B. MINUTES

I. Minutes

The 11th Conference on Public Works Research and Development in Asia
Discussion on Subjects of Common Interest
– Water Resources and River Management for Sustainable Development –

Minutes

1. Date and Venue: October 17, 2002 09:30 – 16:30

2. Participants

India	Mr. Kaushal Narayan AGRAWAL
Indonesia	Mr. Djoko MURJANTO
Laos	Mr. Viengsavath SIPHANDONE
Malaysia	Mr. MOBARAK Bin Hussein
Pakistan	Mr. Zubair Emran KHAWAJA
Philippines	Ms. Sofia Torio SANTIAGO
Sri Lanka	Mr. Piyankarage DAYANANDA
Thailand	Mr. Jirachai SUTHASSANAJINDA
Japan	Mr. Haruhiko OKUNO (Director-General, NILIM)
	Mr. Jun-ichi MURAKAMI (Deputy Director-General, NILIM)
	Mr. Shuji TAKASU (Executive Director for Research Affairs, NILIM)
	Mr. Takeo NAKAJIMA (Director, Planning and Research Administration Department, NILIM)
	Mr. Satoru KONDO (Director, River Department, NILIM)
	Mr. Kazuhiro NISHIKAWA (Research Coordinator for Evaluation, Planning and Research Administration Department, NILIM)
	Mr. Hitoshi YOSHIDA (Research Coordinator for Water Quality Control, River Department, NILIM)
	Ms. Junko SAISHU (Head of the Research Administration and International Cooperation Division, Planning and Research Administration Department, NILIM)
	Mr. Shigeo MURATA (Deputy Head of Research Administration and International Cooperation Division, Planning and Research Administration Department, NILIM)

In the Conference, presentation and discussion was made on subject of common interest, **"Water Resources and River Management for Sustainable Development"**, from 9:30 a.m. to 4:30 p.m. on Thursday, October 17. Representatives from nine nations – India, Indonesia, Laos, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Japan – participated.

Mr. Satoru Kondo, Director of River Department at National Institute for Land and

Infrastructure Management (NILIM) chaired the conference. To start, Mr. Takeo Nakajima, Director of Planning and Research Administration Department at NILIM, summarized the first to tenth conferences and had a report on the results of the research exchanges through these conferences. Then, the country reports were presented on the subject of common interest, by the representatives of the participating nations in the sequence of Japan, India, Indonesia, Laos, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand.

The summary of the presentations and the discussions are as follows.

Introduction 1: Mr. Takeo NAKAJIMA

Mr. NAKAJIMA outlined the history and goals of the Conference.

The Conference has been started in 1993. Thanks to JICA, 98 representatives from 13 countries without Japan have discussed the issues of common concerns in the Conference. We welcomed new countries, Pakistan and Sri Lanka this year.

The Conference met three objectives:

(1) To facilitate the exchange of information on existing and future public works programs, and ideas between and among countries,

(2) To facilitate engineering discussions which stimulate thinking on solutions to issues common to the countries of SE Asia; and,

(3) To help build a network of practicing professional partnerships in Asian public works programs.

The Conferences bears bi-lateral and multi-lateral cooperative programs. And also, NILIM has accepted some 940 researchers and trainees from participating countries.

The Conference sets up the selected "Common Interest Subject" to help achieve its goals. The 2002 subject, "Water Resources and River Management for Sustainable Development," reflects concerns recently highlighted in major international conferences, such as the Johannesburg Summit 2002. And it is also one of the main topics of the 3rd World Water Forum to be held in Kyoto in March, 2003.

Country Report 1: Mr. Haruhiko OKUNO (Japan)

Mr. OKUNO's presentation on the Tonegawa riverworks showed the evolution of Japan's river management over four centuries. The Tonegawa Basin holds the so called Greater Tokyo metropolitan area.

Japan has four major islands with a total of 3,900 islands. With climate ranging from temperate to sub-tropical, rainfall throughout Japan ranges on the average from 1,000 to 2,500 mm per annum.

The Tonegawa Basin is the largest one in the five river basins draining the

Greater Tokyo area. Although the five river basins occupy just 6% of Japan's land, they have a population of 28 million (21%). In the Greater Tokyo, the property is evaluated at US$ 3.2 trillion (39%).

Sabo and riverworks programs on the Tonegawa actually began in 1594, over 400 years ago. In constructing the new capital of Edo (old Tokyo), the Tonegawa was redirected to east for four main reasons: (a) to prevent floods in Edo, (b) to develop new rice paddies, (c) to allow navigation of ships, and (d) to provide for the strategic defense of the new capital. The success of this early civil engineering brought tremendous prosperity to Edo as well as a rapid population increase.

