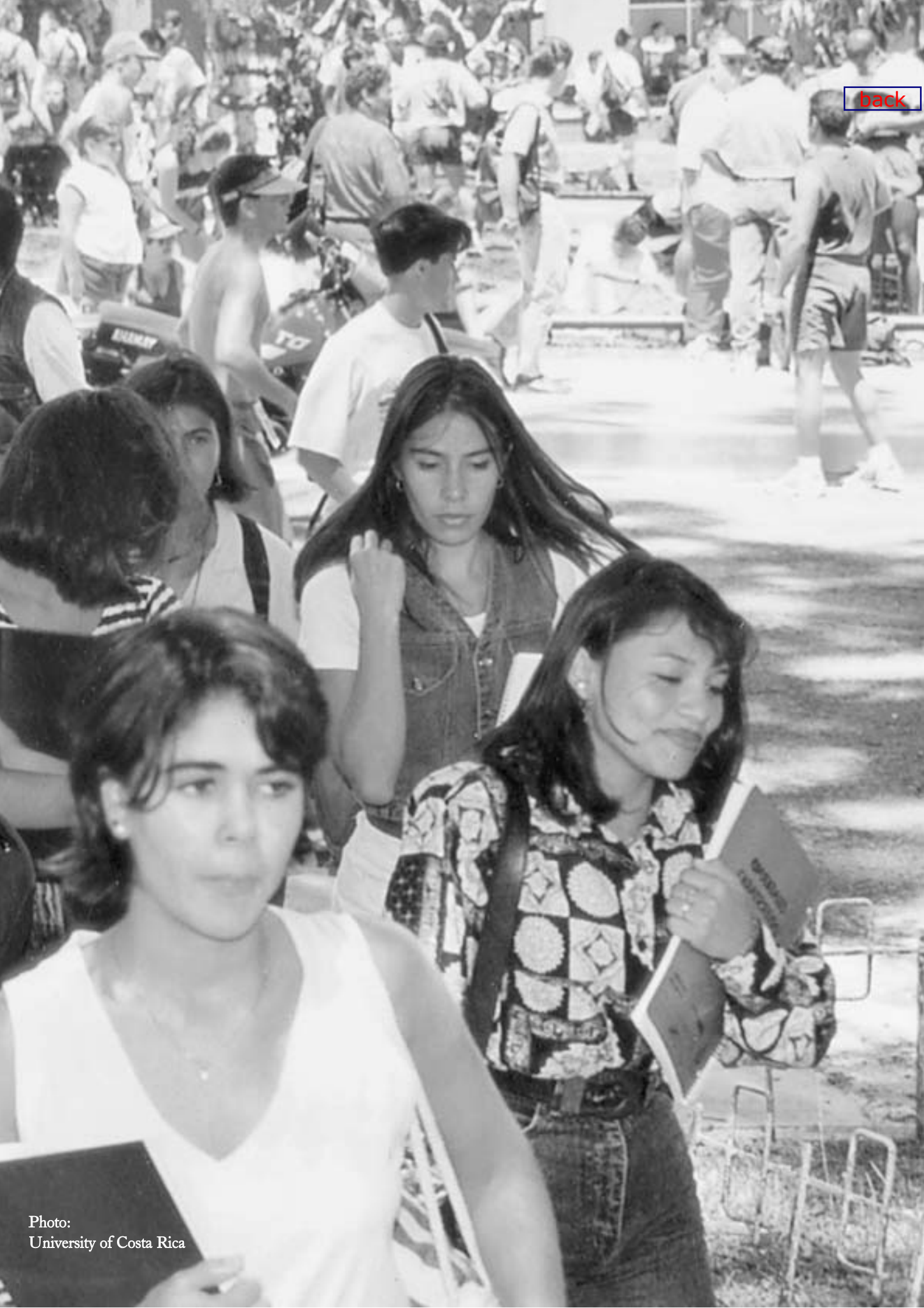
Chapter 4

Building understanding: development of knowledge and information sharing

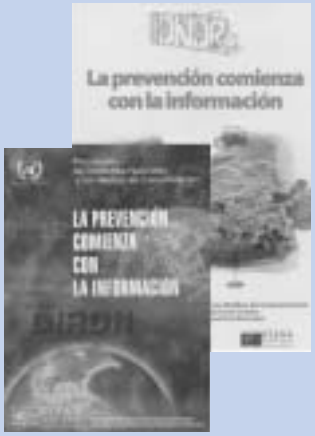


back

Photo:
University of Costa Rica

4.1. Information management and communication of experience

Effective disaster risk management depends upon a series of related actions and the means to engage the informed participation of all stakeholders. Exchange of information and communication practices play key roles in the realization of these activities. Data availability is crucial for ongoing research, to monitor hazards and for assessing risks. Information describes working conditions, provides reference material and allows access to resources. It shapes many productive relationships. Rapid and widespread developments in modern communications record and disseminate the value of experience, convey professional knowledge, and contribute to decision-making processes. Integrating new developments in information management with established and more traditional methods can help to create a much better understanding about hazards and risk at all levels of responsibility through public awareness programmes. They inform are instrumental in achieving more comprehensive early warning systems and effective mitigation efforts.



"Prevention begins with information" IDNDR theme for public awareness campaign, 1998

Effective information management and communication about disaster risk reduction is conveyed through:

- An awareness of current issues of information management
- An appreciation of initiatives around the world
- Selected national information programmes
- Technical information, experience about different hazards
- Using cyberspace to discuss disaster risk reduction

Current issues of information management

Advantages

As disaster risk reduction issues pervade both popular interest and official policy outlooks, related information to the subject is expanding rapidly. The sources, previously associated mainly with the catastrophic events, or considered as the exclusive domain of specialists, can now reach a wider range of users. The number of interested people, educational institutions, organizations and local community users is growing, as are relevant websites, networks, and multidisciplinary and professional exchanges.

In addition to these many sources for exchanging technical or specialized data, other means of communication have emerged to disseminate research about disaster risks, to convey information about new activities and programmes, and to seek new ways through which people can work together in reducing risks. Within the ISDR framework, the use of Internet-based and electronic conferences and discussion forums have been successful on several occasions.

Innovations in GIS technology are increasingly becoming an accepted tool for the presentation of hazard vulnerabilities and risks. Other forms of information dissemination provide new insights about knowledge engineering, management techniques and cognitive sciences. Some of the most significant and useful developments in the evolution of information systems relate to innovative machine-user interfaces that rely on natural language processing for searching and analysing data. Others rely on the expanded use of "fuzzy logic" and expert learning systems such as those based on neural networks.

Many of these advanced techniques hold particular promise in communicating data, information or experience in quicker or automated early warning systems, distinctive public awareness programmes, and for a wide variety of educational or community-based applications. They can assist in the development of learning materials, but rather guided by the specific needs and interests of communities or individual users.

back

Limitations

The exponential growth in the volume of sources and data also poses continuing challe nges for the processing and dissemination of meaningful information. Users find it ever harder to assess the accuracy, veracity, and in some cases, the validity of the content. While systematic gathering and timely provision of information are keys to ensuring the effective use of information, processes of sorting, analysing and targeting information for primary interest groups are at least as important to avoid information overload and confusion among users.

Moreover, there is a growing tendency for many information providers to rely on increasingly sophisticated means of electronic communication, thereby excluding many potential users that live in impoverished areas. While some institutions have been hesitant to adapt to new forms of communication and technologies, many others now rely on electronic communications or web site access for information that is often beyond the reach of the people most vulnerable to disasters.

Several factors have hindered the development of efficient information systems for general use, while other constraints might be more institutional in nature. Several commentators in Africa have conveyed to the ISDR secretariat their view that the provision of timely, definitive information remains problematic throughout all aspects of disaster management responsibilities. A response from Bangladesh to an ISDR survey on the status of disaster reduction shared a common concern voiced by other countries as well. Their concern results from the fact that various government agencies, international organizations, technical organizations or academic institutions, as well as NGOs, all produce data and information relevant to disaster risk management processes. The need of individual organizations or external donor agencies to have adequate information for their own programme interests has motivated most agencies to develop information systems that cannot easily be applied to other settings.

