**Global Risk Identification Programme (GRIP)**
**Risk Sub-programme Planning Workshop**
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# WORKSHOP SUMMARY

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## Summary

A planning workshop for the GRIP risk sub-programme was held at Columbia University in New York on 4-6 January 2006. The participants included 30 invited natural hazard risk experts from nine countries and 17 institutions along with other contributors, observers and rapporteurs from research units of Columbia's Earth Institute (see participant list, below). Several invited experts who could not attend submitted written contributions. The spectrum of assembled expertise encompassed earth science, engineering, social science, public health, international development and risk reduction practice. A complete record of the meeting, including contributed papers, background materials, presentations and rapporteur reports, is available at the website: http://www.ldeo.columbia.edu/chrr/news/2006/grip.html.

The workshop examined existing risk identification methods and results and identified opportunities for systematically improving the quality of the risk information available for decision-making at different scales. Breakout groups defined and refined major GRIP outputs.

The workshop produced recommendations on specific activities to be undertaken during GRIP preparation:

*Design of national and sub-national scale risk assessments*

One of the most important areas where the GRIP can contribute is helping to develop risk identification capacity in high-risk countries. Specific areas of engagement include assisting countries to identify and map risk hotspots, prioritize risk reduction strategies, and demonstrate that evidence on risks and losses can improve risk management. To ensure that the country level efforts have a larger impact, it will be important to identify and foster a mechanism for knowledge transfer. GRIP should achieve this through the identification of countries/regions with common interests.

*Country selection*

The GRIP should engage in selected countries with the objective of demonstrating evidence-based risk management results. Country selection considerations for successful

demonstrations include high risk levels, political engagement and sufficient capacity to identify and manage risks. The GRIP can promote interaction between the technical and non-technical communities. Scaling up of results can be achieved by twinning countries and working regionally.

*Global risk update*

A global perspective facilitates the identification of common problems in risk identification and management across different regions, and can provide a baseline against which regional improvements can be assessed. It also provides a basis for standardizing discussion of data standards and exchange and knowledge management. Although published studies offer a good starting point for comparing natural hazard risks, significant improvements can be made. Continuing advances in basic earth science have set the stage for more accurate, more highly resolved, and more dynamic (time-dependent) forecasting of hazard event occurrence and potential impacts. More information is also becoming available to assess natural hazard vulnerabilities, either directly or with more robust proxies. These results should be included in the next generation of global syntheses.

*Design parameters for a GRIP Knowledge Management (KM) System*

User groups that could be supported by GRIP KM activities include 1) GRIP implementing partners; 2) the larger network of disaster experts and managers around the world who could contribute to and benefit from GRIP activities; and 3) public users, including field personnel, educators, journalists, and others. GRIP KM will require both: 1) an underlying information infrastructure to help organize key GRIP data and information resources, and 2) an information portal to support access to—and delivery of—GRIP results and related resources in appropriate ways to GRIP stakeholders.

*Formation of a Risk Experts Panel (REP)*

A REP is an efficient way for GRIP to access a global community of experts on relevant aspects of risk identification, assessment and management. The REP can convene peer-review mechanisms and special studies in its areas of expertise, targeted to specific GRIP needs. The REP will ensure that regional studies and demonstration projects are of a high scientific standard and, through its global contacts, develop recommendations for the assessment of regional institutional capacity, the selection of implementing partners, the formation of regional consortia, and the development of training and outreach materials and programs.

## Workshop background and topics

The GRIP seeks to improve the evidence base for designing, prioritizing and implementing effective disaster risk reduction strategies at national, regional and global scales. This multi-scale approach requires:

- evaluation of current risk identification methodologies
- an inventory of available data
- a description of new data and information needs, and
- a review of the capacities of international, regional and local institutions to design and implement risk reduction strategies and sustain an evidence-based approach.

For GRIP to achieve its risk reduction objectives, risk management programs should be evaluated in the context of accepted frameworks and standards, which in turn should be products of a rigorous design process involving key actors and stakeholders. These activities should be sustained by basic and applied research collaborations and by education and technology transfer, supported by a knowledge system that provides decision support and promotes open exchange of data and information.

The New York workshop was convened to assess the outcomes of global, regional, national and local natural disaster risk identification studies (both single- and multi-hazard), and to develop an initial set of recommendations for the design of the GRIP program plan (see workshop agenda, below). The discussions were informed by recent global risk studies by UNDP (*Reducing Disaster Risk: a Challenge for Development*) and the World Bank (*Natural Disaster Hotspots: a Global Risk Analysis*), and by a regional study by the Inter-American Development Bank (*Indicators of Disaster Risk and Risk Management* for 12 countries in the Americas). These studies provide a basis for comparing multi-hazard risk across countries and regions, and for assessing different data sets and methodologies of risk identification and assessment. The workshop also examined national and sub-national scale risk studies in detail, including the underlying characterizations of hazardous event occurrence and severity.

The workshop also examined decision options and decision-support strategies in the areas of both risk reduction and transfer. Discussion also included the need for risk reduction knowledge transfer and management to support risk management decisions by local and national stakeholders. The workshop was also envisaged as the first meeting of a Risk Experts Panel (REP), a group that should transition from an ad hoc collection of experts to a more structured panel under GRIP.

