C R E D

An Analytical Review of Selected Data Sets on Natural Disasters and Impacts

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PREFACE

In preparation for the ProVention Consortium's Global Risk Identification Program (GRIP) Workshop on the Compilation of Reliable Data on Natural Disaster Occurrence and Impact, the United Nations Development Program (UNDP) and the Centre for Research on the Epidemiology of Disasters (CRED) have undertaken an analytical review of existing available historical disaster databases. The principal researcher was Liz Tschoegl in collaboration with Debarati Guha-Sapir and Regina Below from CRED. Comments from David Hargitt (CRED) are gratefully acknowledged.

ABBREVIATIONS

ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
AFP	Agence France-Presse
APELL	Awareness and Preparation for Emergencies on a Local Level
BARPI	Bureau d'Analyses des Risques et des Pollutions Industrielles of the French Ministry of the Environment
BASICS	British Association for Immediate Care
BBC	British Broadcasting Corporation
CDD	Canadian Disaster Database
COEN	National Emergency Commission of Ecuador
COPECO	Comision Permanente de Contingencias
DCN	Civil Defense of Nicaragua
CRED	Centre for Research on the Epidemiology of Disasters
DFO	Dartmouth Flood Observatory
DiMP	Disaster Mitigation for Sustainable Livelihoods Program
DROMIC	Disaster Response Operations Monitoring & Information Center
DWSD	Department of Social Welfare and Development
EM-DAT	Emergency Management Disaster Database
EMA	Emergency Management Australia
FAO	Food and Agricultural Organization
GLIDE	Global Disaster Identification Number
GRIP	Global Risk Identification Program
IFRC	International Federation of the Red Cross
ISDR	International Strategy for Disaster Reduction
MAHB	Major Accidents Hazard Bureau
MANDISA	Monitoring, Mapping, and Analysis of Disaster Incidents in South Africa
MARS	Major Accident Reporting System
MHIDAS	Major Hazard Incident Data Service
NCDC	National Climatic Data Center
NEMO	National Emergency Management Organization
NGDC	National Geophysical Data Center
NGO	Non Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NSET	National Society for Earthquake Technology
NWS	National Weather Service
OCHA	Office for the Coordination of Humanitarian Affairs (UN)
OCIPEP	Office of Critical Infrastructure Protection and Emergency Preparedness
OECD	Organization for Economic Cooperation and Development
OFDA	Office of Foreign Disaster Assistance
UNESCO	United Nations Educational, Scientific, and Cultural Organization
PAHO	Pan American Health Organization
PSEPC	Public Safety and Emergency Preparedness Canada
SHELDUS	Spatial Hazard Events and Losses Database for the United States
UN	United Nations
UNDP	United Nations Development Program
UNEP	United National Environmental Programme
USGS	United States Geological Survey
WFP	World Food Program

1. INTRODUCTION/BACKGROUND

Recent figures show that between 2004 and 2005 there was an 18% increase in the number of natural disasters worldwide. Although loss of life was significantly lower in 2005, the number of people affected continues to rise (1). Climate change, environmental degradation, the impact of epidemics such as HIV/AIDS, and development within high-risk zones (2) have all contributed to increased vulnerability, particularly for poorer countries whose people suffer disproportionate economic losses relative to national income as a result of natural disasters. All of these factors continue to pose challenges to disaster reduction and mitigation.

Development and responses agencies have recognized the importance of disaster planning and preparation in protecting vulnerable populations from the effects of natural disasters. The systematic collection of information related to the frequency and impact of disasters provides an invaluable tool to governments and institutions in charge of funding planning and relief activities (3).

However, there is a lack of international consensus regarding best practice for collecting data on natural disasters. Along with the complexity of collecting information in disasters due to the constraints of time, funding, and the complexity of the situation there also remains huge variability in definitions, methodologies, sources, and data points collected.

The Workshop for Improving the Compilation of Reliable Data on Disaster Occurrence and Impact is an opportunity for agencies working in the field of disaster data compilation and analysis to synthesize experiences in creating and maintaining disaster databases. The following paper is an effort to document those experiences and provide a background for discussions on improving current and emerging databases.

2. METHODOLOGY

2.1 OBJECTIVES

This paper aims to summarize the content, presentation, and accessibility of a select group of international, national, regional, and event-specific disaster loss databases. The objective is to provide as comprehensive a view as possible of the current disaster database landscape to better identify gaps in information and strengths in our individual interpretations.

2.2 CRITERIA FOR SELECTING DATABASES FOR REVIEW

Setting the criteria for selecting natural disaster databases for review was required but proved to be a challenging exercise as there exists no agreed upon definitions for "natural", "disaster", or "database".

Natural disaster types were defined as follows; drought, earthquakes, epidemics, extreme temperatures, floods, insect infestation, slides, volcanoes, waves/surges, wildfires, windstorms, industrial accidents and transport accidents (4). Disaster types such as panic, accident, and structural (5) were also included. Database which collect any or all of the above disaster types were included.

From a methodological standpoint, the definition of "disaster" helps to clarify the scope of events that are being analyzed and collected. Viewed in another light, the definition clarifies the overall mission of a database (5). An event is commonly considered a disaster or catastrophe when "the affected regions' ability to help themselves is clearly overstretched and supranational or international assistance is required as is the case when there are thousands of fatalities, when hundreds of thousands of people are made homeless, or when the economic losses reach exceptional

orders of magnitude**"**(6). Where possible, attempts were made to ascertain the criteria for what constitutes a disaster. However, a database was not excluded if no definition was provided, as there is no "gold standard" for what constitutes a disaster.

