Second Year of 9th Term Research Committee

Research Report on International Affairs, Global Environment and Food Issues

INTERIM REPORT

June 2012

Research Committee on International Affairs, Global Environment and Food Issues
House of Councillors
Japan

Contents

I Background and Deliberation Process

Research committees of the House of Councilors' are bodies established to carry out long-term and comprehensive research relating to basic issues of state administration. Focusing on a specific research theme, each research committee hears the views of voluntary testifiers and others and engages its members in open discussions. With this mission in mind, the Research Committee on International Affairs, Global Environment and Food Issues was established on November 12, 2010, in the midst of the 176th session of the Diet, to conduct long-term and comprehensive research into international affairs, global environment and food issues.

While international affairs, global environment and food issues are very wide-reaching, water was identified as one of the common interrelated issues. Therefore, the research committee decided to deal with the water issues in its first year, proceeding with the investigation by seeking the views of experts, etc.

As a result, the following findings were acquired:

- World water issues might worsen due to various factors such as population growth, rising food demand, progress in urbanization and industrialization and climate change.
- Water issues are cross-cutting in nature, and the key to their resolution lies in the mobilization of the knowledge and wisdom of the international community in diverse areas.
- It is very important for Japan to contribute to the resolution of water issues by making the best use of its knowledge, technologies and experience, in order to enhance its presence and leadership role in the international community, as well as to ensure its prosperity.

Thus, we decided to continue dealing with water issues for the second year and onward, and set a research theme of this term as "global water issues and Japanese foreign policy strategy", on August 31, 2011. In the second year, under that theme, we proceeded with the investigation mainly on Asia, one of the regions most prone to water-related issues.

The investigation first dealt with the damage caused by the flood occurred mainly in the Central Thailand since the early October of 2011 and relevant countermeasures by Japan, and then with the actual status of water issues in Asian regions, sequentially from Southeast Asia, Central Asia, South Asia, China and the whole Asia, and the actual status and issues of Japan's relevant countermeasures. We had 5 meetings in total, in which views and explanations from a total of 17 experts, practitioners and government testifiers were sought, followed by a free Q&A session and exchange of views among committee members.

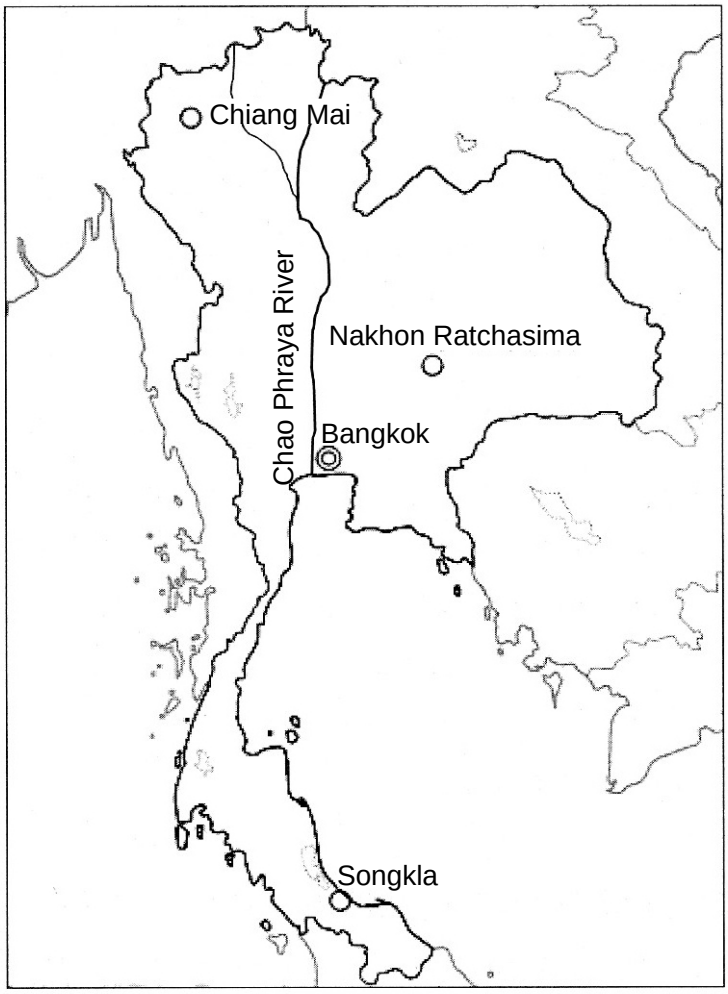
In addition, to ascertain the actual status of water-related measures taken by local governments, universities and private companies, we sent committee members to Hyogo Prefecture and Osaka Prefecture, who visited local governments of Hyogo City and Osaka City, the Center for Membrane and Film Technology of Kobe University and private

companies of Nitto Denko Corporation and Nagaoka International Corporation. At each of those sites, a briefing was given, views were exchanged and an inspection tour of related facilities was conducted.

Furthermore, to ascertain the actual status of water disaster-related R&D and human resource development, Public Works Research Institute was visited. A briefing was given, views were exchanged, regarding R&D on water utilization, flood control and prevention and mitigation of water-related disaster, dissemination of these technologies in Asia and the whole world, international contribution through human development, etc., and an inspection tour of related facilities was conducted.