Workshop attendees were charged with examining the following questions and topics:

1. What are the risk management decision-making entry points where information on disaster risks can be most effectively used, particularly at national and local scales? Who are the primary decision-makers and stakeholders to involve in risk identification work at that level? What are the primary risk management applications?

2. Regional-to-Local Risk Indices: Do global indexing methods provide an adequate conceptual framework for regional, country-level or local prioritization? How can different regional methodologies be assessed within a common conceptual framework? Should there be an effort to promote a standards-driven but location-specific approach to regional risk indexing?

3. How can the regional demands for risk reduction activities be assessed? What is the association between risk reduction and the improvement and preservation of livelihoods? What demographic and development factors are changing the spectrum of risk? Are both persistent and extreme events important? Is the local implementation of Millennium Development Goals a factor in generating demand for risk reduction? How should progress in risk reduction be measured in relation to other development programs?

4. Global Risk Indices: Do global natural hazard risk studies properly identify the highest risk countries? Is more work needed to define relative vulnerabilities or their proxies? Should the empirical, static analysis be periodically updated and supplemented by a time-dependent or dynamic analysis? Are such rankings a consensus starting point for the selection of GRIP project countries? How should new global syntheses be combined with regional and country-level risk identification?

5. How are physical and social vulnerabilities best measured, and what are the most reliable proxies? How should regional variations and pre-existing conditions be taken into account? What data are required for assessing comparative vulnerabilities? How can this be calibrated against past experience?

6. How should the capacities of regional institutions to implement disaster risk reduction strategies be assessed? What are the best sources of data and information, and how should

these be accessed and integrated? How should constituencies be identified? How should GRIP coordinate among the regional stakeholders? Would regional consortia be effective organizational models? Is there political will? Is there donor interest?

7. How should knowledge and information flow among global and regional programs? What types of regional data and information are available and how can quality be assessed? How should regional data and analysis be organized and incorporated into risk reduction programs? What should be archived? What standards must be developed and applied? How can minimum standards of data collection, quality control and management be achieved?

While broad, these questions are crucial to the design of risk identification and assessment projects, and speak to the research themes that underlie the transition from global studies of risk to the country-level approach being advocated by GRIP. However, it is clear that the need for research should not be an impediment to GRIP implementation. Instead, feedback between GRIP and the research community can foster a more active and timely integration of research products into GRIP projects. In fact, GRIP could be a significant driver of international research and technical collaborations that ultimately build capacity for sustainable implementation of disaster risk reduction strategies.

## Plenary discussions

The plenary sessions reviewed global, regional, national and sub-national approaches to risk indexing and methods for managing risk. One of the important conclusions of the global discussion is that global studies still have significant utility despite their obvious shortcomings. The global studies are a consensus starting point for comparing multiple hazard exposure that can support a coordinated approach to regional efforts implemented under GRIP. A global perspective can facilitate the identification of common problems in risk identification and management across different regions, and can provide a baseline estimate against which improved regional approaches can be assessed. It also provides a basis for standardizing the discussion of data standards, exchange and knowledge management.

Quantifying the physical and social aspects of vulnerability remains a significant research and applications issue. On the one hand, the physical fragility of residential housing remains one of the most important aspects of physical vulnerability for some hazards. On the other hand, pre-existing socio-economic and political factors, such as poverty and conflict, complicate a simple approach to prioritizing mitigation interventions, and demand a more carefully parameterized linkage with broader development goals (including the MDGs). Moreover, there is the realization that infrastructure and modern urban interdependencies, both consequences of development, have poorly characterized fragilities leading to poorly understood vulnerabilities. Finally, environmental degradation, demographic trends and climate change can alter hazard impacts, and are only superficially incorporated into assessments of future risks and the design of mitigation strategies.

One of the important developments in the technical community is the growing emphasis on global environmental monitoring, specifically the real-time detection, characterization and forecasting of natural hazard events. The infrastructure investment in these monitoring networks is very large and will continue to grow. However, it is not yet clear how developing countries can explicitly incorporate these networks into their own ability to manage disaster risk. For example, the global networks might provide backbone technical infrastructure for the densification of monitoring and early warning systems within countries or in regional consortia, and thus provide a platform for knowledge transfer. GRIP could develop a technical education and training element that would encourage participants to utilize technologies already available.

With these observations as background, the participants divided into breakout groups to develop consensus recommendations on four cross-cutting themes:

1. Design parameters for regional, national and local studies;
2. Criteria for country selection and assessment of capacity;
3. Improving global studies;
4. Design parameters for a Knowledge Management System.

Participants also discussed how the Risk Experts Panel could contribute to the further implementation of GRIP.

## Development of national and sub-national/local level risk identification and assessment plans

GRIP should engage with selected countries to develop risk management strategies aimed at reducing high priority risks. Throughout this process, GRIP should aim to build up local capacity and facilitate collaboration across institutions, providing a network of international experts and technical guidance.