Modern riverworks measures came in the Meiji era (early 1900's) as railways and automobile roads decimated the importance of river navigation. Civil engineering in this era focused on dredging and providing flood control embankments. The volume of dredged soil between 1900 and 1930 exceeded 30 million m^3. In 1947, the death toll and losses caused by the collapse of the levee by Typhoon Kathleen led to new, stronger measures for riverworks. Japan began building sabo erosion control facilities and dams. The Tonegawa was widened to increase river drainage capacity.

The Tonegawa basin has particularly been affected by population growth and changing land use. The Tsurumi-gawa, barely urbanized 10% in 1958, however, it shows 80% urbanization today. Urbanization and asphalt/concrete surfaces consequence less water absorption during rains. While improvement of riverworks has reduced the total inundated area, the concentration of properties and population in the flood plains has made floods greater disasters than ever before.

River management in Japan is now focused on comprehensive basin management, which includes the use of retarding basins and regulating reservoir on site storage, etc.

Additionally, the examples of recent river improvement projects like super levees, underground flow diversion pipes or channels to help drainage of smaller rivers, the use of multi-purpose dams were presented.

Country Report 2: Mr. Kaushal Narayan AGRAWAL (India)

Modern water resource management must maximize advantages of development while holding down adverse impacts, as well as deal with new demands arising from the linkage of freshwater resources and ecosystems. India reviewed its National Water Policy in 2002. Rainfall throughout India varies from 100 mm/annum in the west to 11,000 mm/annum in the NE. Also, India measures gross runoff from melted snows as 4,000 BCM (billion cubic meters) per year. The 877 key stations of the Central Water Commission gather data throughout the nation, and have marked significant advances in the remote sensing of snowmelt.

Flooding brings silt accumulation to the river beds that in turn, leads to future

higher flood levels. Nearly 12% of India's area is subject to floods, which claim an average annual 1,500 lives and 94,000 head of cattle. Along with flood plains, India has broad water logged areas where flat land suffers from inadequate capacity to drain. Nearly all of India's modern reservoirs are multi-purpose facilities, serving irrigation, power generation and flood control.

As a non-structural measure, Flood Plain Zones have been clearly set to define areas prone to flooding risks. Indiscriminate development is restricted to minimize losses from floods. Another non-structural measure is flood forecasting.

A major concern is sedimentation disasters. These are variously caused by deforestation, improper tillage methods, and other various other human activities. Sedimentation is a major problem for irrigation, navigation, and hydropower engineering projects.

Water demand forecasts predict shortages and there is immediate need to augment reservoir capacities.

A final urgent issue is potable water quality and the discharge of untreated wastes: pollution. Urban centers have overloaded the carrying capacity of water bodies to assimilate waste. Contaminated water may account for 80% of all disease and possibly 1/3 of all deaths. Treatment programs must be further considered.

Country Report 3: Mr. Djoko MURJANTO (Indonesia)

Some 6,000 of the 17,506 islands comprising Indonesia are inhabited. As island communities, the issues of water involve both floods from torrential rains and water shortages. The islands are undergoing rapid population growth and urbanization, particularly Java which accounts for only 6% of the land surface.

Three primary factors affect Indonesia's floods: (a) geological conditions and geographical position, (b) changing natural phenomena, and (c) socio-economic factors ranging from deforestation to urban concentrations. There are both structural and non-structural countermeasures. Structural measures include dikes or embankment upgrades, dredging of river channels, the use of reservoirs and lowlands for flood water retention, and pumps to drain excess water from low lying areas. Non-structural measures include evacuation and resident warning systems, and disaster relief.

Indonesia recently launched a comprehensive flood management program which includes (a) studies on balancing use and conservation of natural resources, (b) using a "one river, one plan, one management" approach to cover whole river basins, and (c) providing low cost housing to relocate squatters on levees and slum areas.

Population growth and rapid urbanization in Java have led to degradation of catchments and watersheds. In Java and in outer islands, sedimentation has stopped up the lower reaches of the rivers, threatening harbors and inland water navigation. This constrains transportation of food and other goods to upstream

areas.

Most sustainable development issues are related to the management of land. In Indonesia, land use issues of efficiency, sustainability, and equity are important focuses. On Java, for example, the conversion of higher elevation forests and coastal wetlands to agricultural use has led to soil erosion, watershed degradation, and loss of valuable marine resources. Unrestricted urban expansion gives rise to lower efficiency in providing for infrastructure.

