

# **1. Outline of the International Institute of Seismology and Earthquake Engineering**

## **1-1 Outline of the Training Program**

The International Institute of Seismology and Earthquake Engineering (IISEE) of the Building Research Institute (BRI), one of the Incorporated Administrative Agencies in Japan in cooperation with the Japan International Cooperation Agency (JICA), has provided training courses in seismology, earthquake engineering and tsunami disaster mitigation to researchers and engineers from developing countries with an aim to mitigate earthquake disasters. Currently, there are four training programs, namely: Annual Training Course in Seismology, Earthquake Engineering and Tsunami Disaster Mitigation, China Seismic Building Course (one of the Seminar Courses), Global Seismological Observation Course, and Individual Course.

The number of participants who completed the training has reached 1,653 from 99 countries as of September 2014 and the IISEE training programs have been highly regarded both within Japan and around the world.

The Second World Conference on Earthquake Engineering was held in Tokyo in 1960 and a need for training in earthquake engineering for young researchers and engineers from developing countries who studied seismology and earthquake engineering was discussed and then recognized. In response to this, the first International Training in Seismology and Earthquake Engineering, which consisted of a Seismology Course and an Earthquake Engineering Course, was carried out at the University of Tokyo later that year. The results of the training were widely praised by the international community, and the Government of Japan established the IISEE at the BRI of the Ministry of Construction (the present Ministry of Land, Infrastructure, Transport and Tourism) after the discussion in ministries concerned in order to maintain these training courses. The former half of the second training course was held at Waseda University in 1961, with the IISEE taking over for the latter half.

From 1963 to 1972, UNESCO (United Nations Educational, Scientific and Cultural Organization) has joined the programs and offered the funds. Since then, the IISEE has continued to revise its curriculum according to requests from developing countries and in response to the advancement of academics and technology.

### **1-1-1 Annual Training Course in Seismology, Earthquake Engineering and Tsunami Disaster Mitigation (from 1960 onwards)**

#### **1) Seismology Course**

This one-year training course aims to provide advanced knowledge and

technology concerning earthquakes and seismic hazards to training participants who are invited from the organizations responsible for seismic observation and earthquake disaster mitigation in their respective countries. It is also designed to help participants utilize this knowledge and technology for seismic hazard/risk evaluation and earthquake disaster mitigation policy-making in their native countries. The IISEE incorporates fast-evolving seismological knowledge and seismic observation technology into programs without delay, and is willing to provide not only classroom lectures but also practical exercises and field study tours, as well as participation in international conferences.

## 2) Earthquake Engineering Course

As the Seismology Course, this one-year training course provides training to participants who mainly consist of researchers, engineers and administrative officials, centered on young personnel working in governmental organizations, universities and other institutions in their respective countries. The training is provided with a view to mitigate structural damage caused by earthquakes, thus reducing human damage in developing countries. The curriculum comprises basic earthquake engineering studies such as structural analysis and structural dynamics, various earthquake resistant structures such as reinforced concrete and steel structures, as well as the latest technology such as seismic isolation and response control technique and seismic limit state design. All of these are systematically provided through lectures, practical exercises and field study tours, enabling participants to solve problems in their respective countries.

## 3) Tsunami Disaster Mitigation Course

This one-year training course was launched in 2006-2007 training period. The gigantic tsunami that was generated by the 2004 Sumatra-Andaman Islands Earthquake wreaked havoc on the coastal regions of the Indian Ocean.

To mitigate such tsunami disasters, it is necessary to take disaster mitigation measures based on the latest information regarding earthquakes and tsunamis. This course provides advanced knowledge and technology related to earthquakes and tsunamis, with the aim to train participants with a high level of ability to apply and disseminate their acquired knowledge and techniques for tsunami disaster mitigation such as tsunami hazard evaluation and early-warning systems in their respective countries.

### **1-1-2 China Seismic Building Course (from 2009 onwards)**

On 12 May 2008, a magnitude 7.9 earthquake in Wenchuan, Sichuan Province in the

People's Republic of China caused extensive damage, leaving 69,185 dead, 374,171 injured, 18,404 missing and 23.143 million households damaged, including the collapse of 6.525 million houses. The BRI launched its China Seismic Building Course in October 2009 as part of the "Human Resource Development Project on Earthquake-resistant Structure", carried out by JICA as a supportive measure for the post-earthquake reconstruction in China. This course is set to be offered for four years, with approximately 20 participants each year. After completing the training, engineers are expected to introduce and disseminate the acquired technologies in China.

Short-term training courses focusing on specific themes such as this have been carried out since 1980. These are generically referred to as "Seismology and Earthquake Engineering Seminar Course".

### **1-1-3 Global Seismological Observation Course (from 1995 onwards)**

Efforts are made to put the Comprehensive Nuclear-Test-Ban Treaty (CTBT) into effect in and out of Japan. In parallel with this, the International Monitoring System (IMS) for CTBT-compliance verification is being developed. Monitoring technique using seismological observation technology is a pillar of the IMS' essential activities.

At the request of the Ministry of Foreign Affairs of Japan, the IISEE launched a the Global Seismological Observation Course in 1995 in cooperation with the Japan Meteorological Agency and JICA as a part of Japan's contribution to nuclear disarmament. The training is provided to develop human resources who can play an important role in the CTBT system and IMS by acquiring the skills necessary for detecting nuclear tests through seismological observation technology as well as the data analysis techniques required for identifying nuclear tests.

### **1-1-4 Latin American Earthquake Engineering Course (from 2014 onwards)**

Latin America, one of the earthquake prone regions, has been severely devastated by strong jolting many times during its history, lagging behind in dissemination of earthquake resistant structural technology.

BRI has been collaborating on the JICA technical cooperation projects and carrying out the field of earthquake engineering in Mexico, Peru, Chile, El Salvador, Nicaragua, etc. Furthermore, many training participants from other Latin American countries have studied in IISEE, too. However, due to the Japanese ODA (Official Development Assistance) budget policy after the Great East Japan Earthquake Disaster, the emphasis lies on capacity building rather than conventional technical cooperation projects in Latin American countries. Considering these circumstances and their

common language in Latin America, IISEE/BRI has decided to propose to JICA for a new short period training course on earthquake engineering. The training is conducted in Spanish. JICA approved the proposal and it was held in June and July, 2014.

14 participants from 4 countries participated in the course.

### **1-2 Master's Degree**

Through a partnership with the National Graduate Institute for Policy Studies (GRIPS), part of the lectures of the Annual Training Course in Seismology and Earthquake Engineering started in October 2005 has been certified as the GRIPS lectures. This enables each training participant to obtain a master's degree (Master of Disaster Mitigation, afterwards Master of Disaster Management) certified by GRIPS and BRI by taking a master's degree program run by GRIPS and if the required credits are obtained. In September 2006, all 19 participants became the first holders of the master's degrees under the new system. The Tsunami Disaster Mitigation Course, launched in 2006, is also run as a master's degree program. With degrees, participants are now able to ensure and enrich the foundations for their activities as experts in seismology, earthquake engineering and tsunami disaster mitigation after they return to their countries.

