not an end, that change occurs because of work done on the ground. Do not underestimate the value of information; the potential for ineffective, if not disastrous, mistakes as a result of lack of knowledge is obvious. But if you are truly interested in mitigating disasters, you must transform knowledge and conviction into efforts that change the world.

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