While many of them are involved in various projects concerned with hazard and risk issues or land-use planning, no commonly acknowledged focal point exists to provide easy or consistent access to such information. As a consequence, important data or information related to risk maps, or associated public awareness and education programmes about hazards, might either be scattered or confined among libraries, individual government offices, academia or individual technical programmes with no common point of access.

Lack of information-or lack of access?

As conveyed in the regional ISDR report which took account of conditions in Southern Africa, but which no doubt apply elsewhere, there are many countries in which a wealth of disaster risk information exists in archived form: hydrometeorological data, early land-use records, historical natural resource conditions, water records and related issues. Such information might be recorded in an unsuitable form, or more seriously, might not be readily accessible because of restricted institutional or technical reasons. These might include conditions in which,

- Data is retained or restricted under presumed security considerations, or as an institutional power base;
- Inadequate cross-sectoral reference or communication about the existence of data so that other potential users are not aware of the information;
- Compilation and dissemination of information are not considered a priority by organizations;
- Information is maintained in specialist, non-standard, incompatible or even archaic formats;
- Information that exists in spatial or other formats can be costly to convert into more readily accessible formats;
- Data compilers might not have consulted potential users about their respective data requirements so available data are not structured to easily address the needs of either current or subsequent users.

An appreciation of initiatives around the world

There are numerous examples that illustrate how information management, innovative communication practices about hazards and various professional initiatives associated with disaster issues, have helped to advance public understanding and professional involvement in disaster risk reduction in recent years.

International scope of information

There are two primary global information sources that are widely used for access to accumulated hazard and disaster reduction information, both located in Europe. One, the *Centre for Research on the Epidemiology of Disasters (CRED)* is a *World Health Organization (WHO)* collaborating centre at the School of Public Health of the Catholic University of Louvain in Brussels, Belgium. It maintains an *Emergency Events Database (EM-DAT)*. This comprehensive record of natural disasters that has documented more than 12,500 events by types and country of occurrence during the twentieth century, was created with the initial support of WHO and the Belgian Government. The CRED database is widely recognized professionally for its efforts to provide a consistent rendering of the often casual, vague or conflicting information about disasters that is frequently conveyed in different formats. It can be accessed on the following web site: www.cred.be.

A second highly regarded source of cumulative information about natural disasters that have occurred around the world since 1965 is the *NatCat Service* database maintained by the *Research and Development Department of Munich Reinsurance (Munich Re)*, in Munich, Germany. Information derived from this hazard documentation service is published in five major languages by MunichRe and circulated widely in Topics, an annual review of natural catastrophes. Munich Re also provides more specific information to commercial clients and other interested parties about the extent and intensity of specific disaster events or amalgamated information regarding regional or global exposure

GLobal IDEntifier Number (GLIDE)

Accessing disaster information can be a time consuming and laborious task. Not only is data scattered but frequently identification of the disaster can be confusing in countries with many disaster events. To address both of these issues cred is working with a technical advisory group of partners on a globally common Unique Identification code for disasters, proposed by the *Asian Disaster Reduction Centre (ADRC)*.

The partners include ReliefWeb-OCHA, OFDA-USAID, FAO, US/NOAA Office for Global Programs (OGP) and the World Bank. A *GLobal IDEntifier number (GLIDE)* is issued every week by EM-DAT at CRED for all new disaster events that meet the EM-DAT criteria (www.cred.be). The components of a GLIDE number consist of two letters to identify the disaster type (e.g. ST - storms); the year of the disaster; a four-digit, sequential disaster number; and the three-letter ISO code for country of occurrence. So, for example, the GLIDE number for hurricane Mitch in Honduras is: ST-1998-0345-HND.

This number is posted by CRED, ReliefWeb, NOAA-GOP and ADRC on all their documents relating to that particular disaster and gradually other partners will include it in whatever information they generate. As information suppliers join in this initiative, documents and data pertaining to specific events may be easily retrieved from various sources, or linked together using the unique GLIDE numbers. The success of GLIDE depends on its widespread use and its level of utility for practitioners.

ADRC has prepared a specific website http://glidenumber.net/ to promote GLIDE. Being in its experimental phase, the group encourages visiting this website and welcomes comments or suggestions.

For more information contact CRED or ADRC (arakida@adrc.or.jp)
:

analyses and trend studies. The Munich Re World Map of Natural Hazards has been valued by disaster and risk management professionals since its first publication in 1978. Its subsequent Globe of Natural Hazards most recently updated in 1998, has also proved to be an effective information tool. Munich Re regularly produces additional publications and has recently issued a CD-ROM, *World of Natural Disasters,* to advance the public knowledge of hazards and exposure to risk. By employing digital technology and the benefits of GIS representation of information, this CD-ROM is easily able to provide the risk identification and evaluation expertise of the reinsurance industry to engineers, government officials and other interested people. It is able to make a quick assessment of the basic natural hazard potential at any terrestrial position in the world at the click of a button. Additional information can be found at www.munichre.com

Another widely used source of public information and database is the *ReliefWeb*, operated by OCHA. Located at www.reliefweb.int, it focuses primarily on current international emergencies and disasters with humanitarian implications, although it also provides current response-oriented information about natural disasters. ReliefWeb provides an excellent and wide-ranging selection of information, press accounts, related contacts and operational information, as well as archived information drawn from public, governmental, NGO and authoritative sources about various types of emergencies and their consequences. However, as its name indicates, it largely relates to emergency preparedness and response interests.

In November 2001, IFRC launched its *Disaster Management Information Systems (DMIS)*. This provides a single entry point for relevant disaster-related information and multiple disaster management information sources that is browser-accessible for members of the Red Cross and Red Crescent Movement. Supported by four National Societies, the United Kingdom bilateral development agency, *Department for International Development (DFID)* and the commercially sponsored Ericsson Response Program, the project aims to provide information about disasters in a systematic way and to monitor a number of factors that might signal an impending disaster. It provides a toolbox of working documents, tem-

back

Global reports about disaster, risk and vulnerability

World Disasters Report

One of the most respected sources of information about disasters is the World Disasters Report, an annual publication of the International Federation of *Red Cross and Red Crescent Societies (IFRC)*. Published since 1993, the World Disasters Report provides the latest trends, facts and analysis of the world's humanitarian crises. Described by the World Bank as "a very valuable resource for the international community", the report is an indispensable reference work for those searching current information about strategies and tactics in the face of disaster. The report is backed by the resources and expertise of IFRC.

The 2002 edition of the World Disasters Report is focusing on risk reduction issues. The report analyses the challenges and opportunities facing risk reduction, and examines preparedness and mitigation initiatives from disaster-prone countries around the globe. In addition, the report studies the issue of humanitarian accountability, presents a methodology to assess vulnerabilities and capacities, and concludes with disaster data tables that are updated annually. It addresses such current issues as whether disaster preparedness and mitigation can convincingly be shown to pay off in terms of lives, livelihoods and assets saved. (www.ifrc.org)

Global Environment Outlook

In line with its role in environmental monitoring and assessment and early warning, UNEP has launched the *Global Environment Outlook (GEO)* series, which contains baseline information on emerging environmental issues and threats, as well policies being implemented at the global and regional levels. The findings and recommendations of the GEO report series constitute the basis of UNEP activities in early warning and vulnerability and risk assessments.

The GEO-3 report of May 2002 specifically addresses the issue of human vulnerability to

environmental changes, including elaboration on the specific relationship between the impact of natural hazards and emerging disasters. It also includes a section on disasters, in which the ISDR secretariat collaborated with information. UNEP also produces other associated reports of regional and/or thematic scope, such as on small island developing states. More information about GEO-3 can be found on the UNEP web site (www.unep.org).