Although the aim of GRIP country-level work should be risk reduction actions of benefit to those at risk, the primary partners carrying out these risk reduction plans will be local authorities at both the national and sub-national level, local learning institutions, risk experts, and organizations that customarily deal specifically with risk management or social vulnerabilities that feed into risk. Specific groups that should be enlisted include those working on issues of livelihood and social vulnerability (e.g., NGOs, health, economic sectors), as their critical role is often overlooked in risk assessment and management.

Risk reduction is often hampered by a basic lack of communication between those with technical knowledge of hazards and policy makers charged with strategic planning, risk management, and development. GRIP should work to facilitate communication across a wide range of critical agencies, institutions and organizations.

Country-level programs should be carried out through three major stages:

1. Assist countries in identifying and mapping risk hotspots within their countries: GRIP should facilitate the development of critical country-specific multi-hazard vulnerability maps, adapting the processes used for the identification of high risk on the global scale to country specific hazards and vulnerabilities. The country level effort should build upon existing scientific and social data where possible and the collection of new data where gaps are identified. Of specific interest would be data addressing the social, economic, and political aspects of vulnerability. Clear indicators or indices should be identified as a means to highlight risk hotspots resulting from in-country marginalization or underdevelopment. The hazard and vulnerability maps that result from this risk identification process could serve as the foundation for both subnational prioritization as well as future monitoring. Physical and social indicators used to map risk should become a baseline for future monitoring of the effectiveness of risk reduction efforts.

2. Assist countries in prioritizing risk reduction strategies: Based upon the identification and mapping of risk, GRIP should help countries prioritize risk reduction strategies that target areas identified as high risk. These strategies should aim to utilize existing knowledge and institutions and to foster communication and collaboration among governmental agencies, the local scientific and academic community and non-governmental sectors.

3. Help countries develop and implement demonstration projects: Within areas identified as high risk, GRIP should support the development and implementation of demonstration projects. These projects should utilize an integrated multi-hazard approach to vulnerability reduction.

They should focus on geographic regions or sectors of high risk and demonstrate the appropriateness and effectiveness of risk mitigation within a planning and development process. Wherever possible, these projects should aim toward addressing vulnerability in high profile community infrastructures and programs as a means to spur similar efforts across a wider region or within additional sectors (e.g., integration of demonstrated hazard-resistant strategies at the individual family or business level).

To ensure that the country level efforts have a larger impact, it will be important to identify and foster a mechanism for knowledge transfer. GRIP should achieve this through the identification of countries/regions with common interests. GRIP should foster the development of regional and/or thematic consortia when appropriate. Those countries already experienced with integrating risk assessment and management into national strategic development planning could greatly assist those just beginning to address hazard mitigation. At the same time, it may be beneficial for developing countries facing similar risks and vulnerabilities to join together to discuss their experiences and develop strategies for risk reduction appropriate to their shared situations.

## Country selection and assessment of regional capacity

*Country selection criteria*

** Selection should target developing countries where loss of life is greatest. It is critical that country-level work generates methodologies and encourages capacity building that will enhance the implementation of risk-reduction strategies in high-risk areas of such countries.

** Selected countries should serve as regional demonstration pilots, with the potential to be successful, despite obstacles similar to other developing countries. This may mean choosing countries that do not necessarily have the highest risk or the worst problems – for they may not be successful. However, it also means not selecting case countries that are doing so well or have had so much previous assessment studies/risk management experience that other countries will not feel they can easily follow their example.

Besides working in individual countries, one suggestion is to involve neighboring countries that may share similar risks and could learn from each other. Twinning strategies of less and more developed countries should also be considered as a possible option to strengthen capacity building. If well chosen, these strategies could match countries with solid experience in a specific area of natural disaster risk management with countries that face similar risk but are less well prepared.

**Some countries may not be interested in multi-hazard work because their risk is dominated by a single hazard. GRIP needs to be flexible and let the individual countries help set their own priorities. Multi-hazard management is an explicit goal of GRIP; however, single-hazard countries may contribute keen insights and strategies that could then be incorporated into multi-hazard plans.

The selection of potential countries may bias the work towards uni- or multi-hazards *a priori*. Perhaps countries can be selected that have a dominant hazard but that are also dealing with other related hazards. If multi-hazard sites are selected, they should have combinations of hazards that are common to a wider range of countries and a combination of hazards that can be addressed in a complementary fashion.

*Assessing regional capacity*

The discussion did not focus on specific countries, but rather on the general characteristics and conditions that should be considered for selection. There was a consensus that there needs to be a strong political commitment to risk management in a country to improve chances for successful implementation. The entry point should also be through a political process where UNDP, the World Bank, or a similar actor with an international mandate in risk management approaches the government and negotiates a framework for a program of GRIP activities. Beyond the national government, regional and local officials need to be involved since natural disaster risk is geographically localized and state or provincial governors will be more directly involved (and interested) in risk management activities. Urban planners and city or local government officials are often very powerful and need to play a key role in risk mitigation and disaster response planning. Broadening the group of local counterparts also has the advantage of lessening reliance on a few key players.

Additional constituencies include non-governmental stakeholders such as the private sector, the engineering community more generally, the local academic community, and NGOs. Grenada was mentioned as an interesting case, as the success of a risk management initiative in that country was based on broad private sector and NGO participation (insurance companies, mortgage banks, builders, engineers, etc.). Universities or local research organizations can be involved to provide unbiased technical backstopping for local or national governments.

