IRDR3/1.1







International Strategy for Disaster Reduction

INTEGRATED RESEARCH ON DISASTER RISK (IRDR)

Third Meeting of the Scientific Committee ICSU Headquarters, Paris 14-16 April 2010

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IRDR3/1.2 1 April 2010

List of Participants 3rd Meeting of the IRDR Scientific Committee 14-16 April 2010

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International Strategy for Disaster Reduction international social science council

INTEGRATED RESEARCH ON DISASTER RISK (IRDR)

Third Meeting of the Scientific Committee ICSU Headquarters, Paris 14-16 April 2010

Draft Agenda

Wednesday 14 April 2010

Lunch 12.30

First session begins 14.00

- 1. Opening of meeting and introduction of participants and guests Changes in Committee membership.
- 2. Approval of Draft Agenda
- 3. Summary Report of Second Meeting, and matters arising not treated elsewhere
- 4. <u>International Programme Office and Executive Director appointment</u> (HM and presentation of Jane Rovins)

5. Update on collaboration discussions

- Cooperation in research on weather and climate extremes and their role in disasters: arrangements with WWRP and WCRP (GMcB)
- WWRP's Working Group on Societal and Economic Research and Applications (SERA) (Angelika Wirtz)
- Links with Global Assessment Report (Asst. to Andrew Maskrey)
- Need/opportunity for holding Consultative Forum?
- 6. Capacity building and collaboration with START (Hassan Virji)
- 7. Capacity building mechanisms in the Americas (Allan Lavell and Omar Dario Cardona)

First session closes 18.00

Group Dinner : Chez Andre, 12, rue Marbeuf, Paris, France at 19.30.

Thursday 15 April 2010

Second session begins 09.00

7. Forensic Investigations (FORIN) programme Report from the Toronto Workshop and decisions on follow-up (Ian Burton)

8. Long-term database, monitoring systems and tools (Susan Cutter)

9. Extreme Natural Hazards and Societal Implications (ENHANS) project Multi-union initiative led by IUGG (Alik Ismail-Zadeh)

Second session ends 12.45

Lunch

Third session begins 14.00

- 10. AIR project (Dick Eiser)
- 11. IPCC Special Report on Climate Extremes

Update and continued discussion on links with IRDR. (GMcB/Susan Cutter/Allan Lavell/Omar Dario Cardona)

12. Cities at Risk project (GMcB)

Third session ends 17.45

Free evening

Friday 16 April 2010

Fourth session begins 09.00

- 13. <u>Establishment of IRDR-designated International Centre for Research, Taipei</u> Report on recent discussions (GMcB)
- 14. <u>National Committees for IRDR</u> Report on establishment of Japanese National Committee for IRDR (Kuniyoshi Takeuchi)
- 15. Promotion of IRDR and its objectives
- 16. Date and venue of next meeting

Meeting closes with lunch at 12.45.







Integrated Research on Disaster Risk addressing the challenge of natural and human-induced environmental hazards

Second Meeting of IRDR Scientific Committee

21-23 October 2009 ICSU Secretariat, Paris

SUMMARY REPORT

Members present:

Gordon McBean (Chair), Omar Darío Cardona, Raymond Chan, Richard Eiser, David Johnston, Michel Lang, Allan Lavell, Maria Patek, Ortwin Renn (part), Kuniyoshi Takeuchi, Angelika Wirtz

Ex officio:

Reid Basher (ISDR), Howard Moore (ICSU)

Apologies:

Steven Sparks, Coleen Vogel, Heide Hackmann (ISSC)

Other participants:

Susan Cutter (Univ. of S. Carolina), Veronica Grasso (GEO Secretariat), Patricia Ocampo-Thomason (ICSU), Paul Cutler (ICSU), Michel Béland (Environment Canada)

Opening and introduction of new participants

The Chair opened the meeting at 14.00 by welcoming all those present, members and observers alike. He announced that Bill Hooke had been obliged to resign from the Committee due to substantially increased work with the American Meteorological Society. Astri Suhrke had also announced her intention to withdraw. It had been agreed with the Chair that they would be replaced for the moment by one new member, and Prof. Susan Cutter was in the process of being nominated to serve. Pending formal approval by the governing bodies of the co-sponsors, she had agreed to participate in the Second Meeting in the capacity of guest specialist.

Approval of Agenda

In order to allow individual members of the Committee to take part in discussions of particular interest to them, the agenda items scheduled for day two were re-ordered. A revised agenda was subsequently adopted (see Annex 1).

Matters arising from Summary Record of First Meeting

The Summary Record of the First Meeting was approved without change, and no matters not covered elsewhere in the present agenda were raised.

Open discussion on collaboration possibilities

The Chair made a short presentation on the International Group of Funding Agencies for Global Change Research (IGFA) following contact, earlier that day in Paris, with individuals attending its Annual Meeting. IGFA is a forum (established in 1990) through which national agencies that fund research on global change identify issues of mutual interest and ways to address these through national and, when appropriate, coordinated international action. IGFA is primarily concerned with the four International Global Change Research Programmes WCRP, IGBP, IHDP and DIVERSITAS under the aegis of ICSU, and the Earth System Science Partnership (ESSP). The IGFA system is currently undergoing review, and contact between IRDR and IGFA is highly desirable.

The Chair reported on informal discussions he had had with Prof. A. Busalacchi, Chair of the World Climate Research Programme (WCRP), especially concerning the WCRP cross-cutting theme on climate extremes. WCRP is reported to be ready to modify its research programme according to our identified needs. This would cover the climate extremes – the events of extreme temperatures, storms, droughts and floods. One practical way forward would be for IRDR to have a seat on the WCRP Working Group; the person who would represent IRDR needs to be identified. In the meantime, the Chair will attend the 31st session of the Joint Scientific Committee of WCRP on 15-19 February 2010 in Antalya, Turkey.

A meeting with Dr David Parsons, Director of World Weather Research Programme (WWRP) had led to a verbal agreement that IRDR and WWRP should work together, and that IRDR will give input on WWRP's ten research foci. This needs following up through some form of Memorandum of Understanding.

Angelika Wirtz reported briefly on a recent meeting of the WWRP Working Group on Societal and Economic Research and Applications (SERA) meeting she had attended on behalf of IRDR at the request of the Chair. After a somewhat formal start, there had been a useful brainstorming on concrete projects. The following actions had been decided upon:

1. Development of a warning information system - built on an Internet-based system from Austria, to be expanded into other regions (e.g. Africa)

2. Build-up of a disaster information system to forecast weather information. Angelika to be involved and Munich Re to support a meeting shortly in Munich.

3. Establishment of a flash flood warning system. Discussion centred on the instrumentation required. Group will be co-chaired by the Weather Bureaux of Australia, South Africa and Switzerland.

4. Comparison on warning thresholds. Are reactions same or difference? This would involve a literature research.

5. How do we rank countries affected by disasters – according to GDP, nature of building codes, etc.? A Working Group is to be set up.

SERA remains very interested in linking up with IRDR. It could be regarded as the principle point of interaction between IRDR and the WWRP, and an effective means of gaining direct access to social scientists familiar with weather issues. If we were to take on a joint activity, could we expect to expand its purview? At present it is wholly weather-oriented, although risk reduction is the broad objective.

The Chair reported on a meeting he had had during the Second UN Global Platform with the Secretary-General of the International Federation of Red Cross and Red Crescent Societies, Mr Bekele Geleta. The Red Cross emphasis is naturally on response-recovery but it is interested in working with IRDR to identify key research areas of common interest and to that extent would wish to join workshops, etc. The Red Cross has a large community on the ground and could be a key partner in outreach activities. A key question would be how to optimize the work of such volunteers. The Chair had had informal contact with the International Council of Academies of Engineering and Technological Sciences (CAETS) on the occasion of an ICSU-CAETS meeting at the ICSU Secretariat, and he had taken the opportunity of speaking on IRDR. This had proved very useful, and expressions of interest in collaborating with IRDR were received from the CAETS Officers. This needs to be pursued.

Allan Lavell reported on contact with ISDR's Andrew Maskrey, Editor of the *Global Assessment Report*, which arguably represents the largest single research project in the area of disaster risk reduction. IRDR could provide important input into the GAR process in future.

Michel Lang had taken the opportunity presented by the French National Congress to speak of IRDR during the first session devoted to societal impacts and risk management.

The Chair concluded the agenda item by underlining that the major challenge is how to interact with all the multiplicity of programmes. Members need to identify key areas, underline the importance of interdisciplinary research, avoid overlap/duplication, and demonstrate clearly the added value of working with IRDR at the international level. Of course, the Committee would not wish to spend all its time in trying to persuade potential partners; there is an evident lack of capacity at present, but this will change with the establishment of an International Programme Office and the recruitment of dedicated staff.

It was felt that the Committee needs to take the Science Plan and use it as its guide as to what it is to do - starting from the identification of the gaps – and not only talk with potential partners on generalities of cooperation. WCRP had been established by identifying where important gaps existed and by listing scientific questions and developing new plans through themed working groups.

It was underlined that members of the Scientific Committee should continue to use 'meetings of opportunity' to spread the word about IRDR, and discuss ways and means of collaboration and joint programming. It was recalled that the American Geophysical Union has a new focus group on natural hazards, and this group should be pursued as a potential partner.

Case studies and demonstration projects, scenarios and forensic investigations

The Intergovernmental Panel on Climate Change (IPCC) has commissioned a Special Report (for publication in 2011) on managing the risks of extreme events and disasters to advance climate change adaptation, which represents a major opportunity to bring to the world's attention accumulated knowledge and experience in reducing and managing disaster risk. Several Members of the IRDR Scientific Committee (McBean, Cutter, Lavell, Cardona, plus members of the IRDR Planning Group Burton and Dube) are involved in the writing process. The Chair has convening lead author responsibility for Chapter 9 of the Report on Case studies, and this may represent an opportunity for IRDR-SC. One possibility might be the holding of an IRDR workshop attached to the IPCC process. It was emphasized that the case studies assembled for the IPCC report would <u>not</u> necessarily be those used in IRDR.

It was agreed that a small working group would meet in the coming months to develop a template for the case studies. Notes made by Ian Burton, member of the IRDR Planning Group, may be used as a starting point. [Note: a small workshop on forensic investigations was convened on 2-4 February 2010 in Toronto, Canada. A report thereon will be provided to next meeting of IRDR-SC.]

During the course of the open discussion, the following points were made:

Case studies do not necessarily have to be event-focused, but some could be more theme-like: for example, on insurance issues or vulnerability. There is a dearth of cross-cultural or longitudinal studies, for which research funding is normally difficult to find: here would be the value-added of IRDR in carrying out same. There was support for case studies on disaster response and recovery, although it is recognized that there can be no standard model: similar hazards can give rise to very different disasters

as a result of differing socio-cultural conditions. Other issues considered worthy of consideration were: avalanches and recoveries from a social viewpoint; how countries manage risk, and what are the conditions leading to certain approaches; failure or inadequacy of infrastructures; the role of early warning systems; and illegal squatting as a key factor in vulnerability.

Decision-making, planning resilience

Richard Eiser gave a presentation on decision-making and resilience planning. He spoke of the political structure around a warning system that may not allow the scientific information to get through. Decision making brings in risk assessment and risk conception, which are not quite the same. Not always dealing with hard numbers, but dealing with trust.

Resilience is the extent to which communities do or do not recover in the aftermath to an event: this has not only to do with building codes, but involves major issues such as how some communities organize themselves to 'bend like a tree in the storm'. What are the social dynamics involved? What determines the potential of events to destroy communities or not? This may be complicated by differing concepts of the stability of one's house; in certain cultures there are expectations that houses will be destroyed and rebuilt.

We have some knowledge on what makes communities vulnerable, but less so on resilience. There is an absence of baselines for risk reduction, and resilience indicators are needed.

There are widely different regional perspectives on concepts such as 'coping', adaptation and resilience.

IRDR could be instrumental in promoting research on what we mean by resilience: the typology; then at the next level: how do you measure it? This could influence things: a standard setting of sorts. How communities prepare for disasters is a hugely social complex. Mutual-help networks are one area it was felt that IRDR must to look into. Indeed, social, economic and cultural dimensions must all be examined. Throughout, concepts of scale and time also need to be factored in.

Long-term databases and monitoring systems and tools

Susan Cutter introduced the discussion on this topic by describing the different types of data: from specific information on past events to large data sets associated with remote-sensing operations. There are problems in obtaining data, then maintaining database architecture. There is a great deal of room for a major research effort in reconciling and improving data bases. The ISDR Scientific and Technical Committee has identified the subject as one requiring priority attention, and the dangers of overlap between its newly established data subcommittee and any IRDR initiative are self-evident and need to be avoided.

EM-DAT has carried out an assessment of all existing databases at the international and national levels, dealing with reliability, quality checks and validation. On methodology, good progress has been made, although there is need of further discussion, research work and the linking up of levels (national, regional, and international). We lack reliable data on individual disaster: each event seems to result in varying figures for losses, for example. There is an ongoing search for common standards by a group consisting of EM-DAT, Munich Re and Swiss Re.

Data and information systems presently seem to be not up to the task for policy makers. Even a basic question such as: 'is disaster risk increasing?' is very difficult to answer. Mortality is relatively well covered, whereas qualitative data is missing, and there is no information on the long-term situation. Migration data is not available, for example.

There was some discussion on restrictions of access to databanks held by the major reinsurance companies. Munich Re has freed up its policy and datasets can be obtained on demand, once the precise needs are known.

Regional programmes on hazards and disasters, and their articulation with IRDR

In opening discussion on this item, the Chair welcomed Patricia Ocampo-Thomason, Officer in the ICSU Secretariat responsible for liaison with the three ICSU Regional Offices in Kuala Lumpur, Pretoria and Rio de Janeiro. Allan Lavell recalled that the question of articulation between the regional programmes and the global IRDR initiative had been raised repeatedly during the planning process (with some members of the Planning Group also serving on the various regional committees) but without conclusion. He had agreed to provide a brief assessment of the regional hazards programmes being planned by the three ICSU Regional Offices. He described differences in approach to research between the three, in part reflecting the diversity between communities. He compared the hazard-based approaches of Africa and Asia and the Pacific with the more socially-linked themes addressed by the Latin American and Caribbean team, and underlined the need for strengthening holistic approaches to research.

He listed four options for possible collaboration, integration and synergy between global and regional programmes:

- creation (or consolidation) of standardized, comprehensive disaster risk databases that would facilitate cross-continent comparative analysis
- establishment of research training facilities to allow cross-regional exchanges and consolidation of research visions and methodologies
- promotion of disaster risk reduction decision-making studies in a cross-cultural perspective, and
- implementation of cross-continent post-mortem studies based on clear criteria for comparative analysis.

Overall, IRDR could play an important brokering role in breaking down the divide between the natural and social sciences.

David Johnston and Kuniyoshi Takeuchi reported on the ICSU Third Regional Consultation for Asia and the Pacific that they had attended in Penang on 13-14 October 2009. Discussions on regional/global programmes on disasters had taken as their starting point the IRDR two-pager as it described objectives and cross-cutting approaches. There was general satisfaction over the establishment of the IRDR IPO within the Region. The Asian mandate is similar to that of IRDR; key areas are public understanding, the use of science knowledge, and how policies are played out. There is a call for better hazards and vulnerability mapping and getting the results to decision makers. Case studies – learning from the past but with a view to looking to the future – are strongly supported and will seek to establish why disasters happen, and why some local communities are able to develop programmes that are making a difference. Capacity building for integrated disaster management is being stressed, with funding seemingly available, perhaps a reflexion of the current emphasis on the relationship between disaster risk reduction (DRR) and climate change adaptation (CCA)

The Directors of all three ICSU Regional Offices had taken part in the discussions as to how regional efforts can link into the global effort, and how to take things forward with inter-regional consultation. The absence of SOPEC representatives meant that the programme devoted to small islands had not been adequately discussed. Small islands offer the opportunity for having a cross-cutting project dealing with DRR and CCA. The Fiji/Samoa tsunami could be offered as a case study.

Discussion revolved around the establishment of three case studies as a way of moving ahead in a concrete way: on the vulnerability of small islands, forward-looking strategies for megacities and a transverse theme for Latin America. In addition, the Committee considered regional hazard and vulnerability mapping in the context of the next Global Assessment Report (GAR) (it was understood that mapping would go beyond the purely physical risk to encompass the human dimension). Angelika Wirtz indicated that Munich Re would be willing to share its experience in the development of indices for a megacities initiative.

The importance of getting down to projects for the visibility of IRDR was stressed, as was the need for the Committee to be clearer in its thinking.

Cooperation with the ISDR system

Reid Basher described the ISDR Secretariat and its work. ISDR is not a typical UN body. It does not enjoy regular programme funding enjoyed by the UN Specialized Agencies, and has therefore to be entrepreneurial in spirit. ISDR's original orientation was political/social, but in 2005 came the realization that science was missing from the equation. An ISDR Scientific and Technical Committee was established, with a mixed membership of representatives of key organizations and institutions plus experts named in their personal capacity. The Committee has held three meetings, but is still seeking a role. This role must be a strategic one, identifying gaps and advising as to what governments should be thinking about science. It does not do or commission research. The Committee reported to the Second UN Global Platform in mid-2009 on how science should be used to serve decision-making in the policy area. A subcommittee on early warning is to be chaired by Dennis Wenger (NSF). Another, on data availability, is headed by Prof. Virginia Murray of the University of London. Strong connections are needed between the data subcommittee and IRDR-SC to ensure synergy and avoid duplication of effort.

The ISDR Secretariat has continuing to work within the Copenhagen process and was a key driver in the decision of the IPCC to commission the Special Report on Extremes. An application in for funding for the building up a literature base to be available to all, scientists included. The Committee may give ideas on types of information to be included; and specialist groups will need to be put together to carry out rapid literature reviews. Regional activities are important to ISDR, and the Secretariat is seeking ways to better support local and regional scientists.

Links being forged between IRDR-SC and the Global Assessment Report team are encouraging. The next GAR will appear in 2011, and there has been a greater engagement with stakeholders during the preparatory process. Interaction with GAR might be best achieved through a subcommittee; the Chair suggested this could be discussed at the forthcoming IPCC meeting in Panama, coordinated by Allan Lavell.

Some 40 National Platforms exist within the ISDR system, but there are, as yet, no institutional links between the Platforms and IRDR. It was felt that IRDR could help build links between Platform and scientists, and create a better balance within the Platforms themselves (there is need to get both scientists and development-based actors on board).

IPCC Special Report on Climate Extremes

As was reported above, the Intergovernmental Panel on Climate Change (IPCC) has commissioned a Special Report on managing the risks of extreme events and disasters to advance climate change adaptation. Several Members of the IRDR Scientific Committee are involved in the writing process, with the first editorial meeting scheduled for November in Panama.

Reid Basher reported that IPCC is also moving ahead with Fifth Assessment Report – IRDR authors should also be prepared to engage in the production of this from the DRR viewpoint, and may be approached. The meeting was asked to consider how IRDR could play a role in encouraging reports and research that will feed into the Fifth Report and provide a body of research for the Sixth. So far, there is no likelihood of IPCC wanting to change the structure of IPCC Working Groups. Mention was made of the relaxation of rules regarding peer review literature; to some extent this has already happened, with the inclusion of grey and blue literature.