Reviewed databases were restricted to those that systematically collected information relating to human and/or economic losses due to disaster (7). Hazard databases such as the National Climatic Data Center's (NCDC) drought database (http://www.orbit.nesdis.noaa.gov/smcd/emb/vci/current.html) which only provide reports of trends were excluded. Recycled versions of profiled databases (World Disasters Report of the IFRC) were excluded. Disaster databases such as ReliefWeb (http://www.reliefweb.net) were ultimately not included in the review because, although ReliefWeb provides useful country profiles and links to disaster resources, it does not appear to collect searchable disaster statistics relating to human and economic loss.

2.3 SEARCH STRATEGY

As the aim was to identify historical databases searches were not limited to a specific time-period. Regrettably, searches were limited to English language databases, which limited the scope of the review.

Publicly available databases were identified using the Google internet search engine. Keywords used to identify relevant databases included "natural disaster", "disaster database(s)", "flood database(s)", "drought database(s)", and "typhoon database(s)".

Integral to the identification of relevant databases were interviews and inputs from the following; Debarati Guha-Sapir (CRED), Regina Below (CRED), Maxx Dilley (UNDP), Julio Serge (UNDP), Kamal Kishore (UNDP), Rajesh Sharma (UNDP), Cristina Rosales (DesInventar), Masaru Arakida (ADRC), Pedro Basabe (UN/ISDR), Lianne Bellisario (PSEPC), Dr. Ailsa Holloway (University of Cape Town).

2.4 METHODS OF REVIEW

Internet searching for disaster databases produced an innumerate number of references thus inclusion criteria were employed to identify references most useful to the review. Unfortunately, databases with restricted access, under construction, or under the domain of another organization were sometimes outside the scope of this review. In some cases, websites of respected agencies in the field such as the International Strategy for Disaster Reduction (ISDR) provided invaluable links to disaster databases. Finally, contributions from the above provided a substantial amount of the information used in this review.

Relevant databases were reviewed by means of an adapted template of characteristics previously used in other reviews (3). An analytical component was also added to detail the presentation and accessibility of each database.

Every attempt was made to highlight both the strengths and weaknesses of all reviewed databases. The following analysis was not intended as a means of praising one database at the expense of another. Nor does the paper claim to be comprehensive. It must be recognized that due to limitations of time, language, and resources there are probably notable gaps in information. Rather the following is an attempt to document a representative sample of the currently available disaster databases. The hope is that this will enable users to identify appropriate data sources (3) and also act as a means of learning from the experiences of our colleagues in the field.

3. DESCRIPTION OF DATABASES

For ease of reference, the reviews of databases have been broken up into categories: international, regional, national, disaster event, and country-level disaster databases. Although some databases conceivably span two categories, as is the case with national event-specific databases, for the most part the category into which each database belongs is clear.

3.1 INTERNATIONAL DATABASES

3.1.1. Centre for Research on the Epidemiology of Disasters (CRED): EM-DAT

The Emergency Disasters Data Base (EM-DAT) managed by the Centre for Research on the Epidemiology of Disasters (CRED) at the Catholic University of Louvain, Belgium is a publicly accessible international database collecting information on natural and technological disasters. The database contains approximately 15,700 entries with an average of 700 new entries per year and covers the period from 1900 to the present. It is updated on a daily basis and made available to the public once a month after validation of the figures. Criteria for inclusion in the database are as follows: ≥ 10 people killed, and/or ≥ 100 people reported affected, and/or a declaration of a state of emergency, and/or a call for international assistance (4). Events are entered on a country-level basis and information collected includes location, date, number of people killed/injured/affected, number homeless, and estimated damage costs. Sources include governments, UN agencies (UNEP, OCHA, WFP, and FAO), NGOs (IFRC), research institutions, insurance institutions (Lloyds) and press agencies, although priority is given to UN agencies. Amongst disaster databases, EM-DAT provides one of the most comprehensive and transparent explanations of the methodology employed. The database is searchable by country, disaster type, or timeframe. Due to the nature of the inclusion criteria, EM-DAT maintains a "global observation level and a national resolution level" (8). This makes some smaller scale disasters "invisible" and creates difficulties for agencies attempting to disaggregate disasters at a local or municipal level.
[Accessed March 15, 2006: http://www.cred.be]

3.1.2. Münich Reinsurance Company: NatCat

NatCat is a private international level disaster database maintained by Munich Reinsurance Company. NatCat collects information on natural disasters (excluding technological disasters) and entries cover a period from 79AD to the present (although only major events are recorded prior to 1980). There are over 20,000 entries in the database with approximately 800 new entries per year, in part due to the lack of exclusion criteria enforced (3). Events are entered on a country and event level and recorded information includes number of people killed/injured/affected, economic losses, and scientific data such as wind speed, magnitude, and geocoding (6). Sources include national insurance agencies, Lloyds, press and media, UN agencies, NGOs, world weather services, clients and subsidiaries. Priority is given to clients and branches, and insurance industry reports. Due to the availability of resources, NatCat is able to provide detailed economic loss data which is not always found in databases that rely on humanitarian agencies in the field. However, because of its dependence on calculating insured losses, it provides less data for areas with lower insurance coverage (9). The database is partially accessible to the public, although it requires the most recent internet operating systems to view the data, and more is only available to clients of Munich Re. The publicly available information includes a short report searchable by country, time-period, or event type (limited to earthquake, flood, volcanic eruption, storm, other) and provides georeferencing, but only provides information on a very limited number of natural disaster types. As it partially publicly accessible, it is not possible to report on any search functions of the database.
[Accessed March 15, 2006: http://mrnathan.munichre.com]

