

## **THE THIRD INTERNATIONAL WORKSHOP ON EARTHQUAKES AND MEGACITIES** *"Reducing Vulnerability - Increasing Sustainability of the World's Megacities"*

31 October, 1 and 2 November, 2002  
Shanghai, The People's Republic of China

### **WORKSHOP SUMMARY**

#### 1. Introduction: A Partnership Effort

The workshop was jointly organized by:

- The Earthquakes and Megacities Initiative
- China Seismological Bureau (CSB)
- Shanghai Municipal People's Government
- Shanghai Seismological Bureau (SSB)

with the collaboration and sponsorship of eight additional organizations worldwide:

- Asian Disaster Preparedness Center (ADPC)
- Circum Pacific Council – Crowding the Rim Initiative (CTR)
- Earthquake Disaster Mitigation Research Center (EDM - NIED)
- International Lithosphere Program (ILP)
- ProVention Consortium and World Bank Disaster Management Facility
- United Nations Educational, Scientific, and Cultural Organization (UNESCO)
- United States Geological Survey (USGS), and
- World Federation of Engineering Organizations (WFEO).

This third international workshop on earthquakes and megacities developed the theme "*Reducing vulnerability – increasing sustainability of the world's megacities*" by focusing on local initiatives for reducing vulnerability and the relationship of these initiatives to sustainable development for megacities.

Attendees included 70 participants from China and 87 participants from 25 other countries. The Chinese participants included 13 representatives of provincial and municipal governments and 57 representatives from academia and research organizations. The foreign participants came from the following backgrounds: Academia/Research (35); Government Officials (23 Local; 3 National); Professionals (15); NGOs (8) and UN delegates (3).

#### 2. Workshop Structure and Objectives

The primary aim of the workshop was to bring a selected but widely varied representation of stakeholders together to share experiences, advance the state-of-practice and learn lessons in reducing the vulnerability of cities to earthquakes and other perils. The workshop, like the previous two EMI workshops, served as an important mechanism for strengthening EMI's network of megacities partners and for providing opportunities for building coalitions and consolidating partnerships.

The workshop structure revolved around the single theme of reducing urban vulnerability. The workshop analyzed urban vulnerability reduction by addressing four complementary components:

- Community participation
- Public policy actions
- Safer construction and urban planning, and
- A culture of prevention.

These components were discussed in four panel sessions structured to present actual experiences in the development and implementation of strategies and initiatives for vulnerability reduction. Common threads or themes, which arose in the sessions, included:

- The roles of governmental and non-government institutions including academia, professional organizations, and civil society
- The need for collaboration among researchers, practitioners, and government officials
- Development of mechanisms for local institutionalization of risk reduction
- Key target audiences for educational efforts (to include policy-makers, urban planners, educators, the media, and the informal building sector)
- The need for integration of community participation, government activities, and scientific and technical knowledge and information.

The two days of panel sessions were followed by a full-day participatory session on regional cooperation and post-disaster conflict resolution based on RIMSIM, a structured game simulation developed by the Crowding the Rim Initiative (CTR). The RIMSIM game enhanced teamwork and the building of personal relationships among workshop participants. In addition, the workshop included an opening session with two distinguished lectures and a closing session aimed at collecting feedback from participants.

### 3. Opening Session

The opening session was highlighted by the introduction of officials and welcoming addresses by Prof. Minister Ruixiang SONG, Director General of CSB, Prof. Zheng HAN, Vice Mayor of Shanghai Municipality, and Dr. Fouad Bendimerad, Chairman of EMI. Following a program overview by Workshop Program Chair Shirley Mattingly of EMI, there were two distinguished introductory lectures. First, former Mayor Kazutoshi Sasayama of the City of Kobe presented his unique experience in responding to the destruction caused by the Great Hanshin-Awaji earthquake when it ravaged his city on January 17, 1995. He emphasized the importance of cooperation among governmental institutions, with the private sector, and the community for the post-earthquake development of “disaster prevention welfare communities” to reduce future risk. Then, Director ZHU Shilong of the China Seismological Bureau briefed the participants on the significant achievements in seismic disaster mitigation in China through a comprehensive, cross-cutting strategy based on integration of prevention with preparedness and response, and the perfection of the three systems for monitoring, hazard prevention, and emergency response.