A critical component of GRIP case study planning then becomes encouraging interactions among state and non-state actors, if they do not already exist. GRIP's role could include facilitating communications between the technical and non-technical communities, helping to resolve potential private and public conflicts due to differences in incentives and objectives, and initiating dialogue and collaboration among different sectors and levels of government. Interactions with international scientific and technical resources, such as hazard monitoring networks and international scientific consortia, could also be encouraged.

## Improving global studies

The Hotspots and Disaster Risk Index (DRI) studies have had a significant impact on the public and institutional perception of global natural hazard risk. In general, global studies will continue to serve an important function in helping to maintain public and donor agency awareness and to mainstream risk reduction activities within economic development policies. From a technical and scientific perspective, global studies serve the additional function of illuminating flaws and gaps in comparative risk and loss analyses and data sets, including those commonly produced and used by agencies for disaster response and reconstruction. Finally, global studies provide a test bed for developing comprehensive methodological approaches to comparative risk indexing and identification, and for data assimilation and integration. Global studies are the best way to engage the international scientific and technical communities, which then can approach more detailed regional assessments with an understanding of best practices as well as relative priorities and needs.

For countries instituting multi-hazard risk assessment programs, global studies provide a framework against which regional studies can be reviewed and assessed. This function could be viewed as a foundational component of GRIP. Global studies can promote the development of regionally appropriate yet globally consistent methodologies, and can drive adoption of standards for open information exchange and for data acquisition, quality control, archiving and management. If done effectively, the global studies are an effective and useful starting point for prioritizing risk reduction activities by identifying areas of comparatively high multi-hazard risk, and can be used as part of the evidence base for generating interest in specific regions.

Nevertheless, from a technical standpoint, the principal weaknesses in global studies accrue from the conflict between the need for global consistency and the "spotty" quality of risk, loss and vulnerability data. For example, the global syntheses of hazardous event characteristics used in the global maps have lagged scientific advances, which often rely on detailed regional studies. An instructive illustration of this problem is the occurrence of the Pakistan earthquake of 8 October 2005. The potential for this earthquake did not register in the Hotspots study because that analysis relied on an empirical record of past earthquakes, and few significant ones had occurred in this region. However, a detailed tectonic analysis published some twenty years ago in the scientific literature had effectively forecast the potential for a mega-event. While these sorts of studies have not been done everywhere, it may be possible to provide feedback to the scientific community to perform such studies in areas having the greatest potential exposure. This is precisely the sort of linkage that should be encouraged by the GRIP approach to regional assessments.

Specific recommendations include:

1. The global studies should be updated on a defined schedule, incorporating new data and new knowledge. There should be a strategy to analyze significant events as soon as practicable, and to recalibrate the global studies if necessary.

2. In addition to globally synoptic views of hazards as presented in Hotspots and DRI, future global multi-hazard risk studies should be structured to bring new specialties into the analysis, and to explore risk from different perspectives. For example, it would be useful to search for common characteristics of multiple hazard risks within defined geographic or physiographic zones - such as coastal regions, small islands, sediment deltas, and tectonically active regions - or zones organized according to dominant human activity - such as urbanization, agricultural activity, urban hinterlands and rural settlements, watersheds, or other concentrations of natural resources. These analyses could suggest common approaches for hazard risk reduction associated with these morphological or land use classes and provide another axis along which to prioritize risk reduction activities. For example, there is a sense among earth scientists that large deltas, such as those underlying Bangladesh or southern Vietnam, constitute a concentration of multi-hazard risks and that cross-comparisons among deltas might be useful in designing risk reduction strategies. Urbanized zones in the Central Asian republics comprise another concentration of multi-hazard risks.

3. The research community is generating new approaches to quantifying social, political and economic indicators, some of which would be useful proxies for or direct indicators of so-physical and social vulnerabilities. These include:

   a. Contributions of environmental degradation to hazard vulnerability, including destructive land use practices, destruction of habitat, soil erosion, natural resource exploitation and waste disposal;
   b. The role of conflicts in reducing hazard resiliency, especially the capacity to plan and respond;
   c. Human triggering of hazardous events, such as induced seismicity or slope instability, resulting from various practices such as mining, waste disposal, dam building and landforming;
   d. Better understanding of the finer scale interdependencies in urban or linked agricultural areas leading to cascading failures;
   e. Natural event triggers of technological hazards, such as chemical pollution or dam failure, and a better mapping of critical infrastructure and related population exposure;
   f. Loss of livelihood, as evidenced by an understanding of critical, vulnerable economic activity.

4. Global studies should include secular amplification of exposure and/or vulnerabilities due to human activity such as trends in demographics, urbanization, environmental degradation, or climate change.

5. Current analyses are static in time. More should be done to make estimates of hazard occurrence, severity and loss both probabilistic and predictive, and to include robust estimates of time dependence using the best available science.

6. Global maps should be linked to hazard monitoring and early warning systems, so that analyses can be provided to response and reconstruction agencies. Data from these systems should be reviewed and incorporated regularly to update hazard risk estimates. This involves the operating agencies as well as the global research community, but could be the basis for specific programs of scientific and technical collaboration.