3.1.3. Swiss Reinsurance Company: Sigma

Swiss Reinsurance Company maintains the Sigma database, a limited access global natural (excluding drought) and man-made disaster database. Events are recorded from 1970 to the present. There are approximately 7000 entries in the database with 300 new entries per year probably due to the more stringent inclusion criteria. Sigma requires at least one of the following for inclusion in the database; ≥20 deaths and/or, ≥50 injured and/or, ≥2000 homeless and/or, insured losses >US$14 million (Marine), >US$28 million (Aviation), >US$35 million (all other losses), and/or total losses in excess of US$70 million. Disasters are recorded on an event entry basis and recorded information includes dead, missing, injured, and homeless, along with detailed accounting of insured and uninsured damages. However, Sigma does not report "affected" nor does it clearly define the variables of homeless, causing an underreporting of human effects (3). Sources of information include newspapers, Lloyds, primary insurance and reinsurance periodicals, internal reports, and online databases although no primary source is suggested. Again, the lack of public accessibility to the Sigma database makes it difficult to report on the ability to search the database. However, Sigma does provide a yearly publication of "raw information" listing all disasters for the year.
[Accessed on March 15, 2006: http://www.swissre.com]

3.1.4. ADRC: GLIDE

The Global Disaster Identifier Number (GLIDE) is a project initiated and maintained by the Asian Disaster Reduction Center (ADRC) in collaboration with ISDR, CRED, UNDP, IFRC, FAO, World Bank, OFDA/USAID, LA Red, and OCHA/ReliefWeb (8). A GLIDE number is generated for all disaster events with the aim being that the number is then attached to all databases documenting the same disaster thereby linking the various information sources. The GLIDE database is searchable by date, disaster type, country, and GLIDE number. Information produced by a search includes date, duration of event, location, magnitude, information source used, and a description of the event which will include human and economic loss information where available.
[Accessed March 15, 2006: http://www.glidenumber.net]

3.1.5. University of Richmond: Disaster Database Project

The Disaster Database Project is an independent database created and maintained by Dr. Walter Green at the University of Richmond. International in scope and publicly accessible the database has 1552 recorded entries with the earliest dating to a volcanic eruption in Java in 2000BCE. The database dichotomizes disasters into natural disasters, conflict-based disasters, and human systems failures although definitions of the three are not readily available on the website. Inclusion of a disaster in the database is based on the following criteria: "if the disaster represents a threat to life, property, or the environment; they would have required the use of emergency procedures for the limitation and resolution of their impact; they reasonably could have caused a responsible jurisdiction, agency, or organization to invoke or declare the existence of an emergency situation or to mobilize its resources in response and; that some significant degree of community or organization impact was present.." (10) The main sources of information are government reports, newspapers, and scholarly texts. The database collects information on location (including latitude and longitude where available), date and time (including end date and duration), class and intensity of event. However, along with people missing, injured, and displaced, the database attempts to collect information on animals killed, buildings destroyed, the area covered, and the cost of the disaster. Finally, what is most interesting is the way in which the database attempts to disaggregate the disaster into phases; prodrome, development, impact, response, and recovery, giving a detailed description of the factors involved in each phase and a narrative of the event during the particular phase. The

database is easily searchable by type of disaster, disaster class, year, location, or maidenhead grid but it is not clear how source data is validated.

[Accessed March 15, 2006: http://learning.richmond.edu/disaster/index.cfm]

3.1.6. BASICS

The British Association for Immediate Care (BASICS), a U.K. based charity, maintains a database of natural and technological disasters. The database contains approximately 7500 records dating back to the Mount Vesuvius eruption in 79AD. The database is searchable by two methods. By accessing the following URL http://www.basedn.freeserve.co.uk/ it is possible to search by type of disaster only. Information on disaster type, date, location, number of people dead/injured, and additional comments are listed although the completeness of the records varies between disasters. It is also possible to access the website via another URL on an associated webpage: http://www.basics.org.uk/data/searchPage.php. It is possible to search by date, country, and/or casualties or incident type freely entered. However, the information provided only includes the incident, the number dead, and the additional comments. There is no methodology provided to suggest sources of information or inclusion criteria and the different search options are slightly confusing.

