The 14th Conference on Public Works Research and Development in Asia

Session on Subject of Common Interest

- Risk Management and Mitigation for Flood and Sediment Related Disasters -

MINUTES

1. **Date and Venue** 09:00 – 15:30 Wednesday 19 October 2005
International Conference Room, NILIM

2. **Participants**

Cambodia	Dr. Bunna YIT
India	Mr. Janak Jerambhai SIYANI
Laos	Mr. Keophilavanti APHAYLATH
Philippines	Ms. Rebecca Trazo GARSUTA
Thailand	Mr. Akkapong BOONMASH
Vietnam	Mr. Nguyen Xuan Hien
Japan	Mr. Tsuneyoshi MOCHIZUKI Director General, NILIM Mr. Kazuhiro NISHIKAWA Executive Director for Research Affairs, NILIM, Mr. Jun INOMATA Director, Planning & Research Admin. Dept., NILIM Dr. Ryosuke TSUNAKI Director, Research Center for Disaster Risk Management, NILIM Mr. Minoru KURIKI Director, River Department, NILIM Mr. Kazunori WADA Research Coordinator for Watershed Management, River Dept., NILIM Mr. Kiyoshi MINAMI Research Coordinator for Evaluations, Planning & Research Admin. Dept., NILIM Dr. Tadahiko SAKAMOTO Chief Executive, PWRI Mr. Akira TERAKAWA Director, Secretariat for Preparatory Activities of UNESCO-PWRI Centre, PWRI Mr. Junichi YOSHITANI Team Leader, Risk Management Team, ICHARM Centre, PWRI Dr. Tarek MERABTENE Specialist Researcher, Risk Management Team, PWRI

3. **Opening of Session on Issues of Common Interest**

The session on subject of common interest convened in Tsukuba on October 19 (Wed.) from 0930 – 1530, on the issue of "Risk Management and Mitigation for Flood and Sediment Related Disasters" in Asia, and were moderated by Mr. Minoru KURIKI, Director of NILIM's River Department. Attendee nations included the Kingdom of Cambodia, India, the Lao People's Democratic Republic, the Republic of the Philippines, the Kingdom of Thailand, the Socialist Republic of Viet Nam, and Japan.

Prior to the country reports, an introductory presentation by Director of the Planning and Research Administration Department Mr. Jun INOMATA provided a broad overview of the conference, including history, objectives, and the broadening base of participating countries.

4. **Summaries of the Country Reports**:

Country Report for Japan by Mr. Tsuneyoshi MOCHIZUKI, Director General, NILIM

Japan's disaster legislation has evolved from focus on specific types of damage to emergency response and post-disaster reconstruction. In terms of sediment flow and flood disasters, infrastructure improvements combined with the concentration of population and assets has resulted in a reduction in total area inundated with relatively unchanged damages. Recent human tolls of elderly disaster victims have put new focus on improving information dissemination. Community disaster measures and preparedness are most important and effectively introduced through drills and education.

Future challenges lie in effectively mixing and matching non-structural and structural responses, local community involvement, and defining roles and responsibilities for all levels of government and community.

After Mr. Mochizuki's presentation, views on a comprehensive tsunami prediction system and communities' preparedness were exchanged.

Country Report for the Kingdom of Cambodia by Dr. Bunna YIT:

Cambodia's primary flooding concern is with the Mekong River, whose basin is shared by several countries. The area suffered its worst recent flood in 2000, which inflicted major damage on primary roads. To make embankments along the river, which are used as roads, more resistant to erosion, Cambodia is trying surface vegetation, bitumen sprays, stone riprap, gabion or concrete slope protection measures.

The Ministry of Water Resources and Management provides information on critical river levels to The National Committee for Disaster Management (NCDM), which in turn, informs provincial, district and commune authorities. Public information is disseminated by TV and radio (Ministry of Information) while the Army and Police are responsible with commune for evacuation of people and animals to safe areas.

Country Report for India by Mr. Janak Jerambhai SIYANI:

Gujarat (western India) suffers from earthquakes, cyclones, sediment flows, and draught. Floods are the most frequent and often most devastating disasters experienced in India, affecting an average of 18.6 million hectares annually. In terms of rainfall, nearly 75% of annual precipitation comes between June and September, yielding flash floods within five to seven hours. The problems from these floods are compounded by the simultaneous occurrence with high coastal tides flowing into the low lying flood inundation plains, severe sediment congestion from upstream erosion, and drainage blockages. India implements both structural and non-structural flood disaster measures.

Zoning is applied to areas highly susceptible to floods to minimize damage. In some areas, raised platforms are constructed to provide shelter areas and preserve core public utilities. Forecasting and warning is handled by the Central Water Commission, recent focus has been on multi-hazard disaster management.

After Mr. Siyani's presentation, questions on Gujurat State Disaster Management Authority (GSDMA), including its structure and responsibility, were raised,

Country Report for the Lao People's Democratic Republic by Mr. Keophilavanh APHAYLATH:

In Laos, the majority of the population lives in lowlands along the Mekong. Some 76% of the workforce is involved in agriculture and a little over 20% of the national economy

comes from international aid. Floods are the primary natural disaster, directly affecting 63% of the population. Limited access and communication systems constrain disaster response. There were 22 floods over the 30 years from 1966 to 1995, among which four (1966, 1971, 1978 and 1995) were large. The government offices involved in floods are the Ministry of Agriculture with the lead role, the National Disaster Management Committee (NDMC), the National Disaster Management Office (NDMO) as the secretariat for international partners, and the Meteorological Office.

The size of the Mekong basin makes international cooperation through the Mekong River Commission(MRC) imperative. Since the 1970's, MRC has used a Stream Synthesis and Reservoir Regulation (SSARR) model developed by the US Army Corps of Engineers, with forecasting accuracy between 10–14%. There is a considerable body of traditional knowledge used by farmers to counter flooding effects. Laos is working to establish an integrated National Flood Management Action Plans but requires further international help and better inter-ministerial coordination.

After Mr. Aphaylath's presentation, discussions on causalities caused by floods, relocation of villages were held.

Country Report for the Republic of the Philippines by Ms. Rebecca Trazo GARSUTA:

The Department of Public Works and Highways(DPWH) is the national agency responsible for public works projects including flood control. Flood management infrastructure is a priority under the DPWH's Medium Term Philippine Development Plan. The Department currently works with a decreasing annual budget. Disaster response is handled by the National Disaster Coordinating Council under the Civil Defense Office of the Department of National Defense.