Country Report 4: Mr. Viengsavath SIPHANDONE (Laos)

Landlocked LAO PDR is one of the world's poorer countries. It has a per capital GDP of only US$329/annum; however, over the last decade, it has had a growth rate of 5.7%.

90% of the nation is part of the Mekong River Basin; indeed Lao PDR has the greatest length of the Mekong of the Mekong River Commission states. The most serious problem of the Mekong is riverbank erosion.

According to the season, the water level of the Mekong changes over 10 meters. The river banks collapse both from fast current during high water and from the low water levels during dry season. This erosion has threatened National Road 13, the nation's most important trunk, as well as urban areas, housing, public utility systems, etc.

Most riverbank protection work uses gabions. However, even gabions are considered expensive in the Lao PDR because the iron mesh baskets must be imported. The annual budget for riverbank protection is about US$100,000 per annum.

Japan has helped introduce embankment protection methods that use natural materials. JICA has also arranged for a Development Survey for Riverbank Protection around Vientiane. This provides for pilot projects testing different uses of the Japan SODA mattress material to protect riverbanks from erosions.

Country Report 5: Mr. MOBARAK Bin Hussein (Malaysia)

PART I: Remote Monitoring and Control of Water Resources

Malaysia has a population of 23 million growing at 2.6% each year. Today, agriculture which contributes to about 20% of the GDP, is the major water consumer. Malaysia's Vision 2020 expects that as industries and household consumption rises, their water consumption will expand several fold.

Current water issues for irrigation in Malaysia include (a) low irrigation efficiencies, now at about 40% but expected to rise to 60%; (b) inefficient field water management due to various causes, and (c) lack of beneficiary participation.

To improve water resource management, Malaysia needs real time, accurate data via telemetry along with automation technology for effective control. A JICA proposed

program for modernization of irrigation schemes in granary areas include the Kerian Irrigation project to (a) convert manually operated gates into motorized systems, (b) install remote control systems, and (c) provide for a Control Centre at Bagan Serai. Also needed are video monitoring, remote sensing, and software development.

PART II: Urban Stormwater Management in Malaysia

Along with greater flood frequency, urban centers are suffering from deterioration of water quality. The Malaysian agency, DID, has widened and diverted rivers, and provided other measures which however, cannot control all flooding. It was decided that there was a limit to conventional methods which emphasize rapid drainage, and the use of larger drains and rivers. However, as urban center runoff increases as a result of greater use of asphalt and cement, it becomes impossible to always build greater drainage systems. We must re-allow infiltration or absorption into the ground. Changing surfaces to gravel or grass are accompanied by greater use of retarding basins and temporary holding areas.

Rain tanks are placed on private properties to permit containment of precipitation, Similar holding facilities in public areas can include ponds and other reservoirs, while wetlands can be preserved to provide for retention of water resources.

Storm water management is governed by a manual provided to concerned developers and local state governments by DID; this manual includes "best practices" from throughout the world. Originally there was some concern that such management practices would add to development costs but the manual has proven to its worth by cutting losses in case of disasters. Malaysia's manual means that ideas and practices are not an issue so much as the major obstacle of convincing local authorities and developers to follow the plans.

Country Report 6: Mr. Zubair Emran KHAWAJA (Pakistan)

Pakistan's economy is primarily agricultural, with the sector accounting for more than 60% of foreign exchange earnings and employing 46% of the labor force. Crop cultivation accounts for 52% of the sector while livestock accounts for 44%.

The Indus, Makran and Kharan Basins are major water resources for irrigation and power generation but groundwater too is a significant source of water.

Silt erosion has reduced storage capabilities in the Mangla and Tarbela some 20%. Decentralization of authority has also given rise to a lack of consensus and slowed action on developing effective additional water storage facilities. Developing additional storage will require strong national commitment and leadership.

With water resources so crucial to the national economy, the Water & Power Development Authority has developed "Vision 2025," which outlines development of about 26 BCM in additional storage capacity.

Population growth and accompanying demand growth is the single most important factor driving water policies. Pakistan's population of 141 million will reach 221

million by 2025.

Future water resources must come from a combination of conservation and storage. There is an urgent requirement for more capacity and a public awareness program to help control scarce resources.