3.2 REGIONAL DATABASES

3.2.1. La RED: DesInventar: Latin America and Caribbean

The Network for Social Studies on Disaster Prevention in Latin America (LA Red) began developing the DesInventar methodology in 1994. DesInventar maintains approximately 16 national-level natural and technological disaster databases in Latin America (see Table 1). Although the databases are accessible through downloadable software on an individual national-level, they represent through their collection via the website regional coverage of Latin America. Although it is not possible in this review to comment on each of the included databases, a short description of the sponsoring institution, date range of entries, number of entries and sources used are detailed in Table 1. The databases represent over 44,000 disaster event entries spanning over 30 years although some of the databases maintain records dating much further back. One of the main differences of the DesInventar methodology is in its definition of disasters as "a set of adverse effects caused by social-natural and natural phenomena on human life, properties and infrastructure within a specific geographic unit during a given period of time" (11). DesInventar attempts to collect the more standard variables of number killed, injured, and estimated economic costs, but also attempts to collect less easily quantifiable variables surrounding infrastructure damage as a means of detailing the social effects of disasters. Because of the national level of data collection DesInventar is able to collect detailed information of small and medium scale disasters that are often not represented in larger scale databases, though it has been recognized that this level of resolution contributes to the exaggerated numbers of people affected (9). Though DesInventar utilizes government agencies, NGOs, and research institutes for source data, it relies heavily on news media as a priority source - which remains controversial. The DesConsultar tool makes searching the variables collected easy but disaggregating the data for individual events provided in the databases continues to be a challenge.

[Accessed March 20, 2006: http://www.desinventar.org]

3.3.2. Asian Disaster Reduction Center (ADRC)

The Asian Disaster Reduction Center (ADRC) maintains a database of Disaster Information for Member Countries, which provides information about natural disasters in Asia and Southeast Asia. Information is available in English and Japanese and the database is searchable by member country with entries beginning in 1998 and continuing to the present. Events are listed in

chronological order and therefore easily searchable if an exact date of the event is known. It is not clear from the website what the criteria for inclusion are as there are few entries listed for each country. Disaster entries include the GLIDE number, location of event, date/duration, number dead, and injured, evacuated, and material damages as reported by contributing sources. Sources include UN agencies (OCHA), Reuters and international news agencies (AFP, BBC, CNN), and NGOs (IFRC, Catholic Relief Services).

[Accessed by March 15, 2006: http://www.adrc.or.jp/disaster_information_aca.php]

3.3 NATIONAL DATABASES

3.3.1. Australia: Emergency Management Australia Disasters Database

The EMA Disasters Database (Emergency Management Australia), sponsored by the Australian government, is the primary resource for all national level natural and technological disasters. Available in the public domain, the database has recorded events from 1622 to the present and includes events in which any or all of the following occurred "≥ 3 or more dead, 20 injured or ill, and/or significant damage to property, infrastructure, agriculture or environment, or disruption to essential services, commerce, industry, or trauma or dislocation of the community at an estimated total cost of A$10,000,000 or more" (12). Detailed information on the duration of the event, number of people killed, injured, affected, homeless, and evacuated along with an accounting of economic loss, including insured loss, is available. However, location is limited to area and region and few maps were available, although the database suggested that they should be there. The database is searchable by region, zone, date, or through an advanced search by disaster effect (people killed, cost range). Although there is no indication of a primary source, the database draws on information from government, the Insurance Council of Australia, emergency service agencies, research bodies, educational institutions, and press media.

[Accessed March 15, 2006: http://www.ema.gov.au/ema/emaDisasters.nsf]

3.3.2. St Lucia: St. Lucia Disaster Matrix

The government of St. Lucia through NEMO (National Emergency Management Organization) has developed the St. Lucia Disaster Matrix. Presented in spreadsheet format the matrix provides information on natural and technological disasters for St. Lucia. The database lists 55 entries spanning from 1780-2004 and includes information on the date of the event, the number killed, homeless, the cost of the event, and comments. Historical records of earthquakes prior to 1990 are included in the matrix. However, after 1990 it appears that earthquakes are recorded on separate spreadsheets, which, although including geophysical information (latitude/longitude, depth), do not provide any human, or economic loss data. Information is provided by government, UNESCO/PAHO, academic institutions, and media though no priority source is suggested. It does not appear that the database has been updated since November 2004 and therefore it is unclear whether this is a continuing effort. There are no links to contact information or an explanation of the methodology available online.

[Accessed March 15, 2006:
http://www.geocities.com/slunemo/disaster_matrix/history_index.html]

3.3.3. Canada: Canadian Disaster Database

The Canadian Disaster Database (CDD) is an ongoing effort by the Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP) to record natural, technological, and conflict-related disasters that directly affect Canadian citizens. Although mainly a national database, there are entries for international incidents in which Canadian citizens were involved. The database contains 700+ entries beginning in 1900 and going until the present day. The database is

searchable by location (province), disaster type, or time-frame. Information provided includes a description of the event, location, number dead, injured, evacuated, and economic losses. The database also provides references for the sources of information for loss estimates, which was helpful. Primary sources appear to be press media but information sources include government, provincial emergency management organizations, municipal government, Insurance Bureau of Canada, and NGOs along with occasional cross-referencing of EM-DAT for validation of findings. Inclusion criteria were adapted from early collaborations with the EM-DAT database and are as follows: 10 or more people killed; 100 or more people affected/injured, evacuated, or homeless; an appeal for national/international assistance; historical significance; significant damage/interruption of normal processes such that the community affected cannot recover on its own (13). A more detailed methodology was available but had to be accessed through a Google search and was not easily accessible on the website. The database is easy to navigate but might benefit from more detailed geophysical information.