The most serious disasters in the Philippines generally derive from typhoons. With international assistance, DPWH commenced a massive flood response program using both structural and non-structural approaches in 1985. Structural measures include dikes, retention ponds, sediment basins, sabo dams, channeling, and improvement of drainage facilities. Non-structural measures includes forecasting and warning systems and communications equipment as part of warning networks..

After Ms. Garsuta's presentation discussions were held on the number of annual casualties, hazard maps, and community based programs against flood disasters.

Country Report for the Kingdom of Thailand by Mr. Akkapong BOONMASH:

Flood control in Thailand is primarily handled by the Royal Irrigation Department, the Ministry of Agriculture. In particular, it is now working on an Integrated Plan for Flood Mitigation in the Chao Phraya River Basin, which includes preservation of the present natural retarding effect to minimize the increase in flood damage in the future through control and guidance on basin development in areas where flood damage is expected. Suitable measures to assure the safety level against floods in Bangkok and other urban areas will be introduced, and the safety level in agricultural areas will be enhanced.

After Mr. Boonmash's presentation questions were raised on the demarcation of responsibility on flooding of the Chao Phraya River.

Country Report for the Socialist Republic of Viet Nam by Mr. NGUYEN Xuan Hien:

Although floods occur in Vietnam annually, water levels rise slowly, thus usually providing communities with sufficient time to implement safety measures. A series of riparian measures combined with new seed and farming techniques have already doubled or in some areas tripled Vietnam's rice production. Nonetheless, there are still many measures needed, because floods in Vietnam arrive slowly but tend to stay for long periods.

Floods have both positive and negative aspects, and Vietnam has a philosophy of liv-

ing in harmony with floods.

After Mr. Nguyen's presentation, discussions on the cause of death during floods and on the term "living with floods" were held.

ICHARM Announcement by Dr. SAKAMOTO:

The world has need of an international center that allows countries to share information on flooding, control measures, and effective technology transfers.

ICHARM will be established as a Category II international Center under the auspices of UNESCO in JFY 2005, and will work in collaboration with other UNESCO-IHP agencies. Sponsored by the PWRI, it has the primary objective of collecting and applying a broad scope of knowledge and experience related to overcoming water-related disasters and helping the sustainable, integrated management of river basins. Additionally, it will serve a second goal of capacity building, and third of research.

Among the earliest available courses is Flood Hazard Mapping, to take place for four weeks for five years (2004-2008), to be provided to 16 trainees from eight Asian nations.

Secretariat Affairs:

It was decided that Mr. Mochizuki, would chair the General Discussion on October 28 where the conclusion of the Conference and minutes of the Common Interest Issue discussed on October 19 and Specific Subject Issues on October 20 and 21 will be summarized.

The 14th Conference on Public Works Research and Development in Asia

Discussion on Specific Subject

- Session on Mitigation Measures and Risk Management against Flood and Coastal Disasters-

MINUTES

1. **Date and Venue** 10:00-12:00 Thursday 20 October 2005
International Conference Room, NILIM

2. **Participants**

Cambodia	Dr. Bunna YIT
India	Mr. Janak Jerambhai SIYANI
Lao PDR	Mr. Keophilavanh APHAYLATH
The Philippines	Ms. Rebecca Trazo GARSUTA
Thailand	Mr. Akkapong BOONMASH
Vietnam	Mr. NGUYEN Xuan Hien
Japan	Dr. Tadashi SUETSUGI Head, River Division, River Department, NILIM Mr. Tetsuya NAKAMURA Head, Flood Disaster Prevention Division, Research Center for Disaster Risk Management, NILIM Mr. Fuminori KATO Senior Researcher, Coast Division, River Department, NILIM Mr. Yoshito KIKUMORI Senior Researcher, River Division, River Department, NILIM

3. **Discussion Minutes**

The primary focal points of the keynote presentation on Mitigation Measures and Risk Management against Flood and Coastal Disasters were: (1) Flood Disasters and Countermeasures; (2) Countermeasures for Urban Floods, and (3) Coastal Disasters and Countermeasures. The discussion raised the following questions from the overseas participants. The Japanese representatives provided additional information and/or further explanations.

(1) Flood Disasters and Countermeasures

(a) Countermeasures against infiltration into dikes (Cambodia)

Both floods and rain can cause water infiltration into dikes. The basic concepts behind countermeasures against water infiltration are to prevent water from entering the dyke body and to drain infiltrated water from the body. To drain infiltrated water, it is most effective to equip drainage at the toe of backside slopes. The gentle slope of dyke makes the body stable; however, it also increases surface susceptible to rainwater infiltration. Therefore, the gradient design for slopes must consider both stability of dyke body and prevention of water infiltration.

(2) Countermeasures for Urban Floods

(a) Rain Forecasts (Vietnam)

In Japan, three organizations work to predict precipitation levels. First and primary is the Japan Meteorological Agency which provides official forecasts. The Agency provides information to the pubic through the mass media. Secondly, private concerns also forecast rain for on limited areas. These services are useful when weather information on specific areas is needed. Lastly, river administrators also forecast rainfall levels. Using radar rain-gauge

system, they predict rain as part of their work in river management.

In respect to precipitation, the use of past precipitation records enable reasonably accurate forecasts for the approximately three hours ahead.

Japan Meteorological Agency computers manage comprehensive data on various factors such as air pressure and temperature. Such data management allows the Agency to conduct mid and long term rain forecasts.

(b) Rain Storage Facilities (The Philippines)

Generally speaking, rainwater reservoirs are built in schoolyards. However, urban areas often lack enough space needed for such reservoirs. To facilitate the underground permeation of rainwater, several measures are taken, including construction of permeable pavements or underground spillways, are taken. During non-flood season, underground reservoirs are also used to cope with emergencies such as fires and earthquakes.

(c) Rainwater Infiltration Facilities (India)

Normally speaking, gravel is the main material for construction of rainwater infiltration facilities. Pipes for rainwater drainage installations are connected to tanks of infiltration facilities. The base of the tanks is made of gravel. It is important to select gravel of appropriate size since when dirt and/or particle are jammed between gravels, it is difficult for rainwater to permeate. At the same time, the facilities must be maintained. The price of gravel is not expensive so much, however, maintenance cost of facilities is rather higher.