Vulnerability and risk - quantification and modelling

Ortwin Renn gave a presentation on the quantification and modelling of vulnerability and risk. It was noted that terminology needs to be clarified in order to be helpful in assessments. Given that there are hazards, then exposure is important and this is, in part, determined by zoning so planning of settlements can reduce exposure. For exposed populations, vulnerability is the critical factor and there

will be variations in coping with stress. How fast recovery can take place will dependent on many factors but it is important for the system to recover and continue with its main functions. For IRDR the critical issue is how can science intervene? In the future there will be changes to hazards, climate and culture, so there is need to examine probability incertitudes. Main topics highlighted included rapidly urbanising areas that lead to large assemblies of people and potentially greater numbers of victims; and the adaptation capacity of agricultural areas which can result in different patterns of vulnerability. Organizational capacity and the possible role of private-public partnerships are issues and there is a need to look at better models to give better incentives to individuals. Mandatory insurance arrangements and general role of insurance are related topics.

In the discussion, rapid urbanization was identified as a priority issue, with China as a possible case study. On public-private partnerships there is the issue of mandatory insurance: essentially, those not at risk pay for those that are. The example was given of the wholesale cancellation of insurance in Germany (government intervention followed by cancellation of insurance). Understanding the organizational chart of different institutions helps with understanding. Civil defence institutions now include other bodies (and civil society institutions). The World Bank and Inter-American Development Bank, for example, have new policies on DRR which they are promoting with government and the people.

Rapid development of IRDR flagship project on people, risk and human vulnerabilities

Richard Eiser made a presentation on the Assessment and Interpretation of Risk. Risk and risk perception are of interest to both Natural and Social Sciences but from different perspectives that are still inadequately integrated. Natural scientists and funders recognize the need for communication and engagement to translate science into prevention, protection and loss reduction. The social scientists are increasingly motivated and pressured to address global issues. These perspectives come together in relation to how specific hazards are assessed, interpreted and acted upon by scientists, policy-makers and communities at risk, and how these assessments, etc. change over time. Hazard risk exists in a continuum, but events (e.g. volcanic eruption) provide the discontinuity. There is no single criterion or cut-off point at the decision-making level.

It was commented that decision-making is a science, but how can research support decision-making? A question: what is needed by decision-makers in order to make correct decisions?; how to improve decision making ability where one needs to decide on probabilities and vulnerabilities? Communication is needed for mitigation, not just warning systems. Information is needed for longer term planning. How the community understands and what we need to communicate to them.

There are differences between disaster management and risk management: it takes perhaps a decade or two before one knows if risk management has worked. For risk communication, it is necessary to let the decision-maker understand that the risk decisions taken will vary according to the environment. There is need for a checklist out of which the decision-maker will make a choice.

In the light of the comments made, it was decided to establish a project entitled 'Assessment and Interpretation of Risk' (AIR) and Messrs Eiser, Renn, Modaressi, Cardona and Chan were invited to develop the thinking for the next meeting.

Capacity building

The Chair described briefly the structure and functioning of START – the <u>SysTem</u> for <u>Analysis</u>, <u>Research</u> and <u>T</u>raining for Global Change. He recalled that the ICSU Planning Group had envisaged capacity building in IRDR following the START-like model. Some START capacity-building activities could involve disaster risk areas. It was agreed that discussions should be held with START with a view to developing a MOU on cooperation in capacity building and research training for disaster risk reduction in developing countries. A complication is that START does not have a role in the Americas, a region covered by the Inter-American Institute for Global Change Research (IAI). However, IAI is not really appropriate as

capacity-building organization. Indeed, there is no a stable, sustainable operation/process for training in risk management in Latin America. Allan Lavell described several ad-hoc arrangements that were in place, but suggested that both the Inter-American Development Bank (IDB) and the World Bank (WB) are eager to promote capacity building in the region. Of particular note is the Central American Probabilistic Risk Assessment (CAPRA) initiative, started in 2008 to enhance the understanding disaster risk throughout the region by establishing a common methodology and tools to assess disaster risk. In the framework of the CAPRA and indicators programme, IDB and WB are looking for capacity-building opportunities in risk management. IRDR could propose an extension to CAPRA and Indicators initiatives. An MOU could possibly be proposed between IRDR and WB to promote dialogue between scientists and decision-makers within the framework of the IDB and CAPRA.

There was some discussion as to the target group for capacity building. Unlike programmes like WCRP and IGBP, IRDR should be seeking to set in motion a training system not only for young scientists but also practitioners. A programme like CAPRA is not in the business of training of practitioners, however. Some clarification is needed before going further.

In conclusion, the Chair requested Allan Lavell and Omar Dario Cardona to propose ideas for capacity building activities in disaster risk reduction for IRDR in Latin America and the Caribbean.

International Programme Office

Howard Moore reported on the site visits carried out to Beijing (3-5 August 2009) and Taipei (5-7 August 2009) to further assess the two bids that had been received to host and financially support the International Programme Office (IPO) for IRDR. A report of the site visits had been prepared and awaited examination and decision on the part of the governing bodies of the co-sponsors. The recommendation was that the offer from the China Association for Science and Technology (CAST) should be accepted. This would mean that the IPO would be located within the Center for Earth Observation and Digital Earth (CEODE) of the Chinese Academy of Sciences on the outskirts of Beijing, with financial support of at least 300,000 euros per annum. Once the decision is taken, further negotiations will take place, leading to a Memorandum of Understanding between the parties. Provision is being made for one of the meetings of the Scientific Committee in 2010 to be held at CEODE.

International recruitment will be started immediately for the post of the Executive Director of IRDR based in Beijing. A draft of the announcement of the vacancy was presented for comment, and in revised form this text appears as Annex 2. It is hoped that the Executive Director will be in place by end-May 2010, the moment at which the Office will be established. Two professional officer posts will later be opened for recruitment within China.

IRDR-designated international centres

The Chair reported on a secondary recommendation of the group that had carried out the IPO site visits to China and Taipei: that the co-sponsors consider inviting the Academy of Sciences located in Taipei to consider hosting an international centre at which national researchers and international visitors could work on one defined part of the IRDR programme. The idea behind this proposal is that there could be created a limited network of such small international centres located in, and financed by, host organizations around the world and contributing to the aims and objectives of IRDR.

National Committees for IRDR

National Committees have been established in many countries for the various other global change programmes of ICSU (WCRP, IGBP, DIVERSITAS, etc.) and have proved extremely effective over the years. It was felt that National Committees for IRDR would be equally important, acting both alone and in concert with others in regional and international contexts. It was agreed that their establishment should be encouraged, and to this end a draft text describing the role of such committees was examined. In the light of comments made on the draft, a revision was undertaken and this text is reproduced as Annex 3.

The Committee welcomed the news that a Japanese National Committee for IRDR was in the process of being established [Note: JNC-IRDR was established with 25 members on 26 November and the first meeting was held on 25 December 2009]; it was agreed that this would form an excellent template, and encouragement, for other countries' initiatives.

Some Japanese activities were also reported by Kuniyoshi Takeuchi: a task group on flood management had been formed and had met with some 10 Local River Management Offices in Regional Development Bureaux, MLIT to work with the Japanese National Committee for IRDR. The initial agenda of the task team includes:

- Coordination and integration of parallel administrative actions, especially with respect to uncertainty;
- Mobilization of population from understanding to action in preparedness and emergency responses;
- Development of effective evacuation plan: path of evacuation, guide to evacuate, judgment on whether to stay or evacuate

Problems identified were: lack of standard data (e.g., magnitude of future floods) and lack of researchers to consult with.

Promotion of IRDR and its objectives

Draft texts for a flyer and a Powerpoint presentation on IRDR for use by Committee Members and others were presented by Howard Moore, and reactions sought. In the light of comments made on the former, changes were made to the text, and a revised version is appended as Annex 4. An illustrated, four-colour version will be printed in a quantity sufficient for wide distribution in early 2010.

Group on Earth Observations (GEO)

Dr Veronica Grasso, member of the GEO Secretariat and invitee to the meeting, gave a Powerpointassisted presentation on GEO and the development of the Global Earth Observation System of Systems (GEOSS). GEO is an IGO set up outside the UN system, but with 79 Members and 56 participating organizations. The benefits accruing to Charter Members were described, as was the development of linkages and synergies between stakeholders. Dr Grasso briefly described GEO activities that respond to the objectives of IRDR and might prove the subject of collaboration. While it was pointed out that there are limitations to what remote sensing on geohazards can bring to an area such as risk assessment, the Committee welcomed the idea of collaboration between IRDR and GEO. It was recognized that there are geotechnical problems to be resolved over satellite-sourced data, not least that of reliability (realtime measurements are needed for validation). Nevertheless, it was agreed that there was an opportunity for cooperation: IRDR as a research programme could make good use of satellite data, using GEO as a technical partner, and it was thought that an overall MOU could be signed between IRDR and GEO. In the future, IRDR might well wish to identify an area of interest, specify where we need information and the type required, approach GEO and propose a GEO/IRDR project. Is there an opportunity or means for reviewing what IRDR's disaster risk reduction requirements are, and how they can be met by GEO – for example through a workshop leading to a document? The meeting was informed of a workshop in early 2010 of leaders of the nine GEO areas, which would offer IRDR an opportunity for linking with the various disaster communities.

Visioning Earth System Research

Howard Moore briefly described the visioning process being carried out by ICSU in collaboration with ISSC concerning the new challenges facing earth system research, as an example of interactive Internet-based consultation possibly open to IRDR in the future.

ICSU Foresight Exercise

After an introduction by a member of the ICSU Secretariat, Paul Cutler, of the Foresight Exercise being conducted by ICSU as a part of its strategic planning process, the meeting was invited to brainstorm on

two main questions: how will international collaboration in science help progress in science and benefit society, and what will be the key drivers influencing science in the next twenty years and beyond?

Action points

- <u>Case studies:</u> It was agreed that a working group should develop, as a priority, a template for the case study initiative. This would involve Gordon McBean, Allan Lavell, Susan Cutter and Steven Sparks, plus Ian Burton, a former member of the IRDR Planning Group who had already developed some notes in this regard. All Members should help draw up a list of case studies that would be useful. Disaster recovery, long-term, successive illegal immigration and risk assessment were mentioned in this context.
- <u>Assessment and Communication of Risk (development of the AIR proposal)</u>: Fusion of the two working groups previously assigned to 'Decision making, planning resilience' and 'Vulnerability and risk'. Richard Eiser, Ortwin Renn, Hormoz Modaressi, Omar Dario Cardona and Raymond Chan to form a task team to be in a position to go forward at the next meeting. To what extent is the Committee thinking of a methodology based on case studies? Major gap area and it needs to stake its claim. There is a need for something concrete; if that means it will be limited, so be it.
- Long-term databases, monitoring systems and tools: Susan Cutter, Angelika Wirtz and Allan Lavell to pursue, in close collaboration with ISDR-STC working group.
- o <u>Three regionally-based initiatives</u> proposed:
 - (a) with ROAP case study on small island states: David Johnston and Kuniyoshi Takeuchi.
 - (b) with ROLAC pursue the CAPRA idea on capacity-building and indicators with WB/IDB: Omar Dario Cardona and Allen Lavell.
 - (c) with ROAP working group on Cities at Risk creation of a team involving David Johnston, Steven Sparks, Allan Lavell, Omar Dario Cardona and Kuniyoshi Takeuchi plus Roland Fuchs (?), with Angelika Wirtz to provide information. Reference was made to a START initiative 'Cities at Risk' for developing adaptive capacity for climate change in Asia's coastal megacities, and the recently issued brochure.
- <u>Memoranda of Understanding</u> need to be developed to cover collaboration with: WCRP, START, ISDR's GAR system, GEO, and the public-private Global Earthquake Model initiated by the Global Science Forum of OECD.
- o Further definition is needed over the coming months of the concept of IRDR International Centres.
- Issuing of one-page <u>IRDR flyer</u> in early 2010 and its wide distribution (to incorporate a new IRDR logo)

Date and venue of next meeting

It was agreed that the third meeting of the Scientific Committee would be held in Paris during the period 12-23 April 2010. [Note: dates subsequently decided upon: Wednesday 14 April to Friday 16 April.] The possibility will be explored of ISDR's convening its ISDR-STC back-to-back in Paris, with a half day's joint session.

The fourth IRDR-SC meeting will be convened in Beijing, by which time the IPO should be established, and the IRDR Executive Director in place.







22 October 2009 Rev. 1

INTEGRATED RESEARCH ON DISASTER RISK (IRDR)

Second Meeting of the Scientific Committee ICSU Headquarters, Paris 21-23 October 2009

Revised Agenda

Wednesday, 21 October

- 12:30 Lunch
- 14:00

1. **Opening of meeting and Introduction of new participants.** Changes in Committee membership.

14:10

2. Approval of Draft Agenda

14:15

3. Summary Report of First Meeting, and matters arising not treated elsewhere

14:30

4. Open discussion on collaboration possibilities – feedback from Members

[Committee members were encouraged to look at big supranational and national projects in their areas, make informal links with potential partners, without commitment, and report back to the Committee with a view to a finite number of more formal arrangements being made.]

- 4.1. <u>Specific initiatives</u>:
- 4.1.1 Cooperation in research on weather and climate extremes and their role in disasters: development of agreements with WWRP and WCRP. (GMcB, Len Barrie)
- 4.1.2 Joint socio-economic research activity (to be developed in collaboration with WWRP's Working Group on Societal and Economic Research and Applications (WG-SERA) of WMO) report on preliminary discussions with Co-Chair, Brian Mills (GMcB)
- 4.1.3. Cooperation with Red Cross International. (GMcB)

15:15

5. Creation of IRDR Working Groups and their terms of reference

Successive discussions on each theme, after introductory remarks or proposals from the assigned Group Leaders.

5.1 Case studies and demonstration projects, scenarios and forensic investigations (GMcB)

16:00 Tea

16:30

5.2 Decision-making, planning resilience (RE)

17:00

5.3 Long-term database and monitoring systems and tools, with an assessment of capacity of data sets to meet research needs. Interaction with Subcommittee of ISDR-STC (Susan Cutter)

17:30 Meeting adjourns

Thursday 22 October

09:00

6. Regional programmes on hazards and disasters, and their articulation with IRDR

- 6.1. Preliminary analysis of the three ICSU Regional initiatives. (AL)
- 6.2. Report on ICSU 3rd Regional Consultation for Asia and the Pacific as it referred to disaster plans. (DJ)

10:00

7. Cooperation with the ISDR system

7.1 Possible mechanisms for collaboration and exchange with ISDR Scientific and Technical Committee charged with providing "strategic guidance on research needs for disaster risk reduction and oversight of progress". (RB)

10:45 Coffee

11.15

9. IPCC Special Report on Climate Extremes (contd)

9.1. Opportunities and challenges for IRDR. (GMcB)

11.30

5. Creation of IRDR Working Groups and their terms of reference (contd)

5.4 Vulnerability and risk – quantification and modelling (OR)

12.00

5.5 Rapid development of IRDR flagship project on people, risk and human vulnerabilities (GMcB)

12.30

8. Capacity building

- 8.1 Report on discussions with START (the global change SysTem for Analysis, Research and Training) on cooperation in capacity building and research in developing countries. (GMcB)
- 8.2 Brief appraisal of Latin American capacity-building possibilities for IRDR (including collaboration with Inter-American Institute for Global Change Research). (AL, ODC)

13:00 Lunch

14:00

8. Capacity building (contd)

14.15

10. International Programme Office

- 10.1 Report on site visits carried out to Beijing (3-5 August 2009) and Taipei (5-7 August 2009) and recommendations to co-sponsors. (HM)
- 10.2 Appointment of IPO staff, and especially IRDR Executive Director. Ideal profile(s). Recruitment procedure and timing. Draft announcement. (HM)

14:45

11. IRDR-designated international centres

11.1 Possible establishment of modest network of IRDR-designated international centres for excellence in research (or some similar name), nationally supported but with international visiting researchers; participants to focus on integrating across a subsection of the IRDR areas. (GMcB)

15:15 Tea

16.15

14. National Committees for IRDR

14.1 Draft text for use in promoting the creation of National Committees. (HM)

16 45

13. Promotion of IRDR and its objectives

13.1 Outreach and promotional materials – draft text for flyer and draft Powerpoint presentation for use by Committee members. IRDR logo. (HM)

17:30 Meeting adjourns

19:00 Committee Dinner

Friday 23 October

09:00

12. Group on Earth Observations (GEO)

Presentation by Dr José Achache, Director of GEO Secretariat, on GEO and the Global Earth Observation System of Systems (GEOSS), and collaboration in the field of hazards.

10:30 Coffee

11:00

15. Visioning Earth System Research

15.1 Report on the consultation process being spearheaded by ICSU and ISSC. (HM)

11.15

16. ICSU Foresight exercise

Presentation by Paul Cutler, followed by brainstorming

12.00

17. Date and venue of next meeting (HM, GM)

Meeting closes

12:15 Lunch







Announcement

Executive Director of the Integrated Research on Disaster Risk (IRDR) programme

The International Council for Science (ICSU), the International Social Science Council (ISSC) and the UN International Strategy for Disaster Reduction (ISDR) invite applications for the important post of Executive Director of the new Integrated Research on Disaster Risk (IRDR) programme.

IRDR is an exciting decade-long, internationally integrated, all-hazards research programme bringing together the talents of the natural, social, medical and engineering sciences in a way not attempted before. Its objectives are the scientific characterization of natural and human-induced environmental hazards, vulnerability and risk; the understanding of decision-making in complex and changing risk contexts; and the reduction of risk and curbing losses through knowledge-based actions. The programme is founded on the recognition that disaster prevention and mitigation are critical dimensions of the global poverty reduction agenda and efforts to adapt to climate change, and should be an integral part of all international and national development efforts.

The Executive Director will head an International Programme Office (IPO) for IRDR being established at the Center for Earth Observation and Digital Earth (CEODE) of the Chinese Academy of Sciences in Beijing, China, with core funding from the China Association for Science and Technology (CAST). The location of the IPO was selected following an international call for offers to host the Office.

The IPO will be expected to meet the management needs of the IRDR programme and fully support the work of the international Scientific Committee for the Integrated Research on Disaster Risk programme (SC-IRDR) responsible for its overall scientific planning, coordination, guidance and oversight.

Under the authority of the SC-IRDR, the Executive Director of IRDR will be expected to:

• facilitate the development, implementation and co-ordination of IRDR science projects and joint projects with partner programmes;

- liaise with such international centres as may be established within IRDR;
- ensure effective representation and links between IRDR and other relevant research programmes and their sponsoring organisations, relevant entities of the United Nations system, as well as the international policy community and funding agencies;
- support the development and implementation of an information strategy which promotes networking within the disaster risk research community and the wider practice community;
- play a major role in organizing capacity building and outreach activities;
- promote the establishment and/or strengthening of national IRDR committees and regional initiatives; and
- promote IRDR internationally and assist in the acquisition of funding for the programme.

The Executive Director will oversee a staff of at least two professionals, and will direct all activities of the IPO, especially in respect of the preparation for, and conduct of, meetings of the SC-IRDR and of the implementation of actions decided upon by the Committee. He/she will have responsibility for drawing up annual programme and budgets of the Office, and ensuring that they are implemented. The Executive Director will maintain effective cooperation on administrative and technical matters with the host institution and relevant local organizations.

The host institution, CEODE, is recognized for its commitment to scientific research, with wide experience and expertise in research on disaster mitigation—especially remote sensing, data collection and modelling. The Center also has a proven track record in international cooperation, establishing long-term partnerships with institutions from more than 20 countries and international organizations. The IPO will be located within CEODE's brand new Headquarters being built within Space City, a major new research park on the edge of Beijing.