World Vulnerability Report

Since 1989, the annual UNDP *Human Development Report* has increased a wider public understanding of the social or human dimensions of development. The human development index and the subsidiary human poverty index are both based on a small number of carefully selected parameters for which data are available and provide alternative indicators to conventional *gross domestic product (GDP)* measurements. Awareness of the linkages between natural disasters and development has also increased considerably in recent years. Vulnerability to calamities is now recognized by many institutions as an important issue for sustainable development. However, while Human Development Report has been far more successful than was originally envisaged, the linkages between increasing disaster risk and "human" development have yet to be fully explored and addressed.

In this regard, UNDP is in the process of producing a first issue of the *World Vulnerability Report (WVR)*. The goal of WVR is to increase the attention of governments and the international community to viable approaches to managing and reducing disaster risks.

As part of this report, UNDP will present a Global Vulnerability Index, which will compare countries according to their relative risk levels over time. The index will highlight the level of national efforts and progress made on mitigating disaster risk annually, and will promote the further production of related national reports. The first issue will be made available in the second half of 2002.

plates, operational guidelines and links to online data sources and more than 400 web sites all sorted by categories. It is expected to speed up emergency awareness and action by providing decision makers with timely information, as well as with feedback from the Red Cross and Red Crescent network throughout the world. Specific operational links to data sources during a disaster are grouped, highlighted and then archived for future reference. The Preparedness Section of the site allows delegates and National Societies to directly input information on disaster trends from anywhere in the world and potential response to unfolding disaster situations. During large-scale emergencies, ongoing operational information can be exchanged, as logistics mobilization actions and contact details are also posted to improve communication and cooperation between the different actors involved. This dynamic and interactive working tool continues to evolve and adds new features on a regular basis in response to the needs of its users. After a first year of activity, the password-protected site has over 600 users from 178 National Societies, delegations, IFRC and International Committee of Red Cross staff.

Other institutionalized efforts also are under way to facilitate the global use of shared disaster management information. Working through both negotiated international agreements as well as efforts to standardize communication protocols and technical compatibility, some governments and disaster management professionals are working to realize a comprehensive initiative to increase the availability and improved utility of advanced communication and information technologies for more effective disaster management. While the objectives of the *Global Disaster Information System (GDIN)* are yet to be fully realized, this international collaborative association of specialists from governments, international and donor organizations, NGOs, commercial and academic institutions is working to enhance its capacities to receive and use disaster information. In a general sense, GDIN seeks to offer a variety of services that can link users with appropriate information providers and to encourage the use of greater technical compatibility or integration of information systems across geographical regions so that information can be shared more effectively. While much of

its interest revolves around remotely sensed data, GIS applications, mapping and display information, GDIN also tries to assist disaster specialists in obtaining information that may otherwise be difficult for them to locate or to access through individual efforts. It particularly strives to benefit disaster managers in areas where there are limited resources or limited access to technology. Further elaboration about GDIN activities and intentions can be obtained at www.gdin.org.

Using cyberspace to discuss disaster risk reduction

At a more individual level of information exchange, there is an increasing number of publicly accessible and free multidisciplinary e-mail discussion groups, listserves and related electronic networks that can be accessed.

An NGO network, The Stakeholder Forum for Our Common Future, and the ISDR Secretariat organized an online discussion during May 2002, on the subject, "Links between natural hazards, environment and sustainable development: Taking action to reduce the risk of disasters". An effort was made to broaden the discussion of these related topics to a much larger group of interested people than those who may otherwise be involved with matters of sustainable development. More than 350 participants from 80 countries registered and many engaged in an active exchange of views, experience and concerns. These were all posted on a dedicated website which can be viewed at www.earthsummit2002.org/debate. Numerous topics emerged, including: the impact of natural hazards on development and how to reverse vulnerability; risk assessment and early warning systems; fostering community involvement and developing coping capabilities within communities; and the promotion of education and capacity building. A wealth of experience unfolded during the month, as case examples illustrated a variety of specialist knowledge. There were also carefully considered comments about current limitations, and the imagined roles and responsibilities that may lead to potential solutions. Some of these outlooks are included in this global review. Regardless of the individual views expressed, a readily perceived value of such exchanges is the ease of being in touch with other people around the world who share a professional interest and personal commitment to these issues. It is an excellent form of networking, that is stimulating too. It is easy, and does not require a large investment - beyond ones' own time and wish to contribute.

A similar discussion was and cyber conference was organized in Novermber 2001 with the Division for the Advancement of Women (UN/DESA), on disaster reduction and natural resource management with a geneder perspective, see: www.un.org/womenwatch/daw

One such initiative is the *natural-hazards-disasters network* that is a managed information service and discussion group that covers socio-economic, psychological, organizational, scientific and technical aspects of disaster triggered by all kinds of natural and technological hazards. Its members are drawn from operational agencies and academic institutions throughout the world and anyone with an interest in the subject can join through the list's web site at www.jiscmail.ac.uk/lists/natural-hazards-disasters.

Another similar and lively source of information, discussion and professional debate regarding the social dimensions of hazards, vulnerability and risk particularly following a major disaster, is the R*adical Interpretation of Disaster Experience (RADIX)* web site, located at www.apu.ac.uk/geography/radix, which was initiated by the scholar Ben Wisner . IRADIX seeks to provide a venue for discussion, working papers, opinion pieces, resources, or links that can help in understanding the root causes of disasters. This includes issues such as human rights, respect for diversity, translation of available knowledge into action, links between disasters, economic development and politics, with particular relevance to local community interests and people-centred activities for risk reduction. RADIX seeks to bring together groups related to disaster risk reduction that have not always shared information easily with one another, including scientists, human rights activists, development workers, government officials, business executives, environmentalists, media representatives, etc.

Regional initiatives

Regional information or documentation centres relating to hazard awareness or risk reduction activities have been established in several locations. A review of some of these centres will illustrate the different approaches and the diversity of interests that are served in different parts of the world, while the value of their various products and services all contribute to the body of international experience in disaster risk management.

Africa

There is no region-wide disaster information centre covering the wide variety of hazard or risk conditions on the African continent, but there are several specialized documentation centres that are expanding their activities into related fields of risk. The Southern African Research and Documentation Centre (SARDC) is one such highly regarded centre. Based in Harare, Zimbabwe, SARDC is an independent regional information and documentation centre that seeks to enhance the effectiveness of key development processes in the region. It pursues this aim through the collection, analysis, production and dissemination of information and by working to enable local capacities to generate and use information.

It has operated as a non-profit foundation since 1987 and its objective is to improve the base of knowledge about economic, political, cultural and social developments and their implications, by making information accessible to governments and policy makers, NGOs, the private sector, the media and regional and international organizations. The documentation centre contains more than 9,000 subject files on regional issues, a library of books and periodicals, computerized databases of selected materials that are retrievable through the use of keywords and maintains specific bibliographic and contact databases on primary areas of interest.

Particular areas of interest related to risk reduction include the state of the environment in Southern Africa, disaster management infor-

Drought Information in Africa

Mention should also be made of several other specialized or technical organizations in different regions of Africa that produce and disseminate numerous information products related to the specific hazards or risk reduction activities with which they are involved. As these have not been constituted for fulfilling comprehensive functions related to disaster risk management and as they do not exist primarily as information or documentation centres, they are discussed in further detail elsewhere in other sections of this review. Nonetheless, the IGAD Drought Monitoring Centre, located in Nairobi, Kenya, and the SADC Drought Monitoring Centre in Harare, Zimbabwe, have expanded their professional interests in recent years to become important regional centres for information about a wide range of climate conditions and hazards. Periodic and semi-annual climate forecasts are produced by each of these centres and circulated widely among both technical and policy officials in most countries of Southern, Eastern and Central Africa.