(3) Coastal Disaster and its Countermeasures

(a) Tsunami Alert (The Philippines)

The Japanese Tsunami Alert System covers the Pacific. Due to its broad coverage, it predicted the occurrence of the last year's Indian Ocean Tsunami. It can provide precise Tsunami alerts near Japan area. The current challenge is how the receivers can make an effective use of the prediction.

(b) Cost of Building Coastal Dyke and the Height of Dyke (Vietnam)

Differing from river dykes, coastal dykes are surfaced with concrete or asphalt, which makes their construction more costly. The dike height is determined by sea level and wave height. Sea level and wave height referred for dyke construction is usually based on the highest sea level that occurred in the past and the biggest wave that occurs in 30 to 50 years, respectively.

The 14th Conference on Public Works Research and Development in Asia

Discussion on Specific Subject

- Session on Risk Management and Mitigation for Sediment-Related Disasters -

MINUTES

1. **Date and Venue**: 13:00-15:00 Thursday 20 October 2005
   International Conference Room, NILIM

2. **Participants**:

Cambodia	Dr. Bunna YIT
India	Mr. Janak Jerambhai SIYANI
Lao PDR	Mr. Keophilavah APHAYATH
The Philippines	Mr. Rebecca Trazo GARSUTA
Thailand	Mr. Akkapong BOONMASH
Vietnam	Mr. NGYUEN Xuan Hien
Japan	Mr. Jun'ichi KURIHARA Team Leader, Volcano and Debris Flow Research Team, Erosion and Sediment Control Research Group, PWRI Mr. Kazunori FUJISAWA Team Leader, Landslide Research Team, Erosion and Sediment Control Research Group, PWRI Dr. Nobutomo OSANAI (Head, Erosion & Sediment Control Division, Research Center for Disaster Risk Management, NILIM Dr. Hideaki MIZUNO Senior Researcher, Erosion & Sediment Control Division, Research Center for Disaster Risk Management, NILIM Mr. Taketoshi SHIMIZU Research Engineer, Erosion and Sediment Control Disivion, Research Center for Disaster Risk Management, NILIM

3. Discussion Minutes

The "Risk Management and Mitigation for Sediment-related Disasters" session focused on the initiative to "identify, assess and monitor risks, and enhance early warning." This topic was among the five action priorities in the "Hyogo Framework for Action 2005-2015, Building the Resilience of Nations and Communities to Disaster" adopted at the World Conference on Disaster Reduction (WCDR) held 2005 in Kobe City, Hyogo Prefecture. The discussions considered the following two aspects of sediment-related disasters:

a. Risk Evaluation, and,
b. Early Warning Systems.

To begin, a National Institute for Land and Infrastructure (NILIM) representative presented background on sediment-related disasters in Asia and on the Hyogo Framework as the Session Outline(1). This was followed by a presentation on Risk Evaluation, with emphasis on the Application to Past Disasters of a Method of Setting the Range of Debris Flow Damage to Houses (2). This outlined methods of determining special hazard zones and to determine the range of debris flow damage to houses.

The presentation continued on the following three aspects of (b) Early Warning Systems.

(3) Warning and Evacuation System against Sediment-related Disasters
(4) Debris Flow Detection Sensors
(5) Development & Actual Utilization of the Landslide Displacement Detection Sensors Using Optical Fibers

Q and A followed each presentation.

(1) Outline of the Session

First, the session was outlined. Some specific content was:

Of all of Asia's hydro-meteorological disasters, 9% are sediment-related. There is an average of 71 deaths per disaster, with average damages of $2.28 Million. Effective counter measures are crucially needed.

The Five Priorities for Action set out in the "Hyogo Framework for Action 2005-2015" adopted at the WCDR held in Kobe City, Hyogo Prefecture in 2005, are:

a. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation
b. Identify, assess and monitor disaster risks and enhance early warning
c. Use knowledge, innovation and education to build a culture of safety and resilience at all levels
d. Reduce the underlying risk factors
e. Strengthen disaster preparedness for effective response at all levels

(2) Application to Past Disasters of Methods of Setting Range of Debris Flow Damage to Houses

A method to calculate stream factors where there is the potential for debris flows was introduced. One means of mitigating sediment disaster risks lies in restricting land utilization. He outlined methods of zoning new land developments (in the potential range of debris flow damage) in Japan.

(3) Warning and Evacuation Systems for Sediment-related Disasters

The role played by prompt dissemination of warnings is significant in ensuring safe evacuations in sediment-related disasters. The presentation outlined how improvements of the risk management system to enable data collections are required to promptly and efficiently communicate warning information on sediment-related disasters.

Methods typically applied in Japan to design warning and evacuation systems for sediment disasters were introduced. The primary response was to predict debris flows based on combining rainfall intensity and cumulative rainfall.

(4) Debris Flow Detection Sensors

The presentation emphasized the importance of detecting of debris flows to lessen the death toll in sediment related disasters. Additionally, the various detection sensors for debris flows actually used in the field in Japan were outlined, along with a detailed introduction on a new method to set vibration sensor trigger levels.

(5) Development and Actual Utilization of the Landslide Displacement Detection Sensor Using Optical Fibers

This presentation introduced the development of using optical fiber to monitor ground fluctuation caused by landslides; this has the advantages of ability to measure broad expanses and resilience to lighting. A case examining actual field use of the device in a real world land slide was examined.

(6) Comprehensive Discussion (Q and A)

Q. A formula to calculate velocity of debris flow was provided. How do you verify its accuracy? Also, will it be improved in the future? (The Philippines)

A. To enhance the estimation accuracy of velocity and depth of debris flows, detailed topographic data is crucial.

Q. From what perspective or what factors govern the classification of Japanese sediment-related disasters such as debris flow, landslide, and slope failure? (The Philippines)

A. Although the term "landslide" is commonly used throughout the world, Japan categorizes these into the three separate types. Landslides are separate based on its cause: groundwater up-rise. All three are categorized according to their different movement patterns.

Q. How is the volume of debris flows calculated? How do you evaluate the changes of rainfall to predict debris flows? (Cambodia)

A. We conduct field surveys to survey deposit volume in mountain streams and the volume of earth and sand subject to move in a sediment flow, and calculate the potential debris flow volume comparing those two numbers. We then assess where debris flows occur according to the estimated volume of rainfall as it happens.

Q. How is the number of days with rainfall determined, when predicting debris flows caused by precipitation? (Cambodia)

A. Although normally be determined considering geological conditions, we also use statistics from which we can estimate if a debris flow will occur. Not only the antecedent rainfall, but also half-life period used when calculating working rainfall is designated with statistics.