The Executive Director will hold a PhD in a natural, social, medical or engineering science discipline related to natural hazards and disaster risk reduction and have several years of direct experience of international research collaboration in an interdisciplinary setting. International science management and diplomatic skills would be at a premium. He/she will have an excellent command of written and spoken English, and a working knowledge of other major languages would be desirable. Some experience in the use of on-line consultation techniques and web-based collaborative tools (e.g. Google Groups) would be an advantage.

Applications should include: (i) a Curriculum Vitae; (ii) a letter outlining the skills and experience you feel you, the candidate, could bring to IRDR and its IPO; and (iii) the names and addresses of three individuals who have indicated their readiness to provide a reference.

The address to which applications should be sent is:

Dr Howard Moore International Council for Science (ICSU) 5, rue Auguste Vacquerie 75116 Paris France e-mail: howard.moore@icsu.org

The closing date for applications is 14 January 2010.

The annual salary of the Executive Director of IRDR will be negotiable in the range 75,000-90,000 euros equivalent and will take due account of the experience and qualifications of the candidate. The initial contract of employment will be of two years' duration, renewable. It is expected that the successful candidate would take up his/her appointment, located in Beijing, as soon as possible and no later than end-May 2010.

For more information on the IRDR see *A Science Plan for Integrated Research on Disaster Risk – addressing the challenge of natural and human-induced environmental hazards* which is posted on: www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/2121_DD_FILE_Hazard_report.pdf







Integrated Research on Disaster Risk

addressing the challenge of natural and human-induced environmental hazards

IRDR National Committees

The Integrated Research on Disaster Risk (IRDR) programme welcomes and encourages the creation of National Committees dedicated to the support of IRDR's research initiatives, and the establishment or further development of vital links between national disaster risk reduction programmes and activities within an international framework. National Committees will make it possible to implement – extending or adapting where necessary – the IRDR Science Plan to address local and regional concerns.

The establishment of National Committees for an integrated research programme like IRDR will help foster the much-needed interdisciplinary approach to disaster risk reduction within national scientific and policy-making communities; and each Committee can serve as an important focal point between national disciplinary scientific unions and associations, as well as promote cooperation between the research sector and practitioners.

Each National Committee is being encouraged to include, in its make-up, researchers from the natural, social, health and engineering sciences, policy makers and practitioners from national disaster risk reduction programmes. The Committees may wish to designate focal points on such matters as data/information management.

IRDR National Committees are likely to undertake a range of activities in the context of the IRDR, including:

- advocacy of integrated research on disaster risk
- participation in the implementation of IRDR research projects;
- hosting of events such as symposia or workshops related to the aims and objectives of IRDR;
- involvement in capacity-building for disaster risk reduction;
- collaboration with other National Committees in the development of international initiatives to respond to regional needs;
- contribution towards IRDR's fund-raising efforts; and
- cooperation with ISDR National Platforms in the common pursuit of the goals of the Hyogo Framework for Action.

IRDR encourages ties between its National Committees, and their interaction with the International Programme Office for IRDR located in Beijing. Meetings of Chairpersons of National Committees are foreseen, as is their presence at the proposed annual IRDR Consultative Forum.







INTEGRATED RESEARCH ON DISASTER RISK (IRDR)

Why is it that, despite the marked growth over recent decades in our knowledge and understanding of natural hazards, losses associated with environmental disasters have also risen during that same period at a seemingly exponential rate? The situation is particularly dramatic as regards weather-related events where, while death rates and numbers have dropped due to more extended and effective early-warning systems and preparedness plans, material and livelihood losses as well as numbers of affected persons have grown considerably.

The response

The response of ICSU, ISSC and ISDR to this conundrum has been to create a major new international programme – Integrated Research on Disaster Risk (IRDR) – that seeks to address the challenge of natural and human-induced environmental hazards.

The complexity of the task is such that it requires nothing less than the full integration of research expertise from the natural, socio-economic, health and engineering sciences, coupled with socio-economic analysis, understanding the role of communications, and public and political response to reduce the risk. Although the approaches in the sciences vary, IRDR will not only be multi-disciplinary but also approach the issues of natural and human-induced hazards and disasters from several perspectives – from the hazards to the disasters and also from the human exposures and vulnerabilities back to hazards. This coordinated approach takes IRDR beyond approaches that have traditionally been undertaken.

Objectives

The IRDR programme has three research objectives:

- characterization of hazards, vulnerability and risk
- understanding decision-making in complex and changing risk contexts
- reducing risk and curbing losses through knowledge-based actions.

Attainment of these three research objectives through successful projects will lead to a better understanding of hazards, vulnerability and risk and an enhanced capacity to model and project risk into the future; to the understanding of the decision-making choices that lead to risk and how they may be influenced; and how this knowledge can better lead to disaster risk reduction.

Three cross-cutting themes support these objectives:

- capacity building, including mapping capacity for disaster reduction and building selfsustaining capacity at various levels for different hazards;
- development of case studies and demonstration projects; and
- assessment, data management and monitoring of hazards, risks and disasters.

IRDR will both generate new information and data and to leave a legacy of coordinated and integrated global data and information sets across hazards and disciplines, with an unprecedented degree of access. One of the main contributions of the Programme will be to serve as a framework for the development of a range of modern information systems devoted to disaster risk reduction.

The hazards covered

IRDR focuses on natural and human-induced environmental hazards, including all hazards related to hydrometeorological and geophysical trigger events, i.e., earthquakes; volcanoes; flooding; storms (hurricanes, typhoons, etc.); heat waves; droughts and fires; tsunamis; coastal erosion; landslides; aspects of climate change (increases in occurrence of extreme events); and space weather and impact by near-Earth objects. The effects of human activities on creating or enhancing hazards, including land-use practices, are also included.

Building on, and complementing existing research

Arrangements are being sought with existing programmes so as to undertake research with shared outcomes and responsibilities. Collaborating organizations, working through a Consultative Forum, will become significant actors in IRDR.

IRDR has a strong commitment to development – development of science and development of broadly-based capacity. Its partners in this development will include the national and international development aid agencies as well as the national and international science institutions and funding councils. National Committees for IRDR are also set to be key players. The building of capacity in disaster risk reduction around the world requires the involvement of all countries in a meaningful way.

IRDR – the first three years

During its first three years, IRDR will focus on building partnerships and undertaking scientific analysis to put in place longer-term projects towards meeting its declared scientific objectives and overall vision, and contributing to the search for fundamental explanations for the current rise in disaster losses. A series of post-disaster, multi-disciplinary 'forensic' investigations will be carried out – in-depth, all-encompassing, arms-length, careful and detailed analyses that will not only draw lessons and insights from 'failures' or cases where mistakes were made, but also accumulate evidence of good practices from the success stories.

In parallel, a global network of long-term hazard research sites will be developed to allow for enduring (decades-long) place-based, longitudinal studies of natural hazard risk, while leading to progressive building of resiliency across that same network. The network will provide a mechanism for reaching out to communities located in the most vulnerable areas and engaging them in the science agenda, as well as providing a context for comparative analysis

The legacy

IRDR's main legacy will be an enhanced capacity around the world to address hazards and make informed decisions on actions to reduce their impacts. This will include a shift in focus from response–recovery towards prevention–mitigation strategies, and the building of resilience and reduction of risk through learning from experience and the avoidance of past mistakes. By way of this enhanced capacity and a shift in strategic approaches, there will be a reduction in loss of life, fewer people adversely impacted, and wiser investments and choices made by civil society, when comparable events occur.

Further information

The full text of the Science Plan of the Integrated Research on Disaster Risk can be accessed at: www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/2121_DD_FILE_Hazard_report.pdf

Contact regarding IRDR

e-mail to howard.moore@icsu.org

Curriculum vitae: Jane E. Rovins, PhD, MPH, CEM, FPEM

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EMPLOYMENT

American Public University System/American Military University Emergency & Disaster Management Department

Associate Professor

- Provide instruction, evaluation, and discussion for graduate level courses related to theoretical and conceptual essentials of risk analysis, disaster management and incident management.
- Provide instruction, evaluation and discussion for undergraduate level courses related to basic theoretical and conceptual ideas on incident management, disaster management and risk awareness.
- Advise on the development of graduate and undergraduate courses in mitigation and natural disaster management.
- Conduct research in disaster risk reduction and related policy to promote disaster risk reduction and integrated risk governance.

All About Training, Inc.

Senior Planner

June 2006 to present Frederick, MD

November 2008 to April 2009 Throughout Asia-Pacific region

September 2004 to June 2006

Atlanta, GA

October 2007 to present Charles Town, WV

- Research, analyze and compile information and case studies related to hazard risk and vulnerability analysis, hazard
 assessment methodologies, hazard planning and recoverability, hazard insurance, hazard prevention, community
 education and outreach including risk perception and communication.
- Develop organization development and management tools including field operations guide, positional task books, and credentialing plans for disaster risk reduction and recovery personnel.
- Manage project tasks including personnel and reporting.
- Research, assess and identify risk reduction technical data; integrate and operationalize into knowledge management tools to meet learning objectives of federal risk reduction field courses and instructional materials
- Facilitate working groups of risk reduction specialists to develop organization development tools of disaster manuals, credentialing plans, operational plans and guides to promote capacity building.
- Integrate evolving policies, "best practice" operational procedures and technical information into disaster operations curriculum for federal disaster workers.
- Ensure applicability, user-friendliness and accuracy of training and knowledge management materials.

Association of Southeast Asian Nations (ASEAN) Regional Forum	Unit
Disaster Consultant	

- Developed a work plan for the ASEAN Regional Forum (ARF) member states in disaster preparedness and relief adopted by the ARF Ministers in July 2009.
- Developed the format for compiled experiences to be shared by member states as case studies to improve disaster risk reduction and response.
- Developed a case study on the response and recovery efforts to Wenchuan, China Earthquake based on the People's Republic of China report at the 8th ARF Inter-Sessional Meeting on Disaster Relief.

Federal Emergency Management Agency

- Deputy Public Assistance Officer
- Develop the *Public Assistance Mitigation Long-term Strategic Vision for Mississippi* during Hurricane Katrina, drafted policy recommendations, managed 8 staff, supervised and reviewed more than \$275 million in projects for compliance with federal regulations, cost-effectiveness and feasibility.
- Researched, developed, utilized, and promoted the new formal concept of *Partnered Mitigation Projects* and *Public Assistance Mitigation Go Kit* to help provide policy and program guidance and information in a field friendly format.
- Coordinated inter-organizational goals and efforts, integrating federal, state, and local agencies and sections through regional and disaster specific strategies, situation reports and staffing needs.
- *Response Liaison*, a member of the Emergency Response Team. Assisted the State of Alabama to assess their needs prior to and during Hurricane Dennis

Mitigation Lead for Emergency Housing Task Force. Researched and developed an emergency housing strategy to facilitate risk reduction in response to Hurricane Katrina.

Hazard Mitigation Planning Team Leader for an eight state region, managed and supervised up to 11 Risk Reduction Planners, including reviewing applications, conducting personnel performance assessments, developing scopes of work, coordinating and providing training for new staff.

Hazard Mitigation Community Planner

- Provided technical assistance to local, tribal, and state government officials with regard to preparation, revision, and
 update of risk reduction plans to comply with federal regulations and requirements and grant funding applications.
- Researched and reviewed over 125 local, state and tribal risk reduction plans for compliance with the Disaster Mitigation Act of 2000, the implementing regulations and policy, including written recommendations to federal regional staff, state, and local governments for improvement to the risk reduction plans, risk and vulnerability analysis, and long-term recovery. Evaluated strategies, objectives and goals for goal alignment.
- Developed regional database to track and monitor all plans through the planning approval and renewal process.

American Red Cross

Shelter Manager and Logistics (volunteer)

- Served as Assistant Shelter Manager for a level 3 disaster (Hurricane Ivan).
- Worked to coordinate logistics, inventory, mass care, meal planning and ordering for 1000 meals per day as well as shelter set up and break down.

Center for Disaster Management and Humanitarian Assistance **Research Assistant**

September 2000 to July 2003 New Orleans, LA

July 1996 to September 1999

The Gambia, West Africa

September 2004 to October 2004

New Orleans, LA

- Coordinated, organized and supervised administrative and guest speaker support for the Interoperable Regional Humanitarian Assistance and Natural Disaster Seminar (INTERHANDS), a 5-day conference for military personnel on civil military relations in complex contingency and humanitarian response settings in Latin America in conjunction with U.S. Southern Command, United Nations and international relief agencies (2001, 2002 & 2003).
- Coordinated INTERHANDS in the Republic of Congo for the Congolese Department of Defense and U.S. European Command, Kinshasa, Congo (2003).
- Assistant Coordinator for the Information Technology Sector of the Disaster Risk Reduction Hemispheric Conference 2001, San Jose, Costa Rica.
- Orchestrated logistics and administration for international conferences in disaster planning, mitigation, risk and vulnerability reduction, and preparedness including the Central American Disaster Preparedness Seminar in Guatemala City, Guatemala and the Andean Ridge Disaster Preparedness Seminar in Santa Cruz, Bolivia.
- Implemented a new management system and website to enhance program planning, tracking, reporting, budgeting, and organization.
- Conducted measures of effectiveness for program review.
- Created and managed disaster related research database.

United States Peace Corps

Volunteer Leader

- Assisted volunteers and staff in obtaining funding from various sources for the design, implementation, documentation, and evaluation of projects, programs, and trainings related to sustainable development in West Africa.
- Collaborated with the Associate Director on grant writing, project reports, financial and program management.
- Designed, implemented, and co-supervised 6 in-service trainings for 30 volunteers and Gambian counterparts.
- Served as Health Technical Trainer for 2 10-week Pre-Service Training for 35 Peace Corps Trainees each.
- Provided peer counseling for problems of medical, technical, security, personal, social and cultural nature.

Health Nutrition Degreed Volunteer

- Assisted in design and implementation of village improvement grant from European Development Fund to rehabilitate health clinics and develop a plan for maintenance and sustainability.
- Partnered with women's group to create strategies to reduce food spoilage and vitamin deficiencies, create a training manual of the strategies and develop small business plans.
- Facilitated and obtained funding for a local youth NGO to conduct peer counseling on HIV/AIDS.

Education

Summer Institute for Advanced Study of Disaster and Risk (2009) Beijing Normal University, Beijing, China Served as working group co-leader and international student liaison Doctor of Philosophy (2009) International Development and Disaster Management Tulane University Law School, New Orleans, LA

Master of Public Health (2001) International Health and Complex Emergencies Tulane University, School of Public Health and Tropical Medicine, New Orleans, LA

Bachelor of Science (1996) Health Appraisal and Enhancement/ Exercise Science, Nutrition (minor) Miami University, Oxford, OH

Certificates (full list available upon request)

Federal Emergency Management Institute, Emmitsburg, MD Over 40 training courses (300+ hours) including incident command system, mitigation planning, FEMA Grant programs exercise design, role of volunteer agencies, continuity of operations planning, National Incident Management System and National Response Plan

Professional Development

- Personal Safety and Security Awareness, CARE on-line training, June 2009
- World Conference on Disaster Management, Toronto, Ontario, Canada, Volunteer 2007, 2008; Ambassador 2009
- Annual Natural Hazards Research and Applications Workshop, Boulder, Colorado, 2008, 2009
- International Association of Emergency Managers Annual Conference, various locations, 2001, 2002, 2006, 2007 (presenter), 2008, 2009 (presenter/moderator)
- Federal Emergency Management Agency Annual All-Hazards Emergency Management Higher Education Conference, Emmitsburg, MD, 2007 (presenter), 2008 (presenter); 2009 (moderator)
- Mass Care & Introduction to Disaster, American Red Cross, 2002
- Roles of the Military in Disaster Management Humanitarian Assistance and Peace Keeping, U.S. Army Civil Affairs and Psychological Operations Command, 2000
- Staying Safe in Unsafe Environments Emergency Response and Security Issues in Crisis Areas, CARE seminar, 2000
- Direction in CARE's Policies and Strategies for Disaster and Complex Emergency Management, CARE seminar, 2000
- Safe Haven Medical Training and Rape Awareness, U.S. State Department, 1998

Certifications & Awards

- Certified Emergency Manager (CEM)
- Florida Professional Emergency Manager (FPEM)
- Best Emergency Management Graduate Student Research Report, FEMA 11th Annual All-Hazards Emergency Management Higher Education Conference, Emmitsburg, MD (2008)
- Individual Cash Award, Federal Emergency Management Agency (2005)
- *Dean's Grant*, Tulane University, School of Public Health and Tropical Medicine (2000)

Professional Organizations

- Natural Hazard Mitigation Association, President (2008 to 2009), Board of Directors (2008 to 2011)
- International Association of Emergency Managers (2001 to present) Scholarship Commissioner (2007-2009); Conference Committee (2007 to present); Standards Committee (2007 to present); Bylaws Committee (2008-2009); Education and Training Committee (2006-present); Region 4 Nominating Committee Chair (2008-2009); Region 12 Vice President (2002)
- International Research Committee on Disasters (2009 to 2011)
- International Sociological Association (2009 to 2011)
- Florida Emergency Preparedness Association (2007 to present)
- Emergency Management Professional Organization for Women's Enrichment (EMPOWER) (2007 to present)
- Association of State Flood Plain Managers (2007 to 2009)





International Strategy for Disaster Reduction



INTEGRATED RESEARCH ON DISASTER RISK

IRDR FORENSIC INVESTIGATIONS

Report from the ad-hoc Working Group

Toronto, 1-4 February 2010

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Executive summary

Despite considerable advances in the geophysical sciences and in geotechnical capacity over the past several decades, losses from disasters associated or related with natural phenomena continue to rise at a rapid rate. This report explores and elaborates upon various hypothetical explanations for this fact and endorses the idea of the ICSU Planning Group to develop and implement an innovative methodology identified as "forensic investigations" of disaster risk. Critical to this methodology is a broad multidisciplinary research strategy that will bring together researchers in the natural sciences, engineering, the social and health sciences, economics and other fields. It is proposed that the research will employ several approaches singly and in combination, including: critical cause analysis; meta-analysis of existing studies and new research; longitudinal analysis; and disaster scenarios.

The ad-hoc Working Group recommends that a formally constituted Working Group be established as soon as practicable, charged with the responsibility to further develop and implement Forensic Investigations as outlined in this report.

Preface

In its planning for what was to become the new Integrated Research on Disaster Risk (IRDR) programme, the ICSU Planning Group proposed that there be an initial emphasis on case studies as a cross-cutting theme. Over the first three years of IRDR the Scientific Committee would commission and encourage case studies to identify major research needs and gaps at the interface of natural and social sciences. The case studies would aim at analysis of crises or disasters caused by natural phenomena from which lessons can be learnt. The Science Plan proposed that these case studies of serious, all-encompassing, arms-length, careful and detailed analysis of both 'failures' – or cases where mistakes were made – and success stories. The Science Committee for IRDR has endorsed these principles and approaches and concluded that there was need to move ahead, relatively quickly, to better define the scope and approaches of case studies and forensic investigations.

Due to some short-term opportunities for funding and people's availability, it was decided to convene a meeting in early February, hosted by the Institute for Catastrophic Loss Reduction in Toronto. Specific funding support was provided by UN-ISDR and ICLR, while ICSU provided logistic support.