Similarly, the Regional Early Warning Unit (REWU) and the Regional Remote Sensing Unit (RRSU) of the SADC Food and Natural Resources Development Unit (FANR) produce both routine and specialized information on drought and related potential risks affecting food security in the 14 SADC countries. The SADC Environment and Land Management Sector (ELMS) Coordination Unit and the SADC Water Sector Coordination Unit are also both involved significantly in project activities, policy development and information dissemination pertinent to the natural hazards and risks associated with their respective areas of interest. In the Sahel region of West Africa, AGRHYMET (www.agrhymet.ne) is a specialized hydrometeorological institution of the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) with the primary function of producing and disseminating information and related products. These institutions work together to improve the extent and quality of technical information about environmental hazards, drought and other related disaster risks that is available for policy makers in the region. However, in the broader context of information management and communication of experience on disaster risk reduction, the example of such specialized centres of knowledge, working within specific professional environments, highlights the problem of incorporating their information capabilities more systematically into conventional practices of risk reduction communication.

back

mation devoted especially to drought and other regional socio-economic and political issues relevant to the development process and governance that have a direct bearing on matters of risk awareness and management practices. In this latter respect, SARDC maintains the Musokotwane Environment Resource Centre for Southern Africa (IMERCSA) which provides users with current information on environment and disaster management in Southern Africa. It is also the leading regional centre for global reporting on the state of the environment, producing fact sheets on environmental issues and a newsletter about the Zambezi River basin. It published the comprehensive book, State of the Environment in Southern Africa, with the thematic updates, Water in Southern Africa and the forthcoming "Biodiversity of indigenous forests and woodlands".

With offices in Dar es Salaam, Harare and Maputo, and by working with partner organizations in all SADC countries, SARDC is well placed to facilitate seminars, to conduct briefings and undertake consultancies for information exchange on environmental issues, human development, gender, electoral processes and related aspects of information networking. Additionally, SARDC staff and correspondents produce a variety of articles and reports on these same subjects for the Southern African News Features media service. As part of its commitment to develop professional information and reporting capabilities in the region, SARDC also conducts regional training programmes involving attachments and exchanges for Southern African journalists, editors and documentalists.

Latin America and the Caribbean

As elsewhere, the worldwide revolution in digital communications has swept through Latin America and the Caribbean. As an example in a crucial area of disaster management responsibility, by 2000 practically all Ministry of Health disaster programmes in the region had been connected to the Internet. This global "network of networks" served as one of the key tools for response to the many emergencies spawned by the El Niño phenomenon of 1997-1998. The response and reconstruction activities that followed Hurricane Mitch are considered the first in which computer-mediated communications played a major role in decision-making. Risk management institutions and professionals are now routinely accustomed to seeking information from a large number of World Wide Web sites, such as www.disaster.info.desastres.net, sponsored by PAHO.

Regional Disaster Information Centre (CRID)

One of the most comprehensive sources of information on disaster and risk management in Latin America and the Caribbean is the Regional Disaster Information Centre (CRID), located in San José, Costa Rica. This Centre was established from a pilot scheme originally developed by the Pan American Health Organization (PAHO)/WHO in 1990, with a mission to reduce disaster vulnerability by promoting a culture of risk reduction and cooperative efforts in risk management activities.

In 1997 it was conceived as a multi-organizational project supported by PAHO, IDNDR, CEPREDENAC, IFRC, CNE, MSF.

CRID has proceeded to offer information and documentation online and for direct consultation at its offices on a wide range of subjects, in both Spanish and English. CRID provides governments, professionals and civil society organizations with abundant, unrestricted and freely available disaster information. A web site at www.crid.or.cr or www.crid.desastres.net provides online access to CRID resources as well as convenient links to other disaster information resources. It now responds to some 120,000 information requests yearly as measured by use of the information products available on the web site, requests for technical advice and information searches by electronic forms and mail.

Additional products available from CRID include a Virtual Disaster Library CD-ROM in English and Spanish, produced by the United Nations system, and the LILACS Bibliographic Database on CD-ROM, updated peri-

The Centre has become a regarded regional institution through its gathering, processing and dissemination of high-quality information, as well as a focal point for training and knowledge engineering related to bibliographic information technologies. A primary aspect of all its activities is the building of additional institutional capacities for the better management and wider dissemination of disaster information, or the management of national or local disaster information centres. While its efforts contribute to the institutionalization of a regional disaster information system, CRID also promotes the concept of decentralization and disaster information exchange so that institutions and users can access materials more easily. In order to fulfil these functions CRID provides the following information services:

- Assists a wide variety of institutional and individual users to search and find disaster and health-related information available through physical or electronic media;
- Electronic access to an extensive collection of documents and other source materials;
- Publication and distribution of information products such as bulletins, bibliographies, and other materials for both public and technical use;
- Development and delivery of training for disaster management information centres, in such areas as the use of databases, controlled vocabulary for disaster-related information, use of the Internet, etc.;
- Design, production and distribution of training materials;
- Collaboration with other institutions interested in disaster information management;
- Management of information management projects;
- Organization of information stands, participation in specific events, etc.

odically. Furthermore, CRID produces specialized bibliographies on specific disaster related issues. So far 30 issues of this Bibliodes series have been published and distributed to several thousand users in both print and electronic versions. Other information products developed by CRID include a variety of training modules on information management and the digitization of documents, made available online or on CD-ROM. The Centre also provides information management project administration services and provides technical advice to sister organizations on the development of web sites and other information products. Currently with funding from ISDR, PAHO/WHO and the United States National Library of Medicine, CRID is implementing a project aimed at creating better information management capacities in El Salvador, Honduras and Nicaragua.

CEPREDENAC

More specific to the disaster reduction activities of individual countries in Central America, the CEPREDENAC web site (www.cepredenac.org) contains continuously updated information on plans, programmes and projects in the region. The web site contains disaster statistics and analysis for the region, as well as links to the web sites of each of the national disaster organizations in Central America and many other risk and disaster management organizations active in the region. As the regional coordination centre for disaster prevention, CEPREDENAC has an important responsibility in encouraging economic and social planners working at national, regional and international levels to incorporate all information available in project design. This necessarily includes information about hazards and risks and how they may affect cost-benefit analyses of development and infrastructure projects, leading to possible design modifications that can bolster durable investments.

In 1999, CEPREDENAC produced a detailed inventory of available hazard, risk and vulnerability maps and related information as a first step in making them available to decision makers regionally and

back

A simplified version is available on the CEPREDENAC web site and an interactive format is being prepared to allow users to conduct searches and queries while online. Every source is described by the

- Type of map support, digital format, original software, etc.;
- Thematic nature of map (hazard, vulnerability, risk/type of hazard);
- Scale on which map is displayed, geographical coverage, year of last update;
- Institution in charge of compiling map information;
- Means of accessibility, reciprocity conditions.

investors worldwide. This inventory of 314 different cartographic references presents sources of information related to hazard, vulnerability or risk issues in Central America in a conventional database format. The inventory includes institutions located outside the region that have produced additional cartographic materials about Central America. The relational format of the database allows searches by country, institution and type of hazard.

LA RED

Disaster Inventory - LA RED

Wider public dissemination of disaster information is similarly served by the DESINVENTAR disaster inventory programme that was created and is maintained by the Latin American Network for the Social Study of Disaster Prevention (LA RED). This innovative software permits the storage and recovery of statistical analysis and graphic presentation of information about all types of damaging events registered in a database at the smallest territorial scale. Its utility has been demonstrated through its having become the official software used by all of the national disaster organizations in the region through an agreement fostered by CEPREDENAC. It will soon be introduced into the Caribbean under the joint auspices of the Association of Caribbean States and CEPREDENAC. In addition to this specific disaster inventory, the LA RED web site (www.desenredando.org) contains publications, reports about ongoing projects and additional information about social science initiatives in vulnerability and risk reduction throughout the Latin American and Caribbean region.

The Caribbean Disaster Information Network

The Caribbean Disaster Information Network (CARDIN) (www.cardin@uwimona.edu.jm) was established in 1999 at the library of the University of the West Indies at Mona, Jamaica. By drawing on the previous experience of, and working closely with, CEPREDENAC and CRID, CARDIN has pursued similar information objectives: to serve as a subregional Disaster Information Centre and to become the central focal point for the exchange of disaster information in the Caribbean. CARDIN provides important information and communication linkages between the various national disaster management organizations in Caribbean countries.