### **1-3 Organization**

The training is carried out under the International Institute of Seismology and Earthquake Engineering (IISEE), the Building Research Institute (BRI) headed by the Chief Executive of BRI and the Director of IISEE (Figure 1). Instruction is given by IISEE staff, however, as a wide range of academic fields is not covered by only the staff, leading lecturers from national universities and other educational and research institutions are also invited to assist the staff. Participants are enrolled on courses through the JICA.

BRI, originally a national research institute, was reorganized as an incorporated administrative agency by Japan's administrative reform on 1<sup>st</sup> April 2001. On this occasion, based on the outcome of previous training activities, training contents were further developed and improved, and the IISEE was renamed in Japanese (English name is same as before.) from "Department" to "Center" to broaden our horizons of international cooperation. Accordingly, the "Expert Committee for International Training in Seismology and Earthquake Engineering", "Council for International Training in Seismology and Earthquake Engineering" and "Curriculum Council" were reformed as the "Dissemination Council for International Training in Seismology and

Earthquake Engineering” that aims to give advice on the training and the dissemination of knowledge and technology in seismology and earthquake engineering. Under the umbrella of the Council, the “Curriculum Committee” (Figure 2) was constituted to obtain valuable advices for the implementation of training.

## **2. Development of Training Activities**

### **2-1 Seismology Course**

#### **2-1-1 Change in Demand for the Training and its Reflection in the Curriculum**

According to the international situation, economic conditions, furthermore the devastating earthquakes and occurrence of earthquake-related disasters in the 21st century, the trend of the demands for the IISEE has been changed. For instance, countries in Central Asia and Caucasus, which are on the way to emerge from their political and economic confusion caused by the collapse of the Soviet Union after the end of the Cold War, are eager to switch from previous academic and technological systems to those of western countries. By receiving benefit of world economic globalization, the attention to earthquake disaster mitigation is being developed in least developed countries such as Bangladesh, Myanmar, etc., which previously placed a great importance only on the basic human needs such as food production increase, etc., and the demands for the IISEE training have been risen in those countries. Besides, Chile, Mexico and other so-called medium-developed countries have already grown to be international joint research partners owing to the efforts for the Japan's past technology transfer. On the other hand, Malaysia and Sri Lanka started sending participants to the training course although they do not have damaging earthquakes in their own countries, the turning point of which was the 2004 Gigantic Tsunami in Indian Ocean. In addition to these countries, Turkey, China and others keep on sending participants for the capacity development of young core researchers of their seismology-related research institutions. (Table 2-1).

The epoch making advances of seismology in recent ten years are dissemination of digital seismological observation equipments, especially broadband seismographs in the developing countries, and establishment of distribution of digital data between researchers by using those devices. Besides, as the attention to earthquake hazard arises, the number of demand for training personnel who cover or will cover seismic micro-zonation which divides big cities, especially the capitals in finer ground classification grids and evaluates amplification characteristics for every grid, in addition to the seismic macro-zonation which divides a country into few blocks according to the probability of occurrence of ground shaking in seismological observation and/or research institutions has been increasing.

The above mentioned change of demand has been reflected to the selection of the candidate countries through the survey of JICA and also to the improvement of curricula.

The Strong Motion & Earthquake Hazard (SH) Sub-course started in 1999, which

was an approach from the viewpoint of seismology to the interdisciplinary field between seismology and earthquake engineering, was merged with Seismology (SS) Course in 2004 at the occasion of JICA training course review and became a new Seismology Course. Simultaneously, the subject of disaster policy management such as project cycle management workshop, etc. was introduced. From this year, the training course was ruled to start in October. Also, after the JICA training course review, the course as a JICA group training was named “Seismology and Earthquake Engineering and Disaster Mitigation Engineering.”

In 2005, in cooperation with GRIPS, the part of the training subjects was certified as the subject of GRIPS. Disaster Mitigation Policy by Prof. Morichi and Disaster Mitigation Plan and Urban Planning and Public Infrastructure Development by Prof. Okazaki were included in the curriculum. Those lectures were carried out by GRIPS professors. After the completion of the one year training, the participants can be awarded the Master’s degrees named Disaster Management certified by GRIPS and IISEE/BRI.

After 2006, the number of the lecture days was gradually decreased and self-study days with supervisors’ guidance were increased, and then participants can reserve the time in preparation for individual studies.

On November 2008, all Seismology Course participants joined the general assembly of the Asian Seismological Society held in Tsukuba, Ibaraki prefecture, co-hosted by the Seismological Society of Japan and BRI.

By the 2008 JICA training course review, the course was named “Seismology, Earthquake Engineering and Disaster Mitigation Policy,” and the curricula was reorganized to be oriented towards individual studies to lighten the participants’ overload. Additionally, we opened the contents of the individual studies at the stage of recruiting participants. We also set up the yearly seminars and carried out the guidance towards individual studies by each adviser at the beginning of the training explicitly.

In 2011, the study tour to the damaged area of tsunami and liquefaction by the 2011 off the Pacific coast of Tohoku Earthquake was carried out.

On February 2012, all the participants joined the international symposium on sustainable reconstruction from super earthquake disaster co-hosted by GRIPS and IISEE/BRI. By the JICA training course review, the course was renamed “Seismology, Earthquake Engineering and Disaster-Recovery Management Policy & Tsunami Disaster Mitigation.” We are now forwarding the study and analysis on case studies of recovery from the recent earthquake damage such as the aforementioned 2011 off the

Pacific coast of Tohoku Earthquake to include the curricula.

Table 2-1. Number of participants and countries by regions.

Regions	Number of Countries	Percentage of participants
East Asia	7	31 (29.2%)
South Asia	5	24 (22.6%)
Central Asia & Caucasus	6	9 (8.5%)
Middle East	4	13(12.3%)
Africa	6	9 (8.5%)
Latin America	8	14 (13.2%)
Oceania	3	4 (3.8%)
Europe	2	2 (1.9%)
<b>Total</b>	<b>41</b>	<b>106 (100%)</b>

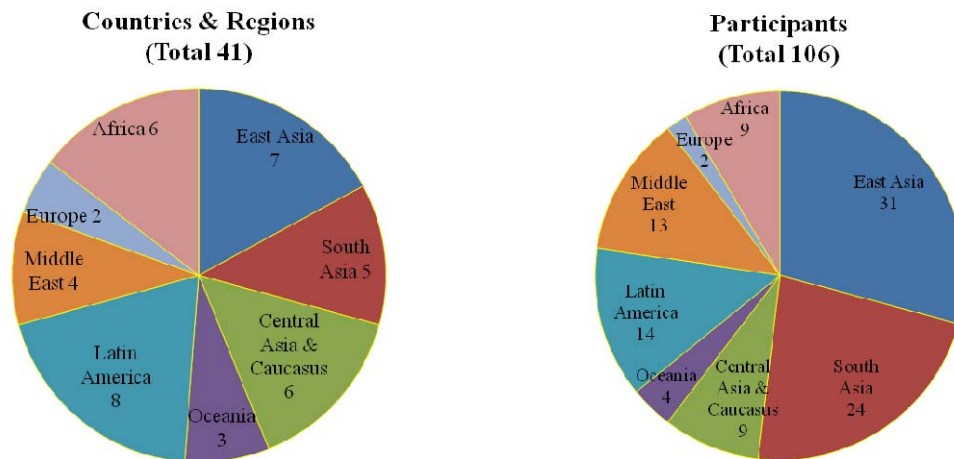


Fig. 2-1. Number of Countries and Regions (left) and Participants (right) in Seismology Course for the period from the course 2001-2002 to the course 2011-2012.