The participants in the meeting were a selection of IRDR SC members (S. Cutter, A. Lavell, G. McBean), B. Mills, who is chair of the World Weather Research Programme's (a research partner of IRDR) Working Group on Socio-Economic Research Activities (SERA) and I. Burton, a member of the ICSU Planning Group, who had taken a lead on case studies within the planning process. I. Burton was asked to chair the meeting. Special thanks are due to P. Kovacs, Executive Director of ICLR for his support of, and participation in, the meeting and to K. Hewitt, T. Islam, D. Sandink and C. Rodgers for their contributions to the meeting and the report. R. Basher of UN ISDR joined the meeting dinner and provided insight. This was an excellent group but it will be important to extend the participation in future meetings to other regions and areas of expertise to provide greater international diversity of authors, literature cited, and other inputs.

One output of the meeting is this report, which provides excellent guidance for the further pursuit of the concepts and activities of forensic investigation as a key component of the IRDR. The meeting has also recommended that the SC IRDR formally establishes a Working Group and charges it with the further development and implementation of forensic investigations. The report provides guidance on some initial steps that could be taken by such a Working Group on Forensic Investigations. The SC IRDR will consider these recommendations at its next meeting in April 2010.

On behalf of the SC IRDR, I thank again the participants in the meeting for an excellent report, based on some spirited and in-depth discussion, and for their specific recommendations.

G. McBean Chair, Scientific Committee Integrated Research on Disaster Risk
1. Context

The Science Plan for Integrated Research on Disaster Risk (International Council for Science, 2008) includes a proposal for the design and execution of "Forensic investigations of recent disaster events" (Section 12.2, p. 47). This proposal has also been endorsed and recommended by the Latin American ICSU disaster risk reduction research programme elaborated in 2008 (ICSU-LAC, 2009). It is suggested that such investigations be included in the first three years of the IRDR programme both to demonstrate some early results, and to help identify specific research questions to be addressed as the programme develops. The Science Plan also proposes the formation of a Working Group to further refine the concept of forensic investigations and subsequently design the template to guide the investigation teams.

With the support of ISDR an ad-hoc Working Group was convened in Toronto, 1-4 February 2010, for the purpose of elaborating upon the proposal and considering what next steps might be taken.

2. Problem statement

One of the underlying questions that began the momentum towards the IRDR proposal for forensic investigations was the conundrum: why when so much more is known about the science of natural events including extremes and when technological capacity is so much stronger, are large scale disasters (as well as the impacts of small and medium scale ones (see ISDR,2009)) apparently becoming more frequent and the losses continuing to increase at a rapid rate? (White, Kates and Burton, 2001). There has been over the last 50 years a substantial expansion of knowledge about the potential magnitude and frequency of many natural events and the places in which they are more likely to occur. Often the growth in losses is attributed to increases in human population and material wealth, and their expansion into more hazardous locations. This is certainly part of the explanation for increasing losses. It is also true that scientific knowledge and modern technology are not uniformly distributed and that many developing countries have a low capacity to utilize or introduce the science and technology that is theoretically available due to institutional or human resource barriers or, more importantly, cultural and resource scarcity reasons. But the fact that large disasters continue to occur in developed countries suggests that there must be more to the explanation than access to science and technology, and choice of location, important though these factors undoubtedly are.

It might be expected that the effective application of new and better knowledge and stronger technology would allow for a decrease in losses or at least stabilization, even as population and wealth increase. To some extent this has happened in some developed countries where it seems (subject to some serious limitations in available data) that losses have just about kept level with economic growth; in other words they are a more or less constant proportion of GDP. In many developing countries the "success" rate has been less satisfactory and there are clear indications that in the highly vulnerable and exposed countries at least, losses are increasing faster than wealth, and are an impediment to social and economic development. Single larger scale or a series of sequenced smaller scale events can sometimes set back years of economic and social development, foster political insecurity, and cause long lasting environmental impacts. Where the environment has been severely degraded, as in Haiti for example, such events will probably lead to greater human impacts as new socio-natural hazards are added to already existing natural ones. In developed countries disaster risks could be managed better. In developing countries it is not enough to say that improvement is possible, it is an imperative.

After a major disaster event it often happens that an enquiry is made or new research undertaken into the causes and consequences. When such investigations are conducted (and there have been

many), they typically focus heavily on either the geophysical or atmospheric processes or the technological and structural aspects of the damage. Emergency preparedness and the disaster relief and rehabilitation response are also often examined. Sometimes an enquiry may extend to the effectiveness of existing policy and make recommendations for future policy improvements. These efforts rarely seem to probe very deeply into the more underlying and sometimes longer-term causes of the disaster, although excellent examples of this are to be found. (Oliver-Smith 1999; Maskrey (ed), 1996). Nor are the enquiries necessarily carried out at arms-length from those most intimately involved and responsible. This is understandable to the extent that those consumed in disaster response and on the spot have the most knowledge of just what occurred, but not necessarily why or how. One consequence appears to be that enquiries tend to leave many questions unanswered or even not asked. Is it also the case, as some would argue, that in the aftermath of a disaster when many are suffering materially and physically and from post-traumatic stress disorder that there may be reluctance to risk creating more distress by probing too deeply into the causes?

3. The forensic approach

The ad-hoc Working Group endorses the idea that more penetrating investigations, developed in a more explicitly designed and enacted multidisciplinary framework with a common methodology and a common set of fundamental questions could and should be made as part of the early phase of the IRDR programme. Such studies will search for additional, wider and more fundamental explanations for the current rise in disaster losses. These might extend from gaps in scientific knowledge in some instances to the ineffective application of available knowledge. Commonly identified in previous investigations are poor building standards, planning and design of infrastructure and human settlements. Less frequently addressed are questions concerning how and why decisions were made and management options chosen. This applies not only to major policy choices but to the many everyday incremental decisions and social and cultural practices that shape the resilience and vulnerability of communities. Investigations should explore these questions as well as new forcing that may be emerging through the evolution and proliferation of communication and other technologies or the globalization of the world economy. The IRDR research initiative is therefore aimed to conduct investigations of these and other hypotheses and ideas at a greater depth and with more rigour than has previously been achieved. The use of the term forensic investigations should not be taken to imply that lessons and insights and new understandings can only be derived from "failures" or cases where mistakes can be identified. It is also important to conduct forensic investigations in places where extreme events have occurred with much less serious or highly variable consequences to help accumulate evidence of good practices and other success factors. An examination of good practice and low impact, as opposed to bad practice and high impact, can be achieved with different results by looking at the impacts of the same event on different areas and sectors and different events on the same types of problem and sector. Clearly the forensic approach as briefly described requires more elaboration and the development of guidance for its implementation. The wider utility of such an exercise will depend on its interdisciplinary design and the non-partisan and professional integrity with which it is executed. The status and reputation of ICSU and its partners in ISSC and ISDR gives reason to believe that there are good prospects that such ambitions can be met.

The essential elements of the disaster forensics approach as envisaged by the ad-hoc Working Group can be summarised as follows:

i) Investigation of the circumstances, causes and consequences of losses in disasters and to identify conditions that have limited or prevented loss.

- ii) To operationalize and test a series of hypotheses of damage causality (including primary and secondary hazards, settlement, land use, the built environment, development paths and others).
- iii) To identify especially key factors in the expanding numbers or losses in disasters during the past few decades and to show just how they enter into risk and disaster.
- iv) Investigation of the use of existing scientific knowledge in disaster risk assessment and management

4. Research methodology

Four approaches are identified as offering different and complementary modes of analysis for application in a series of core investigations of events of particular concern in given places, regions, or contexts where existing explanations seem insufficient or are contested and/or where there are some prospect of bringing exceptional or recurring losses under greater control. These might centre upon Critical Cause Analysis (CCA), and this can in turn draw upon other approaches including meta analysis, longitudinal analysis and scenarios.

It is the sense of the Working Group that despite great advances in many aspects of science applied to disasters, there are rarely investigations sufficient to base a full and comprehensive assessment of the causal factors. Geophysical and geotechnical understanding is rarely brought together with social profiles of risk and response. There are deaths and damages in a range of recent disasters about which there is no mystery. The immediate and proximate causes of the collapse of schools and hospitals in Gujarat, Sechuan and northern Pakistan are well understood. So are the reasons for the collapse of buildings in Mexico City in 1985 or Izmit, Turkey in 2006. It is also clear why casualties among women and the elderly were disproportionate in the Kobe earthquake, and why exceptional losses were recorded among the elderly, the disabled, and poor African-Americans during the Katrina events in New Orleans. Moreover, within all the disaster zones of these events there were cases of schools, hospitals, high rise blocks, groups of women. children and the elderly who survived unharmed or were able to recover quickly mainly thanks to effective social and economic protection measures that others did not have. Thus there is a good deal of evidence that suggests losses were not the inevitable consequence of the earthquakes or storms, but of the failure to learn lessons from past events, the lack of applied normative behaviour, diverse decision making failures, poorly managed recovery and reconstruction following them amongst other humanly induced or promoted factors. It is a remarkable fact that very few places where recent major disasters have occurred lack a history of disasters, or events than can be shown to threaten major losses when they recur.

Forensic investigations are partly about looking more broadly at the conditions and profiles of risk and losses, more sophisticated analysis to identify causal relations of how, where and to whom losses occur; not ignoring where they do not occur and why. The point is to identify those causes about which something can be done, which in itself requires social, cultural and economic sensitivity to the type of society being considered and its opportunities and limitations; to find the best evidence of what was done, and if nothing could have prevented or withstood the forces involved, then what other options there are for avoidance and the use of more risk averse practices; and saving lives if not property. To the extent possible these forensic investigations will seek to emulate what a range of professional investigations have achieved in other fields such as industrial accidents, transportation safety, fire, and disease prevention: that is to identify key hazards or forms of endangerment that can be acted upon to limit or prevent harm.

In the development of this methodology considerations should be given to what can be learned from forensic investigations in these other topics.

4.1 Critical cause analysis

The foundation of the IRDR forensic investigations would be to recommend/carry out a series of studies which retrospectively reconstruct and specify the conditions, causes and responses involved in particular destructive events. They would be 'forensic' in the sense of a broad mandate to trace out and assign causal explanation of losses, and attendant or intervening conditions that magnified or limited losses. Conditions in the impact or crisis-emergency phases are of foremost concern and will usually serve to identify most of the losses to be explained. However, it is anticipated that careful attention would be paid to pre-disaster conditions, especially as they govern exposure and vulnerability to given hazards, and the role and effectiveness of responses to the emergency, and post-disaster recovery conditions. In each case the aim would be to identify key factors and points of risk, immediate loss and adverse consequences that follow. Equally, it would be important to cast a sufficiently wide net within disaster zones to identify the measures and responses that served to prevent or limit the losses found elsewhere and for each process in the disaster sequence that caused harm or failed to offset it. The approach would be multi-disciplinary, aiming to integrate social, environmental and technical assessments, partly because of the complex range and interaction of factors in disasters, partly to be open to pursue whatever explanations or safety conditions may offer best opportunities for improvement. This would serve the main goals of identifying more effective mitigation and preventive measures.

The following factors are of critical importance:

- (1) Conduct causal analysis of hazards and the processes involved in loss, injury, death and damage, with a view to identifying critical factors in the pre-disaster, impact and post-disaster recovery phases. And, attempt to identify the preventive measures that did or can apply to avoid, control, or limit the losses and for each process in the disaster risk sequence identify those that caused harm or failed to offset it. If possible engage, or consult, a relevant range of professional, technical, local assistance in events.
- (2) Identify critical failure (or success) points, meaning a site, step, item or process where damage occurred that could be prevented, eliminated, or reduced to an acceptable level in the face of a particular type of hazard.
- (3) Establish critical limits for failures and failure points --- maximum or minimum values for site, construction, behaviour, in relation to the warnings, evacuations, and building safety criteria to prevent, eliminate, or reduce loss to an acceptable level.
- (4) Establish monitoring requirements, necessary to ensure that the community, item or process is constantly aware and protected at critical failure points.
- (5) Establish corrective actions that are appropriate to conditions and funding in given contexts, and that can be taken when monitoring indicates a deviation from an established critical limit. This will require a plan to identify corrective action if a safety limit is not met, and to reduce exposure and vulnerability to potentially damaging physical events.
- (6) Specify adequate record-keeping, documenting, and monitoring procedures for critical items, threshold points and limits.

- (7) Identify who does, can, or should carry out corrective actions, and maintain the safety systems.
- (8) Clearly identify where more recent prospective or proactive action could have been taken and enacted in order to guarantee that less risk was constructed in reality-such as land use planning, enactment and enforcement of building norms and the like.

In carrying out forensic investigations it is important to anticipate what the implications of the results of analysis may be. In other areas of safety these include inspections, verification and validation: to move from analysis performed by qualified, independent inspectors to ensure disaster mitigation as well as emergency plans are adequate and working as intended and to check that procedures or items do what they were designed to do; that is, are successful in ensuring safety. This may include periodic or on-going reviews of records, critical limits, sampling and analysis and tasks to be performed by responsible personnel.

4.2 Meta-analysis, including existing literature and new research

Meta-analyses are systematic reviews of the extant literature to identify and quantify (if possible) consistent findings across diverse studies. The meta-analysis is an analytical procedure where the results of the observations (e.g. case studies) are coded and then statistically analyzed to look for causal linkages, the strength of relationships among factors (dependent or independent variables), and the effectiveness of interventions. The meta-analyses can focus on thematic attributes of disaster risk (e.g. role of insurance in loss prevention; differential impact of disaster loss on the poor; availability and utilization of knowledge); or they could focus on specific perils (e.g. earthquakes, windstorms, flooding). For example, Rudel (2007) did multivariate statistically-based meta-analysis of 268 empirical studies of deforestation looking at causal factors used to explain forest loss. He found both distinct temporal patterns in causation, but also a shift in institutional drivers from state-sponsored programs to more enterprise driven initiatives over time. On the other hand, Polsky et al. 2007 argued for a common protocol for vulnerability assessments (which they term the vulnerability scoping diagram) that would facilitate comparisons among dissimilar studies, but using qualitative assessments rather than quantitative comparisons.

Another approach to meta-analysis is to derive commonalities across findings based on a research design where the empirical studies all used a common template or set of protocols. In this respect, the meta-analysis is used as a procedure for synthesizing the results of similar studies based on a consistent research design. We might think of this approach as the ex-post assessment, where the archival literature approach is the ex-ante. Examples of the ex-post meta-analysis include White's (1975) pioneering work on hazard case studies ranging from local to global, and the comparative analyses of hazards in the world's megacities (Mitchell 1999a, b). One of the outcomes of such a research project is the identification of knowledge gaps in the existing research as well as contradictory findings on disaster impacts or loss reduction. This gap analysis would suggest where strategic investments could be made by IRDR to stimulate additional research to not only fill the knowledge voids but resolve some of the contradictions in findings. An example of the utility of such meta-analyses is seen in Box 1.

Box 1: Counting fatalities

One of the main mechanisms for understanding losses from disasters is the number of fatalities. Estimates of deaths vary widely depending on the source of the data and once reported they rarely are confirmed before entry into statistical databases such as EM-DAT. For example, the forensic investigation by Altez and Revet (2005) on the Vargas 1999 mudslides was only able to confirm 852 deaths compare to the 30,000 initially reported and thus recorded in the global databases, such as EM-DAT. A meta-analysis of how fatalities are recorded across disasters and regions would shed some light on the magnitude of over and underestimates of deaths attributed to disasters.

4.3 Longitudinal analysis

Longitudinal reconstructions are detailed, place-based re-analyses of particular disaster events and are used to more fully understand damaging processes and contexts that put people at risk; identification of prevention measures that could have made a difference; and lessons learned or unlearned. These reconstructions could be comparative geographically (e.g. two different but essentially comparable places with similar event characteristics where the sequence of actions, decisions, policies, etc leading to disaster risk and particular effects are cross examined in comparative fashion) or comparative *in-situ* (same place, two temporally different events, repeat events; or the same place with two different perils). The methodological approach to reconstructions employs archival and ethnographic techniques. They require sophisticated understanding of the particular place and its history, geography, and culture in order to reconstruct both the context and the driving forces that produced heightened the impact on that place. The most well-known disaster reconstructions are Kai Erickson's Buffalo Creek disaster (Erickson 1976); and Tony Oliver-Smith's work on the Peruvian earthquake in Yungay (Oliver-Smith and Hoffman, 1999).

An example of a current reconstruction that could be done would be to compare the effects of Hurricane Camille (1969) and Hurricane Katrina (2005) on the Mississippi coast (same spatially location) where they both made landfall in nearly the same location, but during different time periods. Another example would be a longitudinal reconstruction of the 2003 European heat wave comparing the impacts on urban areas in France compared to cities in central European countries, for example. Why was the mortality rate so much higher in one country compared to the other?

The value of longitudinal reconstructions is in providing in-depth understanding of the causes and consequences of disasters and the evolution of mitigation and/or risk reduction strategies. In the case of paired comparisons of a single place with multiple disasters, this approach permits an analysis of what mitigation strategies worked, what ones could have worked if implemented, the lessons learned, and the lessons not learned.

4.4 Scenarios of disaster

It is inevitable that a major cyclone will eventually strike again in Southeast Asia, or the Caribbean; an earthquake will strike again in China, Turkey, Pakistan, Haiti, Japan, the United States or South America; and there will be catastrophic flooding again in Mozambique, China or Europe. A tool to help decision makers advance disaster risk reduction may involve a rigorous assessment of potential future disasters particularly in areas already affected in the past and where information on those events and the causes of their impacts can be built into the new scenario

building effort. Ideally, lessons society can learn from an assessment of disaster scenarios will be based on a detailed analysis of both possible adverse impacts and the identification of options for reducing the risk of loss. This type of "forensic" work could possible be referred to as "projective or predictive forensic" given it projects loss and its causes into the future as opposed to examining and explain real loss in the past.

IRDR forensic investigations will involve scenarios that may include cyclones, earthquakes, floods and other natural hazards. Other important risks, like pandemics and terrorist attacks, would not be included in this effort. The hazards explored would be realistic, low probability risks, with the potential for a major adverse impact in terms of loss of life and/or property damage. The investigation should include a multi-disciplinary assessment of the factors contributing to the risk that a natural hazard would become a disaster and an exploration of potential actions to mitigate the risk of loss.

The scenario should be science based, selected on the basis of a known hazard that may be rare, yet represents a realistic and possibly inevitable future event. Potential scenarios may assess a historic disaster event if it were to reoccur in the near future, assessment of a hazard experienced elsewhere relocated to the study community, or the impact of a natural hazard viewed to be realistic for the study area. The analysis would involve natural science with the capacity and experience to provide a detailed description of the potential hazard used to support the scenario. The impact assessment should be multidisciplinary. This should involve experts with knowledge about the hazard, engineering and the social sciences. It would be useful to develop estimates of the potential loss of life, injuries, number of people displaced, damage to buildings and infrastructure, and other economic losses. It would be useful if financial estimates are generated for specific risks like potential damage to homes, interruption in business, destruction in public infrastructure, impact on employment, loss in expected tax revenue, and increase in government disaster relief spending. Detailed assessments would explore impact by gender, age, and socio-economic status. Rigorous analysis of potential adverse impacts will provide a strongest foundation for the identification of specific mitigation options.

The study must also set out specific options for mitigating and preventing the risk of future disaster losses. The most rigorous studies would have the potential for supporting a cost/benefit assessment of each option. Ideally the study will provide an assessment of the root causes that the natural hazard has the potential to become a disaster. This would involve study of the state of public infrastructure, disaster resilience of buildings, quality of emergency preparedness, and public awareness of disaster risk. Perhaps this may involve a comparative assessment measured relative to some benchmark of best international practices. This should also include an assessment of social vulnerability.