### 4. Session Highlights: Reducing Vulnerability through Community Participation

The session was chaired Sergio Puente and recorded by Harkunti Rahayu. The objective of the first panel session was to identify the role of community as an active actor in reducing vulnerability and increasing sustainability related to earthquake disasters through practical initiatives and systematic learning processes. The community is the final actor to whom research and policy needs to be addressed and without whose participation all actions will fail.

Speaker WU Nianzu discussed the proactive role of the Shanghai Seismological Bureau in creating public participation in earthquake disaster mitigation activities through public awareness and education of citizens and higher-level officials in regard to what needs to be done for risk reduction. Also, he discussed programs providing knowledge and entertainment for secondary school students through such mechanisms as knowledge competitions, summer camps, special schools for earthquake disaster prevention and reduction (about 20), awareness programs for citizens, and the establishment of the first Shanghai seismic science museum. Shanghai is responding to publicly expressed needs; the city is also willing to cooperate with other cities to share information and experience.

Speaker Alan Lavell discussed the importance of the social actors and their perceptions of risk in risk reduction and control activities. “Participation” needs to be construed as “being part” rather than “taking part” in an activity. Mr. Lavell argued that, to be successful within communities, mitigation for “exceptional” risks (e.g., natural disasters) needs to be incorporated with mitigation of “everyday” risks, which are better understood by communities and policy-makers as well. Also, how we approach an issue and how that issue is constructed will determine the outcome.

Three major lessons learned are:

- Progress with risk management concerns is much better achieved when they are fully integrated into development concerns
- The organized, conscious knowledge of civil society is a potent force in moving risk management forward
- To the extent we can get organized society informed, we have the basis for sustained work and organization for disaster preparedness and response.

Mme. Cora De Leon spoke of the school as the community focus. The rationale of focusing the earthquake risk reduction effort on schools is because the “teacher speaks much louder than birds”, which means that school is expected to be the vocal target group in risk reduction. Mme. De Leon also discussed the regular education campaign conducted by the NDCC (National Disaster Coordinating Council) of the Philippines. To complement the presentation, a documentary film was shown to illustrate how a scientific experiment aimed at collecting data from seismic instruments was used to involve students and teachers in earthquake vulnerability reduction.

The major focus of the presentation by Mr. Amod Dixit was that community participation is an effective tool in seismic risk reduction, and through working with the community we learn about indigenous knowledge or culture in construction as a natural reaction to earthquake risk. In fact, “the more you work with the community, the cleverer you become.” This presentation focused on NSET’s efforts regarding public schools and masons. In Nepal, public schools are the most forgotten facilities in terms of building conditions for evacuation sites or temporary shelters. The primary lesson learned was that the effort requires a group of committed professionals, with international and government support, sharing responsibilities among institutions, and building capacity and trust at the local grassroots level. Mr. Dixit emphasized that building coalitions, while a tedious and often frustrating process, was absolutely necessary for shifting paradigms and accomplishing results.

The discussion following the panel presentations addressed the “chemistry” of getting the community to participate and the need for a catalyst or agent for change, e.g. experts and “self responsible” participation. Other factors are partnerships between the people and government, stimulating the use of funding from the development market rather than the humanitarian market for financing mitigation during reconstruction, and working out technology transfer. The session highlighted the need for interaction between community participation, the government, and scientific and technical information. The issue of measuring effectiveness was raised, as well as the need to expand community-based programs to target other constituencies particularly neighborhoods, professionals, businesses, and policy makers.

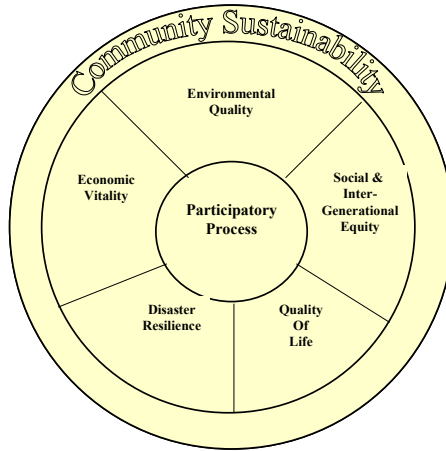
## 5. Session Highlights: Reducing Vulnerability through Public Policy Action

Louise Comfort chaired this session and Ellis Stanley served as rapporteur. The objective of this session was to explore options for vulnerability reduction through public policy action, and to understand the factors and conditions that determine actions. Presentations were based on actual experiences from Japan (K. Uehara), Korea (K. Namkoog), China (D. Yang), Turkey (P. Gulkan), Algeria (F. Tebbal) and Colombia (O. Cardona).