Q. What is the reason for applying 25m as the value at a standard distance (d') in the formula to calculate vibration sensor trigger level to detect debris flows? (Cambodia)

A. Although installed in mountain areas, the vibration sensors must be on level ground. From the past experiences, the average distance has been approximately 25m.

Q. How do you determine the installation sites of the landslide displacement dictation sensors using optical fiber? (Cambodia)

A. Deformation by landslide generally appears in roads and retaining walls. When those cracks are discovered, a field survey at the upper slope is conducted and the installation location of the system is determined after confirming the condition of the cracks on the slope.

The 14th Conference on Public Works Research and Development in Asia
- Special Session on Flood Forecasting and Warning -

MINUTES

1. **Date and Venue** 09:00-11:30 Friday 21 October 2005
International Conference Room, NILIM

2. **Participants**

Cambodia	Dr. Bunna YIT
India	Mr. Janak Jerambehai SIYANI
Lao PDR	Mr. Keophilavanh APHYLATH
The Philippines	Ms. Rebecca Trazo GARSUTA
Thailand	Mr. Akkapong BOONMASH
Vietnam	Mr. Nguyen Xuan HIEN
Japan	Mr. Akira KITAGAWA Executive Coordinator for International Affairs, PWRI. Mr. Akira TERAKAWA Director, Secretariat for Preparatory Activities of UNESCO-PWRI Centre, PWRI Mr. Junichi YOSHITANI Team Leader, Risk Management Team, ICHARM Centre, PWRI Mr. Yoshio SUWA Dr. Tarek MERABTENE Specialist Researcher, Risk Management Team, PWRI

3. **Discussion Minutes**

(1) Opening Address, Mr. Junichi Yoshitani

At the opening address Mr. Yoshitani have presented the current issues in flood forecasting and warning and put emphasis on future directions in flood disasters mitigation that is 1) to seek the best combination of structural and non-structural alternatives; 2) to seek the effective scheme of involving people in decision process; 3) to seek appropriate role and responsibilities sharing between national government, local government, municipalities, and individuals. There are two different impacts to reduce Loss of lives and Economic loss. While economic loss can be reduce by promoting structural measures loss of lives requires more holistic proactive and reactive actions involving Individual actions, Community actions and Government actions. The public response to flood warning is less than 30% percent, this ratio is even smaller in developing countries where people would prefer to stay in prone area to watch their property.

(2) Summary of country and session reports, Mr. Yoshio Suwa, PWRI

In his presentation, Mr. Suwa emphasized the need to clarify the problems that our society is facing during disasters. For instance, during the Nigata flood in 2004 death of old people occurred and during Typhoon 23 a bus was inundated, along other examples of recent floods in Japan were presented. Among the most important concern during the evaluation of the effectiveness of our current warning system is to analyze the real causes of death for each flood disasters. Other concern put forward for discussion is the evaluation of flood forecasting and warning system during an actual flood for instance the response of agencies and the population to the flood warning and/or Alert.

(3) Flood Forecasting and Warning in India, Mr. Janak Jerambehai Siyani

The flood of 26 July 2005 in Mumbai City was the worst ever recorded event. During the flood the forecasting system could not predict the highly localized phenomena. Despite the issuing of flood warning, the death toll was unprecedented high and reached 736 in Mumbai and more than 1000 death in Maharashtra State. During the flood about 150,000 people were stranded in their offices and schools and many people died drown inside their cars. The coincidence of high tide and heavy rain worsened the situation. The state government had released Rs.5 billion for emergency relief.

(4) Cambodia Case Study, Dr. Bunna Yit

For flood forecasting 8 hydrologic stations are available. Ministry of Public Works and Transport with The National Committee for Disaster Management has approved some action to (1) collect disaster information along the affected or damaged road and hydro-structure, (2) inspect and survey critical section and ready to warn the road user and people when the flood water reach the freeboard design level. Many sections of road in the flood basin are considering as evacuate place for the animals and people from the villages nearby. MPWT shall and ready to warn the transporters of possibility to disrupt traffic or minimize the loading traffic by heavy truck for high risk and high safety. Boats are also valuable mean for rescue activities during flood.

(5) Lao PDR Case Study, Mr. Keophilavanh Aphaylath

Flood forecasting in Lao PDR is coordinated with the Mekong River Commission. The real-time information (water level and rainfall data) includes data from five key hydrological and meteorological stations in Thailand, and five key hydrological and meteorological stations in Lao PDR to transmitted by radio or facsimile to the MRC Secretariat daily at 17 00 hours or, during peak periods twice daily, at 11 00 and 17 00 hours. Normally, the forecast is issued five days in advance. The death toll in Lao PDR is very small or none existing but economic damages to agriculture in particular is still very high.

(6) The Philippines Case Study Ms. Rebecca Trazo Garsuta

The Disaster mitigation program in the Philippines include both proactive and reactive responses are adopted. As proactive measures communities undertake exercise and evacuation drills along many awareness campaign and volunteer team actions. As damage mitigation measure the local community issue guideline on safety measures (such as suspension of school classes) as well as to issue local ordinance to use calamity fund. Much legislation for water disaster mitigation are continuously formulated by the Government.

(6) Thailand Case Study, Mr. Akkapong Boonmash

Flooding in Thailand occur in average 10 times/year. the inundated lands is about 32% of the total. Every year more than 100 people die due to flood and more 800 thousands people are affected. The average damage is as high as 4,094 million Baht. Disaster preparedness in Thailand is conducted as part of the country's civil defense management, which is comprised of three levels National Level (the Department of Disaster Prevention and Mitigation (DPM) is the principal government agency responsible for formulating policy on disaster management and prevention), Provincial Level (the Provincial Governor is designated as Director of Provincial Civil Defence) and Local Level (the Mayor is concurrently the Municipal Civil Defense)

(7) Vietnam Case Study, Mr. Nguyen Xuan Hien

The flood forecasting is not easy, in the Mekong delta we have tried to carry out the long-term flood forecasting (month, season), medium-term flood forecasting (10-15 days) and short-term flood forecasting (3 to 7 days). The result show that short-term flood forecasting is enough accuracy and the others are only for reference. In Vietnam we found that most of the

death people were children. As a response the government establishes the child care houses during the flood season. We have reduced number of the death people (2000 flood: 448 2001 flood: 412, 2002 flood:170, 2003 flood: 85, 2004 flood: 42).