[Accessed March 15, 2006: http://www.psepc-sppcc.gc.ca/res/em/cdd/search-en.asp]

3.3.4. United States: SHELDUS

The Spatial Hazard Event and Losses Database for the United States(SHELDUS), created and maintained by the University of South Carolina, is a publicly accessibly national-level (United States not including Puerto Rico, Guam, US territories) natural disaster database. The database has recorded over 400,000 events since 1960 disaggregated down to the county level. Although "prior 1995 only events that generated a total loss of $50,000 in damage" were recorded, "post 1995 all events represented in the NCDC Storm Data with a specific dollar amount" are entered into the database (14). Sources of information include NCDC's Storm Data Publication, NGDC Tsunami Event Database, and the Storm Prediction Center. The database is searchable by date of event, hazard type, or state/county affected. Information provided includes the beginning date, the event type, location (including FIPS code for spatial information), and number of fatalities/injured, property damage and crop damage cost estimates. It is possible to download the search results and the search metadata results although this is presented in a very basic text file format. An email address is required every time you access the database and due to the large number of entries, the search function is sensitive to entering a date range. The database provides detailed georeferencing and provides maps of event locations that may be very useful for county-level disaster mitigation.

[Accessed March 15, 2006: http://www.sheldus.org]

3.3.5. United States: United States Storm and Hazard Database

The United States Storm and Hazard Database maintained by the US National Climatic Data Center (NCDC) records national level publicly accessible natural disaster information. Records are maintained from 1950 to the present and are updated monthly. Information is gathered from NOAA Storm Data, NWS (which draws information from county/state/federal management offices, law enforcement, skywarn spotters, NWS damage assessment, press media, insurance industry and general public) (15), and Storm Prediction Center. The database is searchable by date of event, location, or event type although it is also possible to conduct a more detailed search by cost of damages, number of fatalities/injuries, and/or hail size/wind speed. Due to the enormity of the database, (there appear to be over 500,000 events entered) searching for specific events requires a certain degree of precision. Information presented in each entry includes location (detailed to the zone), date/time, and type of event, magnitude, number of deaths /injured, property damage and crop damage. Easily accessible methodological information revealing inclusion criteria would have been useful.

[Accessed March 15, 2006: http://www.gesource.ac.uk/hazards/usastorms.html]

3.3.6. United States: National Hazard Statistics

NOAA National Weather Service through the Office of Climate, Water, and Weather Services provides a searchable database of national weather-related fatalities associated with a limited number of natural disasters. The website provides statistics on the following natural disasters: lightning, tornado, heat, cold, flood, wind, winter storm, tropical storm. Yearly summaries available from 1995-2004 for individual weather events include breakdowns of fatalities by state and by gender/age of deceased. US summaries and state summaries, available yearly from 1995-2004, include fatality information along with injured and an accounting of the cost of property damage and crop damage. Information is provided by NOAA's Storm Data report. Although the database itself is easy to use, it is limited in its scope and detail and probably would be most useful in conjunction with the NCDC website.

[Accessed March 15, 2006: http://www.nws.noaa.gov/om/hazstats.shtml]

3.3.7. Philippines: NDCC Database

The National Disaster Coordinating Council (NDCC), through the Office of Civil Defense in the Philippines, began compiling data for a national disaster database in 1990. Originally intended as a means of collecting information on destructive tropical cyclones, the database now collects data on natural and technological disasters. On the national level, the Office of Civil Defense provides data, while on the local level, the agencies involved include the Offices of Social Welfare, local planning development offices, and local emergency management offices (16). The database is intended as being publicly available though at the time of this publication it was not accessible via the web - thus explaining the lack of information regarding search functions.

[Available: http://www.ndcc.gov.ph]

3.3.8. Philippines: DSWD-dromic

The Department of Social Welfare and Development (DWSD) of the Government of the Philippines has developed a Disaster Response Operations Monitoring & Information Center (DROMIC). The records begin in January 2006 and cover the past three months. There is no readily available documentation to indicate history of the initiative or current methodology and there does not appear be an archive of past records. Sources of information appear to be the 15 DSWD field offices along with national seismology and geophysical services, NGOs, and media. The information provided includes date and time of event, type of event, location (down to the level of house address), affected areas and populations, casualties, injured a summary of the event and the assistance given, and a detailed cost of assistance. The website is easy to use although events are chronologically entered so only searchable by date.

[Accessed March 20, 2006: http://disaster.dswd.gov.ph/]

3.4. SUB-NATIONAL DATABASES

3.4.1. South Africa: MANDISA Database

The Monitoring, Mapping, and Analysis of Disaster Incidents in South Africa (MANDISA) database is an approach undertaken by the Disaster Mitigation for Sustainable Livelihoods Program at the University of Cape Town (DiMP) to monitor disasters and assess risk in the Cape Town Metro Area. The database currently maintains records of over 19,000 georeferenced incidents from 1990-2004, including floods, wildfires, and extreme wind events and is considered one of the most robust urban loss databases in Africa (17). The project was inspired by the DesInventar databases and aims to record "small" and "medium-sized" disasters. However, MANDISA found that relying on newspapers as a primary source of loss data was not adequate in their context as news media

routinely underreported disaster losses (17). Currently the database relies on reports from fire services, disaster management agencies, and NGOs (South African Red Cross) in the field among others (18). Variables collected include location, type of housing, severity, spatial and temporal analysis along with loss estimations (19). Unfortunately, the database is not available publicly due to the size and sensitive nature of the data.