### 2-1-2 Themes of Individual Studies by Participants

Table 2-2 and Figure 2-2 show the topics of the individual study from the 2001-2002 course and their breakdown by research field. They cover all over seismology without extremely one-sided, and include its surrounding fields. This tendency is kept through the transition taken in 2005 to start the collaboration with Master Program of GRIPS.



Table 2-2. Individual Study (Master Report) topics by research field (Seismology course).

	Field of Study	01 -02	02 -03	03 -04	04 -05	05 -06	06 -07	07 -08	08 -09	09 -10	10 -11	11 -12	Sum.
1	EQ generation & Preparation		1		1	1				2	1	1	7
2	EQ Source Parameters & Process	3	2	3	1	1	5	4	1		2	2	24
3	Seismicity & Seismotectonics	1	1	2	3	1		2	2	1	1	2	16
4	Velocity Structure of Crust & Upper Mantle	1	1	2	1	2	2	1	1	1	2	2	16
5	Engineering Seismology, Strong Motion & Geophysical Exploration	5	3	5	5	2	1	2	4	4	3	1	35
6	EQ Disaster Prevention		1			1							2
7	Others					1	1	1	1	1	1		6
	Number of Participants by year	10	9	12	11	9	9	10	9	9	10	8	106

Note: EQ denotes earthquake, 5 includes Strong Ground Motion Study, Seismic Micro-Zonation, Geophysical Prospecting and other topics of Earthquake Engineering, 6 means Administration and Policy for Disaster Prevention, 7 Natural phenomena accompanying earthquakes: Volcanos, Geology, Landslide etc.

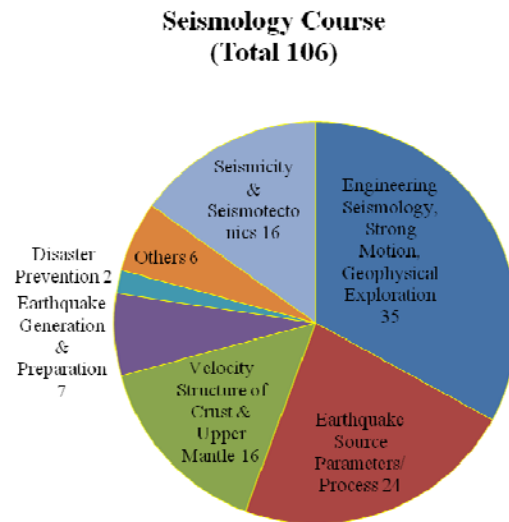


Fig. 2-2. Number of participants sorted by topics of the individual study (Master Report from 2005-2006 course) for the period from the course 2001-2002 to the course 2011-2012 for Seismology Course

## 2-2 Earthquake Engineering Course

### 2-2-1 Change in Demand for the Training and its Reflection in the Curriculum

Earthquake disasters, which instantly take human lives, destroy houses and devastate social properties, are clearly distinguished from other natural disasters. Fires and collapse of man-made structures caused by earthquakes may accelerate human losses, to say nothing of other aspects common to all natural disasters such as heavy economic losses, difficulty of preparedness and precautions due to unpredictability, and difficulty of immediate response to damages due to sudden occurrence. The recent example, the great earthquake disaster in the Eastern Japan caused by the 2011 off the Pacific coast of Tohoku Earthquake (Mw 9.0) showed that more effort is necessary to overcome the problems.

The Annual Training in Earthquake Engineering is geared towards contributing to the reduction of structural damage caused by earthquakes that can result in human suffering in developing countries. The curriculum comprises basic earthquake engineering studies, covering topics such as structural analysis and structural dynamics; various earthquake resistant structures for reinforced concrete construction, and steel structures; the latest technology, such as seismic isolation and response control technique and seismic limit state design. All of these are systematically provided through lectures, practical training and study tours, enabling trainees to solve problems in their native countries.

Table 2-3 and Figure 2-3 show the number of participants and countries by regions. These show that the IISEE training course covers the earthquake prone countries and regions with a good balance.

Table 2-3. Number of participants and countries by regions.

Regions	Number of Countries	Percentage of participants
East Asia	6	31 (30.1%)
South Asia	6	12 (11.7%)
Central Asia & Caucasus	3	4 (3.9%)
Middle East	3	5 (4.9%)
Africa	3	8 (7.8%)
Latin America	9	37 (35.9%)
Oceania	0	0 (0.0%)
Europe	3	6 (5.8%)
Total	33	103 (100%)

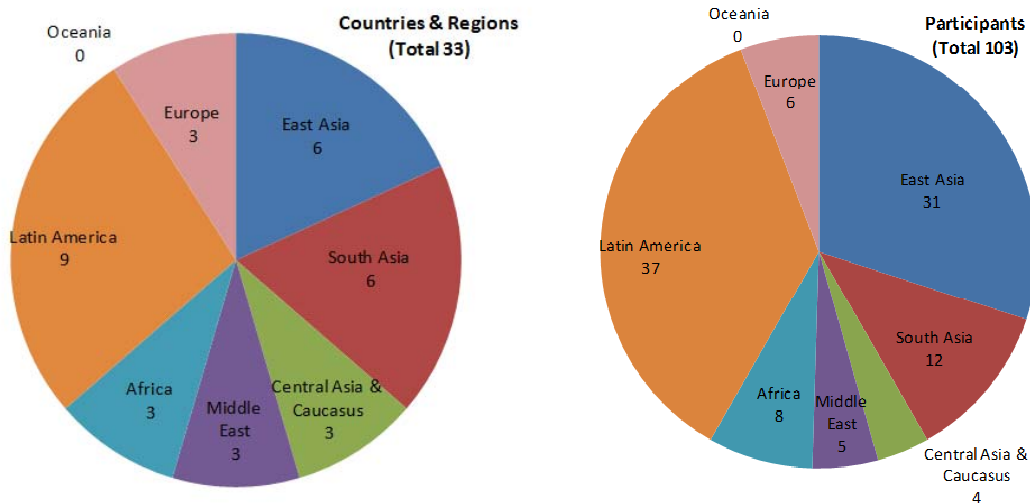


Fig. 2-3. Number of Countries and Regions (left) and Participants (right) in Earthquake Engineering Course for the period from the course 2001-2002 to the course 2011-2012.