Country Report 7: Ms. Sofia Torio SANTIAGO (Philippines)

The Philippine Archipelago includes some 7,100 islands, covering an aggregate 300,000 square kilometers. With a tropical, oceanic climate, the Philippines has two distinct seasons: rainy and dry.

The Philippines has a wide gamut of rainfall levels, but an average annual precipitation of 2,360 mm. Directly in the Typhoon Corridor, the country experiences an average of twenty typhoons a year. 20 of the nation's 421 principal river basins are classified as major basins with catchment areas larger than 1,000 square kilometers. Rivers are generally short and flow down very steep gradients. However, the 20major basins have river deltas ranging between 50 to 280 kilometers. One aspect common to all the major river systems is the inadequate discharge or carrying capacity, equal to the worst flood conditions that occur every two years.

Urban sprawl affects river discharge, as riverbeds suffer sediments, i.e., are heightened at specific bottlenecks. Population has rapidly concentrated in the lower reaches and deltas, meaning that flood management practices struggle to keep up with demographics.

As a volcanic region, eruptions and earthquakes result in serious sediment disasters. Sediment problems have shifted or heightened river beds. Human intervention, such as illegal logging and consequent deforestation, has also contributed to sediment disasters. Needed measures are hampered by limited budget and the low priority given to flood controls. As such, many programs are ODA-dependent.

The demand for potable water far exceeds the capacity of the utilities to deliver.

Under the Philippines' Master Plan, policies and strategies were formulated using structural and non-structural approaches to key problems, including mitigating flooding in Metro Manila, coordinating flood control projects with irrigation programs, and providing flood forecasting and warning systems in all river basins.

Country Report 8: Mr. Piyankarage DAYANANDA (Sri Lanka)

As an island nation, Sri Lanka depends on rainfall during the monsoon season for the bulk of its water resources. However, rainfall comes mostly to what we call the wet zone, and precious little falls in the nation's dry zone. Little affected by earthquakes or typhoons, floods and sediment flows are among Sri Lanka's most serious concerns.

A significant portion of the land, 80%, is owned by the Government. This means

that Land Policy is a crucial factor. Significant portions of Government owned cultivated land is leased to private companies. The implementation of systems improvements is affected by several problem areas, including (a) problems with existing, inappropriate legislation, (b) lack of institutional capacity, (c) limited budgets, (d) misuse of resources, etc. For example, irrigation now takes about 85% of our water.

Pollution is an emerging problem and is due to the lack of land use policies as well as direct disposal of wastes into water bodies by industry, small businesses, animal husbandry, etc. However Central Environmental Authority of Sri Lanka has passed legislation and is the maintaining organization too of the water bodies.

Colombo City had a large water retention area for torrential rains, which mitigated serious flooding. Today this area is taken up by urbanization, and floods are growing more common. Sri Lanka suffers too, from lack of enforcement of its laws.

Another aspect of civil engineering in Sri Lanka is that national agencies use the metric system while many of the local agencies use feet and miles. However distribution of water for irrigation at local level is encouraged to be given to farmer communities at present on an experimental basis.

Country Report 9: Mr. Jirachai SUTHASSANAJINDA (Thailand)

Management of limited water resources is a core issue in Thailand, where farms are generally small, depend on rainfall and have poor soil. Thus, Thailand has turned to an initiative called the Micro Irrigation Program managed by the Agricultural Land Reform Office (ALRO).

ALRO has allocated plots to small farmers, and taken responsibility to develop water resources for these small farming communities. Micro irrigation enhances the efficient use of water resources by providing water directly to the root of base of plants. This water use program also includes storing rainwater for use in dry seasons. Irrigation is done through micro sprinklers or dripping. Farmers must meet pre-set criteria, undergo education programs, and monitoring throughout the Micro Irrigation Program. They must also pay about 50% the cost of very simplified, basic pumps. The total per farm government subsidy of between 30 – 40,000 baht is balanced against expected annual farm revenues of 28 – 40,000 baht per year. Much of the labor is performed by farmers cooperating with each other. Being able to secure adequate labor resources is a criteria for program participation by farmers.

Under the program, ALRO provides equipment to 7,500 small farms, ownership of which is transferred to the farmers themselves. These plots cannot be more than 20 meters from some reliable water source.

Micro Irrigation is a Government project for Thai FY '03 (Oct 2002- September 2003). The 7,500 individual farm plots are scattered throughout 39 provinces. Each farmer must decide to grow either vegetables, flowers or fruit trees.

The success of micro irrigation methods is expected to help alleviate farm poverty, stabilized farm families and reduce migration to the urban centers.