[Accessed March 20, 2006: http://www.egs.uct.ac.za/dimp]

3.4.2. UNDP/NSET: Nepal

The National Society for Earthquake Technology (NSET), an NGO in Nepal, has developed a disaster database in collaboration with UNDP and based on the DesInventar methodology for disaster collection. The project was initiated in 2003 and contains 12436 records of natural disasters from 1970-2004. NSET will, in the next month, be updating the records to include entries up to 2006 (20). Information is obtained from media sources as well as field records from NSET.

[Accessed March 20, 2006: http://undp.desinventar.net/DesInventar/index.jsp]

3.4.3 UNDP: Sri Lanka

In 2003 UNDP began developing a Sri Lankan disaster database that has since been split into two databases. The first reports natural disasters (6015 reports) and the second focuses on technological disasters (accidents etc). Data is presented for events dating from 1974-2005 and is in the process of being updated to 2006. The database was initially built from news media sources for the smaller scale disasters and official reports for the larger scale disasters. However, the database has been widely accepted by the Disaster Management Agency of Sri Lanka and the information presented is now being validated by official agencies against their own data.

[Accessed March 20, 2006: http://undp.desinventar.net/DesInventar/index.jsp]

3.4.4. UNDP: Orissa

Technically a sub-national database, the initiative by UNDP to create and maintain a database in the northern state of Orissa in India could be seen as capturing natural disasters within a region. Modeled after the DesInventar databases using the DesConsultar tool, UNDP began in 2002 collecting historical records of disaster events dating from 1970 – 2001. Much like DesInventar databases, news media and government sources are used to provide source material and verify events. There are currently 9212 events recorded although no date of last update is provided to indicate whether this is accurate. Designing the search query is relatively easy, though accessing the query is not as straight forward. One review of the database noticed that due to the unequal coverage of the entire state of Orissa by the media, relying on news media for source information may lead to disproportionate event recording (18).

[Accessed March 20, 2006: http://undp.desinventar.net/DesInventar/index.jsp]

3.4.5. University of Gainesville: DesInventar Florida

The University of Florida at Gainesville, as part of the ENSO Disaster Risk Management Project in Latin America, has created the DesInventar Florida 1 and DesInventar Florida 2 databases (see Table 1). The first database provides information on natural disasters including drought, flood, hurricane, and tornado, while the second database maintains information specifically on forest fires and sinkholes. The databases maintain over 9000 records dating from 1970-2005 and are funded in part by the Department of Community Affairs. Currently, the DesInventar Florida databases are not publicly available. The University of Florida is anticipating submitting the reports from the datasets in the next 2 weeks and making the databases available soon thereafter (19).

3.5 <u>DISASTER EVENTS DATABASES</u>

<u>3.5.1. Earthquake: USGS database</u>

The United States Geological Survey (USGS) through the Earthquakes Hazard Program provides a publicly accessible database of international earthquake activity. The primary data source is the USGS National Earthquake Information Center with contributions from the World Data Center and news releases. Historical earthquakes are searchable by date (the earliest record is the 1692 earthquake in Jamaica), magnitude, or location (with map), and include anecdotal evidence of the event where available. The database is also searchable by "significant" earthquakes listed as earthquakes "with magnitude 6.5 or greater or ones that caused fatalities, injuries, or substantial damage" (http://earthquake.usgs.gov/eqcenter/eqarchives/significant/)**.** Records date from 1977 to the present and include detailed geophysical referencing with latitude, longitude, depth, effect distances, detailed maps, and event summaries with news releases of damages and fatalities. Earthquakes occurring within the last 8-30 days are included regardless of magnitude and include the same detailed geophysical information as the more "significant" earthquakes. The strengths of the database are in the detail of the geophysical description and the clarity with which the information is presented. Accessing the "significant" earthquakes requires entering the URL directly into the browser and does not appear to be navigable through the website. Top 10 lists for earthquake variables in the US and worldwide are available but limited and the ability to create a query might be useful.

[Accessed March 15, 2006: http://earthquake.usgs.gov]

<u>3.5.2. Technological Disasters: UNEP/APELL</u>

The United Nations Environmental Program (UNEP) provides a publicly accessible international technological disasters database prepared by APELL (Awareness and Preparation for Emergencies on a Local Level). Data are presented on 316 chemical events occurring between the years of 1970-1998 and include information on the origin of the accident, date/year, location, products involved, and the number of people dead/injured/evacuated. Inclusion criteria include any or all of the following; ≥ 25 deaths, ≥ 125 injured or more, $\geq 10,000$ evacuated or $\geq 10,000$ people deprived of water. The database is searchable by any of the variables listed above, making information easy to access, though information provided is rudimentary and no economic loss information is recorded. Sources of information include OECD, MHIDAS, BARPI, Sigma, press media, and industry to name a few but no indications as to primary source are given making the origin and the validity of the information presented questionable.