In addition to these analytical or operational recommendations, the panel provided a set of recommendations on issues related to the availability and quality of data needed for improving global risk analyses. There is a need to improve the characterizations of floods and droughts, and to include other hazards. There should be an effort to quantify causal linkages among hazards, so that the generative events can be uniquely established and correlations estimated.

In addition to maintaining globally consistent standards for the monitoring and characterization of hazardous events, there needs to be a re-evaluation of the methodologies used to acquire loss data. Inadequate loss estimation, including the collection of post-event loss data, the inclusion of economic loss and the estimation of loss of livelihood, is probably one of the biggest barriers to accurate forecasting of hazard impacts and the calibration of risk estimates.

Exposure data, and other vulnerability proxies are continually being improved and should be incorporated into the global risk analyses as they become available.

Specific recommendations for correcting global data deficiencies include:

1. Risk: improve the acquisition of loss data.
2. Hazards: all hazards layers should be improved, but flood and drought layers are the highest priority.
3. Exposure: Additional data layers for calculating exposure:
    a. For population, global gridded population (GPW, Landscan) should be complemented by better data on urban extent (e.g., GRUMP). There needs to be better knowledge of population on some archipelagos
    b. GDPppp in GRID
    c. Crops
    d. Rail, roads, bridges, harbors and other transport infrastructure
    e. Telecommunications and power transmission grids
    f. Water storage and distribution
    g. Oil and gas terminals and distribution
    h. Critical infrastructure, including chemical refineries, power plants, and large dams, with the potential for triggered failures
    i. Economic data on livelihoods
4. Vulnerability: continue the development of proxies for each of the exposure classes.
5. Develop standards for assimilating regional loss, vulnerability and risk estimation into global analyses.
6. Systematize post-event data gathering and global risk updates, including post-event calibration of existing risk assessments.

The administration of global updates should be coordinated. The process must be collaborative and incorporate community input, so that relevant expertise is available. Some form of community governance of the process would ensure high quality, better acceptance, and rapid dissemination of the results. An active process would need to produce a new report every 3-5 years, as resources allow, or after a major event such as the tsunami.

The production of global studies is an occasion to survey data providers and develop cooperating relationships that promote data release and open exchange. Data providers could use the global study as evidence of the utility of their product. A coordinating mechanism should also include an education, training and outreach component, so that data providers, existing or proposed, understand the baseline standards required and can incorporate best practices in data management. The list of partners should include government mission agencies, international data gathering institutions, academic consortia, and NGOs, and the decision-making authorities with the power to support the release of critical geophysical and socio-economic data sets.

**Development of a Knowledge Management System**

Knowledge Management (KM) needs to be a vital component of the GRIP for at least two reasons:

1. KM will improve the efficiency and effectiveness of all GRIP activities by ensuring appropriate access to key data and information needed by GRIP activities and encouraging communication, interaction, and information integration among GRIP participants and contributors; and
2. KM will enhance the overall impact of the GRIP by providing an accessible, usable, and persistent knowledge base for the larger community of users of GRIP results, including both governmental and nongovernmental, research and applied, and local, national, regional, and global-scale users.

We therefore recommend that GRIP KM activities encompass both:

1. an underlying information infrastructure to help organize key GRIP resources, including data, software tools, case studies, and program materials, and support two-way interactions with GRIP participants and contributors; and
2. an information portal to support access to—and delivery of—GRIP results and related resources in appropriate ways to GRIP users.

The GRIP KM activities should not replicate existing disaster web sites and portals, but should create unique capabilities drawing on the GRIP's core activities and link with other resources as needed.

We identified at least three different user groups that should be supported by GRIP KM activities: 1) active participants in GRIP; 2) the larger network of disaster experts and managers around the world who could contribute to and benefit from GRIP activities; and 3) public users, including field personnel, educators, journalists, and others. These groups have different needs and may need different levels of access to the GRIP knowledge base. For example, active GRIP participants may need access to specific project plans and budgets and to proprietary data and information stemming from GRIP case studies. Disaster experts may need access to unpublished, state-of-the-art research or model results, to sensitive high-resolution geospatial data, or to complex analytic tools that require a certain level of expertise for appropriate use. Information made available to the public should meet specified requirements for quality control, documentation and clarity.

We recommend that the GRIP KM information infrastructure be designed with these user groups and associated characteristics in mind. In particular, it is expected that a clear set of standards and associated procedures will be needed for access, quality control, documentation, presentation, security, and other aspects of data and information management tailored to the different user types. It is also important to recognize that the value of GRIP's KM information infrastructure will increase over time, as the data, information and knowledge generated by GRIP and related activities accumulate and improve the underlying knowledge base about disaster risk at a range of spatial and temporal scales.

We recommend that GRIP consider developing and operating a range of KM services such as:

1. A queryable database built on the underlying Hotspots/DRI data, that would allow users to address questions such as: What countries or areas around the world are similar to each other in terms of their multi-hazard exposure, their exposed population and infrastructure, and/or their vulnerability? What has their actual mortality experience been, and are there key factors that explain these differences? What are best practices for risk mitigation given a particular hazard/exposure/vulnerability profile?