(8) Discussions outcomes, Mr. Tarek Merabtene

- While governments have the responsibility to develop flood forecasting and warning systems, it's the responsibility of the Citizens to take proactive measures to safe their lives. For instance Refusal of early evacuate by citizens have proved to increase difficulties to mobilize enough facilities such helicopters and boats for rescue.
- The issue of why people do not respond to warning is still questionable. In many areas poverty is one of the reasons but other reasons have to be identified by undertaking case basis analysis.
- In Japan recent problems such death of old people put forward the issue of evacuation system and evacuation order and directive for old people.
- Disaster from small river scale where no flood forecasting and warning system exist should be carefully considered.
- Traffic control during flood is new issue under discussion.
- Good example: Kochi Prefecture. Community flood fighting > smooth communication and support between individual.
- Thus, Evacuation System are as important as warning system. For instance inability to evacuate due to social conditions.
- Analyses of the real cause of death for every flood disaster is recognized to be a very important issue.
- For instance the cause of death in Mekong Delta during flood is questionable acknowledging that the rising speed of water level is not so rapid to impede evacuation.
- Learning from the different Mechanism of the flow information of warning.
- In major rural area the main limitation for effective warning is the lack Information Perception. For instance farmers have a very poor or absent knowledge to understand forecasting and warning information.
- There is an emerging need to establish accurate database for global analysis
- Since many private boat are made of timber and people tend also to rescue their animals case of drawn boats are witnessed. Other cause of death is sudden biting by wild animals such as snakes.
- Strengthen the international collaboration for support and exchange data, information, knowledge and experiences on flood forecasting and warning are very importance and indispensable.
- Efficient of Measurement station was bought forward by the case of Mumbai flood where 2 meteorological stations recorded different precipitation. Even with higher resolution system it is difficult to forecast a case such as of the localized rain in Mumbai.
- Cause of death: absence of high spot, Submergence of occupied vehicles
- Preparation of manuals in local languages
- People in remote area are not connected to media and human communication is important.
- Moving animals to safe place is also a major issue of local and rural areas during flood.
- The FFWS are limited in many of our regions due to limited rain gauges.

The 14th Conference on Public Works Research and Development in Asia

The 14th International Symposium on National Land and Development and Civil Engineering in Asia

- Flood, Sediment and Tsunami Related Disasters in Asia" -

MINUTES

1. **Date and Venue** 13:10 – 17:00 Thursday 27 October 2005
Sendai International Center Conference Room

2. **Participants**

Cambodia	Dr. Bunna YIT
India	Mr. Janak Jerambhai SIYANI
Korea	Dr. Chang Wan KIM
Laos PDR	Mr. Keophilavanh APHAYLATH
Rep. of Philippines	Ms. Rebecca Trazo GARSUTA
Thailand	Mr. Akkapong BOONMASH
Vietnam	Mr. NGUYEN Xuan Hien
Japan	Mr. Tsuneyoshi MOCHIZUKI, Director General, NILIM
	And many more

3. **Addresses**

A. Host Nation Opening Address by Mr. Tsuneyoshi MOCHIZUKI, Director General, National Institute for Land and Infrastructure Management (NILIM)

Our world has recently seen several major disasters, many water related. In the Century of Water, Asian nations are working to improve water utilities, sewage and irrigation systems, and to develop water resources and disaster prevention. In Japan, water disaster mitigation has a long history, and today, Japan now has comprehensive Basic Laws on Disaster Measures. Advances in communications allow agencies involved in disaster management to stay informed on a real time basis, and help keep the general public better informed. High Risk Areas are being equipped with Hazard Maps marking both danger zones and evacuation refuges. Integrated response is key, and in Japan as throughout Asia, much important work remains to be done and vulnerability remains high. Today's conference allows the exchange of views with Asian nations with similar concerns, so that we can all better understand each other's problems and responses, and can help resolve these problems through mutual cooperation.

B. Guest Address presented by Mr. Michio TANAHASHI in lieu of Mr. Masato SEIJI, Vice Minister for Engineering Affairs, Ministry of Land, Infrastructure and Transport (MLIT).

Today's Conference brings experts from seven Asian states to Tohoku, where the Regional Bureau has done much on behalf of today's proceedings. MLIT's mission is to "Provide both Hard and Soft Infrastructure for Peoples' Lives Filled with Vitality" and, "Ensure a Beautiful, Attractive National Domain, for Diverse, Unique Communities." We try to enhance the quality of government services, lower costs, and ensure quicker response, by seeing things through the eyes of the ordinary citizen. "Building a Nation Resilient to Disasters" is a major policy pillar for our MLIT. Civil Engineering is key to achieving these ends, and we must further research and develop social capital and infrastructure requirements suitable for the social, natural, and economic conditions of each nation. Each achievement in each nation lends to greater advancement and progress for all.

C. Overseas Participants' Representative Address by Mr. NGUYEN Xuan Hien of Viet Nam, representing international attendees

The international attendees would like to express our heartfelt thanks to the Government of Japan, the JICA, and to the Ministry of Land, Infrastructure and Transport for the opportunity to study Japanese technology on disaster mitigation including the site survey program, dam construction, meteorology, and related laws. We know we are all susceptible to disasters, but if we work together, sharing data, information, knowledge, and skills, we will achieve what we aim for. We would like to commit ourselves for more dedicated service in our specific fields to prevent further disasters in the future.

4. **Keynote Address**

Global Disaster – Lessons from the 2004 Sumatra Earthquake and Indian Ocean Tsunami

Prof. Fumihiko IMAMURA, Disaster Control Research Center, Graduate School of Engineering at Tohoku University

The 2004 Sumatra Tsunami was one of the three largest known. Since 1992, there have been 22 major tsunami in the Pacific and Indian Oceans. Essentially, a tsunami is generated by disturbance of the seabed, causing waves to travel across open waters amplified by shoaling and refraction. As the wave reaches shallower waters, the climb in energy density increases both wave height and force. A review of the 1993 Hokkaido tsunami experience underscores how secondary disasters such as fire and landslides can widen devastation. The 1998 Papua New Guinea tsunami resulted in a booklet being made to disseminate the age old wisdom of tsunami awareness, which had dissipated with modernization. The death toll was aggravated when modern residents failed to realize they should run for height cover.