[Accessed March 15, 2006: http://www.unepie.org/pc/apell/disasters/lists/disastercat.html]

<u>3.5.3. Floods: DFO database</u>

The Dartmouth Flood Observatory (DFO) maintains a "Global Active Archive of Large Flood Events" documenting flood events from 1985 to the present with events added immediately as they occur. Publicly accessible, the database provides summary tables by year of all flood events and includes information on location, rivers involved, beginning and end date where possible and duration, number of people killed/displaced, the cost and cause of damages, and detailed information about the area affected and magnitude of the flood. Government, academic institutions, news media provide information, along with satellite-based sources. It is possible to download Excel tables of the yearly summary information along with related flood imagery. Satellite-based flood images are not

provided for many of the individual events but are very detailed where available. It is not possible to search by event or region affected limiting the power of the search.

[Accessed March 15, 2006: http://www.dartmouth.edu/~floods/Archives/index.html]

3.5.4 Flood: Hydrological Information Center

The United States National Weather Service (NWS) provides a summary report on the number of flood fatalities and estimates of the economic costs of flood damage (total damages including insured and uninsured damages along with adjustments for inflation). Damage estimates cover a period from 1903 to 1999. Total fatalities per year are recorded from 1903 to 2002 with a break down of deaths per month from 1998 to 2002. The summary statistics are not searchable by event and give no indication to the number of events the statistics cover or their location.

[Accessed March 20, 2006: http://www.nws.noaa.gov/oh/hic/flood_stats/index.html]

3.5.5. Tsunami: NGDC

The National Geophysical Data Center (NGDC) maintains the publicly accessible global Tsunami Event Database. The database contains over 2400 records of tsunami events dating from 2000BC to present day. Information relating to methodology is not easily accessible via the website, making source data and inclusion criteria difficult to ascertain. The database is searchable by region, country, state, or date of incident, but also on more sensitive parameters such as longitude and latitude and tsunami effects in human loss and economic effects. Information provided through the search includes date and time of incident, location including geophysical referencing, tsunami parameters (maximum water height etc), and tsunami effects including human fatalities and damages in US dollars. Although the website suggests that there are links to damage photos, they were not readily accessible.

[Accessed March 15, 2006: http://www.ngdc.noaa.gov/seg/hazard/tsu_db.shtml]

3.5.6. Industrial Accident: MARS

The Major Accident Reporting System (MARS) is a joint venture by the Member States of the European Union and the OECD, submitted to the European Commission Joint Research Centre in Ispra. The database maintains records of over 600 major industrial accidents from 1980 to the present. Information is entered in a "short form" when the initial incident takes place and then a "full report" is provided once the investigation of the accident is complete. The short form is searchable either through a descriptive drop-down query or by entering a free-text description. Although there are over 200 searchable headings, the categories of variables include: date of incident, type of industry, accident type, substance type, immediate source of accident, suspected causes, immediate effects (dead, injured, ecological harm, material loss), emergency measures taken, and lessons learned. Location of accident is noticeably absent from the search. Although the database aims to be open access it is acknowledged that some information may be protected due to issues such as confidentiality and public security.

[Accessed March 20, 2006: http://mahbsrv.jrc.it/mars/Default.html]

3.5.7. Industrial Accident: MHIDAS

The Major Hazard Incident Data Service (MHIDAS) is a publicly available fee-based international database reporting on disasters involving hazardous materials. The service is maintained by AEA Technology, plc on behalf of the UK Health and Safety Executive. The database focuses on hazardous material accidents in the UK and the US, but offers worldwide coverage and includes detailed records of incidents in the past twenty years and significant events prior to that. Information collected includes the hazardous material involved, number of deaths/injuries/evacuations, and a

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summary of events. Although MHIDAS generates a quarterly report and maintains an information retrieval service, due to the fee-based nature of the operation it is not possible to comment on the presentation or completeness of information available.

[Accessed March 20, 2006: http://www.hse.gov.uk/infoserv/mhidas.htm]

3.6 COUNTRY-LEVEL EVENT DATABASES

3.6.1. Hurricane Mitch

COPECO (Comision Permanente de Contingencias) in Honduras and DCN (Defensa Civil de Nicaragua) maintain independent event-specific disaster databases detailing the effects of Hurricane Mitch in 1998 through DesInventar. Both databases were initiated in 1998 and were last updated in December of that same year. There are 147 and 294 events listed in Nicaragua and Honduras respectively. No information was readily available to suggest sources of information.

[Accessed March 20, 2006: http://www.desinventar.org/en/download/paso2.html]

3.6.2 El Salvador and Peru Earthquakes

UNDP in Peru and COEN (National Emergency Commission) in Ecuador maintain databases related to independent earthquakes in the area in 2001. There are 176 and 306 entries in the Peru and El Salvador databases respectively. Sources of information for the database in El Salvador include government and news media although sources used in Peru are less clear.

[Accessed March 20, 2006: http://www.desinventar.org/en/download/paso2.html]

3.6.3 Indian Ocean Tsunami

DesInventar maintains three separate national level disaster databases related to the Indian Ocean tsunami of 2004. UNDP in Indonesia, in collaboration with the Ministry of Planning in the Maldives and the Division Secretariats in Sri Lanka, has created three databases detailing disaster effects spanning the period of 2004-2005 related to the tsunami. All three databases rely on government sources and official records for information, not media sources, but vary in completeness with 27, 205, and 497 entries in Indonesia, the Maldives, and Sri Lanka respectively. The advantage to the level of detail offered by DesInventar is that in the case of the Maldives it becomes easier to see the relative impact of the tsunami on an individual island level.