2. Interactive mapping services to make GRIP and related geospatial data resources more accessible and usable. These can build on a distributed set of resources already being developed by the World Bank, UNEP, CIESIN, the Pacific Disaster Center (PDC), and other groups and can link in with new initiatives such as the Global Earth Observing System of Systems (GEOSS). A unique service that GRIP could offer might be, for example, a customized user interface/client tailored to disaster risk analysts and managers and based on open geospatial data standards.

3. A set of data toolkits or decision support systems to facilitate the rapid utilization and adaptation of global- and regional-scale hazard, exposure, and vulnerability data at the national and local levels.

4. An interactive database or data system for collecting, integrating, and disseminating physical loss data, designed to increase the knowledge base on past, current, and future disasters.

5. A catalog of GRIP-related data and services, to ensure wide, long-term accessibility of the diverse data and information resources developed by GRIP participants and contributors.

6. Enhancements to existing online databases such as EM-DAT and development of new databases and services for critical data and information resources such as lifelines or for key countries or regions where GRIP has focused its efforts.

7. Communication and integration support services such as discussion fora and list services, catalogs of experts and organizations, training materials, multi-lingual thesauri and dictionaries, guides on adopted standards, and libraries of open software.

8. Periodic (disaster driven) automatically generated recommendations to managers, based on artificial intelligence module. They will contain summary on occurring disasters and lessons from the past on similar cases, including summary statistics and maps. This can be invaluable for all users, public, managers or private.

9. Enhancements to ECLAC standards for quickly acquiring and incorporating post-disaster loss data.

10. Developing technical links between international hazard monitoring networks and in situ country-level densification of hazard monitoring technologies.

We recommend a phased approach to the implementation of GRIP KM services. The initial phase would focus on the immediate needs of GRIP participants and would utilize GRIP participants as prototype users of services to be developed for the larger network of disaster experts and managers. The second phase would directly develop and implement operational services for disaster experts and managers, including a range of data and information tools and access to web-based information resources. This phase could also utilize the network of disaster experts and managers as prototype users of services to be developed for the general public. The third phase would address public data needs, including provision of appropriate data and information tools based on GRIP results in ways designed to be most effective and usable for general users. We anticipate that each phase could take 12-18 months each with some overlap, leading to a fully operational KM infrastructure and portal over about a 3-4 year period. In the long run, it will be important to work out long-term arrangements with appropriate institutions to ensure the long-term maintenance and updating of the GRIP KM infrastructure.

We recommend that GRIP take advantage of key partners in its KM activities, including existing GRIP participants, relevant UN agencies and interagency groups such as the Geospatial Information Support Team (GIST), various regionally focused disaster groups (e.g., the PDC, the Asian Disaster Preparedness Center (ADPC), and the Pan American Health Organization (PAHO)), and other research and data organizations such as the US Geological Survey's Earth Resources Observation and Science (EROS), Kyoto University's Disaster Prevention Research Center (DPRC), and the International Institute for Applied Systems Analysis (IIASA). We emphasize that credibility will be an essential characteristic of GRIP's KM activities, and that it is therefore vital to involve the scientific community both formally and informally. We recommend that a formal link be established with the planned research program on natural and environmentally induced hazards of the International Council for Science (ICSU) and with the ICSU Committee on Data for Science and Technology (CODATA).

In summary, KM should be an integral part of GRIP, designed to multiply the effectiveness of other GRIP activities and provide a solid platform for GRIP to deliver useful and meaningful knowledge, data, and information to operational disaster planners and managers around the world. In order for this goal to be reached, we recommend that GRIP proceed to develop its KM activities in close coordination with other parts of its program.

## Conclusions

1. On country-focused and regional studies of multi-hazard risk:
    a. Local and regional scales are particularly important domains for risk identification. Decision-support needs must be assessed in particular local contexts.
    b. Regional or national studies should take advantage of the best available socio-economic data and scientific analyses, from both regional and international sources. The premise is that such studies would be superior to the global indices when such data sets and analyses are readily available;
    c. Methodological approaches and the acquisition, assessment and assimilation of data should adhere rigorously to global standards where possible. Such standards should be flexible enough to allow for regional variations. Three important aspects of data to be considered include: quality, currency, and ease of use;
    d. Vulnerabilities are often region-specific and their characterization is best done regionally or even locally. However a global framework for vulnerability assessment could be established to provide guidelines for regional assessments. Such a framework would make it easier to make cross-country comparisons and assess performance;
    e. Regional stakeholders and leadership institutions or agents need to be identified. It may be beneficial to encourage the formation of regional stakeholder consortia. In many regions, there are countries or urban areas making progress toward natural disaster risk reduction. The institutions involved in these efforts, having by definition location-specific expertise, could play significant roles in regional programs and projects;
    f. Downscaled studies should be structured so that cross-comparisons can be made among them. Such comparisons would aid in the overall assessment of GRIP projects;
    g. The selection of regions and countries for the initial phases of GRIP should be based on: quantifiable multi-hazard risks; representative characteristics in terms of hazards, geography, development, size, and capacity; demand for the

implementation of risk reduction strategies; availability of data and analyses contributing to the evidence base; regional and local institutional capacity and the comprehensive identification of actors; state of scientific and technical infrastructure and capacity; and availability of funding.