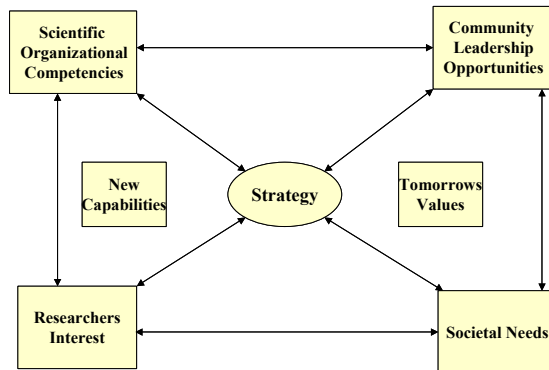
Prof. Uehara from Kobe University showed how information technology is used in Kobe to educate the public about the risk to their properties and how that process has resulted in participation from the citizens and resulting actions from the local authorities. Prof. Namkoong from Seoul, showed the impact of the Kobe Earthquake in raising awareness in Korea and in triggering a series of government actions to create disaster management institutions both at the central and local levels and to support a number of initiatives spanning from multi-peril risk assessment to funding research to involving business communities. Prof. Gulkan from Turkey discussed how the use of government-sponsored insurance pools can be used as a public policy tool to foster mitigation. In view of the long history of earthquake losses in Turkey, insurance can be a means of not only transferring risk but also educating the public and initiating vulnerability reduction efforts. Mr. Tebbal made a point that the lack of community involvement in the implementation of Algeria's post-1980 El Asnam earthquake measures, left all decisions in the hand of central government institutions. Government priorities shifted with time and conditions, and as a result various programs were cancelled or were simply forgotten. Mr. Tebbal stressed the importance of decentralized action and community involvement to enforce government commitments. Mr. Yang explained how the Tianjin local government has put various policies in place to educate the public, improve preparedness as well as promote international cooperation (involvement of Tianjin in EMI Cluster Cities meeting). Prof. Cardona proposed a model for integrating physical vulnerability with social and institutional vulnerabilities that can be used to understand weak links and develops priorities for public policy actions.

In regard to what government should do, it was noted that government has responsibility to protect life and property and maintain security, safety and the continuity of services. Government has also a responsibility to create inter-disciplinary mechanisms for integrating "best practices" into risk reduction as well as support research and the work of NGO's and professional organizations. However, these actions often stretch the policy cycle of most governments, which generally are more comfortable reacting rather than acting. However, reaching community sustainability is seen as a participatory process (see Sketch 1) and other catalysts must intervene. Academia is an important catalyst by being a partner in preparedness, translating data into information, looking out for new solutions, and being a change agent to influence the behavior of policy makers, practitioners, and the public (see Sketch 2). Science also produces means for alert and notification processes, which are effective tools for emergency management. Industry has a direct interest in mitigation and also develops and applies technologies. In particular, insurance should be structured to play a greater role in mitigation. Mechanisms for shaping public policy include: building public-private partnerships and using/strengthening existing networks (panelists noted that risk is international and inter-jurisdictional), dissemination of knowledge and technology, learning from others' tragedies, advertising success stories, and involving business and civil society. A holistic approach that identifies, assesses, manages, and transfers risk, is seen as more efficient in impacting public policy. Solutions that consider both 'hard' and 'soft' measures, and take into account such factors as functionality and social fragilities, are often easier to translate into public policy actions. In his session report Ellis Stanley presented a sketch illustrating the elements for success in disaster management and mitigation (see Sketch 3).

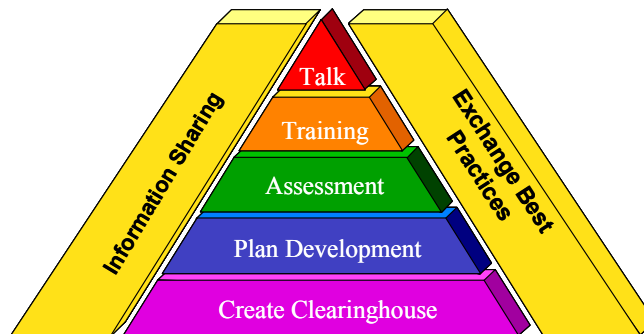
**Sketch 1. Components of Community Sustainability**



**Sketch 2: Shaping a Scientific Strategy for Participation**



**Sketch 3. Elements of Success in Disaster Management**



6. Session Highlights: Reducing Vulnerability through Safer Construction and Urban Planning

This session was chaired by Mustafa Erdik and recorded by Stuart Mustow. The background for this session is that in most cases, a large proportion of casualties and economic losses is caused by the partial or total destruction of buildings—the victims of inadequate design or construction. Poor migrants to the city set up home at the periphery in under-designed houses they build for themselves, while people in more established housing are at risk because the building regulations were not observed in their construction or they were inadequately designed. The effect of all this is that large areas of a number of cities are liable to major damage. Disasters impact all classes of society but the poor are in the worst position of all.