The CARDIN focus is to provide wider access and coverage of disaster information in the region and to facilitate the dissemination of disaster-related information to the general Caribbean public. It will strive to do that by working through electronic means on the World Wide Web, by publishing a newsletter and by document delivery services. It also intends to create a database of disaster related information that is available on the Internet, CDs and in print formats that will provide essential resources for policy makers, practitioners, researchers and the general public. CARDIN offers the following services:

- Document delivery services ;
- Documentation centre ;
- Online search for disaster information;
- Reference services;
- Electronic journals;
- Links to selected full-text databases;
- Dissemination of disaster information to the public through a web site, newsletters and document delivery services;
- Creation of full-text documents and scanned images pertaining to disaster-related issues in the Caribbean for wider electronic circulation;
- Expanded working relationships with other agencies for more effective coordination of disaster information activities within the region.

North America

The Natural Hazards Research and Applications Information Center at the University of Colorado in the United States was founded 30 years ago to "strengthen communication among researchers and the individuals and organizations concerned with mitigating natural disasters". Its Natural Hazards Observer is a free publication published ten times a year that provides current hazards and risk reduction information, resource and institutional contacts, new publications, announcements, research initiatives and findings across the entire range of professional disciplines and jurisdictional responsibilities involved with risk issues, predominantly in North America.

Copies of the Center's Disaster Research, an e-mail newsletter, the Natural Hazards Informer, a peer-reviewed series that summarizes current knowledge in specific areas of natural hazard interests, and many selected disaster-related Internet sites are all available on the Center's web site at www.colorado.edu/hazards. The Center also has an extensive specialized library which is catalogued on the web site as well as a wealth of material related to hazards research and the mitigation of natural disasters. All titles and the procedures to obtain the Center's many publications are also available on the Center's web site.

There are many other noteworthy disaster risk management or hazard research centres in the United States covering different subject areas or specializations. As the subject reflects rapidly growing public interest and professional relevance throughout United States society, several new centres dedicated to various aspects of risk management are being established. While many exist as part of a university or academic institution, others have been established as "charitable institutions", foundations, professional or scientific organizations, NGOs or commercial enterprises. Practically all of them are engaged in the exchange and dissemination of information related to risk reduction and virtually all such centres have web sites and additional information materials. An extensive list of these many sources of hazard and disaster information, institutes for study in related fields and all of their contact information are available on the Natural Hazards Center web site.

An example of regional collaboration to publicize hazard and risk assessments to a wider public audience can be cited from North America. In 1999, the National Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP) in Canada coordinated research with the National Centre for Disaster Prevention (CENAPRED) in Mexico and the United States Geological Survey (USGS) to produce the North American Map of Natural Hazards and Disasters. This comprehensive and informative series of maps drew on information from a number of existing sources and was published with very wide circulation by the American National Geographic Society*. The distribution of different natural hazards was combined with population characteristics to provide a simplified picture of risk and vulnerability throughout North America. Beyond the public education values served by the map, the joint exercise in producing it was instrumental in initiating cross-border dialogue and the sharing of knowledge between hazard experts and national, state/provincial and local organizations with interests in supporting hazard awareness and risk reduction in the three countries.

* The National Geographic Society, Natural Hazards of North America Map (Washington, D.C., July 1998).

back

Asia

In Asia, barely a start has been made to adequately compile the vast range of institutional abilities and breadth of information available on disaster risk reduction. There are important institutional focal points for the subject such as the ones that follow, but there are many more academic and technical facilities that address risk matters in their own areas of professional expertise or within the context of individual country needs.

Asian Disaster Preparedness Center
www.adpc.ait.ac.th.

The Asian Disaster Preparedness Center (ADPC) is a regional resource centre dedicated to disaster reduction for safer communities and sustainable development in Asia and the Pacific. Located in Bangkok, Thailand, ADPC is recognized as an important focal point for promoting disaster awareness and developing capabilities that foster institutionalized disaster management and mitigation policies. ADPC maintains a specialized library of disaster-related material and publishes the quarterly Asian Disaster Management News newsletter for the disaster management community in Asia and the Pacific. It also supports regional information exchange, networking and capacity- building through a European Community Humanitarian Office Disaster Preparedness (DIPECHO) programme in South-East Asia and by working through its partner organization in its Asian Urban Disaster Management Programme supported by the US/AID. Additional information about its wide-ranging information services and projects is available on the web site.

Asian Disaster Reduction Center
www.adrc.or.jp

Similarly, by collaborating with partners in Asian countries the Asian Disaster Reduction Center (ADRC) located in Kobe, Japan, accumulates and provides disaster reduction information throughout the region. The body of information available at ADRC provides a basis to carry out research into multinational disaster reduction particularly as it relates to multidisciplinary and multinational cooperation. The Center works through several mechanisms to convey information and to link different institutional activities related to disaster risk reduction in Asia. ADRC has developed a unique geographical information system for disaster management called VENTEN with the objectives of providing both a common structure for referring to disasters and also the data that it contains. It has also developed a comprehensive database on disaster management in collaboration with existing institutions such as CRED and OCHA/ReliefWeb and by drawing on the information resources of ADRC member and advisory countries. A network of NGOs in Asia called the Asian Disaster Reduction and Response Network (ADRRN) is also being formed to recognize the importance of NGOs in disaster reduction by exchanging information and promoting more collaborative relationships. These and other activities are accessible through the informative ADRC web site, and are addressed through a bi-weekly ADRC newsletter. Additionally, by including an extensive list of related institutional linkages in its web site, ADRC seeks to expand access to current information and to motivate broader opportunities of cooperation among already existing institutions.

Europe

A different type of information is provided by the Benfield Greig Hazard Research Centre (BGHRC) located at University College, London, in the United Kingdom. This centre has been recognized as a model of productive public-private collaboration in extending the availability and wider exposure of information about disaster risk reduction. It has the primary objective of providing a means to transfer advanced natural hazard and risk research, practice and innovation from the academic environment to the business world, government and international agencies. The intellectual products of BGHRC and Cranfield University of the UK fall into the two categories of strategic research about natural hazards and the processes that drive them, and more specific applied studies targeted at reducing the impact of natural hazards on society. There are also plans to publish a series of topical papers, "Issues in risk science", summarizing and promoting new research about natural hazards and associated risks, disaster management and related issues. Current information supplied by the Centre for disaster management professionals and the public includes the quarterly newsletter Alert and a series of working papers on disaster management that was launched in 2001. Individual projects have yielded their own materials for wider circulation, such as the operational manuals Communication During Volcanic Emergencies and Corporate Social Responsibility and Disaster Reduction.

Additionally, by being able to draw on an enviable range of hazards expertise from University College, London and through its own extensive research network, BGHRC provides public information resources and media access to academics, research organizations and government institutions in the United Kingdom, throughout Europe and internationally. This includes the dissemination of professional analysis and observations through an information service and the publication of event and post?loss reports that are all used widely by the media, including all the major United Kingdom radio and television news services and others in Europe, the United States and elsewhere.

In France, PRIM.NET (www.prim.net) is a French educational multidisciplinary internet portal from the Ministry of land-use planning and environment (MATE) which promotes the culture of natural and technological disaster prevention. It underlines the close relationship between the human being and its natural environment in the framework of sustainable development. It is a forum for teachers, students and citizens where they can find useful information in French.

back

Selected national information programmes

To varying degrees and with different intentions, individual countries have established their own distinctive approaches to institutionalizing information functions for disaster reduction. While recognizing that the information needs of countries vary and there are reasons for different emphases, there is nonetheless a growing recognition of the need to combine different types of information that could be collected or maintained historically within various departments or agencies. The examples that follow demonstrate some of the challenges that countries have faced in gaining a clear understanding of their respective risk issues and how four different countries are proceeding to update and consolidate the body of their information for improved disaster risk reduction. In all of the cases cited, improved hazard and disaster risk information was an essential precursor to the further development of strategic national disaster risk management programmes.

