

## WORLD SEISMIC SAFETY INITIATIVE An IAEE UNDERTAKING

### “A Dream, a Challenge, and a Time for Action”

#### SUMMARY

*This article is based on a report from the International Association for Earthquake Engineering (IAEE)<sup>1</sup> on the establishment of a World Seismic Safety Initiative as part of the International Decade for Natural Hazard Reduction set up by the United Nations. After describing the organisation of the WSSI, the report goes on to outline some of the projects currently under way and describes two in greater detail. These are the Workshops held earlier this year in Bangkok and Okinawa. Future plans are also outlined.*

#### BACKGROUND

The International Decade for Natural Disaster Reduction (IDNDR) was originally conceived in San Francisco in 1984. It was during the Opening Ceremony of the 8th World Conference on Earthquake Engineering that Frank Press, President of the US National Academy of Sciences, addressed some 1,500 researchers and practitioners of earthquake engineering:

*"I would like to make a proposal to you on this occasion to establish an International Decade of Hazard Reduction. This special initiative would see all nations joining forces to reduce the consequences of natural hazards. What better way to start the new millennium than a world better organized to reduce suffering."*

In response to the above challenge, the United Nations General Assembly on December 1, 1987 approved resolution 42/169 and voted to designate the 1990s as the International Decade for Natural Disaster Reduction. By creating IDNDR, the United Nations has recognized that natural disasters are an international concern, a part of life that must be planned for and prepared for by those in areas at risk.

The International Association for Earthquake Engineering (IAEE) is an unaffiliated but definitive international society, with 39 member countries, in the field of earthquake engineering. IAEE is very visible through the World Conferences on Earthquake Engineering (WCEE). The first conference was held in 1956 and the most recent one in Madrid in July, 1992. The Madrid conference attracted 2,000 participants and 1,500 technical papers.

In Madrid, IAEE made an important decision to be more proactive and strongly involved with IDNDR. A document titled "A Time for Action: World Seismic Safety Initiative"

was distributed (see Reference 1) as a discussion item to delegates who attended the Madrid conference. After careful evaluation of its resources and its responsibilities, IAEE decided to establish the World Seismic Safety Initiative (WSSI), a long-term international cooperative scheme that will advance and spread earthquake engineering knowledge worldwide. After taking into account the inputs given at the Madrid conference, a revised document with the same title as Reference 1 was published by IAEE. WSSI has three goals:

- Disseminate state-of-the-art earthquake engineering information throughout the world.
- Incorporate experience and research findings into recommended practices and codes in earthquake-prone countries.
- Advance engineering knowledge through problem-focused research.

WSSI will make the best engineering knowledge in the world available to every engineer on the globe. Through seminars, data banks, newsletters, translations, etc., WSSI will give engineers everywhere the knowledge they need to design and build safe buildings<sup>2</sup>.

WSSI was endorsed by the delegates to the Tenth World Conference on Earthquake Engineering in Madrid, Spain, in July, 1992. Delegates pledged to support, participate in, and enlist their countries' participation in WSSI activities. As WSSI starts implementing its projects, they and other

<sup>2</sup> The term building is used in a general sense and includes not only buildings, but all the structures in a community - pipelines, towers, industrial facilities, highways, power poles, and bridges, to name a few. It also includes engineered structures and traditional (non-engineered) construction.

<sup>1</sup> Haresh C. Shah, Stanford University and Tsuneo Katayama, University of Tokyo, CoChair, WSSI Interim Organising Committee

engineers worldwide will form the backbone of this unprecedented global effort whose end result will be better engineering practice and safer buildings.

WSSI is a not-for-profit legal entity. It is governed by the Board of Directors, who are appointed to a one-year to three-year term by the Executive Committee of IAEE. As of July, 1993, WSSI is managed by the WSSI Interim Organizing Committee (WIOC) made up of eight members and two liaison members from IAEE. As a result of its deliberations and discussions, WIOC has made some concrete and definitive decisions. It has recommended to the Executive Committee of IAEE that the size of the Board of WSSI should be fixed at ten at this time, with the Executive Director of IAEE as an additional voting ex officio member. Currently (mid July, 1993), the Executive Committee of IAEE is in the process of appointing the ten individuals to the Board of WSSI. Besides the above recommendation given by WIOC, they took some much needed and practical actions. A summary of those decisions and actions follows:

- Build WSSI from regional bases, developing one region at a time. This will facilitate development of shared hazard information, and will strengthen existing communication and resource networks.
- Develop a decentralized organizational structure. Thus, for each WSSI region, a regional director will be appointed. Such a decentralization will avoid potential "political" and cultural" problems. It also opens up opportunities for new leadership and reduces dependency on one central managing director.