Moreover, it is important that the findings from an assessment of potential disaster scenarios contribute to appropriate actions by decision makers. The studies should include active communication of findings to policy makers, private industry, the general public and other stakeholders. Involvement of decision makers in the study design and implementation will increase the likelihood that the knowledge generated will advance disaster risk reduction. The ShakeOut scenario is an example of this form of forensic investigation. More than 300 experts from academia, industry and the public sector assessed the impact of the potential 7.8 magnitude earthquake on the San Andreas Fault near Los Angeles California. The ShakeOut study estimates that the earthquake may cause 1,800 deaths and US\$213 billion of economic losses.

A comprehensive, multi-disciplinary assessment was completed to identify actions to reduce the potential impact of the next major earthquake in Southern California. The study found that retrofitting programs have increased the seismic resilience of buildings, highways and other lifelines, yet much more can still be done. Five major areas of expected loss include older building designed to earlier standards, non-structural elements that are largely unregulated,

vulnerable public infrastructure, business interruption due to failure of public infrastructure, and uncontrolled fire following an earthquake.

The findings from the ShakeOut study have been communicated broadly to a wide range of stakeholders, including emergency managers and the general public.

The specific elements of a potential disaster scenario may never happen but it is inevitable that cyclones, earthquakes, floods and other natural hazards will continue to strike with great force. The assessment of scenarios can support enhanced preparedness and stimulate investments in mitigation. Rigorous scientific analysis of the natural hazard, the potential impact, and options for mitigation provide an important foundation of knowledge to support decision makers as they manage these perils. The study of potential disaster scenarios empowers users to identify what they can change now, before the hazard strikes, to reduce the catastrophic impact after the inevitable hazard occurs. Moreover, lessons learned from any given scenario could apply to a range of alternative risks.

5. Elaboration of problem dimensions

Each of the approaches elaborated above provide a well-reasoned advance on important research questions. In composite, they establish a medium and mechanism for developing a comparative understanding of the root causes and underlying processes that lead to disaster risk in diverse socio-economic, cultural, national, regional and local settings. As well, the methods offer an understanding of the processes by which risk reduction policies and instruments are, or are not, laid out on the ground in specific but comparable disaster risk contexts. However, beyond this lie a series of fundamental probing critical questions that should be informed through the integration of results. These questions¹ synthesize into five general themes or focal points: a) disasters in the context of everyday life; b) knowledge creation, communication and relationships with decision-making; c) responsibility and governance; d) measurement of outcomes and differential impacts; and e) attribution of cause and effect by social actors.

(a) Disasters in the context of everyday life

This theme appeals to a broader construction of risk that is not divorced in time or space from everyday life and experience. Are disasters only, or mainly, caused and explained by environmental extremes, unprecedented conditions, unscheduled events, or 'a few bad apples'? Or rather are the degrees and forms of risk established by pre-existing conditions and, in most cases, those of the 24/7 fabric of home, family, community, work, services, entitlements, expectations and leisure? Evidence for the latter implies that people and property damaged in disaster were already and specifically exposed and vulnerable to more or less well-known threats—but lacked protections that others had. Triggering agents like earthquakes or storms are clear points of reference, contributing to threats and facilitating damage, but are not fundamental in the disaster risk management equation, which must always be based on human intervention filtered through an understanding of societal conditions and habitat relations.

Taking this line of inquiry further, one questions whether everyday life has been treated as simply the opposite of and, therefore, irrelevant to, disaster. In causal explanations of why, where, and to whom disaster happens, evidence points to this as a convenient 'myth'. Whether coincidental or intentional, the fabrication serves to subvert attention away from essential avenues of responsibility. Everyday life is contrasted as opposite that of disaster by way of its 'normalcy'— traditional, predictable, and static—an illusion that only occasionally if ever presents itself in the modern world. What is more often meant by 'global change', not to speak of 'globalization', is the deliberate, if not always well-planned, transformation of everyday life. So when one speaks of

¹ A more complete series of questions raised during the ad hoc working group meeting and synthesized into section 5 are listed in Annex 2.

'everyday life' as a precursor of disasters, it is rarely because it remains unchanged. Nor does it mean that life would have been only benign, stable or secure in the absence of disaster. Slums and risky jobs, not to speak of driving or fast food, have their everyday dangers. For these reasons too, it is essential to address the links to and role of 'development' in disaster.

'Development' or modernization is essentially a reconfiguring of everyday life and it too has been the site of a false dichotomy—that disaster is the opposite of development. Although this may be the intention of development proponents, in practice a world is revealed where both lack of development and ill-considered, risky forms of development have been major precursors of magnified or novel damages. That is pretty obvious when dams fail, tunnels collapse, or mining makes river and lake water toxic. But there is very little about the modern world that is not being changed with, or usually without, a precautionary accounting of the risks that may follow—for some if not most people. Recognizing the links between 'everyday' and disaster is the basis for acknowledging that efforts to reduce disaster risk require real advances in development parameters and indexes and that disaster risk reduction and management are or should be an integral part of development planning.

Finally, it is hard to imagine day-to-day life not pervading and controlling to some degree the form, extent, and success of disaster responses—which are far from independent of pre-disaster life. That 'everyday' capacities, skills, and values of people at risk are fairly decisive in how they influence disaster response exposes another often ignored reality. In a majority of disasters, lives saved that would otherwise be lost, and most evacuation, sheltering, feeding, comforting, in the hours or days before outside relief arrives (if it does at all), are overwhelmingly the product of actions taken by relatives, neighbours, local service and professional persons still able to function. Since it does not have the stamp of something special to disaster, this is usually neglected in mainstream research and media coverage.

(b) Knowledge availability, creation, communication and relationships with decisionmaking

The assertion that society and its institutions have failed to fully apply existing knowledge concerning disaster risk and disasters—the wisdom of past successes and failures—is a motivating rationale for the IRDR effort. However, the many issues surrounding it deserve much more careful and critical attention.

In some cases, massive and important gaps exist in basic information that must be resolved for utility to be derived from ideas and lessons learned elsewhere or from those long ago. For example, many of the major disasters that have affected Central America in the last 20 years were never seen to be likely given the lack of physical analyses and projections, or forgetfulness of past experiences—often decades or even centuries ago. Understanding how this lack of information or the application of knowledge based on incomplete information or erroneous assumptions, leads to poor decisions will enable the unpacking of precursors to disaster. The process of generating or creating knowledge may offer important clues as to why results have not been successfully transformed into policies, practices, standards, investments, and other actions to the extent envisioned or possible. Taking cues from environmental assessment and general risk management literature, one would expect that response uptake, application, and effectiveness improve when local experience (tacit knowledge) is combined with and given standing alongside 'expert' knowledge in participatory research and decision-making processes. It is not clear whether these qualities actually produce 'better' knowledge or simply build credibility and trust. What is evident is that strongly held local knowledge claims concerning disaster causes are not easily supplanted with outside expert opinion and that institutions, politics, and social organization play primary roles in establishing, reinforcing or breaking down barriers to information.

The divide between expert and lay perceptions and opinions concerning risk and response are but one illustration of difficulties associated with knowledge translation and communication. Much of the available knowledge may exist outside of a particular region and in a form that may be foreign to decision makers (e.g., journal articles) or inappropriate for their particular problem (e.g., precision, certainty). Understanding how information flows and modifies when translated and interpreted across languages, cultures, media, regions/locations, hazards, disciplines, institutions, gender, age, and through time will permit identification of factors that influence cognition, use, and ultimately disaster outcomes.

(c) Responsibility and governance

Complementing the quest for the root causes of disasters is the search for responsibility, which naturally extends into the realm of management, institutional arrangements, and other processes associated with governance. How can 'responsibility' be assigned to social actors? Clearly this depends on the type and form. Deliberate acts of corruption, deceit, and gross negligence perpetrated by a few 'players' usually make their way into and through legal proceedings or inquiries—especially in developed countries. This contrasts with situations where participation in the creation of risk is *en masse*, unknowing or coincidental with efforts that, by many measures, produce tremendous societal benefit (e.g., jobs and livelihoods produced through coastal development, urbanization, deforestation). It is these broader areas of responsibility that must be carefully examined in greater detail, teasing out the evolution of institutions, social norms, and basic incentives for encouraging or discouraging risk reducing behaviour from well before to well after the disaster in question.

(d) Measurement of outcomes and differential impacts

Establishing the various causes of disasters, identifying and assigning responsibility for damages, and recommending mitigating actions, demands a common interpretation of desired and undesired outcomes. A partial list of these includes: mortality with cause of death; morbidity with kinds and numbers of injuries; number of displaced and homeless; direct economic losses; property losses, other losses, business disruption and discontinuity; losses covered and not covered by insurance; disruption of access to basic services, mobility and communication; and longer-term stress and psychological effects. Although there are many important practical and methodological challenges of obtaining such information, a more compelling question is whether such measures are adequate for evaluating aggregate impacts such as 'social disruption' or conceptions of system qualities like 'resilience'? Depending on how many indicators are considered and how they may be subjectively weighted (e.g., lives take precedence over livelihood or insured loss) by researcher and decision-maker alike, one might derive a very different assessments of success, failure, damages, and responsibilities. In disaster and risk analyses, the outcome or damage indicators noted above are often used as dependent variables whose variability (i.e., differential impacts) can be connected to corresponding changes among independent variables (e.g., land use, income, education, dwelling age). The resulting correlations, when coupled with a plausible mechanism or process, become valid sources of explanation that are strengthened even further when repeated in multiple locations (within a disaster area and between different regions) and time periods for multiple forms of hazard. This suggests that considerable effort needs to be spent on identifying and evaluating potential plausible mechanisms and independent variables for application across a wide variety of disaster contexts.

(e) Attribution of cause and effect by social actors

Understanding different interpretations of the causes and effects of disasters may yield insight into why certain actions were undertaken while others were not. Maybe another fundamental one is how the disaster was interpreted in causal terms by different social actors, in newspapers, on television, in reports. What was revealed or argued to be the initial or fundamental causes. How do physical interpretations play off against more social explanation? Additional generic question sets could include a section on how disaster is explained by different social groups and interests.

6. Guiding the investigations

There is a wide range of possibilities for forensic investigations and it is appropriate that selection criteria be established. These criteria should be seen as flexible guidelines since there will undoubtedly be opportunities which require pragmatic response. However, it is important that selected investigations address the core principles of the IRDR. Thus they should be inherently integrated across the disciplines and be appropriate to relate to other hazards and other geographical regions than the ones specifically in the investigation. Further since the outcome of **IRDR** is to leave "the legacy of an enhanced capacity around the world to address hazards and make informed decisions on actions to reduce their impacts, such that in ten years, when comparable events occur, there would be a reduction in loss of life, fewer people adversely impacted, and wiser investments and choices made by governments, the private sector and civil society" the selected investigations should specifically contribute towards this legacy and these contributions should be identified clearly in the project objectives. When developing the rationale and work plan for the investigations, clear links to policy issues need to be identified. It is important that the outcome of these investigations be such that there is a definite positive impact; part of the research will need to be on how to make the benefits of the investigations most effective and useful and ensure that they are actually implemented.

In view of expected forensic investigations, it is particularly important that they address the institutional levels of governments, the private sector and civil society and their roles in disaster risk reduction. Institutional analyses should be undertaken to clarify relative roles and responsibility. For this reason, the participation of local partners should be part of the selection criteria.

For these selected forensic investigations, the IRDR should bring together teams of experts and practitioners, including appropriate expertise in the relevant fields of natural and social sciences, as well as decision-makers, to address the key questions to be answered. The selection of investigations should include those where there is potential for arriving at objective views or assessments of responsibility.

The IRDR co-sponsors all have policies with respect to openness and the free distribution of information, appropriate privacy and ethics, and on issues of balance. These policies must be respected.

As outlined in the IRDR Science Plan, in relationship to Objective 3, (Reducing risk and curbing losses through knowledge-based actions) it is proposed that some initial forensic investigations be carried out on recent disasters. Following the suggested methodologies and approaches outlined above, detailed examination of a number of cases should be carried out to gain experience in combining and integrating the diverse areas of knowledge that are necessary for any practical programme of risk reduction and include vulnerability assessments and the analysis of effective (and ineffective) approaches to risk reduction.

In addition to the other criteria, it is proposed that in the next few years, forensic investigations be carried out to identify major research needs and gaps at the interface of natural and social sciences. These studies would also test methodologies and approaches in a systematic way. The selected investigations would involve a wide range of hazards, scales, geographical regions, cultural and economic contexts, including the social contexts from hazards affecting, for example,

large mega-cities to rural communities, from the most impoverished countries that have limited resources to highly sophisticated communities in the developed world.

7. Potential outcomes

Several potential outcomes can be identified at this time. The following list of three broad sets of outcomes needs further elaboration. As in all scientific research there can be other unanticipated outcomes which though unforeseen can add to knowledge and point to future research.

- i) These forensic investigations have the potential to improve understanding of the causes of disasters in ways that can lead to improved practice in disaster risk reduction and management, especially by identifying options for future action that can reduce exposure and vulnerability. A key element is the identification and location of responsible decisions in ways that permits or mandates improvement.
- ii) To the extent that new understanding is achieved these investigations have the potential to set disaster risk reduction on a new path that will begin to slow down the rate of increase in losses and could eventually lead to stabilization and reduction. In making this claim the Working Group is keenly aware that while there is hope for a safer environment it cannot be achieved easily or soon.
- iii) An important part of the research is to develop and improve the research methods and approaches themselves. To the extent that these newly designed forensic investigations prove to be effective when conducted by the research community, they may provide a new model and a new paradigm for official investigations conducted under public authority.

8. Recommendations

The ad-hoc Working Group recommends to the Scientific Committee for IRDR (SC IRDR) that:

- 1. This report be reviewed (subject to modification and expansion as necessary) and accepted at its next meeting in April 2010.
- 2. The SC IRDR formally establishes a Working Group and charges it with the further development and implementation of Forensic Investigations.
- 3. It invite the Working Group on Forensic Investigations to:
 - participate in a coordinated way with funding activities,
 - initiate as soon as feasible some research for early completion, specifically metaanalysis based on existing literature,
 - convene meetings and workshops as required for the furtherance of its agenda,
 - seek opportunities for collaboration among the sponsoring organizations (ISCU, ISSC, ISDR) and other agencies, and
 - convene groups of experts to design templates and elaborate common methodologies for forensic investigations.

References

- Altez, R. and S. Revet, 2005. Contar los muertos para contar la muerte: discussion en torno al numero de fallecidos en la tragedia de 1999 en el Estado Vargas-Venezuela. Revista Geografica Venezulana. Also appears in Maskrey's Global Assessment Report.
- **Erickson**, K. T., 1976. *Everything in its path: destruction of community in the Buffalo Creek flood.* New York: Simon and Schuster.
- **International Council for Science-ICSU** (2008) A Science Plan for Integrated Research on Disaster Risk: Addressing the challenge of natural and human-induced environmental hazards, ICSU, Paris
- **ICSU-Latin America and the Caribbean** (2009). Science for a better life: Developing regional scientific programme in priority areas for Latin America and the Caribbean. Volume 2 "Understanding and Managing Risk Associated with Natural Hazards: An Integrated Scientific Approach in Latin America and the Caribbean" (Authors: Cardona, O.D.; Gibbs, T; Hermelin, M. and Lavell, A.) Rio de Janeiro and Mexico City
- ISDR, 2005: Know Risks, United Nations International Strategy for Disaster Reduction Secretariat, Geneva
- **ISDR**, 2007: Living with Risks : A Global Review of Disaster Reduction Initiatives. United Nations International Strategy for Disaster Reduction Secretariat, Geneva.
- **ISDR**, 2009: *Reducing Disaster Risks Through Science: Issues and Actions*, United Nations International Strategy for Disaster Reduction, Geneva, Switzerland.
- Maskrey, A. (Ed) (1996) Terremotos en el Tropico Humedo. LA RED. Tercer Mundo Editores. Bogota.
- **Mitchell**, J. K. 1999a. Megacities and natural disasters: a comparative analysis. *GeoJournal* 49(2):137-142.
- Mitchell, J. K. (ed.) 1999b. *Crucibles of Hazard: Megacities and disasters in transition*. Tokyo: United Nations University Press.
- **Oliver Smith**, T. and S. **Hoffman** (eds.), 1999. *The angry earth: disaster in anthropological perspective*. New York: Routledge.
- **Polsky**, C., R. **Neff**, and B. **Yarnal**, 2007. Building comparable global change vulnerability assessments: the vulnerability scoping diagram. *Global Environmental Change* 17 (3-4): 472-485.
- **Rudel**, T.K. 2007. Changing agents of deforestation: from state-initiated to enterprise driven processes 1970-2000. *Land Policy* 24(1): 35-41.
- White, G. F. (ed.). 1976. *Natural Hazards: Local, National, Global*. Oxford: Oxford University Press.
- White, G.F., R.W.Kates and I. Burton (2001). "Knowing better and losing even more: The use of knowledge in hazards management." Environmental Hazards: Human and Policy Dimensions, 3(3-4): 81-92.

Annex 1: Participants in the ad hoc Working Group meeting on Forensic Investigations, Toronto, 1-4 February 2010.

- i) Ian Burton (Chair)
- ii) Susan Cutter
- iii) Ken Hewitt
- iv) Paul Kovacs
- v) Allan Lavell
- vi) Gordon McBean (Chair SC IRDR)
- vii) Brian Mills
- viii) Caroline Rodgers
- ix) Tarik Islam
- x) Dan Sandink

Annex 2. A preliminary formulation of questions derived from meeting documents and discussions.

1. Disasters in the context of everyday life

What is the influence non- or less than-disaster events (however defined)—some might say as being more routinely managed risks—on disaster management?

Are disasters only, or mainly, caused and explained by environmental extremes, unprecedented conditions, unscheduled events, or 'a few bad apples'? Or are the degrees and forms of risk are set up by pre-existing conditions and, in most cases, those of the 24/7 fabric of home, family, community, work, services, entitlements, expectations and leisure?

Is it a convenient myth that everyday life has been treated as simply the opposite of and, therefore, irrelevant to, disaster?

Is everyday life really 'normal', static, benign, and secure or is it constantly in flux and therefore compellingly complex as important precursor to disaster?

Is disaster really the opposite of 'development' as some (and experience) might suggest? Or can development (or at least that which fails to account for future risks) and the lack of development both contribute to disasters or at least the amplification of damages?

Are research and popular media so skewed by the 'special' (or unique) features of disaster response (outside assistance) that they neglect the role that 'everyday' capacities, skills, and values of people at risk play in determining outcomes?

How do fundamental development issues, in particular poverty, interact with disaster processes to affect vulnerability and impacts?

2. Knowledge availability, creation, communication and decision-making

Does the process by which knowledge was created and characteristics of those who created impact uptake and application?

Does the incorporation of local tacit knowledge and engagement of local decision makers in the design and execution of research enhance the likelihood that recommendations will be adopted? How does understanding how information flows and modifies when translated and interpreted across languages, cultures, media, regions/locations, hazards, disciplines, institutions, gender, age, time, etc. permit identification of factors that influence cognition and use.

How does awareness that knowledge and experience exist, timeliness of the information relative to the decision, and the ability to retain, store or archive the experience for later application affect the use of knowledge in decision-making?

What appeared to be the immediate, proximate causes of the disaster or the initiating event(s)? Would the removal or shift in one or two key factors dramatically altered the outcomes?

What this event forecast or predicted? What was the state of scientific knowledge about the event (or category of events)?

Was the existing knowledge widely available and accessible?

Were there any decision-makers, other actors, stakeholders or victims (or those at direct risk) who were unaware of the information (or less aware than they might have been)?

How was the risk of this event (or similar events) perceived and understood by all the categories of stakeholders?