Through a partnership with the National Graduate Institute for Policy Studies (GRIPS) initiated in October 2005, part of the training course of the Annual Training Course in Seismology and Earthquake Engineering has been certified as a GRIPS lecture course. Today, each training participant can obtain a master's degree (Master of Disaster Management) certified by GRIPS and BRI if the required credits are obtained. The course is scheduled in Individual Study (Master Report) oriented manner. Sufficient quantity of self-study days with individual guidance is scheduled to promote the self-study of the course participants. In addition to the lectures on Earthquake Engineering such as Structural Analysis, Structural Dynamics, RC Structures, Structural Testing, etc., those of the subjects related to both of Seismology and Earthquake Engineering are included in the curriculum, for example, Strong Ground Motion Study, Micro-zonation, Soil Dynamics, Geophysical Prospecting, etc. Those of the subjects related to the recovery from devastation due to earthquakes and to the disaster management policy are also included, for example, Disaster Mitigation-Recovery Policy, Disaster Risk Management, etc.

### 2-2-2 Themes of Individual Studies by Participants

Table 2-4 and Figure 2-4 show the topics of the individual study from the 2001-2002 course and its breakdown by research field. From the 2005 the training course has been Master Program of GRIPS and the individual study report has been Master Report. This covers Earthquake Engineering comprehensively and impartially.

Table 2-4. Individual Study (Master Report) topics by research field (Earthquake Engineering course).

	Field of Study	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	Sum.
1	Design, Risk Assessment & Response Evaluation	6	2	2	2	3	2	2	1			1	21
2	Structural Engineering (RC, PC, Masonry)	1	3	3	2	2	2	3	4	3	2	2	27
3	Ground, Input & Foundation		1	1	2	1		1		1		1	8
4	Response control & Base Isolation	3	1		1	2	3	1	2	3	3	2	21
5	Retrofitting, Diagnosis & Monitoring	1	3	3	2	2	3	2	2			3	21
6	Others							1		1		1	3
	Number of Participants by year	11	10	9	10	10	10	10	9	8	5	10	101

**Earthquake Engineering Course  
(Total 101)**

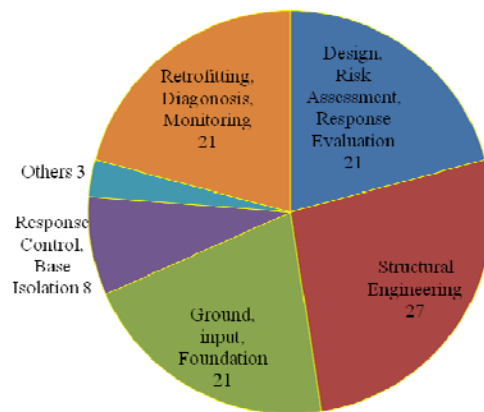


Fig. 2-4. Number of participants sorted by topics of the individual study (Master Report from 2005-2006 course) for the period from the course 2001-2002 to the course 2011-2012) for Earthquake Engineering Course.

## **2-3 Tsunami Disaster Mitigation Course**

### **2-3-1 History**

The gigantic tsunami that was generated by the 2004 Sumatra Earthquake (M9.1) wreaked havoc on the coastal regions of the Indian Ocean and claimed 226,898 lives. Two major factors of the extensive tsunami disaster were the lack of a tsunami early-warning system in the Indian Ocean regions and that there were almost no tsunami countermeasures developed in the area. After the catastrophe, under the initiative of UNESCO, the Indian Ocean tsunami early-warning system was developed and it became necessary to train specialists who understand earthquakes, tsunamis and tsunami disaster mitigation technologies in Indian Ocean countries.

In the wake of the devastating Indian Ocean Tsunami, the Tsunami Disaster Mitigation Course was launched in October 2006. The objectives of the course are to help participants acquire advanced knowledge and skills relating to earthquakes and tsunamis and to develop people capable of using and introducing these knowledge and skills in their own countries. This course has been provided as JICA's region-focused training program for coastal countries where tsunami disaster can be occurred and conducted simultaneously with the Seismology and Earthquake Engineering Courses.

After the Indian Ocean Tsunami, tsunami disasters were repeatedly occurred around Indonesia and the Pacific Ocean. Earthquakes which induced major tsunami disasters so far were: the 2006 Off South-East Java Earthquake (M7.7, 802 deaths), the 2008 Solomon Earthquake (M8.1, 52 deaths), the 2009 Samoa Earthquake (M8.0, 192 deaths), the 2010 Chile's Maule Earthquake (M8.8, 156 deaths) and the 2010 Indonesia's Mentawai Islands Earthquake (M7.8, 431 deaths). Large tsunami disasters have also been occurred in small countries in the Pacific and Oceanian regions as well as South America, and countries in need of tsunami countermeasures are increasing.

The gigantic tsunami generated by the 2011 Off the Pacific coast of Tohoku Earthquake (M9.0), which caused tremendous disaster in the Pacific coastal areas in eastern Japan, made a big impact since it occurred in a country that was considered to have most advanced tsunami countermeasures. Japan has the most densely installed earthquake and tsunami observation networks in the world through which the mechanism of gigantic tsunami generation and details of tsunami damage are being clarified. In addition, based on lessons learned from the Great East Japan Earthquake, a tsunami early-warning system which can respond even to a megathrust earthquake is being developed and that tsunami hazard assessment and tsunami countermeasures assuming a megathrust earthquake occurred in the Nankai Trough, etc. are being promoted. In order to mitigate tsunami disaster, it is very important to disseminate,

through the Tsunami Disaster Mitigation training, such knowledge and technology as the mechanism of gigantic tsunami generation that was clarified after the Great East Japan Earthquake occurred, processes of tsunami disaster and recovery, and tsunami countermeasure technologies against a supergiant earthquake to developing countries.

### 2-3-2 Contents of the Training

The duration of the course is one year and about five participants are trained each year. One term consists of three trainings. In the first term, the target countries were coastal nations around the Indian Ocean, but from the second term, they were expanded to include countries around the Pacific Ocean. Table 2-5 shows the nationality and the number of the participants from 2006-2007 course to 2011-2012 course.

The training consists of a lecture period (8 months) and an individual study period (3 months) aiming for solving individual research problems and issues. First, during the lecture period, participants acquire basic knowledge and analysis technology of earthquakes and tsunamis, and then they learn knowledge and technology related to tsunami disaster mitigation such as tsunami hazard assessment, tsunami early-warning system, etc. Next, during the individual study period, they acquire practical ability to mitigate tsunami disaster. Each participant is expected to complete a master thesis related to tsunami hazard assessment and tsunami early-warning system. As shown in Table 2-6, the major themes of master theses are the element technology related to tsunami early-warning system and tsunami hazard assessment based on the situation of each developing country.

Table 2-5. Nationalities and number of ex-participants.

Nationality	06-07	07-08	08-09	09-10	10-11	11-12	Total
Indonesia	1	2	3	2	2	2	12
Malaysia	2	1	1	1	2	3	10
Bangladesh	1	1					2
Thailand	1	1					2
Fiji				1			1
Peru				1	1		2
Total	5	5	4	5	5	5	29

Table 2-6. Themes of individual training (Tsunami Disaster Mitigation Course).