- Keep WSSI organization lean and simple. Only add additional layers of organizational structure if absolutely needed for smooth functioning of WSSI.
- Explore if each regional centre can be a separate legal entity. Such a structure could help in taking advantage of special regional funding opportunities.

The following chart (Figure 1) gives an idea of the proposed organizational structure of WSSI. To get WSSI approval and sponsorship of a project, a project proposal may be prepared by any interested party or individual. The submitted proposal will be reviewed and selected for sponsorship (with or without funding) based on its quality and whether it contributes to the overall WSSI goals. WSSI Board or its designated group will be the reviewing body for the proposal. A Working Group (WG) will be formed for the approved projects. WGs are the backbones of WSSI.

WIOC realizes that there will be many hurdles on the road before WSSI is functioning smoothly. However, there is no way to turn back. A concerted drive towards achieving the goals of WSSI and IDNDR will be needed. It is sincerely believed that WSSI will certainly help in mitigating the disastrous effects of future earthquakes. To make this dream a reality, support from individuals and organizations from around the world will be most crucial. It is hoped that such a commitment will be forthcoming. Earthquakes will not respect words and organizational charts. Earthquakes will respect actions. **IT IS TIME TO ACT NOW.**

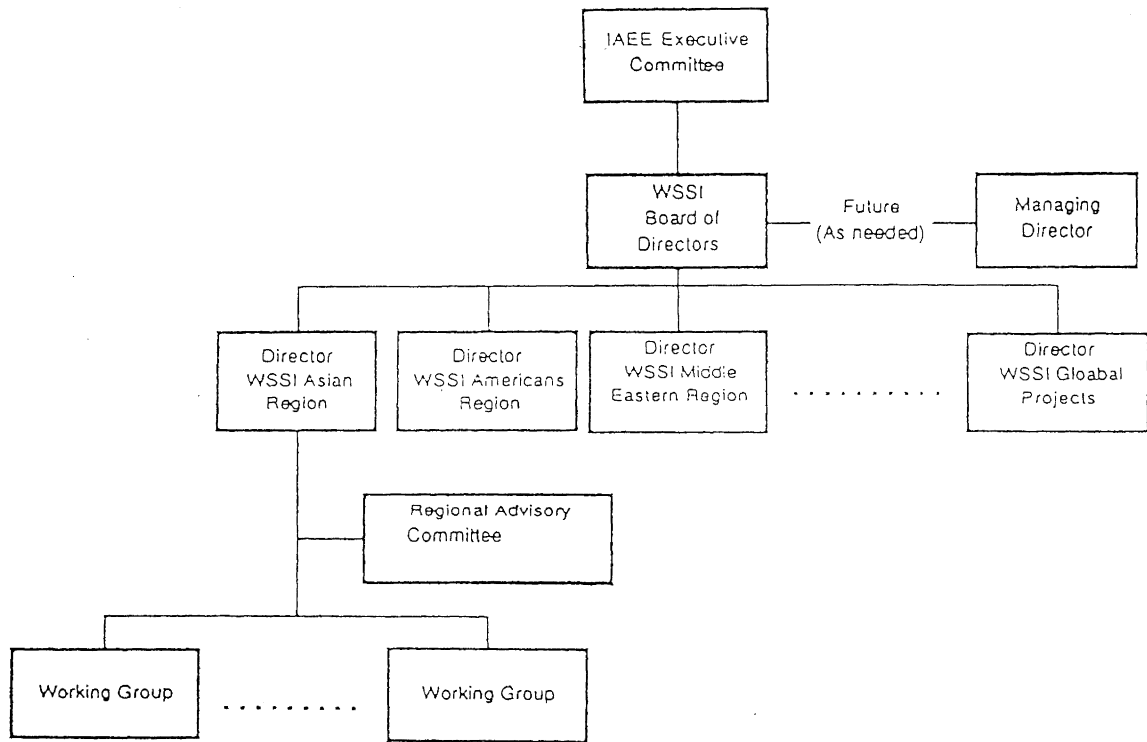


Figure 1 WSSI Organizational Structure (As revised at the WIOC Meeting in Bangkok in February, 1993)

In the next section, the various projects already initiated will be described. The section after that will describe the future plans and projects that have been already under active development. Resource needs will also be alluded to in this section. The final section will include concluding remarks.