The 11th Conference on Public Works Research and Development in Asia
Discussion on Specific Subjects I – Flood Control and Water Resources Management –

Minutes

1. Date and Venue: October 16, 2002 13:30-17:00 Discussion

2. Participants

India:	Mr. Kaushal Narayan AGRAWAL
Indonesia:	Mr. Djoko MURJANTO
Laos:	Mr. Viengsavath SIPHANDONE
Philippines:	Ms. Sofia Torio SANTIAGO
Thailand:	Mr. Jirachai SUTHASSANAJINDA
Japan:	Mr. Satoru KONDO (Director, River Department, NILIM)
	Mr. Tadashi SUETSUGI (Head, River Division, River Department, NILIM)
	Mr. Junji MIWA (Senior Researcher, Flood Disaster Prevention Division, Research Center for Disaster Risk Management, NILIM)

3. The discussion is summarized as follows:

(1) India suffers is an average annual loss of 1,500 lives due to floods. Accordingly, India implements both structural measures such as embankments as well as non-structural methods such as Flood Plain Zoning. India's National Water policy 2002 recognizes the need for preparation of a master plan for flood control and management.

(2) Indonesia's water resources management suffers from the negative aspects of population growth, urbanization and industrialization. However, the existing legal and regulatory framework is still inadequate, making organized countermeasures difficult.

(3) The issue in Laos in riverbank erosion of the Mekong River. With Japan's assistance since 1996, the Government has been introducing riverbank protection measures, to include SODA mattress and the use of local materials.

(4) Philippines flood countermeasures are designed to meet the worst flood conditions that might occur every ten year. The existing river system could only accommodate floods equivalent to two year return period. Over the last 20 years, floods have accounted for 27,000 fatalities. Compared to other infrastructure sectors, flood control sectors are given a much lower priority, resulting in less allocations than necessary.

(5) Flood control measures in Japan have reduced the numbers of fatalities and missing persons, but have not led to a corresponding reduction in flood damage costs. The primary cause of 74% of dike breaks is overtopping. This has led to studies of high graded levees, which are now in use at the Nakagawa and Ara Rivers. The 2001 revision of the Flood Fighting Law, led to forecasting of inundation area, the use of flood hazard map from 1995, and real-time river information services via the Internet and mobile phone.

The 11th Conference on Public Works Research and Development in Asia
Discussion on Specific Subjects I – Water Quality

Minutes

1. Date and Venue: October 16, 2002 13:30-16:30 Discussion

2. Participants
   Malaysia: Mr. MOBARAK Bin Hussein
   Sri Lanka: Mr. Piyankarage DAYANANDA
   Japan: Mr. Yoshiya YASUDA
   (Head, River Environment Division, Environment Department, NILIM)
   Mr. Minoru SASAKI
   (Senior Researcher, Water Quality Research Team, Water Environment Research Group, PWRI)
   Mr. Hiroki TSUJIKURA
   (Research fellow, River Environment Division, Environment Department, NILIM)

3. The discussion is summarized as follows:

(1) Mr. YASUDA:

Explained the problems and measures taken regarding water quality in Japan's lakes and reservoirs.

(2) Mr. SASAKI:

Discussed the causes of water pollution and quality degradation in Japan, along with an overview of the countermeasures. He also explained Japan's Environmental Standards.

(3) Mr. TSUJIKURA:

Explained the progress of research using a simulation model on water and water pollutant cycle.

(4) Mr. MOBARAK:

Explained the issues of water quality management in Malaysia. Also, he outlined the essential measure that must be taken by the Malaysia Government. Among these is a promising program to be implemented, called IRBM (Integrated River Basin Management).

(5) Mr. DAYANANDA

Explained climate in Sri Lanka, and outlined how water supply, reservoir systems, and water quality management is provided for the urban and mountainous areas.

(6) Conclusion:

The issues of water supply, usage and environmental problems for rivers and river basins cannot be completely resolved by "hard" or structural means, but requires "soft" operations such as nature restoration, and civic participation.