Theme	06-07	07-08	08-09	09-10	10-11	Total
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Tsunami database for tsunami early-warning system	2	3	1		1	7
Early determination of seismic source for tsunami early-warning system			2	1		3
Utilization of tsunami record for tsunami early-warning system				1	1	2
Tsunami hazard assessment	3	2	1	3	2	11
Estimation of fault slip by tsunami inverse analysis					1	1

### 2-3-3 Results of the Training

Most of the participants who completed the Tsunami Disaster Mitigation Course are directly engaged in tsunami disaster prevention works such as tsunami early-warning system and tsunami hazard assessment (Table 2-7). In particular, in Indonesia, one ex-participant plays a leading role as the head of the Tsunami Early-warning Sub Division. Many other ex-participants from Indonesia actively work in the same sub division. In Thailand, one ex-participant also plays a leading role as the director of the Earthquake and Tsunami Research and Development Division. In Malaysia, the database used for the tsunami early-warning system was developed mainly by the ex-participants.

Table 2-7. Examples of training results (Tsunami Disaster Mitigation Course).

Country	Results
Indonesia	-One ex-participant is in charge of tsunami early-warning issuance as the head of the Tsunami Early-warning Sub Division. -Nine ex-participants are directly engaged in works related to tsunami early-warning system and hazard assessment.
Malaysia	-Database to be used for the tsunami early-warning system in Malaysia was developed mainly by the ex-participants. -Seven ex-participants are directly engaged in works related to tsunami early-warning system, tsunami related education, etc.
Bangladesh	-Maximum tsunami height and tsunami arrival time in Bangladesh coastal areas were estimated. -Two ex-participants are engaged in tsunami related works.
Thailand	-One ex-participant is engaged in works related to tsunami early-warning system and tsunami countermeasures as the director of the Earthquake and Tsunami Research and

	Development Division
Fiji	-Maximum tsunami height and tsunami arrival time at different places in Fiji were estimated.
Peru	-Tsunami hazard assessment was conducted for a massive earthquake to be occurred in the subduction zone around Lima, Peru. -Inundation calculation of tsunami simulation carried out by an ex-participant is used for the development of tsunami hazard map.



## 2-4 China Seismic Building Course

### 2-4-1 Background

The Wenchuan Earthquake on 12 May 2008 in China caused extensive damage, leaving more than 87,999 dead and missing and 6.5 million houses collapsed. In order to consider reconstruction assistance to China, the Japanese government dispatched its mission to China and discussed possible cooperation between the two countries. As a result, a great need to improve the earthquake-resistant technology for structural designers was confirmed, and the Chinese government officially asked Japan's cooperation in the field of "human resource development for earthquake-resistant structural engineers". On 12 May 2009, exactly one year after the large earthquake, "Human Resource Development Project for Aseismic Buildings", as one of a supportive reconstruction measures, was launched as a technical cooperation project of JICA. The objective of the project is to train structural engineers and others in China to secure earthquake resistance of buildings through the combination of expert dispatch, training in Japan, training in China, etc. The period of the project was initially set as three years (from May 2009 to May 2012) but it was then agreed by the two countries to be extended for another year to May 2013 at China's request. IISEE/BRI is in charge of "Earthquake Resistant Design, Assessment, and Retrofit Course (so-called China Seismic Building Course)" in the trainings implemented in Japan, and accepts 20 structural engineers per year from China for a period of some two months to offer lectures on earthquake resistant design, assessment and retrofit as well as site observations.

### 2-4-2 Outline of the Curriculum

Major topics of lectures are seismic design, assessment and retrofit of buildings, however, advanced techniques such as seismic isolation, response control and super high-rise buildings are also introduced in lectures by showing case examples. The curriculum also provides many opportunities to see actual cases of retrofit as well as building and construction technologies through site observations and study trips.

Table 2-8. Curriculum categories and lecture subjects.

Lecture category	Lecture subject	Number of day
Introduction	Introduction to Earthquake Engineering, Seismic Design Codes	3.5
Basis of Seismic	Theory of Structural Response	2.5

Design		
Seismic design, assessment and retrofit of different structures	RC Structure, Steel Structure, Seismic Isolation Structure, Response Control Structure, Super High-Rise Building, Foundation Engineering, Post-Earthquake Assessment, Bridges	14
Practice	Lecture and Practice of Structural Test	3
Site Observation	Construction Site, Seismic Retrofit Buildings, Seismic Isolated/Response Control Buildings	7
Study Trip	Affected Areas by Great East Japan Earthquake, Facility Related to Hanshin-Awaji Earthquake	7
Presentation	Individual Presentation, Intermediate Presentation, Final Presentation	3

### **2-4-3 Training Contents and Activities of Participants after Returning Home**

Participants are to make a report about what they learn during the training period and how to apply acquired techniques after returning to their countries. They are also expected to give lectures for the training held in China. So far, many participants have played a role as a lecturer.

As a result of the training program, during the period from 2009 to 2012, 72 leading engineers participated in IISEE training program. They returned to China and gave the lectures 10 times to 324 core engineers in 8 cities. Those core engineers also gave the lectures 33 times to 8,833 general engineers in 23 municipalities.

## **2-5 Global Seismological Observation Course**

Actions for putting into effect the Comprehensive Nuclear-Test-Ban Treaty (CTBT) are underway inside and outside Japan. At the same time, the International Monitoring System (IMS), a global observation network for CTBT-compliance verification, is being developed. Monitoring technique using seismological observation and analysis is one of the important pillars in the IMS.

At the request of the Ministry of Foreign Affairs of Japan, IISEE has been offering a Global Seismological Observation Course every year since 1995 with an aim to develop human resources who have acquired the skills necessary for detecting nuclear tests using global seismic observation technologies and seismic waves. So far, as of September 2014, a total of 186 participants from 70 countries attended the course.

### **2-5-1 Improvement of the Course Program**

Since 2003, a one-day lecture on new topics such as CTBT, IMS and International Data Center was added to the curriculum which is given by a lecturer either from International Data Center Division or International Monitoring System Division of Provisional Technical Secretariat, Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) (From 2011, two days are spent for the lecture). In 2004, the curriculum started to include another one-day lecture on the “Geotool”, a seismic wave analysis software developed and distributed by the International Data Center Division. In addition, in 2005, presentation of an action plan about the utilization of training results was introduced in the latter part of the training period.

### **2-5-2 Activities of Ex-participants**

After completing the training, many ex-participants work in seismological observation organizations in their countries, observation stations of IMS, domestic data centers, etc. There are some other ex-participants who work at the International Data Center Division. Many graduates of the Global Seismological Observation Course and the Annual Training Course in Seismology, Earthquake Engineering and Tsunami Disaster Mitigation participated in the “International Scientific Studies Conference (ISS09 Conference)” held in Wien in 2009 and “Comprehensive Nuclear-Test-Ban Treaty: Science and Technology 2011”, and they presented current situation of seismological observations and analysis results of seismological data including observation stations of IMS in their countries.