### INITIATED PROJECTS

True to the spirit that the time to act is now, WSSI initiated various activities and projects soon after the Madrid conference. In this section we will describe the purpose, scope, and plan of action of the projects that have been initiated. It should be pointed out that most projects will last through this decade. Hence in this section only those projects which have been initiated and are currently under way are mentioned.

The very first task in front of WSSI and its WIOC was to make sure that the UN Secretariat responsible for IDNDR activities was aware of WSSI goals, objectives and plans. The UN has established three organizations for implementing the goals of IDNDR. They are the IDNDR Secretariat in Geneva, the Special High Level Council (SHC), and the Scientific and Technical Committee (STC). The Secretariat is now staffed by 16 people from all over the world. SHC was formed to act as a fund raising agency. It should be noted that the UN had made it clear at the initiation of the Decade that the activities related to IDNDR should be performed on extra-budgetary basis. The role of STC is to give the general guidelines to IDNDR from the experts' point of view. STC consists of 25 specialists in various fields of natural disaster sciences taking into account their geographical distribution.

The fourth Session of STC was held during February 1-5, 1993, by the invitation of the Government of India in New Delhi. IAEE was invited to present its new undertaking, WSSI. Prof. Shah and Prof. Katayama attended the STC Session as the co-chairmen of WIOC.

WSSI was presented to STC on the second day of the Session (February 2, 1993). Our presentation and plans were generally well received by the STC members, representatives of national organizations and focal points, and of international scientific organizations. There were some concerns expressed mainly about WSSI's budgetary plans. It was also mentioned that the IAEE's proposal was not included in the original list of 25 demonstration projects approved during the Second Session of STC. This was understandable since the concept of WSSI was not developed at the time the Second Session of STC was held. Based on the material provided to the IDNDR Secretariat, the WSSI project was approved by the IDNDR Secretariat as an International and Regional IDNDR project. This endorsement was made under the guidance of members of the subcommittee for IDNDR Project which was set up in the STC session in New Delhi.

Having accomplished the task of informing the IDNDR Secretariat about WSSI, WIOC has embarked upon two major projects and has approved co-sponsorship for two other projects. Projects that will be initiated after July, 1993 will be described in the next section. The following is a list of already initiated projects:

- Workshop on "Seismic Risk Management for the Countries of Asia Pacific Region". The workshop was held in Bangkok between February 8-11, 1993.
- Workshop on "Towards Natural Disaster Reduction. The venue was Okinawa and the dates for the workshop were June 28-30, 1993.
- Assist Malaysia, Singapore, and Indonesia develop their own intellectual and financial resources in assessing the level of seismic risk in their countries and to develop strategies to mitigate those risk levels.
- Endorse the project submitted by Dr. Brian Tucker about Quito. This project will develop seismic intensity distribution maps and estimation of the seismic effects for the City of Quito, Ecuador. Dr. Tucker's project will be considered as a WSSI Working Group activity.
- The proposal "Seismic Protection of Cultural Properties" described by Dr. Charles Thiel, and potentially to be supported by the Getty Conservation Institute was endorsed. Dr. Thiel was encouraged to pursue it as a WSSI project.
- Initiate discussions with the Emergency Management Agency of Australia (EMA) to develop a comprehensive plan for mitigating seismic risk (including tsunami risk) for the island nations of the Southwest Pacific Ocean. This will be further elaborated on in the next session.
- Initiate discussions with the Natural Disaster Prevention Centre of Iran to hold a WSSI-sponsored workshop on "Seismic Risk Management for the Countries in the Middle East". This regional group will also include countries from Central Asia.
- Initiate discussions with Prof. Grandori and Prof. Petrini of the Milan Polytechnic Institute to hold a WSSI-sponsored workshop in Europe. The focus of this workshop would be to assess the levels of interest and expertise that exist in the "donor countries" to work with the developing countries. The goal would be to match the needs worldwide with the available resources existing currently in Europe.