2. On global compilations of natural hazard risk:
    a. Global multi-hazard risk comparison studies provide a sufficient and appropriate starting point for prioritizing locations for GRIP activities;
    b. Global risk maps should be updated periodically and after extreme events, and should incorporate new technical results on event probabilities and dynamics. Calculations of exposure should incorporate secular trends, including environmental effects such as climate change, and social/demographic changes such as urbanization and increasing complexity in the built environment;
    c. Global methodologies provide effective frameworks for designing regional, country-level or urban studies. Some degree of standardization is desirable across countries. Regional and local studies should contribute to new global syntheses where feasible. This should include the assimilation of regional-scale science on hazardous phenomena and the acquisition and assessment of regional socio-economic data with better spatial and temporal resolution.

3. On Knowledge Management (KM):
    a. KM is feasible and desired. It will improve the efficiency and effectiveness of GRIP activities by ensuring appropriate access to key data and information needed by GRIP participants, encouraging communication among participants, and promoting integration and comparisons among activities.
    b. To be effective, KM should include an underlying information infrastructure to help organize key GRIP resources, including data, software tools, case studies, and program materials;
    c. KM should include an information portal to support access to, and delivery of, GRIP results and related resources in appropriate ways to GRIP stakeholders;
    d. KM should support interactions among GRIP participants, contributors, and other interested actors, through education and outreach as well as purely technical means;
    e. Technical implementation of KM may be regionally specific, but should adhere to standards driven by open definitions and protocols, and open access to data and other information.

4. On the Role of the Risk Experts Panel (REP):
    a. The REP is an efficient way for GRIP to access a global community network of experts from different sectors on relevant aspects of risk identification, assessment and management;
    b. The combination of physical scientists, engineers, social scientists and practitioners on the REP (or within its network) offers a broad and deep multidisciplinary foundation for GRIP. The REP can parameterize, with great specificity, the resources required for designing, implementing and assessing GRIP projects;
    c. The REP can convene peer-review mechanisms and special emphasis studies in its areas of expertise and targeted to specific GRIP needs;
    d. The REP can be tasked with developing the frameworks within a standards-driven enterprise that allow regional studies and demonstration projects to move forward transparently, so that comparisons and assessments are meaningful;
    e. The REP, through its global contacts, can develop recommendations for the assessment of regional institutional capacity, the selection of implementing agents, the formation of regional consortia, and the development of training and outreach materials and programs;

f. The REP should meet regularly or as directed by the GRIP Steering Committee. In addition to core activities, it should respond to specific tasks or requests from the GRIP Steering Committee. It may be useful at times to hold panel meetings in countries and regions of interest as GRIP develops.

## Global Risk Identification Program (GRIP)
## Risk Sub-programme Planning Workshop
## 4-6 January 2006, Columbia University, New York

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### Agenda

**January 4 Overview of risk identification and assessment at multiple scales**

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| 9:00 am | Welcome and introductions – Art Lerner-Lam<br>Overview of the GRIP – Maxx Dilley |
| 9:30 am | Global multi-hazard risk comparisons-- Session I<br>Disaster Risk Hotspots – Bob Chen<br>Disaster Risk Index – Pascal Peduzzi<br>Discussion – Art Lerner-Lam (moderator) |
| 10:45 am | *Coffee break* |
| 11:15 am | Global multi-hazard risk comparisons-- Session II<br>Indicators of disaster risk and risk management – Kari Keipi (TBC)<br>Comparative analysis – Silvia Mosquera<br>Discussion – Steve Sparks (moderator) |
| 12:30 pm | *Lunch* |
| 1:00 pm | National and regional studies<br>Earthquake risks in Quito, Ecuador – Carlos Villacis<br>Cyclone risks in the Caribbean – Jan Vermieren<br>Earthquake mitigation in Istanbul – Mustafa Erdik<br>Multi-hazard risks in China -- Peijun Shi<br>Multi-hazard risks in the Caribbean – Walter Diaz (TBC)<br>Multi-hazard risks in Gujarat -- Aromar Revi (TBC)<br>Drought risks in Asia – Muhammad Akram Kahlown<br>Discussion – Klaus Jacob (moderator) |
| 3:30 pm | *Coffee break* |
| 4:00 pm | Methods of risk management<br>Index insurance for risk transfer – Hector Ibarra<br>Survey of risk management tools – Christian Herold<br>Discussion – Uwe Deichmann (moderator, TBC) |
| 5:15 pm | Adjourn and dinner at Lamont |

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# Global Risk Identification Program (GRIP)
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**January 5 Linking hazards and vulnerability to risk assessments**

8:00 am Shuttle pick-up at the Clinton Inn

8:30 am *Continental Breakfast*

9:00 am Introduction – Art Lerner-Lam

9:10 am Single hazard characterization: state of the art -- Session I
- Drought – Emily Grover-Kopec
- Floods – Jim Verdin
- Cyclones – Suzana Camargo
- Landslides – Oddvar Kjekstad

Discussion – Pascal Peduzzi (moderator)