Specific details were given on the seabed deformation that resulted in the 2004 tsunami. Advanced modeling and simulations demonstrated the force and strike zones and angles which hit Banda Aceh and Khao Lak area of Thailand, as well as a derailed train swept by the tsunami in Sri Lanka. Satellite imagery clearly demonstrated the damage swath. At Kahawa, a single two story residence withstood the tsunami strike, and further studies may yield valuable data on resilient designs. There is some evidence indicating that heavy greenery serves to break the wave forces.

A major aspect in reducing the rate of fatalities appears to be in three factors: self help, public or government help, and good neighbor actions or mutual help. In Japan, reminders of past losses are amplified with Hazard Maps and GIS modeling to identify high risk zones.

5. **Special Reports**

A. Japan (Mr. T. Mochizuki, Director General, NILIM) Disaster Reduction and Risk Management Approach to Flood, Landslide, and Tsunami Problems in Japan

Japan is part of Asia, the part the world most affected by flood disasters. The geologically active Japanese archipelago is a land of steep slopes with swift short rivers. Population is concentrated in heavily urbanized low lying coastal flood plains. Flood damages in recent years have been characterized by lower death and injury tolls, with lower total area inundated. These are the results of improved communications, evacuation logistics, and better infrastructure. However, these drops have also been accompanied by almost no change in the overall monetary value of damages, as the value of the flooded areas has continued to rise.

Japan uses the Flux Difference Splitting (FDS) Method to analyze the combined effect of flood and inundation flows. Flood Hazard Maps have proved an effective, way to reach residents in high risk areas. Japan defines sediment disasters into four types: (1) debris flows or sediment carried by swiftly moving streams, (2) rock falls or sudden cliff collapses, (3) volcanic pyroclastic flows, and (4) landslides, extensive, slow slope failures. The Japanese disaster prevention scheme consists of four phases: Response, Recovery, Mitigation, and Prepar-

edness. Future risk management initiatives concentrate in three areas: (1) Seeking the best combination of structural and nonstructural measures for each river basin, (2) Seeking effective means to involve the public in the decision making process, and (3) Seeking appropriate responsibility sharing between the national, local, and municipal governments and individuals.

B. Regional Report (Mr. M. Shinohara, Director of the River Department, Tohoku Regional Bureau) Disaster Reduction and Crisis Control for Flood, Landslide and Tsunami Disasters in the Tohoku Region

Tohoku constitutes about 18% of Japan's land surface and is home to 8% of the population. Straddling two oceans, floods occur western coasts along the Sea of Japan due to fronts, and along the eastern Pacific coast due to typhoons; it is also hit by tsunami. At the northern end of the main island of the Japanese archipelago, Tohoku is also susceptible to floods from snow melt. Tohoku is now establishing three flood control basins, and four discharge channels. A project similar to the US Tennessee Valley Authority (TVA) program has been established for five dams on the Kitakami River, it is called the KVA. The program incorporates flood controls, irrigation, and power generation. New innovations include integration of structural and non—structural measures including, providing river disaster prevention information on Internet or mobile phone sites, images of river water levels provided to the public media, and support for Hazard Maps.

C. Country Report for Korea (Dr. Chang Wan KIM, Research Fellow, Korea Institute of Construction Technology) Typhoon Rusa and Super Typhoon Maemi: Impacts and Aftermath

Recently, two major typhoons, Rusa in 2002 and Super Typhoon Maemi in 2003, imposed a heavy toll on Korean society. Typhoon Rusa was one of the worst tropical storms in the last 45 years, Super Typhoon Maemi was the strongest since records were first taken 100 years ago. Rusa made landfall in August with sustained winds of 120 km/hr, and gusts of 150 km/hr. Super Typhoon Maemi, a Category 5, attained maximum speeds of 280 km, but made landfall on 12 September with maximum sustained winds of 140 km/hr, gusting to 175 km/hr. Typhoon Rusa was a "wet typhoon" with a 200 year record breaking precipitation with ten times greater than average damages, and five times the previous records. Super Typhoon Maemi was a "dry" typhoon with strong wind force. Maemi struck the Busan harbor with such intensity that it not only tossed shipping containers and fishing boats into the air but also toppled eleven giant container-lifting cranes, each weighing some 900 tons.

One problem with both typhoons was that forecasts and severe weather warnings came too late for disaster management teams to react well. The climate is rapidly changing but government policy is only slowly adjusting. Korea is now developing its first Korean geosynchronous multi-functional satellite (COMeS) program to provide real-time meteorological observation data with higher time, spatial and spectral resolution data than currently available. For more rapid and precise forecasts of rainfall and streamflow, Korea is installing hydrological radar and automated flow measurements.

D. Akira TERAKAWA, Director, Secretariat for Preparatory Activities of UNESCO-PWRI Centre, Public Works Research Institute (PWRI), Outline of the ICHARM

The International Centre for Water Hazard and Risk Management, a.k.a, ICHARM, will operate under the auspices of UNESCO from PWRI facilities located in Tsukuba, Japan. The need for ICHARM is evident from the (77%) share of water disasters in natural disasters, which account for 61% of all disasters vis-à-vis 39% technical disasters. Floods and storm rains account for the overwhelming majority of water disasters with 10 or more deaths or 100 or more victims. Of these, nearly 1/3 occurs in Asia.

ICHARM will be located with the PWRI facilities in Tsukuba. Established in 1927, PWRI today has almost 220 staff involved in 14 prime research themes. Of the nine research teams,

three (Water Environment, Hydraulic Engineering, and Erosion and Sediment Control) work with water related disasters. PWRI will be able to offer ICHARM involvement in its already world wide international cooperative research programs. The objective of ICHARM is to help prevent or mitigate water-related disasters throughout the world, through the synergy of accumulated knowledge and experience and via the international sharing of valuable information with the global UNESCO-IHP network.

Q&A:

Q. Please outline the foreign researcher program.

A. One researcher has been selected to start work in October, and we expect to add another four within the fiscal year.

6. PANEL DISCUSSIONS

MC: (Mr. Tsunaki, Director, Research Center for Disaster Risk Management, NILIM) Asia perpetually suffers from water related disasters, with coastal areas are often hit by tsunami. The Indian Ocean Tsunami has made us all more aware of water related disasters. Let us hear first from our neighbors who have not yet introduced conditions in their countries.