The first two projects described above will be elaborated here. The program of those workshops and the accomplishments will be described below.

#### 1. Bangkok Workshop

The "Workshop on Seismic Risk Management for Countries of the Asia Pacific Region" was held at the Pinehurst Resort near the Asian Institute of Technology (AIT) in Bangkok, Thailand, from February 8-11, 1993. Bangkok was selected as the venue because of geographical advantage and budgetary constraints. Dr. Satyendra P. Gupta, Senior Consultant of the Asian Disaster Preparedness Centre (ADPC) at AIT, kindly agreed to take care of local arrangements and organization. Funds for its conduct were provided by the California Universities for Research in Earthquake Engineering (CUREe), Japan Association for Building Research Promotion (KKSK) and the International Centre for Disaster Mitigation Engineering (INCEDE).

The workshop was the first event of the WSSI. It was attended by 30 participants from 19 countries, a majority of them from the Asia Pacific region. Countries represented were: Australia, Bangladesh, Brunei, India, Indonesia, Iran, Italy, Japan, Malaysia, Mexico, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Taiwan, Thailand, USA, and Vietnam. Each participant was asked to report on the state-of-the-art of earthquake engineering in his/her country.

Participants also commented on how the available knowledge was used (or not used) in developing earthquake disaster mitigation strategies.

In spite of the short notice given to each country representative, it came as a pleasant surprise to the organizers that extremely well thought out and well prepared reports were presented. Proceedings of the workshop will be published by WSSI in Autumn of 1993. Discussions were lively and the following specific actions to be followed by WSSI were decided:

1. WSSI should help to raise public and government awareness of earthquake risk in the participating countries. Towards this objective, the importance of holding High Level Meeting (HLM) in each of the participating countries was recognized. HLM in a given country would include WSSI representatives, government officials, business leaders, people from social and cultural institutions, banking/insurance industries, and mass media. It was decided to hold at least two HLMs during 1993; one in Nepal and one in Bangladesh. It was also decided to organize a course on non-engineered structures. Individuals from the countries of the Asia Pacific region will be invited to attend this course. The course will be held in late 1993 in India. To raise public awareness, it was decided to develop a brochure about earthquakes and what citizens can do to protect themselves and their property. Any other written or video information on earthquakes should be collected and shared by all the countries of the region.
2. WSSI should help in creating a local information network. Towards this objective, it was decided to form the "WSSI Asian Resource Network (WARN)" amongst the participating countries of the Asia Pacific region. Participants from Taiwan were asked to take the lead in this task and they very graciously and willingly accepted the challenge. WARN will publish quarterly newsletters from Taiwan and distribute them to all the interested private, public, and governmental institutions of the region.
3. WSSI should be a catalyst for action in earthquake risk management, education, and awareness. Towards this end, it was decided that a workshop similar to the Bangkok workshop will be held in Iran. Countries of the Middle East will be invited to participate.
4. WSSI will publish the proceedings containing all the country reports presented at the workshop.

It should be pointed out that as a result of the Bangkok meeting, a project titled "An Evaluation of Guidelines for Developing Earthquake Damage Scenarios for Urban Areas", co-sponsored by NATO and the Office of U.S. Foreign Disaster Assistance (OFDA) will be organized by Dr. Brian Tucker. There is a possibility that a project similar to the Quito project will also be initiated by him in Nepal.

In summary, the first action of WSSI in sponsoring the Bangkok workshop was a great success. There are several reasons for its success. The size of the participant pool was optimal, workshop goals were modest and focused, the venue was ideal, and participants themselves were enthusiastic and committed. The accomplishments in Bangkok have indicated to WSSI that the regional approach is the correct approach in implementing WSSI plans.

## 2. Okinawa Workshop

The Okinawa workshop titled "Towards Natural Disaster Reduction" was organized by the Pacific Science Association (PSA) as part of the VII Pacific Science Inter-Congress. PSA formed a task force called the PSA Task Force on Natural Disaster Reduction and this task force was in charge of the workshop. WSSI provided cosponsorship as well as substantial technical and organizational expertise. The United Nations University in Tokyo under the leadership of Dr. R. Fuchs and Dr. Uitto provided invaluable technical, organizational, and financial support.