How long had the scientific knowledge been available and had it significantly changed or improved in the recent past?

What was the past record of the occurrence of this particular type of initiating event? How certain and precise must the evidence of pending hazard events, consequences, and efficacies of particular actions be to support decisions across the spectrum of disaster management (preparedness, response, recovery, mitigation, etc.)? In addition to scientific validity, what other factors influence these decisions.

How are risks communicated within the areas directly affected by a disaster? What are the relative roles of different communication media? How might current social networking capabilities have affected past disasters?

How engaged were citizens in risk management processes prior to (since) the disaster? What formal or informal means were available for people to identify and express concerns, debate evidence (knowledge claims), and contribute to the formation of actions?

Were public and community leaders (and the institutions/organizations they represent) perceived as credible and trustworthy?

For a given hazard and aspect of vulnerability or exposure, what are the current "best practices/standards" at regional, national and international levels relative to those in place in the disaster area? How much impact could have been avoided/lessened if these were implemented? Are community experiences with disaster/hazard embodied in art, culture, traditions, and architecture? Does this have any effect on community attitudes toward disaster management? Do we really have more knowledge or do we have a lot of information? Or do we have many more people with a little knowledge finding it difficult to share, integrate, apply?

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Who possesses this knowledge and how transferable is it/has it been?
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Has knowledge increased equally for both physical hazard and "consequence" elements? What knowledge (modern and traditional) existed, what was taken up on in terms of policy, practice, etc., and what was not utilized and why? How successful were various methods used to gain and distribute knowledge?

What knowledge did not exist and why? In multi hazard areas, how was knowledge of some factors skewed in favor of some risks and not others.

How does centralization versus decentralization, participatory versus top down approaches to knowledge and intervention critically affect intervene in explaining risk?

Are policies being informed by the current, existing knowledge? If not, why?

What strategies, policies or measures had been put in place? Were any options rejected? Explain the reasons why the reported decisions were taken or not taken. To what extent were these consistent with prevailing scientific and stakeholder knowledge?

3. Responsibility, power and governance

Were there groups or individuals in the community (or outside the community) who clearly benefited from the disaster event?

Was there any sense of unfairness or recrimination in the community before, during or after the disaster? Describe and explain.

What is the power structure in the community? Who makes decisions and how are they made? Has the changed pre- and post- disaster?

Were persuasive communication, social marketing and fear appeals used to encourage action? Is it ethical to portray potential harm/impact in excess of that supported by scientific evidence—even if shown to be an effective motivator for evacuation or other behaviours?

How can "responsibility" (whether direct, indirect, informed, misinformed) be assigned to social actors?

How does the varying capacity of nations to institute change relatively easily affect issues of responsibility and the utility of recommendations (from research)?

How do social, political, economic, and legal system characteristics limit or enable the assignment of responsibility for risk? Does the lack of a translatable and accepted delegation of responsibility negatively influence the rebuilding process which requires the responsible government to work with international community that has found them negligent etc. ?

Are there inherent inequalities in the proposed actions to reduce risk?

What were the drivers of risk and can they be separated from issues of neglect, failure etc that will demand accountability/responsibility? Which aspects have contributed to increasing risk over the past 50 years?

Are there any cases where specific responsibilities have been assigned for mitigation of disaster impacts? Should we review these cases as part of the pilot test to identify whether or not responsibilities *can* be identified?

What were the roles of key personnel and agencies throughout the course of the disaster?

4. Measurement of outcomes and differential impacts

What were the impacts of the disaster in qualitative and quantitative terms: mortality with cause of death; morbidity with kinds and numbers of injuries; direct economic losses; property losses, other losses, business disruption and discontinuity; losses covered by insurance and not covered; access to basic services, mobility and communication; longer-term stress/psychological effects? What disaster response measures were taken, including: numbers made homeless or trapped; numbers evacuated or migrating; the nature and effectiveness of the emergency response including short term and longer term rehabilitation and reconstruction?

Are common measures of impact (such as deaths, injuries, property loss) adequate for evaluating the extent of social disruption?

Is the return to "normalcy" (with or without substantive adjustment—a new normal) taking longer and coincident with the troubling trends noted for the common measures?

How are success and failure defined? Does a level of acceptable or tolerable loss exist? What has been the effect of wrong or imperfect predictions? What has been the effect of good predictions? How do institutional setups for urban, rural, development, sector or territorial planning influence risk creation and eventual disaster contexts?

How does the structure and capacity of institutions affect resilience?

How does placing focus on resilience or risk reduction as a desired outcome affect the research? Building resilience assumes that event is going to occur and cause damage but in some cases risk reduction could imply acting so that events do not occur.

What was the distribution of losses (impacts) within the community in special terms and by socio-economic status or type of occupation or employment? Were the impacts differentially felt by people or groups according to level of education or other variables such as location, size of household/family unit, or access to information and communication?

How are sub-populations differentially susceptible to risks?

How does geographic scale affect the distribution of risks and impacts?

What was the economic/social status of the community in the immediate pre-disaster period and what were the current development trends?

How has the community been affected in the longer term? Is the community making a good recovery and in what period of time? Have pre-disaster trends been continued, exacerbated or reversed? (Comments from Brian: This must be linked into how it contributes to understanding disaster risk existing before the event)

Is it possible to determine the influence of past (2-3 decades) disaster management efforts? Had they not occurred would it have been much worse than the storyline above?

5. Attribution of cause and effect by social actors

Is there an overall community shared view of the disaster? Is it seen as an 'act of God or fate''? Are other explanations offered and if so what are they?

6. Generic questions

What strategies, policies or measures had been considered to prevent the event or reduce its consequences?

Where damage prevention or reduction measures had been put in place or adopted were they effective? What contributed to their effectiveness or lack of it?

What are the conditions, causes and consequences of losses in disasters? What conditions limit or prevent loss?

What factors affect or cause damage (e.g., primary, secondary hazards, settlement, land use, built environment...) and what are key factors that explain the expanding numbers or losses in disasters during the past 50 years?

What were the critical transitions in recent history as regards development models or facets and transitions that can be used to explain risk and stakeholder participation in this (risk discourse?)? For example, search for rapid but environmentally degrading development in landslide and flood prone areas; rapid urban growth to accommodate need for rapid industrial growth but with few building controls or lands use regulations.

How do culture, history, societal norms and setups influence risk?

What are critical factors that explain the "second disaster"—that that occurs after first level impacts have been consolidated—for example, lack of ability to distribute emergency supplies and attention to dispersed outlying populations which results in unnecessary and preventable death?

What were the drivers of disaster prevention/resilience by broad categories: social characteristics; economic activity and livelihoods; institutional and governance structures; environmental; infrastructure (critical infrastructure and residential environments); community competence (including prior experience with events; social cohesion; social networks).

How do culture, language, and other factors act as barriers and opportunities for disaster risk reduction enhancement?

What are the implications of trans-boundary risk management issues?

How are disaster risks in countries, regions or communities constructed over time through complex inter-play of various development factors and geo-physical and atmospheric processes that generate conditions of exposure, vulnerability and hazard?

What are the dynamic aspects of disaster risk configurations in particular locations or regions? What are the synergistic effects of multiple, simultaneous hazards and those of slowly shifting risks (e.g., sea level rise) which may escape detection/attention until exposed by an acute event (e.g., tropical cyclone)?

7. Suggested template questions:

- (1) What appeared to be the immediate, proximate causes of the disaster or the initiating event(s)?
- (2) What this event forecast or predicted? What was the state of scientific knowledge about the event (or category of events)?
- (3) Was the existing knowledge widely available and accessible?

- (4) Were there any decision-makers, other actors, stakeholders or victims (or those at direct risk) who were unaware of the information (or less aware than they might have been)?
- (5) How was the risk of this event (or similar events) perceived and understood by all the categories of stakeholders?
- (6) How long had the scientific knowledge been available and had it significantly changed or improved in the recent past?
- (7) What was the past record of the occurrence of this particular type of initiating event?
- (8) What strategies, policies or measures had been considered to prevent the event or reduce its consequences?
- (9) What strategies, policies or measures had been put in place? Were any options rejected? Explain the reasons why the reported decisions were taken or not taken.
- (10) Where damage prevention or reduction measures had been put in place or adopted were they effective? What contributed to their effectiveness or lack of it?
- (11) Provide a detailed description of the disaster from beginning to end including to role of key personnel and agencies.
- (12) Provide a list of the impacts of the disaster in qualitative and quantitative terms specifying is detail the following: mortality with cause of death; morbidity with kinds and numbers of injuries; direct economic losses; property losses, other losses, business disruption and discontinuity; losses covered by insurance and not covered.
- (13) Describe the disaster response measures including numbers made homeless or trapped; numbers evacuated or migrating; the nature and effectiveness of the emergency response including short term and longer term rehabilitation and reconstruction.
- (14) What was the economic/social status of the community in the immediate predisaster period and what were the current development trends? How has the community been affected in the longer term? Is the community making a good recovery and in what period of time? Have predisaster trends been continued, exacerbated or reversed?
- (15) What was the distribution of losses (impacts) within the community in special terms and by socio-economic status or type of occupation or employment? Were the impacts differentially felt by people or groups according to level of education or other variables such as location, size of household/family unit, or access to information and communication?
- (16) Were there groups or individuals in the community (or outside the community) who clearly benefited from the disaster event?
- (17) Was there any sense of unfairness or recrimination in the community before, during or after the disaster? Describe and explain.
- (18) What is the power structure in the community? Who makes decisions and how are they made? Has the changed pre- and post- disaster?
- (19) Is there an overall community shared view of the disaster? Is it seen as an 'act of God or fate"? Are other explanations offered and if so what are they?
- (20) Other. Question 20 stands for the many other questions not yet on the list.

IRDR3/9.1



GRANTS PROGRAMME 2010

APPLICATION FORM

(Valid for ICSU Members only)

(Applications must be submitted electronically to maureen@icsu.org)

Deadline for submission is 1 December 2009

Lead applicants may submit no more than one application. A ceiling of Euro 30,000 is imposed on all applications.

Project title: Extreme Natural Hazards and Societal Implications (ENHANS)

Requested amount (€): 30,000 (Maximum Euro 30,000)

Applicants:

Lead Applicant (Organization):

International Union of Geodesy and Geophysics (IUGG) Alik Ismail-Zadeh, Secretary-General, Alik.Ismail-Zadeh@kit.edu

Supporting Applicant(s) (Organization(s):

ICSU Scientific Unions (in alphabetic order)

Partner 1: International Geographical Union (IGU)

Ron Abler, President, rabler@aag.org

Partner 2: International Society for Photogrammetry and Remote Sensing (ISPRS) Orhan Altan, President, oaltan@itu.edu.tr

Partner 3: International Union of Geological Sciences (IUGS) Alberto Riccardi, President, riccardi@fcnym.unlp.edu.ar

Partner 4: International Union of Theoretical and Applied Mechanics (IUTAM) Frederic DIAS, Secretary General, Frederic.Dias@cmla.ens-cachan.fr

ICSU Scientific Committee

Partner 5: Integrated Research on Disaster Risk (IRDR) Gordon McBean, Chair, gmcbean@eng.uwo.ca

ICSU Interdisciplinary Body

Partner 6: Global Ocean Observing System (GOOS) Keith Alverson, Director, GOOS Project Office, k.alverson@unesco.org

ICSU Regional Offices¹

Partner 7: ICSU Regional Office for Asia & the Pacific (ROAP) Nordin Hasan, Executive Director, nordin.hasan@icsu-asia-pacific.org

Partner 8: ICSU Regional Office for Latin America and the Caribbean (ROLAC)

Alice Abreu, Executive Director, alice.abreu@icsu-lac.org

Associate Partner

Partner 9: American Geophysical Union (AGU) Jaime Urrutia Fucugauchi, International Secretary, juf@geofisica.unam.mx

How will support benefit ICSU's strategic goals outlined in its Strategic Plan 2006-2011 (max 10 lines):

The Strategic Plan 2006–2011 identifies natural and human-induced hazards as one of the major research-led issues for ICSU over the planning period. The 29th ICSU General Assembly in Maputo decided to establish a major interdisciplinary Programme "Integrated Research on Disaster Risk" (IRDR), in collaboration with other international organizations. The proposed project ENHANS (via research workshops and symposia in Latin America, Africa and Asia regions and the open forum on natural hazards) will directly contribute to the development of the IRDR programme as well as the programmes on natural hazards of the ICSU Regional Offices by (i) identifying the gaps in knowledge and methods for the effective identification of disaster risks and (ii) exploring the ways to deliver the scientific knowledge on natural hazards to disaster management authorities and public in a proper time.

Project plan (max 3 pages)

State clearly the objectives of the project and the beneficiaries. Elaborate on its relevance to the review criteria – e.g., innovative nature, interdisciplinary and international nature, visible and measurable outputs, relevance to the ICSU Strategic Plan 2006-2011 and priorities of ICSU Regional Offices. If the activity targets young scientists, women scientists and/or scientists from developing countries – please refer to it here.

Objectives (1/3 page)

The principal goals of the proposed project ENHANS are

- To improve understanding of critical phenomena associated with extreme natural events and to analyse impacts of the natural hazards on sustainable development of society;
- To promote studies on prediction of extreme events reducing predictive uncertainty and on natural hazards mitigation; to bring the issues into the political and economical policies;
- To disseminate knowledge and data on natural hazards for the advancement of research and education in general and especially in developing countries;
- To establish links and networks with the international organizations involved in research on extreme natural hazards and their societal implications.

In working to achieve this, the project will:

- set up a consortium of experts of ICSU Unions (IGU, ISPRS IUGG, IUGS, IUTAM) and other relevant international and multi-national organizations (e.g. AGU, GOOS & IOC) dealing with natural hazards and risks;
- provide insight into the relationship between natural hazards, extreme events, risks, society and sustainable development;
- determine approaches to analyse the impact of natural disasters on ecological and social systems;

¹ The ICSU Regional Office for Africa was contacted several times, but unfortunately no any reply was received. Nevertheless, we intend to organize a workshop on extreme natural hazards in Africa in this project framework, in cooperation with the University of Pretoria, South Africa. We hope that the representatives of the ROA team on natural hazards (Chair G. Mulugeta) will participate in the ENHANS project and in the proposed workshop.

- promote an activity to plan and set up an international global observation framework for collection, management and open sharing of data and information on natural hazards;
- address the problem of implementation of scientific initiatives as elements of public policy and of preventive disaster management.

The goals of ENHANS will be achieved via <u>symposia, a workshop and open forum</u> bringing experts in various scientific disciplines from many international, regional and national unions and organizations dealing with natural hazards, disaster risk reduction and sustainability (see Work Plan). *Principal beneficiaries* of the proposed activity would be a wide network of geoscientists, social scientists, decision makers, disaster management, insurance agency and mass media practitioners who will gain an integrated view of the problems of natural hazards, risk reduction, sustainability and social implications of extreme natural events.

Project description (2 pages)

Humans face natural hazards on different scales in time and space. Geological, hydrometeorological and geophysical hazards affect human life and health as well as having a dramatic impact on sustainable development of society. They are a pending danger for vulnerable lifelines and infrastructure such as water supply and reservoirs, pipelines, and power plants. Developed countries are affected, but the impact is disproportionate within the developing world. Extreme natural events can change the life and economic development of development of minutes and throw them back for decades.

The beginning of the 21st century has been marked by a significant number of natural disasters, such as floods, severe storms, wildfires, hurricanes, earthquakes, landslides, volcanoes, and tsunamis. Extreme natural events cause devastation resulting in loss of human life, large environmental damage, and partial or total loss of infrastructure. The principal signature of such events is that their probability decreases rapidly with magnitude, but the damage caused increases rapidly, and so does the cost of protection against it. The last catastrophic events of the beginning of the XXI century (e.g. the Indian Ocean giant earthquake and devastating tsunami in 2004, earthquakes in Pakistan in 2005 and China in 2008, Katrina hurricane in USA in 2005) reminded us once again that there is a strong coupling between complex solid Earth, oceanic, and atmospheric processes. A holistic approach is required to understand the phenomena, to predict catastrophic events, and to mitigate natural disasters².

Obviously, humankind will never be able to prevent these occurrences of natural phenomena entirely. However, scientists are able to gain better understanding of the complex mechanisms of extreme natural events that cause the disasters and deliver their knowledge to disaster management agencies in order to be prepared to cope with such extreme events. Scientists need also a deeper understanding, based on work across disciplines, of all of the processes that are involved. They must be mindful of public concerns and the risk perceptions that underlie them. *Communication between the groups of experts of various international organizations dealing with natural hazards and their activity in disaster risk reduction needs to be strengthened*.

The World Conference on Disaster Reduction (18-22 January, Kobe, Japan) called for the establishment of a clear framework for action to reduce risk and to build resilient communities³. In addressing extreme natural events, ENHANS will have important implications for current natural hazard attitudes and polices. In particular, it relates directly to key matters such as hazard mitigation and disaster risk reduction and is at the very core of the idea of sustainability.

http://www.agu.org/outreach/science_policy/positions/naturalhaz.shtml].

² IUGG Commission on Geophysical Risk and Sustainability, 2005, <u>http://www.iugg.org/resolutions/tsunami05.pdf</u>; ICSU Statement on Science and Natural Hazards, 2005 <u>http://www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/557_DD_FILE_Natural_Hazards.pdf</u>; AGU position statement on meeting the challenges of natural hazards, 2007

³ http://www.unisdr.org/wcdr/media/statements/Egeland-statements-closing.pdf.

The following fundamental question⁴ underpins ENHANS: What technologies and methodologies are required to assess the vulnerability of people and places to hazards - and how might these be used at a variety of spatial scales?

To answer the question ENHANS seeks to integrate closely with the existing and future planned work of the ICSU Unions as well as another relevant international unions and organizations.

This project builds on and extends the foundation provided by the highly successful scientific meetings: 2002 Budapest⁵, 2004 Stockholm⁶, 2005 Baku⁷, 2004 Hyderabad and 2006 Munich⁸ workshops and the 2008 IYPE Symposium in Oslo⁹, all on risk science, society and sustainability. These scientific meetings brought together experts from geosciences and mathematics with experts in social science, science policy and law specifically to deal with problems of natural hazard, risk and sustainability and to discuss a range of topics as diverse as environmental and water risk management and sustainability; earthquake, landslide, and tsunami risks; natural and technological risk modeling; problems of megacities and megarisks; relationship between problems of risk, sustainable development, and society; and social and legal aspects of risk and sustainability.

Relevance to review criteria (1/3 page)

<u>Scientific merit</u> of ENHANS lies in (i) better understanding of natural hazards and critical phenomena behind extreme events, (ii) evaluation of methodologies for prediction of such events and for reduction of predictive uncertainties, and (iii) an analysis of the relationship between extreme hazards, risks, and sustainability. By bringing together a diverse consortium of experts to address key questions, the project will add substantial value to the activities of the individual partners.

<u>Innovative nature</u> of the project is in its inherently multi-disciplinary and international approach to problems of natural hazards, to understanding the complex system science behind extreme natural events, and their impact on society.

<u>Relevance to the priorities of ICSU Regional Offices.</u> All Regional Offices of ICSU identified natural hazards and disasters as one of their major scientific priorities, and this reflects the ICSU Strategic Paln for 2006-2011 and societal needs of each region. IUGG established cooperation with the regional offices on the topic of natural hazards (e.g. IUGG sponsors at present two projects related to natural hazards in Africa and co-sponsored together with IUTAM and ROAP the ICSU project on fluid mechanics and geophysics of environmental hazards). The project ENHANS involves cooperation with the ICSU ROs.