Panel presentations were directed to grassroots mason training in India (Bijay Upadhyah), the development of new building regulations in Ecuador (Jeannette Fernandez), the use of microzonation to aid urban planning in Turkey (Atilla Ansal), and large scale retrofit of buildings in the USA, Turkey and Japan (M. Erdik, F. Bendimerad, and Y. Tanaka). The subsequent discussion underlined the importance and the implications of these ideas.

Developing safer building skills at the grassroots level is very important in addressing the risk of vernacular construction. The use of trainers from Nepal in Gujarat was highlighted as an excellent example of grassroots level action and cooperation. The program combated problems of inadequate communication between stakeholders, inadequate skill levels of masons, and technological complexity, through the sharing of hands-on experience. It should be recognized, however, that the extension of this approach to a megacity scale would be labor intensive over a prolonged period and require ongoing government support. The new building regulations for Ecuador were the product of an effective partnership of academia, business and government. But without action to insist on compliance, the regulations remain a good example of joint working while the desired outcome has not yet been achieved.

Microzonation has traditionally been used as a tool for urban planning and in some cases for informing the public of the potential risks they face. There is an agreement that zonation cannot predict the performance of particular buildings in a catastrophe, and its larger scale analysis cannot be an exact representation of ground conditions. The effectiveness of zonation studies in impacting land-use planning has had mixed results, especially in developing countries as experience shows that urban development often ignores recommendation for limiting construction in high hazard areas (e.g. experience of the city of Adapazare in Turkey). Also, it must be recognized that seismic zonation has not proven to be an effective tool to reduce seismic damage. During the discussion, Polat Gulkan of the Middle East Technical University in Ankara commented powerfully that the apparent “accuracy” of microzonation should not be taken as a reason to downgrade the proper design of buildings to withstand earthquakes. The question remains: Should we keep promoting zonation or should we develop and promote other tools such as risk mapping, scenario studies and loss assessment tools.

The retrofit discussion was opened by Professor Mustafa Erdik, who showed the extent of the potential earthquake threat to Istanbul is and the large volume of the building stock involved. Retrofit is sensible and desirable but without substantial incentives, people are reluctant to leave their houses for prolonged periods while the work is done. The necessary goal of wide scale protection will only be achieved with the ongoing support of the government and the introduction of a scheme of support for the people affected suited to local circumstances. Erdik argued for the implementation of a “minimum” retrofit scheme aimed strictly at protecting life safety. Fouad Bendimerad spoke forcibly of the need to raise the profile of retrofit and there was support for this view among many attendees. It is necessary to create the environment or conditions that are conducive to change. He gave examples of institutionally-driven retrofit programs, corporately-driven programs and individually-driven programs in the USA and identified three factors that would make these experiences work in other countries, namely: 1) general education about risk and its consequences; 2) enforcement of liability; and 3) financial interest/incentives.

In many ways building safety issues lie at the heart of safer cities, and in that context the panel gave a taste of the range of experiences and addressed the complexity of the issues. The merits of the concept of “minimum retrofit” could serve as a focus for a debate to keep the issue of seismic retrofit on the front burner.

#### 7. Session Highlights: Reducing Vulnerability through a Culture of Prevention

This session was chaired by Hiro Kameda and reported by Ray Punongbayan. Developing a culture of prevention in megacities to reduce their vulnerability to earthquakes and, for that matter, to all hazards—natural and man-made—is a key element of disaster mitigation. Without this in place, all formulated disaster mitigation programs are likely not to be sustainable and are bound to fail.

Panelists agreed that recent large magnitude earthquakes which adversely impacted big cities and large urban areas had provided opportunities to assess and then strengthen their disaster mitigation plans and programs. According to Yoshiaki Kawata, a big city, like Kobe, is most vulnerable to disaster with its modern manufacturing facilities and high population density. In fact, he argued that all big cities have high vulnerability even if some measures are taken against earthquakes. It is also his observation that the un-neighborly nature of city dwellers further increases the level of vulnerability because the survivors tend not to extend material help to their neighbors who may be adversely affected by an earthquake. Ravi Sinha argued that the people most vulnerable to disasters are those living in urban areas. It becomes obvious that the main target for building a culture of prevention to reduce vulnerability to disasters is the city dwellers.