The 11th Conference on Public Works Research and Development in Asia
Discussion on Specific Subjects I – Groundwater

Minutes

1. Date and Venue: October 16, 2002 13:30-16:30 Discussion

2. Participants
   Pakistan: Mr. Zubair Emran KHAWAJA
   Japan: Mr. Kazuhiko FUKAMI
   (Senior Research Engineer, Hydrologic Engineering Research Team, Hydraulic Engineering Research Group, PWRI)
   Dr. Yangwen JIA
   (Special Researcher, Hydrologic Engineering Research Team, Hydraulic Engineering Research Group, PWRI)

3. The discussion is summarized as follows:

(1) Introduction of PWRI hydrologic research activities:

Following Mr. Fukami's opening remarks, he continued on to explain the outline of the Independent Administrative Institute Public Works Research Institute (PWRI) using its FY2002 pamphlet. He next explained to Mr. Khawaja about major, recent research topics of the PWRI Hydrologic Engineering Research Team.

(2) Pakistan's major hydrological problems:

Mr. Khawaja explained the two major hydrologic problems in Pakistan. First is surface water quality. The majority of Pakistan's water resources derive from four rivers with headwaters in Himalayas. The water quality is quite good in the upper reaches but as the rivers flow through the urbanized Pakistan-India boundary region, the water is heavily polluted by industrial and municipal waste. Another major problem is quality of groundwater. Major areas far from rivers suffer saline water intrusion into the groundwater. Another issue of groundwater quality is, in certain areas, the presences of fluoride above medically acceptable limits.

(3) Discussion

Mr. Khawaja asked about conditions of flood retarding ponds in urbanized areas of Japan. Mr. JIA explained some examples of flood retarding ponds in the Ebigawa River of the Chiba Prefecture. The regulations and standards of water quality for river and groundwater were also discussed. Mr. Fukami presented some examples of basin wide groundwater management and the water quality standards in Japan.

The 11th Conference on Public Works Research and Development in Asia
Discussion on Specific Subjects II – Roads, Pavement, Traffic Management & Safety

Minutes

1. Date and Venue: October 18, 2002 09:30 - 12:00 Discussion

2. Participants

India:	Mr. Kaushal Narayan AGRAWAL
Indonesia:	Mr. Djoko MURJANTO
Laos:	Mr. Viengsavath SIPHANDONE
Pakistan:	Mr. Zubair Emran KHAWAJA
Sri Lanka:	Mr. Piyankarage DAYANANDA
Japan:	Mr. Toshiyuki NAKAMURA (Director, Road Department, NILIM)
	Mr. Kunio YASUI (Director, Road Technology Research Group, PWRI)
	Mr. Kinji HASEGAWA (Head, Road Engineering Division, Road Department, NILIM)
	Mr. Nozomu MORI (Head, Advanced Road Design and Safety Division, Road Department, NILIM)
	Mr. Nodoka OSHIRO (Researcher, Road Environment Division, Environment Department, NILIM)

3. The discussion is summarized as follows:

(1) Pavement in Pakistan

Mr. KHAWAJA talked about Evaluation Studies for Determining Premature Pavement Cracking. The types, positions and depth/width of pavement cracks in Pakistan were analyzed. It was thought that the major causes of cracks were premature oxidation and inadequate film coating on the particles despite the fact that it met the specified requirements.

(2) Traffic Management in India

Mr. K. N. AGRAWAL discussed how increased road traffic throughout India has resulted in severe congestion, and what measures are being taken. In terms of traffic management, signage that includes not only letters but also colors and images is more easily understood by drivers.

(3) Traffic Management in Indonesia

Mr. D. MURJANTO discussed the spatial planning of and commuting congestion in Jakarta, as well as the measures that are being undertaken. He indicated the need for ring roads surrounding the city center, improvement of public transportation systems, and passenger restrictions on vehicles use in the heart of the city.

(4) Traffic Management in Sri Lanka

Mr. P. DAYANANDA explained Sri Lanka's traffic conditions from the point of safety. There is heavy congestion from increased moped use, and a rising social cost due to accident fatalities. He also emphasized the importance of enhanced training of drivers and traffic enforcement. Further he explained that there is a 5 year Road Safety Program commenced to mitigate these issues. Mr. Nakamura discussed the importance of providing for the elderly in Japan's traffic safety management.

(5) Roadway Traffic Conditions in Laos

Mr. V. SIPHANDONE described roadway traffic conditions in Laos. Much of the roadways are unpaved. He explained the importance of quality control in roadway construction.

(6) Pavement Management System in Japan

Mr. YASUI explained current conditions and efficiency of the pavement management systems used in Japan.