<u>New partnerships between organizations</u>. The proposed project will link the activity of many organizations developing independent programs on natural hazards. ICSU Scientific Unions, interdisciplinary bodies (e.g., GOOS), multi-national (e.g. AGU) and other relevant organizations (e.g. UNESCO-IOC) develop research initiatives and promote science on natural hazards via conferences, publications, and education. Enhanced cooperation and partnership between the organizations are one of the primary goals of the project.

Targeting of priority groups (1/3 page)

The project intends to attract young active researchers (female and male) working in the area of natural hazards to multi-disciplinary studies of extreme natural events. Proposed workshops, symposia and the Open Forum on Natural Hazards (see Work Plan) are designed to foster interaction between different scientific disciplines, to have a training

⁴ <u>http://yearofplanetearth.org/content/downloads/Hazards.pdf</u> (page 7).

⁵ Beer, T. and Ismail-Zadeh, A.T. (eds.) *Risk Science and Sustainability*, Kluwer Academic Publishers, Dordrecht, 2003.

⁶ Ismail-Zadeh, A., and Beer, T., A focus on risk science and sustainable development, *EOS*, *AGU Transactions*, 85 (44), 453, 2004.

⁷ Ismail-Zadeh, A. T. (ed.) *Recent Geodynamics, Georisk and Sustainable Development in the Black Sea to Caspian Sea Region,* American Institute of Physics Conference Proceedings, vol. 825, Melville, New York, 2006.

⁸ Ismail-Zadeh, A. T., and T. Beer (eds.), *Georisk: Interactions between Science and Society*, Springer, Heidelberg, 2007.

⁹ Beer, T. (ed.) *Geophysical Hazards: Minimizing Risk and Maximizing Awareness*, Springer, Berlin, 2009

component, and to facilitate participation of young scientists, especially, from developing countries.

Work plan (max 1 page)

Specify time schedule, major events, methodologies to be used, leadership and management structure, and key milestones in the implementation process, etc.

ENHANS intends to catalyse an integration of activity of many existing programs on natural hazards and disaster risk reduction to develop a research program through networking. To this end, four specially targeted advanced research workshops and symposia will draw together experts working on relevant issues (see *Table 1*).

Location	Theme	Topic of hazards	Date
Symposium Foz do Iguassu, Brazil	Natural hazards and disasters in the Latin America and the Caribbean region	Earthquake, landslide, tsunami, volcanoes, hurricanes	8-13 August 2010
Workshop Pretoria, South Africa	Extreme geo-hydro- meteorological hazards in Africa	Drought, severe weather, earthquake, landslides, tsunami, volcanoes,	End 2010-early 2011
Symposium and Open Forum Melbourne, Australia	Extreme natural hazards (with emphasize on the Asia and the Pacific region). Natural hazards, risks, sustainability and policy-making	All types of natural hazards	28 June to 7 July 2011

Table 1. A list of proposed scientific meetings on natural hazards

This project requires urgent actions to consolidate experts of ICSU Unions and other international and national organizations dealing with natural hazard research and disaster reduction to highlight importance of research on extreme hazards in several regions of the world: Latin America and the Caribbean region, in sub-Sahara Africa, and in Asia and the Pacific region. ENHANS aims to build scientific capacity, through its workshops and by seeding projects that will benefit the countries in the regions.

1. Symposium on Natural Hazards and Disasters in Latin America

The first symposium in the framework of the proposed project is planned be held in August 2010 in Brazil, in a conjunction with the Scientific Assembly "Meeting of Americas" (a principal co-sponsor of the symposium will be the American Geophysical Union). We plan to organize a symposium at the meeting in cooperation with IRDR Scientific Committee and the ICSU ROLAC. The symposium will prepare scientific background for enhancement of disasters risk preparedness and reduction in the region. The symposium will bring experts of natural and social sciences to analyse the problems of natural hazards in the Latin America and the Caribbean region. Also several topical sessions are proposed for the meeting.

2. Workshop on Geo-Hydro-Meteorological hazards in Africa

The second meeting in the project framework workshop is planned to take place in the Natural Hazard Centre, University of Pretoria, South Africa. The workshop will be organized in cooperation with the ICSU ROA teams on geohazards and on hydro-meteorological hazards with the aim to facilitate interactions between scientists from sub-Sahara countries and those from other countries. The workshop will have three components: (i) scientific meeting to be highlight importance of studies on extreme natural hazards, (ii) technical meeting of working groups dealing with geohazards and hydrometeorological hazards to

highlight the planning and organization of research projects and science communication initiatives, and (iii) capacity building component. The latter component will provide a strong training element, such as the range of methods and techniques in analysis of geohazard and hydrometeorological hazards, in risk estimation, etc. Technical meetings will concentrate on the elaboration of research projects, which can network activities of many international and national organizations dealing with geohazards and georisks.

3. Symposium and Open Forum on Natural Hazards in Asia and in the Pacific region

Much attention is being paid to the Indian Ocean region, in the wake of the tragic events of 2004 tsunami and the huge devastation it caused. Earthquakes, volcanoes, wild fires, severe storms are another examples of extreme hazards affecting the region. International efforts are devoted to strengthening monitoring, analysis, and civil preparedness to natural hazards in this region. It is proposed to hold a scientific symposium during the IUGG General Assembly (Melbourne, Australia, 28 June to 7 July 2011). The symposium will be organized by IUGG and other ICSU Unions in cooperation with IRDR and ROAP. The symposium will be followed by the Open Forum on Natural Hazards, which will bridge scientists with policy makers, media and public to highlight an importance of scientific research on natural hazards.

The project will be truly interdisciplinary and will foster and engage collaboration between research fields from the initial stages of research design through to the final stages of dissemination and publication. Indeed, the challenge of understanding and forecasting of extreme natural hazards can only be successfully achieved through an international and multidisciplinary co-operative effort. Key inputs will come from geoscientists, mathematicians, and theoretical physicists. At the synthesis stage inputs will come also from social scientists, psychologists, economists, disaster management and insurance agency practitioners.

The project will be managed by the Lead Applicant (IUGG) and a Steering Committee comprising representatives from the Supporting Applicants.

Expected Results (max 0.5 page)

What outcomes are expected from the project: publications (including audience and dissemination plan), new programme initiatives, etc. Explain how an ICSU grants can strengthen your own overall programme of work, e.g., leveraging funds from other sources, enhancing visibility, enhancing impact or role of your organization. Assess potential follow-on action that may result from the activity.

General scientific insights emerging from this work are expected to include:

- Clearer understanding of the phenomena behind extreme natural hazards and their impact on society, better understanding of problems of risk and sustainability;
- A plan and strategy for on-going interdisciplinary research.

Measurable outputs (deliverables) of the project will include:

- Publications of the scientific results in journal and book format.
- ENHANS project web-page that informs and summarizes the activities and findings of the project and which links to web-pages of affiliated projects and organizations.
- Wide dissemination of the scientific results through Internet.
- News and conference reports for scientific and non-scientific news magazines.
- Non-technical synthesis of the main findings for decision makers.
- Contribution to implementation of the IRDR Programme.

All of the knowledge and results obtained in the project will be transferred to the scientific community world-wide via international unions by means of research meetings, which will ensure the knowledge transfer and stimulating trans-disciplinary exchanges of data, techniques and concepts.

Impact of the ICSU support on the proposed activity

ENHANS needs to be underpinned by a cross-disciplinary alliance of research bodies. An ICSU grant will be instrumental in mapping out the international research agenda in the area of natural hazards and disaster reduction for the next few years and for mobilizing the resources and knowledge of the international scientific community. The proposed activity will benefit from the partners' ongoing projects and base funding. In this way, the ICSU support will act as a catalyst to optimise the existing funding. The formal support by ICSU of this project will then be essential in securing funding for focused scientific research from national and international sources. The project will strengthen the role and visibility of the geosciences in natural hazard research, making their contributions more central to the emerging fields of sustainability science.

Follow-on actions

The project envisaged here is likely to kick-start a myriad of international research efforts in the area of extreme natural hazards. A consortium on natural hazards (experts from ICSU Unions, project partners and other organizations) to be set up during the project will contribute to a development of multi-disciplinary IRDR research programme. For example, the proposed project can elaborate specific programme to establish an international network of researchers to examine the fundamental questions that underpins ENHANS. Topics to be addressed may include new methodologies and tools for analysis of extreme natural hazards, frameworks and models for the assessment of vulnerability and responsibility for integrating physical and social phenomena.

A future exciting development could be a broader integrated research and application program combining the physical and social sciences. The research infrastructure being developed here can be the foundation of a European network of excellence within European Union Framework Programmes and beyond or of a Decadal Project of the United States National Research Council Program on Natural Hazards.

The Role of Supporting Applicants and Other Collaborative Partners (max 1/2 page per partner)

The role of each supporting applicant (minimum one from the ICSU family) and other partner organizations such as UN agencies if relevant) should be clearly described. New partnerships between organizations that do not routinely collaborate are particularly encouraged and should be clearly identified as such.

The role of the IUGG (Commission on Geophysical Risk and Sustainability, <u>http://www.iugg-georisk.org</u>) in ENHANS is to provide expertise in problems of prediction of extreme natural events, of reducing predictive uncertainties, risk analysis and sustainability.

Partner 1. The IGU Commission on Hazards and Risks (<u>http://www.bio.mie-u.ac.ip/~haruyama/hazard and risk plan.html</u>) is focused on societal vulnerability to natural hazards and in developing generalized indices of vulnerability. The IGU will contribute also to the project through the activity of its Commissions on Hazard and Risk.

<u>Partner 2</u>. The role of ISPRS is to provide satellite based remote sensing techniques to assist in the quantification and mapping of geohazards. The contributions of ISPRS to the project are substantial because the Union is frequently involved in the restoration and remediation activities following many natural disasters.

<u>**Partner 3**</u>. The IUGS (Commission on Geological Sciences for Environmental Planning (<u>http://www.sgu.se/hotell/cogeo/index.htm</u>) will contribute to the project via studies on environmental hazards and sustainable development.

<u>Partner 4</u>. The IUTAM will provide an expertise on fluid and solid dynamics of environmental and geological hazards.

<u>**Partner 5**</u>. The IRDR Scientific Committee of ICSU will provide a guidance of the scientific program of the proposed events including the Open Forum on Natural Hazards.

<u>Partner 6</u>. The GOOS, Interdisciplinary Body of ICSU, in cooperation with UNESCO-IOC will contribute to an understanding the changing conditions in the oceans and to a transfer of scientific knowledge about the nature of hazardous phenomena into operational early warning systems (like it is done for tsunami hazard).

Partner 7-8. The ICSU Regional Offices will provide essential assistance through its network of contacts in the region and in facilitating scientific meetings that may be required between scientists of the region at the planning stage.

Partner 9. The AGU Natural Hazards Focus Group (<u>http://www.agu.org/focus_group/NH/</u>) promotes fundamental research into the links between extreme natural hazards and dynamic processes on Earth and in space by dissemination scientific knowledge via publications and research meeting. Its role in the project will be to develop together with IUGG, ROLAC and other partners a scientific program for the symposium on natural hazards in Brazil (August 2010).

Acronyms

AGU	American Geophysical Union
GOOS	Global Ocean Observing System
ICSU	International Council of Science
IGU	International Geographical Union
IOC	Intergovernmental Oceanographic Commission of UNESCO
IRDR	ICSU Scientific Programme "Integrated Research on Disaster Risk"
ISPRS	International Society of Photogrammetry and Remote Sensing
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUTAM	International Union of Theoretical and Applied Mechanics
IYPE	International Year of the Planet Earth
ROA	ICSU Regional Office for Africa
ROAP	ICSU Regional Office for Asia and the Pacific
ROLAC	ICSU Regional Office for Latin America and the Caribbean
UN	United Nations
UN-ISDR	United Nations International Strategy for Disaster Reduction
UNESCO	United Nations Educational Scientific and Cultural Organization

Project Budget

Amount requested from the ICSU Grants Programme: Estimated breakdown of cost		€30,000
Research / Content	€ 3,000	
Travel / Accommodation for Meetings (1)	€63,000	
Training / Teaching	€	
Planning / Coordination	€ 4,000	
Other (specify):	€	
Amount provided by the applicants, including		
IUGG, IGU, IUGS, IUTAM, GOOS (2)		€33,000
Amount provided from other sources (specify): AGU (3)		€7,000
TOTAL		€70,000

Notes:

(1) The full ICSU grant will be devoted to travel and subsistence support for participants (invited speakers, young scientists, and students) from Asia and the Pacific Region and from Latin America and the Caribbean Region to attend the proposed two symposia in Brazil and in Melbourne. All other expenses will be met by IUGG, IUTAM, GOOS (note (2)) or by AGU and other sources (note (3)).

(2) IUGG will provide $30,000 \ (\sim \le 20,000)$ to assist with travel and subsistence support for invited speakers and African young scientists and students to attend the proposed workshop in Pretoria, South Africa.

IGU will provide \in 3,000 to cover cost for travel of IGU speakers for the proposed meetings.

IUGS will provide \$3,000 (~ \in 2,000) to cover cost for travel of one or two speakers for the proposed meetings.

IUTAM will provide fund to cover the full travel cost for one speaker and to co-finance by up to 50% the costs of two other speakers for the proposed meetings (nominal value, say \in 3000).

GOOS will fund its own participation at related events in Melbourne and the other two workshops. Pending future discussions with all partners involved, GOOS may also have limited funds for a few participants from S. America and Africa for the two other events (nominal value, say \in 5000)

(3) AGU will provide, free of charge, the facilities for the proposed symposium and several sessions on natural hazards (nominal value, say \in 7000).

ICSU Project "Extreme Natural Hazards and Societal Implications" (ENHANS)

Most recent natural disasters in Latin America and the Caribbean (12 January 2010 M=7.0 Haiti earthquake and 27 February 2010 M8.8 Chile earthquakes and tsunami) attracted considerably attention of society to problems of natural hazards and risks. "While we cannot prevent natural phenomena such as earthquake, tsunami, cyclones and flood, we, scientists, can assist to limit their consequences" - is the leitmotiv of the ENHANS project.

(Note: at present we are developing a web page of the ENHANS project and the information below can be found at the web: <u>http://www.ENHANS.org</u> in April 2010)

1. ENHANS in Latin American and the Caribbean

The first event in the framework of the ICSU project will be held in Brazil during the Meeting of the Americas (Foz do Iguassu, 8-13 August 2010). The American Geophysical Union (AGU), International Union of Geodesy and Geophysics (IUGG), and the Regional Office for Latin America and the Caribbean (ROLAC) of the International Council for Science (ICSU), as the principal organizers of the meeting, started preparations to the event already in December 2009.

The major event will be a Union symposium "Natural Hazards and Disaster Risk in Latin America and the Caribbean". The symposium will contribute to better understanding of physical phenomena behind natural hazards and to disaster risk analysis in Latin America and the Caribbean region and will promote further research in an interdisciplinary framework focused on natural hazards, risk assessment and reduction. The symposium's topics includes geohazard processes associated with risk and disasters in the region; analysis of disaster risk causes, drivers and impacts; understanding the factors and processes that contribute to the social construction of risk; and climate change adaptation and disaster risk reduction.

Symposium organizers:

- Omar Cardona, National University of Colombia, Manizales, COLOMBIA.
- Jaime Fucugauchi, National Autonomous University of Mexico, Mexico City, MEXICO.
- Alik Ismail-Zadeh, Karlsruhe Institute of Technology, Karlsruhe, GERMANY.
- Ilya Zaliapin, University of Nevada at Reno, USA.

Invited Speakers:

- Irasema Alcántara-Ayala, Institute of Geography, National Autonomous University of Mexico, MEXICO (risk of landslides in Latin America)
- Juan Carlos Bertoni, Cordoba National University, ARGENTINA (hydrological hazards in Latin America)
- Susan Cutter, University of South Caroline, USA (regionalization of hazards and disasters)
- Servando De la Cruz-Reyna, Institute of Geophysics, National Autonomous University of Mexico, MEXICO (volcanic hazards in Latin America)
- Tony Gibbs, Consulting Engineers Partnership Ltd, BARBADOS (hurricane loss reduction and safety in the Caribbean)

- Allan Lavell, Programme for the Social Study of Risk and Disaster, FLACSO, COSTA RICA (risk patterns in Latin America)
- Omar Pérez, Universidad Simón Bolívar, Caracas, VENEZUELA (seismic potential, hazard and risk in the Latin America and the Caribbean)
- Carlos Tucci, Federal University of Rio Grande do Sul, BRAZIL (hydrological hazards and urban water management in Latin America)

Other events related to the project topics are planned:

- Union symposium: The 2010 Haiti Earthquake, Lessons for Seismic Hazard and Societal Impacts in the Caribbean
- Union symposium: The 2010 Chile earthquake

and several scientific sessions related to natural hazards in and around the region:

- Advances in volcano monitoring in Latin America
- Drought in the intra-Americas seas
- Land-ocean-atmospheric processes over Americas: Implication to natural hazards and global carbon cycle
- Landslides under extreme weather conditions in Latin America and Caribbean
- Natural hazards of the Americas in focus of geosciences
- Societal impacts of monsoon variability in the Americas
- Volcanic ash and aerosols: Monitoring, modeling, forecasting and hazards
- Extreme weather events in the Americas: observations, forecasts and projections
- Satellite applications on extreme weather monitoring in the Americas
- Seismic microzoning and risk management in Latin America
- Standardization seismic hazard methods in South America

The Union symposium "Natural Hazards and Disaster Risk in Latin America and the Caribbean" is considered to attract the major attention of scientists, regional policy makers, and society to problem of natural hazards and disaster risk. We plan a Town Hall meeting bringing together experts, leaders of societies and policy makers to discuss again the problem of hazards and disasters.

We expect to solicit more regional experts of various disciplines to attend the meeting, and an assistance of your organizations would be very valuable. We would like that the voice of all project participants on problems of natural hazards to be heard at this symposium. Please nominate a prominent regional expert in natural hazards and disaster risk analysis, who could represent your organization at the Brazil meeting.

2. ENHANS in Africa

The next project event (*workshop on extreme natural hazards and disasters in Africa*) will be held in Pretoria (South Africa) at the Aon Benfield Natural Hazard Centre of the University of Pretoria in January 2011. Africa amalgamates various communities and serves as a harbor of information for the engineering, disaster management and insurance industries. The Centre's network of associates have extensive skills in earthquake hazard modeling, mining catastrophe, and flood and meteorological risk and can offer independent advice, opinion and analysis on all

aspects of African natural perils. The Centre promotes research into natural hazards and makes relevant natural peril information more widely available to the South African insurance community. The local organizer will be Prof. Andrzej Kijko, Director of the Centre (http://web.up.ac.za/hazard.asp?ipkCategoryID=8456&subid=8456).

To assist the Centre in organization of the workshop, please nominate experts of your organization

- to serve on the advisory scientific broad of the workshop,

- to define scientific topics for the meeting,

- to suggest speakers to be invited to the workshop,

who has established contacts with the African experts in natural hazards and disaster risk analysis or policy makers to involve them in the work of the workshop.

3. ENHANS in Asia and the Pacific

The preparation to the final event in the framework of the ICSU project is already started. Two events are planned to be held in Melbourne (Australia) during the XXV IUGG General Assembly (27 June to 8 July 2011): Union Symposium "Grand Challenges in Natural Hazards Research and Risk Analysis" and the Open Forum "Natural Hazards: From Risk to Opportunity by Partnership of Science and Society".