Specifically, in terms of the assigned topic for Panel 4, the reduction of vulnerability through a culture of prevention can be achieved, according to Dr. Sinha, by involving all stakeholders. The development of sustainable partnerships requires a sustained effort and identifying the roles of all stakeholders. While government is traditionally identified as a principal stakeholder, the affected people, corporate bodies and academic institutions are also now recognized as principal stakeholders with important roles in disaster management. Dr. Sinha discussed how Mumbai City has tried to develop sustainable partnerships for disaster management by formally including all the major stakeholders. An Expert Group has been formed for this purpose, which also helps the city in establishing the context of disaster management. The Expert Group has recently convinced the government to focus more strongly on mitigation of risks rather than confining efforts to response only. The experience of Mumbai also shows that integral involvement of NGOs is essential for the successful development and implementation of disaster management plans.

Dr. Jean Tayag opened her presentation by saying that “the many disasters that have visited the Philippines during the second half of the twentieth century should have made the Filipinos wise to the ways of disasters. In certain ways and to a certain extent they have.” As early as the 70s, there were indicators of this nascent disaster consciousness: the enactment of the National Building Code in 1972, organization of the National Disaster Coordinating Council (NDCC) in 1978 through a Presidential decree and declaration of the month of July as National Disaster Consciousness Month.

The 1990 Luzon earthquake, however, highlighted the deficiencies of the disaster management system and the need for broader-based and more far-reaching initiatives for developing the country’s disaster preparedness and mitigation system. In complementing the community-based efforts of the NDCC, civil societies, and local government units, PHIVOLCS launched its own advocacy program directed at three key players in Philippine society – media, legislators and decision makers, and academia. The combined efforts of all the advocates of disaster preparedness and prevention have yielded promising indications of a developing culture of anticipation and proactive attitude to disaster. These include the passage of the Local Government Code, the periodic revision of the National Structural Code, the various hazards-constrained local development and land use plans, and the earthquake disaster preparedness plans for Metro Manila. It is

hoped that a progressive group of disaster prevention advocates will emerge to advance the campaign to all sectors of society.

Nuray Karanci believes that the post-disaster period provides a window of opportunity to build networks aimed at empowering local communities in disaster management, preparedness and response. During this period, when fear and awareness of hazards and feelings of helplessness are high, community members, especially women, are especially receptive to learning how to cope with life-threatening hazards by undergoing training on what to do for mitigation and preparedness and how to behave during and after disasters. At the end, community members will be empowered to combat helplessness during and after disasters by developing a strong sense of control, thus turning them into survivors with resources that can be mobilized and strengthened and avoiding having them as passive helpless victims. However, Dr. Karanci said that sustaining programs for community participation and developing a culture of prevention cannot be motivated by fear and anxiety alone. It should be backstopped through provision of appropriate funding for building disaster-resistant communities, building collaboration among stakeholders and developing a sense of ownership by involving community members in the development of action plans for disaster mitigation and preparedness.

Neil Britton, anticipating that vulnerability reduction will entail many activities and players of varied interests, proposes the utilization of AS/NZS 4360 Risk Management Framework as currently being used by the Earthquake Disaster Mitigation Research Center (EDM) in the administration of a project referred to as EqTAP, the Earthquake and Tsunami Disaster Mitigation Technologies and its Integration for the Asia-Pacific Region. The EqTAP Project is a multi-disciplinary regional project focusing on developing implementation strategies in hazard mitigation. It relies primarily on academic researchers from Japan and counterparts in the APEC countries. The focus on developing implementation strategies is a significant challenge, since this is not an aspect that has traditionally been an academic pursuit. It requires a different orientation particularly one that has practitioner/decision-maker stakeholders as key parties. Also, an understanding and commitment to communicating and consulting with all involved stakeholders is significant – hazard mitigation is not simply a technical issue hence working with all groups is essential.

Dr. Britton concluded that lessons to be gained from this approach are potentially significant for regional projects since it provides greater uniformity of approach, better understanding of similarities and differences between specific locations, enhanced potential for transferability between participating countries, and greater collaboration between researcher and practitioners.