Recognizing the similarities between these factors and those revealed by the LA RED DESINVENTAR database in Latin America, the MANDISA disaster event database was conceived with the following considerations in mind:

- Disaster incidents can occur at different scales, ranging from household to provincial and national levels;
- Disaster risk is driven by the interaction between triggering hazard factors and underlying conditions of social, economic, environmental and infrastructural vulnerability;
- Disaster impacts can occur in different socio-economic sectors or subject contexts, and therefore may be recorded in a wide range of formats or institutional locations;
- Disaster risk can be reduced by minimizing vulnerability-ideally through ongoing, practical initiatives that achieve multiple development objectives; and most fundamentally,
- Public access to information about local patterns of disaster risk is empowering and facilitates community participation in decision-making, thus strengthening opportunities for responsive governance.

South Africa

In South Africa, the University of Cape Town's Disaster Mitigation for Sustainable Livelihoods Programme (DiMP) has developed a disaster information management system for the Monitoring, Mapping and Analysis of Disaster Incidents in South Africa (MANDISA). The objective of the project, co-financed by OFDA/USAID and DFID/UK, is to create a system that can document hazards, vulnerabilities and trends related to localized small to medium-scale disaster incidents and to organize that information for better decision-making. Despite an earlier fragmented to non-existent information base causing localized events to be frequently overlooked, these smaller events are now considered to have disproportionate impacts on already marginalized communities. Moreover, as information about these disaster events is stored in different government services, it has been nearly impossible to create a consolidated profile on municipal disaster occurrence and losses-either by type, location, consequences or over time.

During 1999/2000 a team of researchers identified more than a dozen sources concerning disaster losses in Cape Town alone, containing more than 10,000 records of disasters. This was in glaring contrast to only 20-30 disasters that had been officially declared during the same period. One of the telling observations of the research was that, with the exception of two electronic sources, all other information was confined to paperbound materials. Such widely distributed and often-incompatible sources of information highlight the challenges of creating effective, synthesized disaster information systems. This has made integrated disaster reduction planning virtually impossible.

The information organized by the project is now maintained in a database and linked to a GIS system, visible on a publicly accessible web site. Since the end of 2001 www.MANDISA.org.za has been consolidating data on disaster events that occurred in Cape Town between 1990 and 1999 and has been displaying them with related information in tables, maps, graphs and photos. Users can interrogate the database online and generate additional information about trends and patterns of disaster risk. It is anticipated that this will enable municipal planners and residents alike to consider disaster risks more strategically, just as crime, public health, traffic incidents and other forms of risk are considered to be important developmental priorities underlying broader aspects of basic human security. Improved access to additional information has

created a more readily understood concept of hazards and risks now that they are not marginalized as rare or unique occurrences "caused" simply by either natural or divine intervention.

China

In another context related to national policies for improved disaster risk reduction, the National Disaster Reduction Plan of the People's Republic of China *(NDRP)* adopted an objective to establish a comprehensive information system for the entire country. It seeks to strengthen the institutional abilities of sharing information, communication technology and operational experience among the many government departments and agencies already doing so, but only within their own respective fields. The central Government authorities approved a project in 1997 to create the *China National Center for Natural Disaster Reduction (CNCNDR)* and for it to act as the comprehensive national disaster information system serving the State Council, all ministries and government commissions, and linking central Government authorities with provinces and municipalities. It is expected that the system will be able to incorporate inputs from satellite remote sensing systems, provide comprehensive management system displays of disaster information, and form the basis of assessment and decision support systems by drawing on the widest possible range of professional and technical expertise throughout the country.

This wealth of material will then be provided for analysis and synthesis by the many technical and multidisciplinary abilities located in the *National Academy of Sciences*. By this unified process, the National Center will be able to make full use of the disaster reduction information and operational experience of all the relevant ministries, commissions, research institutions and social groups. It can then provide senior level officials with comprehensive information, professional services and technical guidance for more effective decision-making in matters of disaster risk management. Moreover, the Center is also expected to play an important role in professional training and public education in those specific fields concerned with national risk reduction. A new purpose-designed facility for the National Center for Natural Disaster Management is being established. The Center is expected to open officially in 2002.

India

India has also embarked on a strategic plan to improve the extent and availability of improved information for risk management activities. The Government of India's *High Powered Committee on Disaster Management Plans (HPC-DMP)* has decided to establish a *National Natural Disaster Knowledge Network*. The programme aims to facilitate an interactive, simultaneous dialogue between all official authorities, many professional disciplines and interested communities throughout the country involved with hazards and natural disasters. The *Nanadisk-Net* is planned as a powerful "network of networks" to store, manage and disseminate information and to connect government departments, research institutions, universities, community-based organizations and individuals working with the various aspects of hazard and disaster management. The system is intended to serve as a common repository for accumulated disaster management experience, with the advantage that the Network may then serve as a basis for expanded opportunities of distanced, electronic training. By including access to libraries and other resource institutions, these digital services will be able to provide much wider access to global databases, training materials and early warning systems. It is also anticipated that more technical, academic and professional institutions will become motivated to link into an integrated professional network that spans multiple professional sectors of interest.

Australia

The Australian Geological Survey Organization has been working with Emergency Management Australia (EMA) to establish the *Australian Disaster Information Network (AusDIN)*. AusDIN is a consortium of national agencies, state emergency authorities, universities and private enterprise representatives working to develop an information network that provides information for all types of crisis management including risk assessment, mitigation, planning, response and recovery activities. It is

back

designed to be an Internet-based service that provides accessibility to data and information services for a wide variety of people involved in disaster and risk management. AusDIN is being developed within the international framework provided by GDIN and is planned to be linked with GDIN information systems. It is, however, just one part of a more comprehensive Australian undertaking to improve the management of information for disaster and risk management purposes. Additional non-technical approaches are being developed to foster networks and forums for people involved in the provision of information relevant to anticipating and managing crisis.

One such related initiative has been undertaken by the Urban Geoscience Division of Geoscience Australia, the national agency for geoscience research and information. The *Australian Disaster Management Information Network (ADMIN)* undertakes holistic and comprehensive assessments and numerical modelling of risk from natural and man-made hazards in priority urban areas and addresses issues of concern to urban communities that require geoscientific information. The geophysical network carries out synoptic observations of earthquakes, tsunamis, geomagnetic fields as well as nuclear explosions. It seeks to increase national capacities for the distribution of comprehensive technical data and information for better disaster risk reduction and response.

Technical information service conveying experience about different hazards

Aside from the specific requirements of early warning which are reviewed in section 5.6, there are other examples of information centres devoted to specific hazards. Typically they convey frequently updated technical data as well as more general information about the changing events and circumstances pertaining to their individual hazard interests. They all fulfil a public information function and many are engaged in providing specialist reference material or advice to policy makers. A selection of these hazard information centres is provided. While most of them focus on a single type of hazard, the range of their professional contacts is typically quite extensive, reaching from scientific disciplines through environmental conditions to the social and economic dimensions of local communities where disaster reduction must eventually take place. Each of the examples below relates to the broad contexts in which disaster risk management information functions need to occur.

Integrated Hazard Information

The *United States Geological Survey's Center for Integration of Natural Disaster Information (CINDI)* is a good example in which information about multiple hazards is collected, integrated and communicated to a wider public. Its website at cindi.usgs.gov provides information about drought, earthquakes, floods, hurricanes, landslides, volcanoes, wildfire, geomagnetism and other special topical areas of risk viewed in the context of the earth sciences or natural resources involved. With Outreach, Research and Response dimensions this information center is able to provide near-real time monitoring of hazards by integrating a variety of technical information drawn from many sources, and then to communicate to either technical teams or decision-makers. After a disaster, the Center can combine remotely sensed data with archived information to assess the nature and extent of impact from a particular event. The compiled information which has international application is also available for use in inter-disciplinary research that contributes to the improved use of data for hazard and risk assessment, or in the development of risk management strategies by local or national officials.

Hydrometeorological Hazards

Information about hydrometeorological hazards is widely available through many institutional sources around the world, with specific current information as well as archived data related to individual countries accessible through every national meteorological and hydrological service. A wide variety of global products including forecasts valid for a period of 10 to 30 days are available at the three World Meteorological Centers located in:

- Melbourne (www.bom.gov.au),
- Moscow (www.mecom.ru/roshydro), and
- Washington, D.C. (www.nws.noaa.gov).