A. Cambodia (Dr. Bunna YIT) Risk Management & Mitigation for Flood Sediment Disasters.

Three fourths of Cambodia's 12 million people live in the central plains. Since Mekong flood disasters have far reaching impacts, there are eight hydro-meteorology stations set along the river's banks. River levels rise steeply during the June to November rainy season. Floods in 2000 were especially damaging, including to the road network which obstructed rescue and recovery efforts. Many trunk routes align the river banks, with double service as dykes.

Q&A:

Q. Do you have any plans to clear sediment gridlock during the dry season?

A. This is currently impossible because we do not have the funds. But this is a problem that is not unique to Cambodia and should be tackled through an international framework.

B. India (Mr. Janak Jerambhai SIYANI) Risk Management & Mitigation for Flood Disasters

India is studying both structural and non-structural methods of risk management. Structural means include dams, embankments, flood walls, natural detention basins, et al, but most importantly, multipurpose reservoir projects. Non-structural measures for mitigation of flood disasters include flood plain management measures such as zoning, flood forecasting and warning systems, public health measures, flood insurance, et cetera. Flood warning systems move information from the national centers to public media, and from district and tauka levels to villages. The pre-disaster risk management cycle moves in tandem with post disaster recovery work.

Q&A:

Q. You noted that land use policies should be more stringent; does India have a land use control law for low lying areas?

A. Land use laws and rules are common in the urban areas but are poorly enforced. Without enforcement, the wrong use will only make future problems worse.

Q. Warning systems are important. Does your warning system serve only local residents or does it also provide for tourists or visitors?

A. I think that the issue is the low lying areas of urban centers, where poor people are concentrated. Outsiders tend to stay on higher ground, so we don't see that they have much problem.

C. Laos PDR (Mr. Keophilavanh APHAYLATH)

The overwhelming majority of the 5.5 million people in land-locked Laos PDR live in the lowlands along the banks of the Mekong. Overseas aid makes up a little over 20% of the nation's GDP. Although still reliant on agriculture, much of the land cannot be tilled due to still

remaining anti-personnel cluster bombs. The primary natural disasters are floods and droughts. Much work in risk management is done with the cooperation or under the auspices of the Mekong River Commission. Focus is on better procedures to assess flood behavior and restrict damage. Survey data collected by the Department of Irrigation is being transferred to GIS format. The Streamflow Synthesis and Reservoir Regulation flood forecasting model developed by the US Army Engineers in the 1970's is still being used, although plans call for model amplification or substitution. Laos is now studying long term investment in infrastructure to include dykes, reservoirs and the widening and deepening of natural drains.
Q&A:
Q. You noted Government policies. Who actually is responsible for issuing warnings?
A. Early warning is handled by the Mekong River Commission; there is no system for tributaries of the Mekong. However, our floods are not flash floods but river levels rise slowly enough for the population to evacuate safely without hurry.

D. Rep. of the Philippines (Ms. Rebecca Trazo GARSUTA) Risk Management and Mitigation for Flood and Sediment Related Disasters

Most natural disasters in the Philippines are due to destructive typhoons and heavy monsoon rains. The National Disaster Coordinating Council is the fulcrum of the country's disaster mitigation programs—it focuses on providing non-structural measures. Because the cost of annual damages totals 2% of the national budget, and nearly double the flood funding allocated to the Department of Public Works and Highways, serious measures are supported via ODA funds including help from JICA. Structural disaster mitigation includes conventional public works such as dikes, retention ponds, sedimentation basins, sabo dams, channeling, and drainage improvements. Non-structural programs include capacity building workshops for disaster response teams, and means for proper, effective dissemination of information. Both structural and non-structural mitigation measures must be employed to allow the full benefits of projects. Non-structural measures also imbue the local population with a sense of ownership. Particularly, a JICA sponsored pamphlet for a local community done in the local dialect and adaptation of Hazard Maps as non-structural measures used in Japan have been beneficial.
Q&A:
Q. You are using the Hazard Maps as non-structural measures. I believe NGO's have a major role in outlining the Hazard Maps. If so, can you describe what types of NGO's are used? Also, how do you measure the efficiency of these measures?
A. There is considerable local participation from the preparation stage of the Hazard Maps. The Government merely assists to finalize plans. NGO's, private, church or business-based, represent the many different stakeholders, and help integrate different sectors of society. Schools help disseminate information. As for effectiveness, post-project results in Ormoc City yielded much lower death tolls in a flood that came two years later after a devastating flood, indeed there were zero casualties.

E. Thailand (Mr. Akkapong BOONMASH)

Located in the tropical monsoon zone of SE Asia, Thailand enjoys relatively uniform temperatures in all regions, conditions generally favorable for year-round crop production. The primary disaster prevention and mitigation measures come under the Integrated Plan for Flood Mitigation in Chao Phraya River Basin. Here, the main causes of flooding are the low flow capacities of river channels. For example, dike breaching and overtopping occur at nearly all reaches of the Chao Phraya River. To cope with flooding, the government has implemented several programs including a river improvement and drainage system improvement called "monkey cheek project" in the river delta. The Monkey Cheek Project is drainage work from upper area southwards through the canal to a large storage canal near the shore line. When the sea level is lower than water in the canal, the water in these

storage canals is drained through gravity flow. The basic concepts of the master plan includes, preservation of the present natural retarding effect to minimize future flood damage through controls and guidance on basin development in areas where flood damage is expected.
Q&A:
C. This is not a question, but a comment. Your annual average of 1470 mm is lower than that of Japan.
Q. Does Thailand have any structural measure or flood protection plans for the Chao Phraya?
A. Yes, we have to improve the river by heightening the levees, then we will improve the retarding basin.
Q. I lived in Bangkok from 1993 to 1995. You noted an annual death toll of about 120 persons, but the flooding rises very slowly. Can you give us more information on these deaths?
A. The data is for the entire country of Thailand, not just Bangkok.

F. Vietnam (Mr. NGUYEN Xuan Hien)

The Mekong River Delta is located in Vietnam where an annual 1.2 to 1.8 million hectares are inundated for period of three to six months. A combination of advanced water management programs, new rice seed, and flood infrastructure has resulted in multiple rice crops each year. However, Vietnam considered floods to have positive effects as well as negative, bearing silt to enrich the fields, and generally cleansing the land. Vietnam therefore follows a policy of partially "adapting to living with floods."
Q&A: None

G. Dr. IMAMURA

I would like to comment on Hazard Maps. These are mandatory but not well used by residents. I believe it is important to make community participation in forming these maps more enjoyable. We have sponsored contests for students, for example.