10:45 am *Coffee Break*

11:00 am Single hazard characterization: state of the art-- Session II
- Earthquakes – Domenico Giardini (TBC)
- Volcanoes – Steve Sparks
- Tsunamis—Vasily Titov
- Global earth monitoring technology—Ray Willemann

Discussion –Vasily Titov (moderator)

12:30 pm *Lunch*

1:00 pm Considerations for assessing aspects of vulnerability and risk
- Findings of the UNU workshop – Joern Birkmann
- Report on discussions with Munich Re – Maxx Dilley
- Poverty traps and state fragility – Marc Levy
- Risk modeling (TBC) – Charles Scawthorn
- Infrastructure vulnerability -- Stuart Nishenko

Discussion – Bob Chen (moderator)

3:00 pm *Coffee Break*

3:30 pm Risk assessment (discussion, chaired by Uwe Deichmann)

4:30 pm Towards a program of action (discussion, chaired by Maxx Dilley)

5:30 pm Adjourn

5:45 pm Shuttle pick-up and dinner in Tenafly

CENTER FOR HAZARDS AND RISK RESEARCH
THE EARTH INSTITUTE AT COLUMBIA UNIVERSITY

The Earth Institute AT COLUMBIA UNIVERSITY

**Global Risk Identification Program (GRIP)**

**Risk Sub-programme Planning Workshop**

**4-6 January 2006, Columbia University, New York**

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**<u>January 6</u>  Next steps: Linking global resources to country level risk assessment**

9:00 am  Supporting country-level risk identification
  Discussion, chaired by Carlos Villacis

9:45 am  How to use the GRIP risk experts peer review group
  Discussion, chaired by Art Lerner-Lam

10:30 am  *Coffee Break*

10:45 am  Additional needs and gaps
  Discussion, chaired by Mohammed Abchir

11:30 am  Wrap up and way forward
  Discussion, chaired by Maxx Dilley

12:15 pm  Lunch and adjourn

## Global Risk Identification Programme (GRIP)
## Risk Sub-programme Planning Workshop
## 4-6 January 2006, Columbia University, New York

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<u>Global and regional studies</u>

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| Robert Chen | CIESIN, Columbia University |
| Uwe Deichmann | World Bank |
| Christian Herold | United Nations Environment Programme, UNEP |
| Kari Keipi | Inter-American Development Bank, IDB |
| Art Lerner-Lam | Columbia University |
| Silvia Mosquera | Int'l Research Institute for Climate Prediction, IRI |
| Pascal Peduzzi | United Nations Environment Programme, UNEP |

<u>Hazards</u>

| | |
|---|---|
| Suzana Camargo | Int'l Research Institute for Climate Prediction, IRI (cyclones) |
| Domenico Giardini (Contributor) | Swiss Federal Institute of Technology, ETH (earthquakes) |
| Klaus Jacob | LDEO, Columbia University |
| Emily Grover-Kopec | Int'l Research Institute for Climate PredictioN, IRI (drought) |
| Oddvar Kjekstad | Norwegian Geotechnical Institute, NGI (landslides) |
| Leonardo Seeber | LDEO, Columbia University |
| Steve Sparks (Contributor) | University of Bristol (volcanoes) |
| Vasily Titov (Contributor) | Nat'l Oceanic & Atmospheric Administration, NOAA (tsunamis) |
| Jim Verdin | United States Geological Survey, USGS (floods) |

<u>Vulnerability and risk</u>

| | |
|---|---|
| Deborah Balk | CIESIN, Columbia University (population) |
| Joern Birkmann | United Nations University |
| Meredith Golden | CHRR/CIESIN at Columbia University (health) |
| Hector Ibarra | World Bank (risk transfer) |
| Marc Levy | CIESIN, Columbia University (state capacity) |
| Stuart Nishenko | Pacific Gas &Electric (infrastructure) |
| Charles Scawthorn | Kyoto University (multi-hazards) |
| Jan Vermeiren | Organization of American States, OAS (cyclones) |

<u>National and regional studies</u>

| | |
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| Muhammad Akram Kahlown (Contributor) | Pakistan Council of Res. in Water Resources, PCRWR (Asia) |
| Wafaa Charafeddine | Lebanese Council for Development & Reconstruction |
| Mustafa Erdik | Bogazici University (Turkey) |
| Van Lai Hoang | Institute of Mechanics (Vietnam) |
| Aromar Revi (Contributor) | Taru Leading Edge, Pvt. Ltd (Gujarat) |
| Peijun Shi | Beijing Normal University (China) |
| Carlos Villacis | Stanford University (Equador) |

<u>Data and technology infrastructure issues and assessments</u>

| | |
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| Randolph Pullen | CHRR/CIESIN, Columbia University |
| Ray Willemann | Incorporated Research Institutes for Seismology, IRIS |
| Greg Yetman | CIESIN, Columbia University |

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|---|---|
| Maxx Dilley | United Nations Development Programme, UNDP |
| Mohamed Abchir | United Nations Development Programme, UNDP |

**Global Risk Identification Programme (GRIP)**

**Risk Sub-programme Planning Workshop**

**4-6 January 2006, Columbia University, New York**

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