## 8. The RIMSIM Simulation

The RIMSIM game simulation was played on the third day of the workshop. The game was based on a hypothetical situation in hypothetical countries; it was played in both Chinese and English and it was designed to demonstrate four key objectives in disaster reduction:

- The principles of multi-party negotiation
- The role of science in decision-making
- The ripple effects of modern disasters
- The building of personal relationships through game play.

The debriefing sessions following the game play provided clear evidence that the game was highly successful in regard to each of the objectives. In particular, it was clear that team spirit was created among the participants. Participants found the negotiation process to be anxiety-producing but learned tools and techniques to reach agreement. For instance, creative ideas can “expand the pie” or add value and creatively satisfy parties’ interests. One group chose an internal chairman to drive the decision-making process. The game helped participants to learn their way around obstacles in the collaborative processes of reaching

agreements and building relationships and coalitions, which are useful skills for building partnerships for risk reduction.

#### 9. Feedback and Closing Session

During the feedback and closing session, participants indicated their appreciation for the coherency of the workshop program and the exceptional collective experience and the mix of backgrounds of the panelists. For many, the opportunity to participate and interact with such a varied audience of academicians, practitioners, policy makers, and representatives from inter-governmental and non-governmental organizations in an open and friendly environment was seen as a rare experience, and a critical function in bridging the gap between stakeholders. This goal is real and hinders the effectiveness of vulnerability reduction efforts at all levels. The RIMSIM simulation game was appreciated as a way for team building, but also as a test for understanding the trade-offs and constraints that could result from post-disaster conflicts. The goal of converging the different and varied interests into a common advocacy agenda was pronounced as an important achievement of the meeting. Another achievement pertains to the development of a common language and the identification of focus points. However, it was recognized that an important factor in impacting future results resides in the collective ability to build effective coalitions that spread both geographically and across disciplines. Specific recommendations for improving future meetings included a greater participation from international institutions such as UN organizations, international and regional development and humanitarian agencies, and cities networks such as Metropolis and IULA. Attendees also wished for greater time allocation to questions and discussion. The organizers mentioned that several other UN and international organizations were invited but did not send representatives.

#### 10. Cluster Cities Meeting

The third Cluster Cities Project meeting was held on the day following the Workshop. With the entry of three new cities this year (Mumbai, Kathmandu, and Dhaka), there are now about 18 cities that are full partners in the project and two additional cities (Algiers and Beijing) are at the stage of entry into the project. A new Asian Cluster has been created (Dhaka, Kathmandu, Mumbai, and Tashkent, with the possible addition of Beijing). While the initial idea was of “Twin Cities,” clusters of three or more cities have generally proven more sustainable through changes in local administrations. The idea of the project is for EMI to facilitate networking, to put people in contact and create opportunities for partnerships; there is no blueprint for what follows. The clusters develop their own programs of what is of interest to them; EMI facilitates that process and the sharing of these experiences with other cities. The key objective is to bridge the gap of communication and the gap of knowledge that currently hinder vulnerability reduction efforts.

EMI was created to work in an inter-disciplinary manner, bringing together policy-makers and academic expertise and promoting the application of scientific and technical knowledge. The long-time goal is to implement best practices in cities. Experience has shown that the Cluster Cities meetings serve as an effective catalyst for enhancing collaboration within the host cities and as a mechanism for promoting change. An additional stakeholder group that should be involved more in the future is professional organizations. Also, an important strategy for “cross-cultural” learning would be to place science students as interns in governmental offices so that they can learn how to impact political processes. It is also part of the continuous effort to strengthen partnerships and coalitions.

Coordinators of each cluster cities group gave an update on the activities of their groups for the last two years. The discussion and questions and answers sessions gave the opportunity for the participants to exchange experiences and for the EMI coordinators to receive feedback and suggestions on the project.

Two collaborative projects revolving around the cluster cities are currently in the planning phase. The first involves the cities and academic partners in the Americas Cluster (Bogota, Los Angeles, Mexico City, and Quito); with a linkage to the East Asian cluster in the city of Kobe, Japan. It is being coordinated by Prof.

Louise Comfort at the University of Pittsburgh. The second is under development by an inter-disciplinary team of researchers and practitioners representing cities and academic institutions primarily in Asia.

The Municipality of Naples, a key, active participant in the Euro-Mediterranean Cluster, has initiated discussions with EMI regarding hosting the Fourth International Workshop on Earthquakes and Megacities tentatively to be held in 2005.