Specialized geographical products, and information related to specific types of hazards are compiled and widely disseminated by more than 20 *World Meteorological Organization Specialized Regional Meteorological Centers, (RSMCs)*. There are 24 RSMCs with related geographical specialization located in Algiers, Beijing, Bracknell, Brasilia, Buenos Aires, Cairo, Dakar, Darwin, Jeddah, Khabarovsk, Melbourne, Miami, Montreal, Moscow, Nairobi, New Delhi, Novosibirsk, Offenbach, Pretoria, Rome, Tashkent, Tokyo, Tunis/Casablanca, and Wellington.

There are also eight designated RSMCs for the provision of computer-generated models for analyzing environmental crises and for providing hydrological or meteorological guidance in emergency actions. These centers can provide specialized transport, dispersion, and deposition models in accordance with internationally recognized arrangements and standards. These centers are located in Bracknell UK. for Europe; Toulouse, France for Africa; Montreal and Washington D.C., for the Americas; Beijing, Obninsk (Russia) and Tokyo for Asia; and Melbourne for the Pacific Region.

Hydrological information is also available from many regional centers throughout the world. Hydrology and water-related issues are the focus of many international agencies. One such center with a global focus is the *Centre for Ecology and Hydrology (CEH)* www.nerc-wallingford.ac.uk. By contrast, extensive information and widespread institutional linkages related to drought and associated environmental conditions can be found at the *International Drought*

back

Information Center at the University of Nebraska in Lincoln, U.S.A. (www.ngdc.noaa.gov and enso.unl.edu/agmet/ centers.htm), which also offers a series of regional training seminars on drought management and planning techniques aimed at training scientists and policymakers worldwide in the science of drought management and preparedness. Another source is the *Oxford Drought Research Institute in the U.K.*

Climate Change

An important international initiative has been proceeding since mid-2001 by an Inter-Commission Task Team convened under the auspices of the *World Meteorological Organization (WMO)*, its technical commissions and Member States to create a series of associated Regional Climate Centers (RCCs) Although individual centers are not yet established, they are being planned in order to increase the collaboration among climatological, meteorological and hydrological /water resources management technical communities and to facilitate the widespread availability of climatic information pertaining to longer term forecasting. With the recognized need for more consistent technical criteria for data generation and exchange, and broader forms of inter-sectoral information analysis and dissemination particularly regarding the availability of seasonal to inter-annual forecasts, work is continuing to define both the potential organizational and functional responsibilities of Regional Climate Centers.

While this endeavor will necessarily draw heavily on the already established National Meteorological and Hydrological Services of individual countries, as well as the RSMCs engaged in providing a variety of hazard information and forecast products, the initiative is a timely indication of institutional moves to address emerging global needs for both technical and public information about changing perceptions of risk. In recent years the Regional Climate Outlook Forums have played a key

Other RSMCs specialize in tropical cyclone forecasting and the dissemination of related information services. These include:

- Nadi, Fiji Tropical Cyclone Centre covering the South-west Pacific Region, (www.met.gov.fj/advisories);
- Honolulu Hurricane Center for the Central North Pacific Ocean, (www.nws.noaa.gov/pr/hnl/cphc/pages/cphc.shtml);
- New Delhi Tropical Cyclone Centre, for the eastern Indian Ocean, (www.imd.ernet.in/services/cyclone/cyclone-warning-services);
- Miami Hurricane Center for the Atlantic Ocean and Caribbean Sea, (www.nhc.noaa.gov/products),;
- Tokyo Typhoon Centre for the western Pacific and Asian Region (ddb.kishou.go.jp/typhoon/cyclone/cyclone);
- La Réunion Tropical Cyclone Centre for the western part of the Indian Ocean, (www.meteo.fr/temps/domtom/La_Reunion/trajGP/data/home_trajGP).

In addition there are Tropical Cyclone Warning Centers that have more specific localized regional responsibilities, such as those exemplified by the following:

- the Perth Bureau of Meteorology coverage for Western Australia, (www.bom.gov.au/weather/wa),
- the Darwin Bureau of Meteorology for the waters north of Australia, (www.bom.gov.au/weather/nt/inside/cyclone/cyclone.shtml),
- the Brisbane Bureau of Meteorology for coverage of the Coral Sea, (www.bom.gov.au/weather/qld/cyclone),
- the Port Moresby, Papua New Guinea National Weather Service for the Solomon Sea and Gulf of Papua, (website under preparation) and
- the Wellington Meteorological Service of New Zealand, Ltd. for the Southern Seas etc. (www.metservice.co.nz/forecasts/high_seas.asp)

role in defining these future requirements for RCC functions in the Regions through their cross-program analysis and wide circulation of multi-disciplinary information. At the same time the predominant, and distinctive, roles and requirements of different geographical regions around the world are recognized as being crucial to the most effective accomplishment of the intended objectives. As a broad conceptual framework of RCCs continues to emerge, attention will proceed with individual Regions considering their specific requirements and assessing current operational and technical abilities to meet them.

Wildfire and related hazards

The current state of fire science that includes fundamental fire research and fire ecology and the results of bio-geochemical and atmospheric sciences research of the last decade provide sufficient knowledge to support decision-making in fire policy at most management levels of responsibility. However, in many countries this wealth of knowledge and expertise is either not known or is not readily accessible and available for developing adequate fire policies and related measures of operational management. The prolonged and severe fire and smoke episode that occurred in Southeast Asia in 1997-98 demonstrated that the available knowledge about fire and the related management expertise was utilized only to a limited extent. These circumstances led to confusion and uncertainty at national, regional and international levels of responsibility, resulting in delayed decisions and the late application of appropriately targeted international response to the fire and smoke emergencies. Retrospectively this could be explained by the lack of a regional Southeast Asian fire information system.

Considering the wider extent of fire issues around the world, as well as the extent of global experience in the field. The establishment of an institution preliminarily designated as a "Global Fire Management Facility" was proposed by a number of international conferences since 1996. On the basis of these recommendations the Government of Germany responded through the Office for the Coordination of Humanitarian Assistance in the Ministry of Foreign Affairs to establish a *Global Fire Monitoring Center (GFMC)* at the Max Planck Institute for Chemistry in Freiburg, Germany from October 1998.

The GFMC serves an active role in the documentation, information and monitoring service functions among the fire science community, the technical community of engineering, technology development, the primary user community of fire managers, as well as policy makers. It aims to provide widespread and timely information in the field of long-term strategic planning for the prevention of disastrous wildland fires as well as enabling preparedness measures and appropriate responses for fire emergencies. A worldwide network of many institutions and individuals generates GFMC products of both national and global scale. All of that information and data are systematically collected, interpreted and displayed on the Internet by the GFMC at www.uni-freiburg.de/fireglobe. The information remains current, being updated frequently, and as may be required, daily. It is then archived for future reference or research purposes.

Seismic Hazards

While there are many seismological and seismic engineering institutes around the world, widely known among the practitioners most immediately involved for their technical or informational services. Two representative examples of information centers are cited here that are particularly engaged in the dissemination of information about the seismic hazards.

The Earthquake Hazards Program of the United States Geological Survey (EHP/USGS) is part of the National Earthquake Hazards Reduction Program lead by the Federal Emergency Management Agency. This program has the primary objective to provide relevant earthquake science information and knowledge for reducing deaths, injuries, and property damage from earthquakes through understanding of their characteristics and effects and by providing the information and knowledge needed to mitigate those losses. The EHP/USGS' role is to provide earth sciences information and related products for earthquake loss reduction. Information is available on its website at (www.earthquake.usgs.gov/) to serve its specific goals.

back

The Earthquake Engineering Research Institute (EERI), in the United States is a national nonprofit, technical society of engineers, geoscientists, architects, planners, public officials, and social scientists, with the objective to reduce earthquake risk by advancing the science and practice of earthquake engineering. The organization seeks to accomplish this objective by improving the understanding of the impact of earthquakes on the physical, social, economic, political and cultural environments, and by advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes. EERI is recognized as the authoritative source for earthquake risk reduction information in the USA, and in partnership with other nations, and is involved in developing earthquake risk reduction information worldwide.