### **3. History of the Training Program**

#### **3-1 Background of the Seismology and Earthquake Engineering Training Program in Japan**

In the late 1950's, there was a significant increase of young researchers and engineers coming to Japan to study seismology and earthquake engineering from earthquake-prone developing countries. The Second World Conference on Earthquake Engineering, held in Tokyo in 1960, served as a trigger to start discussion among leading researchers in seismology and earthquake engineering, both in and outside of Japan, about the need for, and importance of a collective approach to training for young researchers and engineers who had hitherto come to Japan on an individual basis. Consequently, the Special Committee for International Training in Seismology and Earthquake Engineering (Chaired by Dr. KAYA, the President of the University of Tokyo) was established in the University of Tokyo initiated by Dr. NASU Nobuharu, the Director of the Earthquake Research Institute, the University of Tokyo, and a training program of 9-month course started in July of the same year. The Overseas Technical Cooperation Agency (OTCA) supported the project by offering scholarships. A part of classrooms in the then Institute of Industrial Science, the University of Tokyo in Roppongi was used. A total of 15 participants from 10 countries attended the training program, 7 for the Seismology Course and 8 for the Earthquake Engineering Course.

The training courses independently launched by Japan received a great response from related countries, and there were a number of requests from other countries to send training participants in the program. As such, the necessity to provide this training program on a more permanent basis was started to be discussed among people related to seismology and earthquake engineering in and out of Japan. To make the program permanent, a number of meetings were held among the Agency of Science and Technology, the Ministry of Foreign Affairs, the Ministry of Education, the Ministry of Transport, the Ministry of Construction and other related ministries and agencies. As a result of discussions about specific measures in achieving this target, it was decided that the Building Research Institute (BRI) (Director-general: TAKEYAMA Kenzaburo (of the day)), the Ministry of Construction (MOC) took charge of the project and set up a new organization (IISEE: International Institute of Seismology and Earthquake Engineering) for this training in BRI (at Hyakunin-cho, Shinjuku-ku, Tokyo). In response to this, BRI conducted the second training session as a host. A part of the Naito Memorial Hall of Waseda University had been used as a classroom before a new building was completed in BRI. A total of 12 participants from 6 countries, 5 for the

Seismology Course and 7 for the Earthquake Engineering Course, attended this training program.

In January 1962, IISEE was established and the latter half of the second training was conducted there. The duration of the courses became one year which commenced each year in September from the third one using the facilities in IISEE. This is how the training at IISEE started.

Thus, the early 1960's was a period when training program in seismology and earthquake engineering for developing countries was steadily developing its basis in Japan. At the same time, the United Nations (UN) was increasingly aware of the need for international cooperation in seismology and earthquake engineering to prevent huge losses of human and material resources caused by earthquakes and resulting tsunamis from the time its Economic and Social Council was founded. During this period, triggered by the damage caused by huge earthquakes in Iran, Morocco, Chile and other countries, the UN Economic and Social Council adopted a resolution that urged its member nations to cooperate internationally in the prevention of earthquake disasters. In response to this, UNESCO (the United Nations Educational, Scientific and Cultural Organization) made a recommendation to the Director-General of the Japan UNESCO Council that the training program should be made more international with the help of the UN Special Fund (UNSF). In October 1962, the following agreement on the training program was exchanged between the Japanese government and UNSF.

According to the implementation plan based on the agreement, a total of 131 participants shall be invited, of which 78 will be by the Japanese government using the OTCA scholarships, and 53 by UNESCO using UNSF; the Japanese government shall provide the land and building used as the training site, equipment for training and practice, the salary of the staff, visiting lecturers' fees and other operational costs; UNESCO shall bear the costs necessary to invite 14 visiting lecturers, foreign-made seismometers, other equipment, foreign books, etc. The total cost during five years was about 380 million yen for Japan and 290 million yen for UNESCO.

This is how the joint project between the Government of Japan and UNESCO started as a 5-year plan in September 1963, and the International Institute of Seismology and Earthquake Engineering of Building Research Institute, Ministry of Construction came to conduct the training program.

Historically, the period of the training program independently initiated by Japan, that started at the Institute of Industrial Science, the University of Tokyo and then succeeded to BRI/MOC, can be called as the first phase (July 1960-August 1963), and the following period in which the project was jointly conducted with UNESCO as the second phase (September 1963 to August 1968) (Figure 6-3).

### **3-2 First Joint Project (September 1963-August 1968)**

During this period, a total of 14 experts, 2 to 3 every year, were dispatched from UNESCO to work in the training project. They achieved a significant result by making use of their considerable expertise and teaching experience in seismology and earthquake engineering in their respective countries, and cooperating with the small team of Japanese in all ways possible. This was possible because, rather unexpectedly, all involved recognized the significance of the training program right from the start, and their enthusiasm was overwhelming. Their participation influenced not only the training program itself but also the IISEE by making it unique in the world as a platform for international academic exchange in seismology and earthquake engineering through interaction with IISEE staff and the many Japanese researchers invited as lecturers from other institutions.

In the implementation plan of the training project jointly conducted by the UN and the Japanese government, there is a section about the Panel of Senior Consultants. According to the section, “the comprehensive plan both in scientific and technical matters for the IISEE shall undergo a periodical review by the Panel of Senior Consultants that consists of three senior consultants appointed by the organization implementing the training program and the other three appointed by the government.” The consultants appointed in the first 5-year plan were Dr.WADATI Kiyoo, Dr.MUTO Kiyoshi and Dr.NASU Nobuharu from the Japanese government and Dr.Stoneley (UK), Dr.G.W.Housner (USA) and Dr.V.Y.Riznichenko (USSR) from UNESCO. The first Consultant Meeting was held in December 1963, the second in March 1965 and the third in April 1967. In these meetings, the content and achievements of the training programs that had been completed were carefully reviewed and strategies for improvement were seriously discussed for the development of the project that resulted in strict recommendations. It owed much to the considerable efforts of the first Director of the IISEE, Dr.OMOTE Shunichiro that achievements and development of the

training project in the first 5-year were more than expected. He realized the sharp advice which was given by the consultants every meeting one by one with the dedicated efforts. His efforts enabled the second plan for the project. In fact, in the recommendations proposed after the third meeting, there was a section requiring that the training project should be continued with expanded and improved contents from September 1968, again under the auspices of the Government of Japan and the UN.

At the end of 1965, before this recommendation was made, UNESCO had already expressed its intention to continue supporting the training program. In the same year, the Director-general of UNESCO, Mr. René Maheu, visited the BRI and recognized that the project was one of the most successful collaborations of UNESCO with various countries and expressed his view that if the Japanese government wished, he would make the UNESCO's administration consider its proposal to the UN for the continuation of the project. In response to this, the Japanese side immediately held meetings among related organizations, ministries and agencies, in which it was confirmed that the joint project with UNESCO would continue, with the BRI/MOC as the main body. After an unofficial discussion with UN headquarters, a proposal was submitted to the United Nations Development Programme (UNDP), which was adopted by the Governing Council in January 1968. This is how the second joint project was set up for the following four years.