The International Program "Integrated Research on Disaster Risk" (IRDR) started in 2009 aiming at curving losses by knowledge-based decision-making. The science and society are the partners to cope with natural hazards by integrating natural and social sciences, engineering, economic and industrial activities, public administration, policy making etc. They can even convert risk to opportunity. The Symposium will address major challenges in natural hazards research and risk analysis and present the ways for their solutions. Open Forum will be the first public forum on IRDR and will be organized together with Scientific Unions of the International Council of Sciences (ICSU) and other multi-national and national geosciences societies. Therefore the actions undertaken by IRDR will be presented at first, which is followed by discussions addressing the following questions:

- How natural and social sciences can integrate their knowledge for disaster reduction?
- How science and society can form partnership for disaster reduction?
- How science and society partnership can convert natural disaster risk to opportunity?
- What are the urgent issues of disaster risk in mega cities and regions under intensifying natural and social pressure?

Scientists, public managers, policy makers and other stakeholders will be invited to present solutions to the problems, to indicate the potential barriers and break-troughs. The outcomes will be reflected in the next step actions of IRDR.

Organizers of the Union Symposium and Open Forum:

Principal organizer:

- Kuniushi Takeuchi (International Center for Water Hazard and Risk Management - ICHARM, Tsukuba, JAPAN)

Co-organizers:

- Tom Beer (CSIRO, Aspendale, AUSTRALIA)
- David Boteler (Geological Survey of Canada, CANADA)
- Shigeko Haruyama (University of Tokyo, JAPAN),
- Fumihiko Imamura (Tohoku University, JAPAN)
- David Jackson (University of California, Los Angeles, USA
- Volodya Kossobokov (Russian Academy of Sciences, Moscow, RUSSIA)
- John LaBreque (NASA, USA)
- Uri Shamir (Technion Israel Institute of Technology, Haifa, ISRAEL)
- Ramesh Singh (Indian Institute of Technology, Kanpur, INDIA)
- Gerd Tetzlaff (University of Leipzig, GERMANY)

Tentative list of speakers to be invited

For Union symposium

- Orhan Altan, Technical University of Istanbul, TURKEY (ISPRS)
- Susan Cutter, University of South Carolina, USA (IGU)
- Alik Ismail-Zadeh, Karlsruhe Institute of Technology, GERMANY (IUGG)
- Keith Moffatt, University of Cambridge, UK (IUTAM)
- Representative of IRDR
- Representative of IUGS
- Representative of GOOS-IOC-UNESCO
- Representative from Australia or New Zealand
- Representative from China or India or Indonesia

For Open Forum

- Fouad Bendimerad, Earthquakes and Megacities Initiative
- Salvano Briceno, United Nations International Strategy for Disaster Reduction (UN-ISDR)
- Harsh Gupta, IUGG Vice-President
- Reiko Kuroda, ICSU Vice President
- Suo Lisheng, Vice Minister, Ministry of Water Resources (MWR), China
- Eric Rasmussen, President & CEO, Innovative Support To Emergencies, Diseases and Disasters (InSTEDD)
- Anselm Smolka, Munich Reinsurance Company
- Robert L. Van Antwerp, Chief of Engineers of the U.S. Army
- Representative of media dealing with natural disasters

To assist the Organizers of the events, please nominate two experts of your organization, - one to serve the advisory scientific broad of the Melbourne events and - another to be invited for the Melbourne events as a speaker.

I hope for fruitful cooperation.

Best wishes, Alik Ismail-Zadeh

Assessment and Interpretation of Risk (AIR)

Draft outline proposal for an IRDR Project

This project would build on priorities identified in the IRDR Science Plan, in particular the need for an integration of the methods and perspectives of different disciplines. To quote from Section 4.1 of the Plan:

"In order to reduce risk, there needs to be integrated risk analysis, including consideration of relevant human behaviour, its motivations, constraints and consequences, and decision-making processes in face of risks...The risk associated with environmental hazards depends not only on physical conditions and events but also on human actions, conditions (vulnerability factors, etc.), decisions and culture...The seriousness of the consequences of any disaster will depend also on how many people choose, or feel they have no choice but, to live and work in areas at higher risk..."

This coupling of physical and behavioural processes underlying the trajectory from hazard to disaster demands a parallel coupling with respect to research methods. Enhanced capacity for assessing the level of any hazard and forecasting when it may occur is thus an essential part of research to reduce disaster risk. As noted in the Plan, "Knowledge here is still far from complete and also unevenly distributed across the world". But even when expert scientific assessment of risk is available, it is still only part of the story. It is just as essential to consider how risk – and risk information from various sources – will be interpreted and acted upon at all levels from the individual citizen through to government and international agencies.

For purposes of this project, assessment of risk would therefore need to comprise:

- a) estimation of the likelihood, and likely magnitude, of a hazard event or set of interconnected events (from a physical science perspective);
- b) evaluation of the vulnerability/resilience of the physical infrastructure in the area at immediate risk (although disasters in one region often have knock-on effects elsewhere, we do not propose to focus directly on these here);
- c) consideration of social and behavioural factors that place the local population at greater or lesser risk, should a hazard event occur, including those that may constrain or facilitate appropriate protective action in response to such an event (or a warning thereof).

Interpretation of risk refers more specifically to how actors attempt to make sense of experience and information from various sources as a basis for decision. While the three facets of risk assessment above all involve some degree of interpretative or subjective judgement, their endpoint is to provide as objective as possible an answer to the question "What is likely to happen?". Here, however, our focus shifts to the question "What do people (especially those at risk) *think* is likely to happen?", which in turn carries the rider "And what will they do about it?".

The contrast between these questions partly evokes a distinction in the research literature between so-called 'expert' and 'lay' perceptions of risk. Much evidence and everyday experience shows that people often differ markedly from one another in their estimations of particular risks, perhaps taking some too seriously and others not seriously enough. Forcing these differences into an 'expert vs. lay' dichotomy, however, is typically unhelpful in that:

- a) it implies that criteria for expertise are unproblematic, whereas they may be contested in many contexts;
- b) it implies, not simply that there is consensus among 'experts', but that any diversity of opinion among 'lay' members of the public is of little interest (theoretically or practically);
- c) it falsely conflates 'expert vs. lay' with 'rational vs. irrational' processing, while begging the question of what constitutes rationality.

To pursue this last point, there is now a large literature (in cognitive psychology and behavioural economics) that concludes that people generally have difficulty in processing statistical information and frequently deviate from the prescriptive axioms of 'rational choice' (expectancy-value) theory when formulating preferences. However, such deviations are neither random nor (often) unreasonable. On the contrary, the experimental paradigms that encourage this attribution of 'irrationality' are themselves open to charges of artificiality in that they require participants to compare prospects of *defined* (numerical) probabilities and a common metric of value (e.g. \$).

The context of disaster risk is rather different from such experiments. We are typically dealing with uncertain, rather than known, probabilities and, especially when considering low-probability, high-consequence events, cannot simply extrapolate from previous frequencies of occurrence. This is especially so when the past is a poor guide to the future, whether because of climate change, population growth and movement, or changing patterns of land use. Likewise, the consequences of suffering or avoiding a disaster are many and complex, and, while they certainly involve monetary value, they can rarely, if ever, be reduced to this alone. We should not persuade ourselves that the simplest thing to count is necessarily the most important thing to measure. Furthermore, what matters or is most valued can be very different for different people: many may accept what they are told about the probability of a hazard but interpret the risk differently because they make different appraisals of the costs for themselves personally (including the costs of evacuation or relocation to reduce their vulnerability). Finally, interpretations of disaster risk are not 'one-off' events but develop over time on the basis of (first-hand and indirect) experience of living with risk, where the association between prediction and occurrence is less than perfect. Risk perceptions, in other words, are not simply given, but are acquired or *learnt* over time.

The *functions* of risk assessment and risk interpretation also differ. Whereas assessment aims to provide as accurate as possible a forecast of the likelihood and scale of any hazard event and its consequences, interpretation involves using information to make a *decision* – for example, whether or not to evacuate, or to raise the height of flood defences. Thus, whereas risk assessments are (or can be) continuous, risk interpretations imply a comparison of perceived threat with some (subjective) criterion or threshold for action (if any such can be identified) or worry
(if not). Depending on where this criterion is set, protective or evasive action in the face of a perceived threat can, with hindsight, turn out to have been either correct, excessive ('false alarms') or inadequate ('misses'). In other words, there can be different combinations of decisions and outcomes. This is illustrated below:

Decision Actual risk	Dangerous	Safe
Danger	Hit	Miss
Safety	False Alarm	Correct All Clear
Learning Should lead to fewer errors, BUT	hits and false alarms may be difficult to distinguish	consequences of misses may be delayed or sporadic

Importantly, the decision-outcome combinations in the top two rows can carry different costs and benefits, financially, politically and personally. Not all errors will be equally costly. The adoption of a more cautious or risk-averse criterion implies a judgement that the likely costs of a miss exceed those of a false alarm. Furthermore, these (actual and perceived) costs and benefits may often differ for different actors or interest groups, which may contribute to policy disagreements and tensions among communities at risk, and/or between communities and other agencies. The bottom row of the figure makes the point that individuals and communities can learn from the outcome of previous decisions. Generally we would expect the experience of a disaster to strengthen pressures for greater subsequent protection, whereas successful protective measures in the face of a hazard are likely to be repeated. However such experience can sometimes be ambiguous or misleading. To use examples from different areas of risk, it is difficult to provide any objective estimate of how many terrorist attacks have been foiled by enhanced airport security; while, on the other side, individuals may often escape the consequences of unsafe or unhealthy practices (drink-driving, smoking) and so come to over-optimistic views of their own immunity. Within the context of natural hazards, this is particularly relevant to situations where events turn out better or worse than forecasted -e.g. the size of a

volcanic eruption or the trajectory of a hurricane. The correspondence between forecasts and events can have a major influence on the extent to which scientific assessments continue to be relied upon by decision-makers at different levels.

Building on these conceptual issues, this project will take as its context *either*:

- a) a comparison of (two or more) contrasting locations exposed (principally) to a single type of hazard; *and/or*
- b) an in-depth case study of a single location exposed to multiple hazards.

Within this context, the project will seek:

- To identify the current state of knowledge, methods and assumptions in relation to assessment of the relevant risk(s).
- To consider how far economic and social costs and benefits have been taken into account in the assessment of such risk(s).
- To consider what kinds of historical evidence of previous hazard events have been used as a basis for such assessments.
- To compare such assessments with evidence of how such risks are interpreted by relevant actors and interest groups.
- To examine how far assessments provided by scientists are understood by, and satisfy the needs for information felt by, policy-makers and/or (sections of) the public.
- To relate such assessments and interpretations to recommendations for action from authorities and/or scientific researchers.
- To explore reasons why (sections of) the public may or may not follow such recommendations, including trust in authorities or scientists, perceptions affordability, costs and benefits of different actions (and how these perceptions may differ between groups and individuals), and personal experience of previous hazard events.

IRDR3/12.1





Conseil de recherches en

sciences humaines du Canada



March 3, 2010

Dear Drs. Anond Snidvongs and Gordon McBean:

Social Sciences and Humanities

Research Council of Canada

I am writing to relay the recent decision on your Letter of Intent submitted to the International Research Initiative on Adaptation to Climate Change (IRIACC), a collaboration between the Social Sciences and Humanities Research Council of Canada (SSHRC), the Natural Sciences and Engineering Research Council of Canada, the Canadian Institutes of Health Research and the International Development Research Centre (IDRC). On behalf of these agencies, I am very pleased to invite you to submit a full proposal.

Your proposal was reviewed by an international multidisciplinary peer review committee. This committee reviewed 96 proposals, which was an unexpectedly high number of applications. Your proposal was one of twelve applications to be invited to proceed to the next stage.

My colleague Mathieu Ravignat from SSHRC will follow up with Dr. McBean to arrange the Development Grant. As outlined in section F of the Letter of Intent Instructions, the Canadian co-director is required to submit an acceptable development grant budget within 5 business days.

Collectively, the four funding agencies are responsible for demonstrating the value and contributions of research to Canadians and audiences worldwide. As a recipient of IRIACC funding, your team has an important role to play in communicating your research with others both within the research community and across society. In this regard, we request that you acknowledge the financial support of the four funding agencies in all forms of communications, including news releases, presentations, research reports and other publications, correspondence, news conferences, advertising and other such materials. Please contact IDRC at iriacc@idrc.ca to discuss how to acknowledge this financial support.

IDRC will notify you when the results of the LOI competition are posted to the IRIACC website. Please do not publicly announce your grant until that time.

At our earliest opportunity, we will provide you with comments from the peer review committee, and the Full Research Application form.

www.idrc.ca www.crdi.ca



Your Full Research Application will be due September 15, 2010.

Should you have any questions, please contact us in writing at: iriacc@idrc.ca

Yours sincerely,

N'R' <

David O'Brien IDRC

cc: Allison Jackson, CIHR Erica Di Ruggiero, CIHR Driss Haboudane, NSERC Mathieu Ravignat, SSHRC

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Cities at Risk project

Heide, Deliang, Howard. See below. If successful we would get \$500,000 per year for 5 years - half to be spent by international partners. I have several member of IRDR SC -(Colleen, Raymond, Kuni and me) and START (Fuchs, Virji) on advisory committee as well as Nordin Hassan of ICSU regional office. Regards Gordon

Gordon A. McBean CM, PhD, FRSC Professor and Director Policy Studies Institute for Catastrophic Loss Reduction Departments of Geography and Political Science The University of Western Ontario Social Sciences Centre London, ON, N6A 5C2, Canada tel: 519-661-4274 fax: 519-661-3750 email: gmcbean@eng.uwo.ca

From: McBean, Gordon
Sent: Thu 04/03/2010 1:26 PM
To: Anond Snidvongs; Antonia Yulo Loyzaga; brian.mills@ec.gc.ca; Chen, Raymond; chliu2@gate.sinica.edu.tw; fuchsr@EastWestCenter.org; gmcbean@uwo.ca; Hassan Virji; ian.burton@ec.gc.ca; Ibidun Adelekan; jdavies@uwo.ca; Kuniyoshi Takeuchi; Linda.Mortsch@ec.gc.ca; Mohd Nordin Hasan [nordin.hasan@icsu-asia-pacific.org]; pkovacs@iclr.org; robert.lannigan@lhsc.on.ca; Ronald Stewart; Simonovic, Slobodan; vogelc@geoarc.wits.ac.za; zhan tian
Cc: Melanie Katsivo

Subject: IRIACC Proposal - Cities at Risk - Good News

To all:

I am pleased to inform you that our proposal for Cities at Risk as an IRIACC study has now been shortlisted for funding. There were 96 proposals submitted and we were among the 12 selected to prepare a full proposal. See attached Decision Letter. About half of these will be actually funded. We have until 15 September to submit full proposal.

We will receive \$30K as funding towards developing the full proposal and I must submit the above forms by March 9. I will work on these in next few days. I fly to Taipei on weekend and will be with Dr. Snidvongs there so we can finish the forms and submit them electronically.

Provisionally, I suggest that we use a series of meetings of opportunity (Taiwan next week – START committee; Hanoi last week March of IPCC; SC IRDR in April and others) to prepare ideas and drafts. START is having a Coastal Cities at Risk in Bangkok the last week of August. Although close to deadline, we may use that, or another place, where many of us can meet to finish the proposal in time for submission by 15 September.

Thanks for your help in this and I look forward to a successful full proposal. Regards Gordon

The instructions from SSHRC are as follows: "Dear applicant,

As the Canadian lead applicant on the International Research Initiative on Adaptation to Climate Change (IRIACC) team, SSHRC congratulates you on succeeding to the Full Research Grant application stage. We ask that the results of the IRIACC Letter of Intent competition remain

confidential until the official announcement has been made by the International Development Research Centre (IDRC).

In order to complete your application through this program, you are required to submit a development grant budget (for up to \$30,000 Canadian dollars) by March 9, 2010. Your budget request will be vetted through SSHRC's staff in order to ensure that SSHRC's policies and procedures are followed. Please include as much information as you feel would be pertinent with regards to your budget request.

In the email attachments, you will find the budget request forms and instructions. Furthermore, you will also be required to identify a financial contact person responsible for the Canadian lead organization. Please note that, depending on your software, you may not be able to save the changes made in the attached forms. In that case, please print and scan the completed forms to send by email or print and fax them.

As outlined in the attached instructions, you must attach an electronic copy of the budget justification for the \$30,000 Development Funds requested from SSHRC. At the Letter of Intent stage, eligible expenses are limited to travel, workshops, meetings, secretarial support, communication and dissemination activities. Please note that secretarial support does not include salaries.

For detailed information on eligible and ineligible expenses, please consult the following two documents:

- 1. SSHRC's Strategic Grant Holder's Guide: <u>http://www.sshrc.ca/site/using-</u> <u>utiliser/grant_holders-detenteurs_subventions/strat_grants-subventions_strat-eng.aspx</u>
- 2. Tri-Agency Financial Administration Guide: <u>http://www.nserc-crsng.gc.ca/Professors-</u> <u>Professeurs/FinancialAdminGuide-GuideAdminFinancier/index_eng.asp</u>

Please submit your budget request and budget justification by email or fax to Anna Torgerson's attention no later than <u>March 9th, 2010</u>. Email: <u>anna.torgerson@sshrc-crsh.gc.ca</u>; Fax number: 613.947.0223."

Professor Gordon McBean, C.M., Ph.D., FRSC Director, Policy Studies Institute for Catastrophic Loss Reduction Departments of Geography and Political Science Room 2431 Social Sciences Centre The University of Western Ontario London, ON, N6A 5C2 Canada Phone: 519-661-4274 Fax: 519-661-3750 email: gmcbean@uwo.ca

Establishment of IRDR-designated International Centre of Excellence – Taipei

An Integrated Research on Disaster Risk International Centre of Excellence will be created in Taipei jointly by Academia Sinica and the IRDR international programme.

The Centre will be overseen by an international advisory board (IAB) of 6-8 members appointed jointly by the SC-IRDR and Academia Sinica with the involvement of the Board of START International. The Director will be appointed by Academia Sinica from among its senior scientific staff in consultation with the IAB.

The Centre's research program will be an integrated multi-disciplinary approach to disaster risk reduction that is initiated from and centred on the perspective of the social sciences. Research foci, to be fully determined, would include risk analysis of disasters and informational sciences, including cloud computing, approaches towards creating a platform for managing broad disaster data bases, leading to integrated disaster risk programs.

The Centre will have both national and international components. The national component will consist of a strong cadre of disaster risk reduction research scientists from Academia Sinica institutes and centres, augmented nationally by professors and researchers from Taiwan universities and the National Science and Technology Center for Disaster Reduction. The international component will consist of short and longer-term (6-12 months) visiting scientists from developed and developing countries. The scientists from developing countries will be arranged through START.

The Centre will also support international workshops to bring together scientists in, for example, case studies or forensic investigations building upon the strong data base for disasters in Taiwan. These could then be extended to other countries in cooperative longer-term studies. It is proposed that a Cities at Risk workshop be held in Taipei in the first quarter of 2011.

Academia Sinica will contribute \$US 300K to the International Council of Science (ICSU) towards operating the international component of the Centre. Guest houses will be available for longer-term visitors.

The National Science Council of Taiwan will support an enhanced national program affiliated with the Center. New funding in the range \$US 1-2M is expected.

The proposed first step towards establishment of the Centre would be setting up the international advisory board. Also arrangement will be made for the financial transfer to ICSU.

The IRDR International Centre of Excellence – Taipei is seen as a model for future international centres of excellence in other regions of the globe.