The Institute is best known for its field investigations and reconnaissance reports detailing the effects of destructive earthquakes. Often EERI serves as coordinator for the investigative efforts of several organizations. EERI membership includes leading earthquake investigators in all relevant fields from many countries, and has been engaged for many years in a project, with National Science Foundation support, to maximize the learning from destructive earthquakes. Preliminary information on the effects of destructive events is published in the monthly Newsletter. Larger reports on major earthquakes are published as supplements to Earthquake Spectra, EERI's quarterly professional journal. EERI also sponsors post-earthquake technical briefings, an effort to reach professional communities throughout the United States.

In addition to its publications, EERI has produced more than 50 slide sets covering specific earthquakes and their impacts, earthquake resistant design, seismicity, unreinforced masonry buildings, loss reduction measures, mitigation of earthquake hazards, and a new series on earthquake basics. Videotapes produced by EERI include technical briefings on the Armenia, Loma Prieta, and Hokkaido-nansei-oki earthquakes. Further information about EERI and the availability of its information materials can be found on the organization's website at www.EERI.org.

Primary GFMC products include

- early warning of fire danger
- near-real time monitoring of fire events
- interpretation and synthesis of fire information
- archive of global fire information
- facilitation of links between national and international institutions involved in fire research, development and policy development
- support of local, national and international bodies to develop long-term strategies or policies for wildland fire management
- emergency hotline and (restricted) liaison capabilities for providing assistance in rapid assessment and decision-support for responding to wildland fire emergencies.

Volcanic Hazards

Within the volcanological community, the *World Organization of Volcano Observatories (WOVO)*, a commission of *IAVCEI,* is starting to build a major database involving information about the former "Decade" volcanoes. (www.volcano.undp.nodak.edu/vwdocs/wovo)

By providing both researchers and citizens alike more access to the details that scientists are monitoring, it will help everyone proceed from overly simplistic considerations of "whether a volcano will erupt tomorrow or not", to a more realistic availability of data with interpretations provided along with their accompanying uncertainties. The system will also convey information about what is being monitored to reduce those uncertainties, and clarify what else can and cannot be forecast. Initially, the database, *WOVOdat* will be an historical database so that observatories can conduct their own research for two years before providing data to WOVOdat, but eventually, it is anticipated that observatories may realize the broader benefits to be gained by sharing data in real-time.

A second initiative to disseminate more volcanological information more widely also involves public electronic access. It is widely known that volcanic eruptions affect people and things in often predictable ways, but information about these effects has been spotty and not relayed systematically from the site of one eruption to the next. Many lessons are unnecessarily relearned, and further research elsewhere is impeded by others rediscovering basic knowledge derived from previous global experience. Efforts are currently underway to update a global compendium that will compile current information about the effects of volcanic eruptions - including practical tips for their mitigation. This will be placed on the Internet for easy access from nearly any country and allow, for example, a water supply engineer and rice agronomist in one country to learn from the prior experience of a water supply engineer and rice agronomist in another country, within minutes. Pictures will illustrate the problems, while text will provide details and suggest possible mitigation measures.

back

Future challenges and priorities

The wide range of selected information services and program initiatives described above provide a basis to identify primary areas for future improvements in information management and the communication of experience in disaster risk reduction. Five key areas are identified:

- Availability of information
- Necessary capacities to utilize data
- Clearing house responsibilities
- Expanded access to information
- Future technology

Availability of information

There is currently abundant information, available globally, on disaster risk reduction but that does not necessarily translate into its widespread availability, nor is it particularly well targeted for all potential users. In many places and cultures there is little relevant information conveyed that is suited to local languages or the actual living conditions of people exposed to natural hazards.

The very abundance of information also creates a problem for non-specialized or public users to ascertain the relative value or quality of specific information, if they are unaware of the originating source or broader professional context of the various sources.

Useful information demands that databases be kept current, bibliographic resources be continually expanded, and that access and search criteria should remain consistent and be widely understood by an expanding user group.

Necessary capacities to utilize data

Frequent observations are made by individual country authorities about the inadequacy of many institutions that frustrate their desire to know exactly what relevant information exists, where to find it, and how to access it in the most efficient manner.

A priority initiative of considerable benefit would be the joint conduct of a national audit about risk-related information needs, availability and limitations. International organizations could help by providing guidance about existing sources or means for obtaining well-suited information.

The engagement of existing regionally-focussed information centres such as CRED, CARDIN, ADPC, ADRC, and the University of Colorado's Natural Hazard Center, and the use of their experience in linking suppliers of information with practitioners would be particularly valuable.

Clearing house responsibilities

There is a glaring need for an international capacity to fulfil clearing house functions specifically related to the identification, ordering and dissemination of hazards and disaster risk-management information. The intended role is one that could foster the exchange of relevant information through the use of *lists of lists*, directories, and catalogue/search/retrieve/deliver procedures that would serve to direct and connect a very wide range of users and practitioners for all policy-making levels. Such facilities exist but concentrate on international disaster response or disaster preparedness, such as ReliefWeb and GDIN.

The ISDR secretariat is working in association with partners, and is in the process of strengthening its web site and resource centre to build a comprehensive and easily accessible series of directories and linkages that can form the basis of an approach to such a global clearing house function for disaster reduction.

By pursuing the issue globally, the existence of primary information gaps, the inadequacy of relevant data, or geographical shortfalls in information availability or dissemination may be more easily identified and addressed. Such a coordinated approach can also, with adequate

support, contribute to the establishment of commonly accepted protocols or procedures for recording or exchanging disaster risk reduction information, similar in function to the new XML protocol being used in the global software industry.

Other commonly acknowledged practices could greatly expand the availability of risk-related information by establishing nomenclature and facilitating search procedures related to key words, such as *yellow pages* type directories, contact details of widely recognized specialist institutions and international experts in key areas of risk reduction.

Experience gained over the years from the evolution of ReliefWeb as an acknowledged information-rich resource could be beneficial to the development of a similar comprehensive information platform dedicated to risk issues and disaster reduction information. Such a comprehensive PreventionWeb does not yet exist but could be a powerful instrument within ISDR to motivate and serve the different constituencies associated with disaster risk assessment and reduction activities worldwide.

Expanded access to information

Beyond the technical limitations of information systems, more attention needs to be devoted to the human dimension of communication, with both policies and facilities that encourage a much wider opportunity for popular and community-based involvement in information processing and dissemination. This can be achieved through local risk maps based on community needs and values, public access information portals, or facilities that enable the shared exchange of locally-derived risk information among communities or countries.

In all such efforts to bring information practice closer to people most at risk, much more attention must be given to ensure that the costs associated with the availability or exchange of disaster information are affordable at local scales, particularly when applied to low and medium income countries, or among more isolated and distant communities. There is a need to support and expand local, national and regional documentation centres and library services related to the topics.

The rapid and widespread use of mobile telephones and the often innovative economies associated with their use, offers a promising opportunity to marry technology with local capacities. The more effective use of radio media, in association with the availability of wind-up radios, represents another example of expanding traditional means of communication for a more informed and engaged population in matters of risk management. (See section on public awareness.)

Future technology

The wider public use of learning systems and artificial intelligence can lead to an increased access to risk management information, which would be better adapted to the needs of specific users. The applications offered by the latest information technology provide a powerful interactive working tool for the extended disaster risk community. Through applications such as electronic conferencing and distance learning via Internet, immediate sharing of documents and drafts, efficiency and timeliness will increase.

Other applications could be developed further to enhance information on disasters and risk reduction. GIS, remote sensing imagery and satellite observations can help considerably to show vulnerable areas, enhance mapping, and ameliorate the understanding of hazards. Agencies like the United Nations Office for Outer Space Affairs (UN/OOSA), the Committee on the Peaceful Uses of Outer Space (COPUOS), the Committee on Earth Observation Satellites (CEOS), the Council of Europe Major Hazards Agreement (EUR-OPA), and the European Commission Joint Research Centre (EC/JRC) already contribute to these tasks.