### **3-3 Second Joint Project (September 1968-August 1972)**

In the four-year plan for the second period of the joint project, it was decided to newly set up an Advanced Course in addition to the Annual Course (formerly the "Regular Course"). The new course aimed at participants with higher academic ability and capabilities and its objectives were to let them work on various research topics corresponding to the particular needs of their own countries, and to cultivate research and leadership capabilities with the proper supervision of BRI staff members and UNESCO experts. In addition, their duties to actively give advice and technical instructions for a post-quake reconstruction program of each country were strengthened than before. In the second joint project, the total cost for four years reached about 540 million yen, of which Japan bore about 300 million yen. As for the building, a fourth floor, that provided a room for participants in the Advanced Course, was added. Regarding the Senior Consultants, on the Japanese side, Dr.MUTO Kiyoshi remained, but two others were replaced by Dr.HAGIWARA Takahiro and Dr.OKAMOTO Shunzo, and on the UNESCO side, Dr.K.E.Bullen (Australia), Dr.J.Penzi (USA) and

Dr.E.Savaresky (USSR) were newly appointed in place of their predecessors. During this second joint project, one or two experts were dispatched from UNESCO every year as before and the international status of IISEE and high reputation, both within and outside of Japan, were consolidated (Figure 6-2B). In this way, the training project continued to advance steadily and the total number of participants who completed the training reached 255 by the end of the second joint project.

As the second joint project came to an end, the question of how to deal with the training project, developed under the auspices of UN and UNESCO, after its end became an issue. Usually, this kind of joint project conducted by the UN for each country is a five-year term and the nine years of assistance to the seismology and earthquake engineering training of IISEE was a special case, due to the exceptional success of the project. Also, Japan, as it had developed into an economic superpower by the time, was not in a position to ask the UN for an extension of assistance for a further third phase. However, the significance and importance of the training project had already been fully recognized both nationally and internationally. In Japan, the Science Council of Japan and other academic societies, such as the Seismological Society of Japan, Japan Society of Civil Engineering and Architectural Institute of Japan, submitted petitions calling for the continuation of the training project. At the same time, the last and fifth Panel of Senior Consultants (March 1971) recommended that, most importantly, the Japanese government should take every necessary measure to maintain the function of the international training site, at least on its present scale, without changing its English name of “International Institute of Seismology and Earthquake Engineering”.

### **3-4 Independent Project by the Government of Japan (September 1972-July 1990)**

The training program became independent from the UNESCO and succeeded to the Japanese government as a project belonged to the IISEE/BRI under the MOC as the competent government agency, and its objectives and contents remained unchanged. The Advanced Course that was conducted individually and intensively for senior participants in their specific fields was replaced by an Individual Course.

The IISEE’s training program had been continued for 17 years at Shinjuku-ward in Tokyo, but in March 1979, the training site was moved to the Tsukuba Science City (Oho town, Tsukuba-gun, Ibaraki-prefecture: present Tsukuba City) when the BRI was relocated there in which a good environment and fully-equipped research facilities were



available.

From 1980, in addition to the existing group training course, the Seminar on Seismology and Earthquake Engineering was held every other year. The aim of the seminar was to provide advanced special knowledge, discuss prevention and reduction measures against earthquake disaster responding to a situation of each country, identify problems of each country, and then contribute to technical and research cooperation in future. The theme of the seminar was to be chosen from the most useful and updated issues in both fields (Figure 6-3, 1980-).

Also from 1985, the dispatch of UNESCO experts, which had not been conducted with the end of the joint project with UNESCO, resumed as a dispatch of invited foreign lecturers through the Science and Technology Sector in South-East Asia, UNESCO.

### **3-5 Independent Project by the Japanese Government II (September 1990-July 1999)**

As mentioned above, the international technical training in seismology and earthquake engineering of IISEE, started in 1960, conducted as a joint project with the UNESCO from 1963 to 1972 and then continued as an independent project of the Japanese government, had been carried out for more than 30 years. During this period, the number of request from developing countries to send candidates to participate in training program of Japan had been increasing year by year. In response to these requests, the government launched a review of its economic cooperation in 1988, in particular, projects of overseas technical training participants acceptance conducted by JICA. Also, IISEE reviewed a necessity to continue the training including the future concept of the training course since all the training participants joined the training program on a JICA's scholarship. As a result of the review, the Seismology and Earthquake Engineering Course as a JICA's program was no exception to the review and was once came to an end in 1989. Then it restarted as the "Seismology and Earthquake Engineering II" from 1990. As the program of IISEE, this was the start of the second phase of the project independently conducted by the Japanese government.

In 1992, the International Training in Seismology and Earthquake Engineering at BRI marked its 30<sup>th</sup> anniversary and as commemorating events, the 9<sup>th</sup> Seminar on Seismology and Earthquake Engineering (Earthquake Disaster Reduction Technology) and the IDNDR International Symposium on Earthquake Disaster Reduction

Technology were held, and an anniversary booklet in English and Japanese were published. The symposium was held at the International Conference Hall of the Tsukuba Center for Institutes for three days from 15<sup>th</sup> to 17<sup>th</sup> December 1992. It became an exceptional international symposium with more than 220 participants from 27 countries and more than 30 leading experts in the field of earthquake disaster reduction technology in and out of Japan invited as lecturers and panelists in cooperation with the UNCRD (United Nations Centre for Regional Development) and others. The focus of the symposium was on dissemination of earthquake disaster reduction technology, problems in technology transfer and so forth, in view of objectives of IDNDR (International Decade for Natural Disaster Reduction) proposed by UN.

Then, in 1998, the 12<sup>th</sup> Seminar on Seismology and Earthquake Engineering was held for a specially prolonged period (about 40 days) as a seminar for technical experts in the RADIUS (Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters) project planned and implemented by the UN/IDNDR. It contributed to network-building in the field of seismology and earthquake engineering with participation of leading researchers from 17 countries.

In addition to the existing three courses, the Annual, Individual and Seminar Courses, the “Global Seismological Observation Course” was launched as the 4<sup>th</sup> course for the period of two months from November 1995 with an aim to acquire verification technology of nuclear tests upon request of the Ministry of Foreign Affairs of Japan in March 1995. The objective of the training is to contribute to the development of global-scale seismological observation network as part of the measures to deter nuclear tests by transferring advanced seismological observation technology of Japan to countries that is not fully developed in seismology and seismological observation technology.

### **3-6 Independent Project by the Government of Japan III (September 1999-July 2004)**

By the end of the period of Seismology and Earthquake Engineering II, IISEE program had been running for nearly 40 years, with more than a thousand participants having completed the training. In a regular project review conducted every 10 years by JICA, the necessity of continuing the one-year training course was questioned, as it was deemed that the initial objectives had been achieved. The IISEE/BRI/MOC also reviewed the training project including whether it should continue or not.