The 11th Conference on Public Works Research and Development in Asia
Discussion on Specific Subjects II – Volcanic Disaster, Erosion Control & Debris Flow

Minutes

1. Date and Venue: October 18, 2002 09:30 - 12:00 Discussion

2. Participants

Philippines:	Ms. Sofia Torio SANTIAGO
Malaysia:	Mr. MOBARAK Bin Hussein
Thailand:	Mr. Jirachai SUTHASSANAJINDA
Japan:	Mr. Masaaki WATARI (Leader, Volcano and Debris Flow Research Team, Erosion and Sediment Control Research Group, PWRI) Mr. Takao YAMAKOSHI (Researcher, Volcano and Debris Flow Research Team, Erosion and Sediment Control Research Group, PWRI) Mr. Masaru KUNITOMO (Senior Researcher, Erosion and Sediment Control Division, Research Center for Disaster Risk Management, NILIM)

3. The discussion is summarized as follows:

(1) Japan: The conditions of sediment-related disasters, e.g. debris flows, land slides and steep slope failures in Japan were introduced with videos prior to the discussion.

(2) Japan: Actual examples were introduced of the measures to prepare for, response to sediment-related disasters in volcanic areas. These include nonstructural measures such as providing hazard maps to the populace, and structural measures that use unmanned monitoring facilities and sabo dikes.

(3) Philippines: The report covered sediment related flow disasters, and the importance of countermeasures, notably for the flows generated by the Mt. Pinatubo eruption.

(4) Japan: The discussion covered how standards are set for precipitation levels that require evacuation and warning procedures used in sediment related flows and disasters.

(5) Malaysia: Mud slides are becoming an affair due to heavy rain and hill sides development (uncontrollable).

(6) Discussion

Efforts to reduce the costs of countermeasures against sediment related disasters, requires the adoption of nonstructural measures. Also, in implementing these countermeasures, it is at times not just challenging to promulgate hazard maps but even more difficult to garner public understanding and cooperation for efforts to relocate residents away from areas susceptible to disasters. These important issues require future resolution.

The 11th Conference on Public Works Research and Development in Asia
Discussion on Specific Subjects III
－Red Soil Erosion Countermeasures & Environmental Preservation in Okinawa: Integrated Operation of Dams－
－Red Soil Erosion Countermeasures & Environmental Preservation in Okinawa: Road Construction

Minutes

1. Date and Venue: October 24, 2002　9:00-11:00　Discussion

2. Participants

Indonesia	Mr. Djoko MURJANTO
Korea	Dr. Lee Jang-Hwa
Laos	Mr. Viengsavath SIPHANDONE
Malaysia	Mr. MOBARAK Bin Hussein
Pakistan	Mr. Zubair Emran KHAWAJA
Philippines	Ms. Sofia Torio SANTIAGO
Sri Lanka	Mr. Piyankarage DAYANANDA
Thailand	Mr. Jirachai SUTHASSANAJINDA
Japan	
Okinawa General Bureau	Mr. Masaaki MANTOKU
	Mr. Takaaki OJIMA
	Mr. Sumio NAKAZATO
	Mr. Tsutomu ANIYA
	Mr. Seiichiro UCHIZATO
	Mr. Hiroshi MAEMURA
	Mr. Takeshi NAMASU
	Mr. Toshiro TOKUNAGA
	Mr. Toshiyuki MATSUURA
	Mr. Yasuhide TAKARA
	Mr. Takenori YAMASHITA
	Mr. Yoshikatsu MINAMI
	Mr. Hironori ISHIGAKI
	Mr. Isyou KOUCHI
	Mr. Chikara SANESHIMA
Okinawa Prefectural Government	Mr. Morio CHINEN
	Mr. Katsunobu UEHARA

Introduction 1　Red Soil Erosion Countermeasures & Environmental Preservation in Okinawa: Integrated Operation of Dams, Toshiro Tokunaga
Introduction 2　Red Soil Erosion Countermeasures & Environmental Preservation in Okinawa: Road Construction, Toshiyuki Matsuura

Question & Answer
Ms. SANTIAGO (PHI): Environmental Impact Assessments in the design stage?
Mr. TOKUNAGA (OGB): Basically, these are done.
Ms. SANTIAGO (PHI): Is there an agency that certifies for environmental compliance of facilities?
Mr. TOKUNAGA (OGB): No such agency. Guidelines used include the recently promulgated ISO 14000 Environment series.