H. Mr. MOCHIZUKI

Information exchange between agencies responsible for disaster response does not always go well. One problem is doubtless cutback in the civil servant workforce, but another is the diversity of available information. One possible solution is the use of IT to provide exactly the same screen readouts to all parties. Such systems would have to be adjusted for different disasters.

I. Mr. SHINOHARA
Q. Since Vietnam is at the delta of the Mekong River, it must be fairly easy for Vietnam to predict coming floods.
A. (Mr. Nyugen) The Mekong River flows through six countries, but the River Commission only includes four. The upstream waters are in China, not a River Commission member. We are aware that China plans to build a total of five hydropower plants, two of which are complete. Cooperation is crucial.

J. Dr. KIM

Structural measures are important in Asia, but in Europe, they have focused on living with floods. The paradigm change seems to be moving toward a greater focus on non-structural measures like forecasting, Hazard Maps, and demolishing concrete surfaces.

K. Mr. MOCHIZUKI
Q. Dr. KIM, you had a bar graph showing damage levels and costs. What has been the result of bureaucrats or media who have viewed your graph?
A. (Dr. Kim) Many people have reacted to the graph as merely showing unusual conditions

and not as precursors of a period of aberrant weather conditions. Another aspect is that private landowners are opposed to publishing of Hazard Maps because such maps can bring down property values.
Q: As you know, typhoons often pass by Japan en route to Korea. Perhaps we should work harder to anticipate paths, and provide the information to our respective citizens.
A: Yes, as I noted, our forecasting center did not adequately anticipate these major typhoons, and information from the Japan Meteorological Agency would be most helpful.

L. Ms. GARSUTA

I was very impressed with Dr. Imamura's presentation on the tsunami. Certainly, global research is going to be very important in the future. With Japan's help, as a leader in tsunami research, the ICHARM project will help lay the necessary foundations at a propitious time.

6. **Closing Address**

The closing address was provided by Mr. Shinichiro TANAKA, of the MLIT Tohoku Regional Bureau. He noted that the symposium considered the theme of Disasters, a topic immediate and central to the Tohoku Regional Bureau. We consider it meaningful to have had the opportunity to have heard from many areas on disaster conditions and measures, and we hope to use much of what we have heard today in our future applications.

The 14th Conference on Public Works Research and Development in Asia

General Discussion

MINUTES

1. **Date and Venue** 09:30-10:00 Friday 28 October 2005
Hotel JAL City Sendai

2. **Participants**

Cambodia	Dr. Bunna YIT
India	Mr. Janak Jerambhai SIYANI
Korea	Dr. Chang Wan KIM
Laos	Mr. Keophilavanti APHAYLATH
Philippines	Ms. Rebecca Trazo GARSUTA
Thailand	Mr. Akkapong BOONMASH
Vietnam	Mr. Nguyen Xuan Hien
Japan	Mr. Tsuneyoshi MOCHIZUKI Director General, NILIM Mr. Kazuhiro NISHIKAWA Executive Director for Research Affairs, NILIM, Mr. Jun INOMATA Director, Planning & Research Admin. Dept., NILIM Mr. Minoru KURIKI Director, River Department, NILIM Dr. Ryosuke TSUNAKI Director, Research Center for Disaster Risk Management, NILIM Mr. Kiyoshi MINAMI Research Coordinator for Evaluations, Planning & Research Admin. Dept., NILIM

〔Secretary General〕
Mr. Junzo INOUE
Head, International Research Division,
Planning and Research Administration Department, NILIM
Mr. Soichiro YASUKAWA
Senior Researcher, the same as above
Ms. Yoriko IIBA
Assistant Head, the same as above
Ms. Akiko ISOGAI
Chief, International Section, the same as above

3. **General Discussions**

As agreed in the Session on Subject of Common Interest on October 19, Mr. Mochizuki chaired this session.

Conference Secretariat personnel reported on the contents of the previous sessions.

(1) **Report on Session on Subject of Common Interest**

M. KURIKI, Director of River Department, NILIM

Mr. Kuriki presented the minutes of the October 19 Session on Subject of Common Interest (Risk Management and Mitigation for Flood and Sediment Related Disasters) to the assembly. The majority of the minutes had been vetted by participants prior to the session.

A minor addition was made to the last sentence in the Country Report for Cambodia noting that “Public information is disseminated by TV and radio (Ministry of Information) while the Army and Police are responsible ’with commune’ for evacuation of people and animals to safe areas.”

Laos requested to correct his name from “Mr. Keophilavanti” to “Mr. Keophilavanh.”

From the report for Philippines, the word of the final sentence “causalities” be changed to “casualties.”

The minutes were approved pending the above changes.

(2) **Report on Specific Subject Session**

R. TSUNAKI, Director of Research Center for Disaster Risk Management, NILIM

The minutes for the three Specific Subject sessions were introduced by Dr. Tsunaki.

In the third minutes on the Special Session on Flood Forecasting and Warning on Oct. 21, there were some additions and corrections.

Cambodia requested to correct his name from “Dr. Bunna Yet” to “Dr. Bunna Yit.”

The Philippines requested to change the phrase in parentheses at the third sentence from “(such suspension of schools)” to “(such as suspension of school classes).”

The minutes were approved pending the above changes.

(3) **Conclusion**

J. INOMATA, Director of Planning & Research Administration Department, NILIM

The conference secretariat, Mr. Inomata presented a draft of conclusion of the 14th Conference on Public Works Research & Development in Asia.

Laos proposed to add a few words of thanks to the Japanese Government to give them this chance to come and attend the conference. Although Japan, the chairperson Mr. Mochizuki, expressed his gratitude to Laos for his compliments, he advised to make the conclusion just only the content of the conference itself and Laos agreed.

Cambodia suggested to add “and in sharing information on forecasting data and natural disasters” at the last part of the first sentence of the agreement.

Vietnam also suggested to add “and non-structure measures” at the last part of the second sentence of the agreement.

The conclusion was adopted with the above changes.

(4) **Proposal for Future Conferences**

K. NISHIKAWA, Executive Director for Research Affairs, NILIM

Mr. Nishikawa presented a proposal for the enhanced operations of future conferences. His proposal included the following:

(a)Establishment of a Research Information Network

(b) NILIM requests in support of future conferences: Following the return of participants to their respective nations, they are requested to provide the conference information to the institutes or organizations concerned including Japanese Embassy and JICA offices.

The participants agreed the proposal and then the chairperson moved to close the general discussion and proceed to the closing ceremony.