As a result, the training program was decided to be continued judging by statistical data and needs survey results which showed that there were great expectations and necessities for the training program in developing countries since serious earthquake disasters had been repeatedly occurred in these countries in spite of continuous technical support and financial assistance over the years from developed countries such as Japan and the U.S., including this training project. As for the training content, the most frequent request to the annual training course was to increase lectures in the field directly related to earthquake disaster mitigation. Previously, it had been difficult to spend sufficient time on this in the existing curriculum because it was on the boundary between the two fields, seismology and earthquake engineering.

Therefore, the third sub-course was established focusing on strong earthquake motion and earthquake disasters in addition to the two sub-courses on Seismology and Earthquake Engineering. Accordingly, the JICA's name of the training course was changed from "Seismology and Earthquake Engineering II" to "Seismology and Earthquake Engineering".

From January 2001, the Ministry of Construction was reorganized to the Ministry of Land, Infrastructure and Transport (MLIT) by integrating the Ministry of Transport, the Hokkaido Development Agency, the National Land Agency, and the Ministry of Construction, and BRI became an organization under the MLIT.

Furthermore, BRI became an incorporated administrative agency and made a new start in April 2001. IISEE was also restarted by changing its name in BRI in Japanese from a "Department" to a "Center" (English name unchanged: International Institute of Seismology and Earthquake Engineering). However, in August 2001, the Seminar Course that had been conducted for 21 years had to be ended as a result of a review of training projects carried out by the Ministry of Foreign Affairs of Japan in line of the administrative and financial reform of the government. Figure 1-2 shows the contents of previous seminars.

In 2002, the IISEE Training Program marked its 40<sup>th</sup> anniversary. In commemoration of this, on 28<sup>th</sup> November 2003, the Symposium on the 40<sup>th</sup> Anniversary of the International Training in Seismology and Earthquake Engineering was held with 176 participants at the Seiryō-Hall in Nagata-cho, Tokyo. In the symposium, the 40 years history and training outcomes of the IISEE program were looked back. Also, lectures

and a panel discussion were conducted with a title “Status Quo and Issues of Earthquake Disaster Prevention in Developing Countries and International Cooperation Activities and Future Prospects on Earthquake Disaster Prevention” with an aim to seek for measures to further improve training effects and technical cooperation to developing countries in future based on challenges and needs in earthquake disaster prevention technology in developing countries. Summary of the symposium was compiled in the “Symposium in Celebration of the 40th Anniversary of the International Institute of Seismology and Earthquake Engineering (IISEE) Training Project” (Issued by BRI, September 2004).

### **3-7 Independent Project by the Government of Japan IV (October 2004-)**

In 2003, the last year of the third term, as a JICA’s training course after starting it training review of the Seismology and Earthquake Engineering Course training, it was decided to be continued as a new course by adding lectures related to earthquake disaster mitigation policy after a JICA’s project review conducted every 5 years. The new course aims to train qualified personnel who can plan, instruct and disseminate technologies by acquiring advanced technologies related to seismology and earthquake engineering and, at the same time, obtaining administrative ability in earthquake disaster reduction to utilize and disseminate these technologies. Therefore, subjects related to earthquake disaster mitigation policy such as “Disaster Mitigation Policy Management”, “Regional and Urban Disaster Mitigation Planning”, “Project Cycle Management related to Disaster Mitigation”, etc. were newly established and they became common subjects of the Seismology Course and the Earthquake Engineering Course together with other subjects given for the previous Strong Earthquake Motion and Earthquake Disaster Course. Accordingly, the Strong Earthquake Motion and Earthquake Disaster Course was closed. Because of the new subjects added, the course period was extended by one month and the total duration became an almost full year.

Furthermore, a master’s degree program was introduced in the 2005-2006 training course after GRIPS (National Graduate Institute for Policy Studies), JICA and BRI had reached an agreement about the award of a master’s degree for participants completing the annual training program that had long been a pending issue. Then, each participant of the annual training course can obtain a master’s degree (Master of Disaster Mitigation) in one-year training if the required credits are obtained and 19 participants who completed the annual training program received the “master’s degree” for the first time in September 2006.

In addition, the “Tsunami Disaster Mitigation Course” was newly started. The course was established to mitigate damages caused by tsunami disasters in view of huge tsunami disasters by the 2004 Sumatra Earthquake and it is also a master’s degree program as the “Seismology and Earthquake Engineering Course”. The name of master’s degree was changed to “Master of Disaster Management” from the annual training in 2006-2007.

From 2007, the collaboration with UNESCO resumed. The training program had been once jointly conducted by UNESCO and the Japanese government but there was no cooperative relation directly between the two bodies from 1985 when it was independently conducted by the Japanese government, though experts were dispatched from UNESCO for ten years. However, in 2007, after discussions aimed at constructing a new cooperative relation, activities such as dispatch of experts and other kinds of activities were resumed. In April and May 2007, expert dispatch from UNESCO was resumed for the first time in 12 years and two experts were sent for the Tsunami Disaster Mitigation Course (Figure 6-2D). In addition, UNESCO donated books for the training. Also, initiated by UNESCO and IISEE in cooperation with MLIT, the “International Platform for Reducing Earthquake Disasters” (IPRED) was launched which aims for promoting international network for earthquake disaster mitigation research and training in the field of building and housing and developing international backup system at the time tremendous earthquake and tsunami occurs.

The Wenchuan Earthquake on 12 May 2008 in China caused extensive damage, leaving more than 87,000 dead and missing and 6.5 million houses collapsed. The Japanese government started the “Human Resource Development Project for Aseismic Buildings”, a JICA’s technical cooperation project, as part of a reconstruction support after a huge earthquake. Objectives of the project is to train structural engineers and others in China to secure earthquake resistance of buildings for planned duration of 3 years through the combination of expert dispatch, training in Japan, training in China and so forth. IISEE/BRI is in charge of “Earthquake Resistant Design, Assessment, and Retrofit Course (so-called China Seismic Building Course)” in trainings implemented in Japan and accepts 20 structural engineers from China for a period of about two months to conduct lectures related to earthquake resistant design, assessment and retrofit as well as site observations. Finally the course was conducted for 4 years from 2009 to 2012 and 72 participants were given the training in IISEE.

In relation to the Great East Japan Earthquake (Off the Pacific Coast of Tohoku Earthquake) occurred on 11<sup>th</sup> March 2011, analysis on damage by the Great East Japan Earthquake was added to lecture subjects (Structural Response Theory and Damages by Tsunami) of the training course and “front line training”, as a special observation to affected areas, was included in a study trip carried out in cooperation with JICA and related local organizations.

In 2014, Latin American Earthquake Engineering Course was launched as a two months' new training course. It is given the lectures in Spanish, a common language in Latin America. It is planned for three years' project and 14 participants from 4 countries attended the course in 2004.

As mentioned, the IISEE training program has entered a new stage after the introduction of a master's degree course to the one-year training program. All the staff members at IISEE are committed to their work on a daily basis, sincerely hoping that the training will further contribute to mitigating earthquake disasters in developing countries.

1,653 participants from 99 countries have completed the training program as of September 2014 and they now play a leading role in the sustainable development of their native countries through earthquake disaster mitigation and other works.