Ms. SANTIAGO (PHI): How is the red soil buildup in dam reservoirs handled?
Mr. TOKUNAGA (OGB): Dam capacity is set at need over 100 years; there is no need for excavation until that standard is reached.
Mr. KHAWAJA (PKS): (1) What is done with red soil collected in sedimentation ponds? (2) Which is your emphasis: reef preservation or slope protection?
Mr. TOKUNAGA (OGB): (1) Red soil from sedimentation ponds is returned to the construction site. (2) Neither response is valid.
Mr. KHAWAJA (PKS): Isn't red soil eroded further by wind than by rain?
Mr. TOKUNAGA (OGB): Okinawa has no large, bare spaces so wind is less a factor than rain.
Mr. KHAWAJA (PKS): Problems in Pakistan include landslides during road construction and other issues. Is erosion from landslides a problem? Do you have other problems?
Mr. MATSUURA (OGB): Red soil erosion countermeasures are in place during the construction process. Much coordination with stakeholders and local residents is done. And, while not a problem in Okinawa, I've heard of problems with groundwater while boring tunnels.
Ms. SANTIAGO (PHI): What about opposition to construction? Do you require full consent or majority consent?
Mr. MATSUURA (OGB): There is no numerical standard for level of consent. If general consensus is not obtainable, we implement under the enforced use allowed by the land procurement and usage act.
Ms. SANTIAGO (PHI): (1) To clear areas for roads, do you compensate for both land and structures? (2) Do you assume responsibility for resettlement?
Mr. MATSUURA (OGB): (1) Monetary settlements cover both land and structures (2) Government is not responsible for resettlement or relocation.
Mr. MOBARAK (MLA): What are the standards for permitting the costs for environmental protection?
Mr. MATSUURA (OGB): It is difficult to say what parts of CE work are for environmental protection so there is no percentage of total project value set.

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Mr. KHAWAJA (PKS): (1) How do you handle prior claims on flows that have been redirected to reservoirs? (2) How do you mitigate the impact on the lower reaches of drawing water from the upper?
Mr. OJIMA (OGB): (1) There are no issues with prior claims. Water is provided to those who drew from the rivers before dam construction. (2) River levels remain much as they were before dam construction. Therefore, there is no excessive environmental impact.
Mr. MOBARAK (MAL): (1) Please explain the role of safety in Integrated Dam Management. (2) Please give more details on the rain measuring radar system.
Mr. OJIMA (OGB): (1) Japan's safety standards are even stricter than England's or the United States'. No safety imperfections have been identified yet. (2) Radar is used to warn construction sites of impending torrential rains.
Mr. MURJANTO (IDN): (1) Does an independent agency certify dams for operation safety? (2) Are there economic feasibility studies or social impact assessments?
Mr. YAMASHITA (OGB): (1) No independent certification system. (2) Benefit/Cost analysis are done. We also have 5-year periodic reviews.
Mr. MURJANTO (IDN): Why does construction take so long in Japan?
Mr. YAMASHITA (OGB): Winning public consensus is a time-consuming process.

II. Conclusion

CONCLUSIONS

The 11th Conference on Public Works Research and Development in Asia

The 11th Conference on Public Works Research and Development in Asia convened with the support of the Japan International Cooperation Agency (JICA) from October 15 to 24, 2002. It opened in Tsukuba at the National Institute for Land and Infrastructure Management, closing in Okinawa Prefecture.

Attendees included officials from government agencies responsible for implementing public works research and development policies. Participating countries included India, Indonesia, Korea, Laos, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand and Japan.

The Subject of Common Interest for this conference was "Water Resources and River Management for Sustainable Development."

Presentations and discussions based on country reports on the subject of common interest prepared by the participants of each country, achieved the common purpose of creating better understanding of the problems faced by each country and promoting mutual learning from the experiences of other countries.

The conclusions reached in the conference include:

1. Water problems such as shortage of water resources, floods and sediment flows are serious concerns for Asian countries. Water Resources and River Management are core policy issues which should be considered by each and every country in Asia.
2. Environmental issues are recognized to be at times, not simply those of a single country but of neighboring countries and the world.

3. Urban planning programs and infrastructure enhancements are needed for the economic growth of developing countries in particular. It is crucial to apply both structural and non-structural approaches to mitigate environmental impacts of development. These should not be accompanied by excessive fiscal burdens for broad and follow-on applications.

4. The participating countries will increase activities in research and development of those technologies in the field of public works, and actively promote technology transfer and mutual cooperation among themselves. The topography, natural environment and socio-economic conditions of each country should be duly considered in these undertakings.

The participants recognized the importance of the conference in furthering understanding of the role of research in public works, and the need for further improvement.

To further enhance and support the infrastructure development of each and every country, each country must seek to learn from the insights and experiences of all participating countries. The participants showed a shared recognition for the need to continue the conference series.