[Accessed March 20, 2006: http://undp.desinventar.net/DesInventar/index.jsp]

4. CONCLUSIONS

The databases profiled above represent only a fraction of the enormous effort that has taken place to better document the effects of natural and technological disasters. In highlighting the strengths and weaknesses the goal has not been to undermine the work of the individual databases but to draw our attention to the problems that still exist and the areas in which our management of disaster information could improve. Previous comparative analyses (3,8) have recognized the following issues:

- Fundamental differences in the definitions of disaster events and effects continue to be problematic. A lack of standardization of the terminology used continues to complicate comparisons of data.
- All of the databases continue to struggle with the issues of how to classify disaster types and sub-types and of reporting primary and secondary disasters. Without

standardized terminology databases will continue to face a decreased precision in reporting the impacts associated with a disaster.

- Georeferencing has allowed for more accurate recording of the location of disaster events but questions still remain on how to locate larger-scale disasters that cross borders as is the case with floods. While data resolution (by smallest administrative boundary) offers a detailed perspective not usually available, disaggregating the effects of a disaster becomes difficult and may lead to overestimation of impact. Setting boundaries for disasters again is important if we wish to analyze the impact of similar events.

- Issues of the level of resolution of a database are compounded by the difficulty of reporting the date of occurrence of a particular event. Events are recorded by some databases as falling within a range while others report a specific date, such as when a call for international assistance is made, which makes verifying same events difficult.

- The lack of available detailed methodological information that is publicly available raises issues of the transparency of databases but also makes comparability difficult because of the ambiguity of important variables such as definitions, sources used, and inclusion criteria.

- The availability of sources varies across the board. Whereas particularly developing country databases must rely on one source of information due to the lack of resources in the country, many developed countries struggle with trying to integrate and validate an overabundance of data sources.

The issues raised above are not new but represent the areas in which we should be focusing our attention. They offer guidance for discussions that will arise in the course of the workshop and remind us of the challenges that this area of research continues to face.

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TABLE 1
Summary table of DesInventar National and Sub-national Databases

Table 1. Summary table of DesInventar National and Sub-national Databases.

Database	Sponsor	Type	Date Started	Period Covered	Updated	Number of Entries	Sources
Argentina	Centro de Estudios Sociales y Ambientales (CENTRO)	NGO	1996	1970-2004	9/30/2005	15466	News media*
Bolivia	Servicio Nacional de Defensa Civil	Govt	1998	-	-	400+	-
Colombia/ Antioquia	Universidad EAFIT - Department of Geology	University	-	1864-1999	-	1701	Government and news media
	Universidad EAFIT - Department of Geology	University	-	1920-2002	-	9351	Government and news media
Colombia/Risaralda	Universidad EAFIT - Department of Geology	Govt	-	1900-2003	-	8287	Government and news media
Colombia/Popayán	Corporación Autónoma Regional de Risaralda - CARDER	University	-	1990-2003	-	1736	Government and news media
Chile	National University of Chile Department of Agrarial Sciences	University	-	1970-2000	8/28/2003	11337	News media*
Colombia	Universidad del Valle - Observatorio Sismologico del SurOccidente (OSSO)	University	-	1914-2002	9/15/2003	16555	Government and news media*
Costa Rica	FLACSO - Latin American Social Sciences Faculty	University	1996	1968-2002	11/17/2003	5568	Government and news media*
Ecuador	Technological University of Quito/Escuela Politecnica Nacional (EPN)	University	1996	1970-2002	4/29/2004	2458	Government and news media*
El Salvador	OPAMSS - Oficina de Planeacion del Area Metropolitana de San Salvador - Planning Office of San Salvadors Metropolitan Area	Govt	-	1980-1988	2/1/1999	648	Government and news media
Florida	University of Florida Gainsville	University	2003	1970-2005	-	9428	Government, media, Academic
Guatemala	CONRED-Coordinadora Nacional para la Reduccion de Desastres Naturales	Govt	1997	1990-1999	12/31/2000	1491	Government and news media*
	FLACSO - Latin American Social Sciences Faculty - Sede Academica Guatemala	University	-	1998-2000	12/31/2000	2418	News media*
Guyana	UNDP/Civil Defense	NGO/Govt	-	1972-	-	137	News media

					2001		
Mexico	CIESAS - Centro de Investigaciones y Estudios Superiores en Antropologica Social - Investigation and Superior Studies Center on Social Anthropology	NGO	1996	1970-2004	10/31/2005	7742	News media*
Panama	SINAPROC - Sistema Nacional de Proteccion Civil - National System for Civil Protection	Govt	1996	1896-2002	4/30/2002	2456	Government, NGO, News media
Peru	ITDG - Intermediate Technology Development Group	NGO	1996	1970-2001	12/30/2005	19481	Government and news media*
	UNDP	NGO	2001	1970-2002	8/31/2002	1851	News media
Republica Dominica	FLACSO - Latin American Social Sciences Faculty	University	-	1966-2000	6/30/2001	2112	News media*
Trinidad/Tobago	LA RED – Red de Estudio Sociales en Prevencion de disasters en America Latina	University	-	1966-2000	11/15/2002	661	News media
Venezuela	Cuerpo de Bomberos de Caracas (CBC)	Govt	1998	1999-2002	6/30/2002	938	Government and news media

*Indicates priority information source used.