The workshop was a forum for discussing and exploring an integrated look at multihazard, multidisciplinary approach to disaster mitigation. Engineers, scientists, geographers, social scientists, economists, and organizational experts attended and participated in the discussions. The goal of the workshop was to highlight the advantages of synergistic, integrated, multidisciplinary strategies to mitigate not only earthquake risks but all natural disaster risks. The workshop was a great success in moving towards this objective. The benefits of such an approach were pointed out repeatedly through case studies and through anecdotes. The following salient points emerged during the workshop:

- Integration, both as a multihazard approach and multidisciplinary approach, has considerable value. This should be encouraged and supported.
- International cooperation is very valuable. In this "global village", it is important that cross cultural, cross resources, and across national efforts are pursued. International cooperation and local regional focus are not contradictory, they are complementary.
- Communication between knowledge generators and knowledge users is essential. All avenues and opportunities must be explored. The role of the mass media is important. We must increase our effectiveness in reaching the public.
- Insurance and its role in mitigating natural disasters received considerable attention. It was felt that this strategy (including reinsurance, mortgage market, real estate bonds, etc.) may provide a longer term strategy for influencing development behaviour by introducing meaningful economic incentives to mitigate risk.
- Hazard management issues were discussed. Causes of the current crisis in disaster and hazard management were pointed out. It was felt that participatory management is better than central, top-down management.
- Modern technology such as remote sensing, GIS, etc., are of great value to managing natural disaster risks.

The above observations are very important for developing a plan of action for WSSI. The cross disciplinary aspects of the Okinawa observations will be utilized in developing future regional projects by WSSI. The Okinawa workshop ended with the set of resolutions given below.

RESOLUTION 1. Resolve that the Task Force on Natural Disasters create three Working Groups (WGs) as follows:

- WG 1. Interdisciplinary and multihazard research agenda for the next 7 years; Risa Palm, Chair.
- WG 2. Mortality and impact data for multihazards in the Pacific Region; S. Herath, Chair.
- WG 3. Joint working group with the task force on Global Environmental Change, on assessing causes of decreasing fatalities due to tropical

storms in the Pacific Region; Liaison Member, A. W. Jayawardena.

**RESOLUTION 2.** Request that the Pacific Science Association encourage its national delegates to make Natural Disaster Reduction a priority consideration in all of their scientific and technical activities during IDNDR.

**RESOLUTION 3.** The Task Force on Natural Hazard Reduction will prepare a monograph titled "Towards Natural Disaster Reduction" based on an agreed upon outline and input from all the attendees.

**RESOLUTION 4.** Hold the next Task Force meeting during the Pacific Science Association meeting in Beijing in June 1995.

These resolutions are very relevant to the future development and success of WSSI.

The above activities of WSSI are essentially planned and organized by WIOC. As soon as the permanent Board of WSSI is appointed by the Executive Committee of IAEE, the tempo of activities will certainly increase. The main task of organizing the projects, getting resources (both intellectual and monetary), and implementing the plans will call for Herculean efforts. However, we believe that WSSI is off to a wonderful start. The initial momentum it has acquired will certainly help in taking WSSI's efforts to a higher level of success.

#### FUTURE PLANS

Various future projects are already under active development and discussions with relevant bodies around the world. In this section we will elaborate on some of those plans.

In the initial phases of WSSI's contributions, WIOC has decided to concentrate on technology transfer to not only engineers and professionals but also to the public at large and to individuals such as masons, carpenters, and other semi-professional people. Also it is important to communicate with agencies that are involved with disaster mitigation planning. With this point in mind, the following specific projects are under development:

1. In partnership with the Emergency Management Agency of Australia (EMA), WSSI will organize a workshop for emergency management and technical professionals. This workshop will be held in South West Pacific, possibly in Fiji. The timing will be the summer of 1994. The goals of the workshop will be:
  - Increase the awareness of not only hazards but of the effectiveness of mitigation strategies.
  - Provide the attendees with the recognition of the benefits of cooperative efforts.
  - Make participating countries accept ownership for the solution of disaster reduction problems.
  - Develop a plan for required cooperation through networking, data base development, communication, and resource development.

WSSI will take the lead on earthquake and tsunami-related problems. Possible attendees for this workshop will be decision makers in government and private enterprises (such as insurance, banking, etc.) who

are involved with disaster mitigation strategies and plans. Local technical experts will also be included. Experts from New Zealand, Australia, and WSSI facilitators will also be present. It is expected that about 25 participants will attend.

2. With the success of the Bangkok workshop and the experience gained from it, it is felt that a few similar regional workshops must be conducted. Towards that end, two future regions have been targeted by WSSI. The first one is the Middle East and the Central Asian region, and the second one is the Central/ South American region. With this to mind, WSSI has initiated discussions with the Natural Disaster Prevention Centre of Iran to hold a workshop similar in format, goals, and size as the Bangkok workshop. It is expected that such an effort will provide tremendous benefits to many nations in that part of the world. It will help them create a local network, focus on the extent of seismic risk, develop cost effective mitigation strategies which are consistent with the economic, social, and political climate of the region. Improvement of awareness with the public and government about the extent of the problem and the benefits of implementing mitigation strategies will be the central goal. Similar efforts are currently under discussion with the Mexican National Centre for the Prevention of Disasters. It is expected that a workshop will be held in 1994 in either Central or South America.
3. One of the biggest discontinuities in knowledge transfer is the one between donor countries and the technology receiving countries. To address this very important discontinuity, WSSI plans to hold a workshop in Milan, Italy. Prof. Grandori and Prof. Petrini of Milan Polytechnic Institute have been contacted and persuaded to organize such a workshop. The goal of that workshop will be to match the resources and the needs in the seismic mitigation and risk management fields. If we can identify the intellectual and monetary resources available in Western Europe and identify the intellectual and financial needs to implement earthquake disaster mitigation strategies in Eastern European, North African, Asian, and Central/ South American countries, then we have some opportunity and hope of making a difference through matching and networking. This will be the goal of WSSI for that workshop. It is expected that the Milan workshop will be held sometime in late 1993 or early 1994.
4. Based on the recommendations of the Bangkok workshop, the following WSSI projects are in the final stages of organization:
  - Course of Earthquake Resistant Non-Engineered Buildings. This course will be organized by Prof. A. S. Arya of Roorkee University, India, and by Dr. H. Gupta, Director of the National Geophysical Research Institute (NGRI), India. The course will be held either in November 1993 or in February 1994 at NGRI, Hyderabad, India. Participants from South East Asian countries will be invited. The course will be one week in duration. Many housing units in that part of the world are not engineered. The course will provide the needed know-how to participants as to how earthquake resistance of non-engineered structures can be improved.

- A series of High Level Meetings (HLMs) will be held in late 1993 in Nepal, Bangladesh, Malaysia, Singapore, and Indonesia. The purpose and goals of such HLMs were described earlier.
- It is expected that WSSI will aggressively work with Indonesia, Singapore, and Malaysia in increasing earthquake awareness. Many cities in this region are going through phenomenal growth. There is explosive increase in urbanization. Many cities are situated on poor soils and are far from the seismic sources (but close enough to feel long period motions). Thus, tall buildings have considerable vulnerability. WSSI plans to conduct a series of courses in these countries to improve technical as well as administrative awareness.

Finally, the greatest task facing WSSI is to generate resources - both monetary and personnel. It is expected that the WSSI Board, once appointed, will spend considerable time and effort on this task. It is important that goals, objectives, dreams, and plans of WSSI are distributed as widely as is practical.

Various institutions around the world must know about WSSI. This will be one of the most important and immediate tasks facing WSSI.

#### CONCLUDING REMARKS

WSSI was established by IAEE not as another paper organization. It was started with a genuine and sincere conviction that it can make a difference. WSSI shares that conviction. It has started towards that path with intensity and energy. WSSI has started developing and implementing projects worldwide.

The greatest challenge WSSI faces is the availability of resources, both intellectual and financial. We are convinced that there is sufficient voluntary intellectual energy available to WSSI to share in attaining the goals and dreams it has outlined. We urge and request all private, public, and governmental national and international organizations to work with WSSI and to help WSSI towards mitigating earthquake disasters. We believe that the goals laid out by WSSI are achievable. We must move ahead; there is no turning back. *The time to talk is over, the time to act is now.*

#### REFERENCES

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