II Research Summary

1. Damage caused by the flood in Thailand and relevant response



Thailand is one of the nations that have historically had the closest relationship with Japan. Recently, it has attained a remarkable economic growth as a manufacturing base in Southeast Asia, with foreign companies actively conducting manufacturing activities in large-scale industrial parks located nationwide. Hundreds of Japanese companies have expanded to Thailand and tens and thousand of Japanese are living in Thailand. Thus, economically, Thailand has become a particularly important country for Japan among other countries in South Asia.

Record rainfalls hit Northern Thailand from the end of July 2011, and an enormous amount of water advanced southward slowly on almost flat land as flooding the river of Chao Phraya, and the flood area expanded to the downstream basin, including Bangkok, where population is concentrated.

The flood didn't reach Central Bangkok, but inundated a vast area of land including riverside industrial parks over a long period of time, causing a large number of victims, hygiene issues and immense damage to a transportation system, industry and agriculture,

which gave serious damage to citizens' life as well as national economy. Significant decrease in industrial production and food production had a widespread impact internationally. It was concerned that Japanese economy would be severely affected, due to the damage caused to a number of Japanese companies.

Under such circumstances, Japan has provided assistance including provision of emergency assistance and relief supplies, dispatch of experts, research on local damage situation and drainage activities, as well as taking measures such as financial support for affected Japanese companies, preferential measure for the immigration and labor of Thai workers for the implementation of alternate production within Japan, etc.

Considering these circumstances, the research committee decided to research the flood damage in Thailand and its countermeasures first, and the views and explanations of the government (Ministry of Land, Infrastructure, Transport and Tourism and Ministry of Economy, Trade and Industry) and Japan International Cooperation Agency were heard, followed by a Q&A session. During the Q&A session, various issues, such as flood damage and response by Thai government, flood damage relief support by Japan, trends of and support for Japanese companies expanded to Thailand, flood impact on agriculture and relevant assistance, flood risk control of Japanese companies expanding overseas and support by government, active utilization of water-related technology in Japanese cooperation for disaster prevention and importance of provision of disaster prevention package consisting both hardware and software were raised.

(1) Summary and outline of government explanations and views of voluntary testifiers

Government explanations and views expressed by voluntary testifiers during the committee meeting are summarized and outlined below.

- **Ministry of Land, Infrastructure, Transport and Tourism (Hirofumi HIHARA, Deputy Director-General for Water and Disaster Management Bureau)**

• General situation of the flood and the emergency response so far
• Characteristics of the damage and the adequate future response

Chao Phraya is a large river about 10 times larger in the basin area and about 3 times longer in the river length compared to Tone River. The lower stream of the river is almost flat, so the flood rises and falls slowly. There are two dams in the upper stream of the river with the water storage capacity of 23 billion tons, which is equivalent to two-thirds of the total storage capacity of dams all over Japan, but they didn't function as flood control facilities since floodwater didn't recede for a long time.

In the Chao Phraya basin, rainfall amount during July to September 2011 was about 150% more compared to the average year. It was also the case with Mekong basin, but it didn't become a major issue since those lands in Myanmar and Cambodia are used for agriculture. In Thailand, deaths of more than 600 people have been reported, with evacuation being conducted on a vast scale and various damages being caused to transportation facilities such as airport and railways. Flood damage occurred in 7 industrial parks. Especially, various problems occurred in Rojana industrial park and Nava Nakorn Industrial Estate, in which a number of Japanese companies are operating. Rojana industrial park is surrounded by the flood prevention wall of 2.5 meters high, which was designed to endure the heavy flood that could occur once in 50 years, but the flood surpassed the height of the wall and the park was submerged. In response to the request from Thailand, Japan sent pumper trucks to the site on November 5, which had completed the draining work in the Rojana Industrial park and continue operating in other industrial parks, etc. This water disaster had a serious impact on Japanese supply chain, as well as on production activities worldwide.

Farming is done in areas around Bangkok, so Thailand has traditionally protected the inner city of Bangkok with the embankment called "King's Dike", and permitted the flooding in the outer areas. However, this method has become difficult due to the expansion of urban districts.

In response to this flood disaster, Ministry of Land, Infrastructure, Transport and Tourism has provided advice and floodwater drainage support so far, by dispatching an international emergency team and experts in flood, drainage, airport facilities, railroad facilities, etc. It further plans to dispatch an academic, business, and government investigation team for the implementation of response measures.

Characteristics of this flood disaster are as follows:

1) Dams in the upper stream were mainly for irrigation and power generation, whose flood control facilities were not sufficient.
2) Industrial parks and airport were constructed in the areas traditionally used for farming, where flooding had been taken for granted. It led to the problems and conflicts between inner areas and outer areas of the King's Dike, as well as between upstream areas and downstream areas.
3) Insufficient evacuation system such as delayed information transmission and poor hazard map preparation.
4) Failure to implement sufficient countermeasures due to the dispersion of water control-related Thai government agencies and lack of comprehensive control of the whole river system.

In consideration of these characteristics, we are planning to implement the comprehensive disaster prevention measures in the form of disaster prevention package

including both hardware and software, as a part of Japan's international contribution.

- **Ministry of Economy, Trade and Industry (Kenji GOTO, Deputy Director-General, Trade Policy Bureau)**

• Damage status of Japanese companies, etc. and Japan's response
• Short and long-term measures by the Thai government

The flood caused direct damages to 449 Japanese companies in 7 industrial parks, which accounts for about more than 20% of the 1,879 Japanese companies operating in Thailand. At present, the flood itself is receding, and floodwater drainage has been completed in some of the industrial parks, but it is estimated to take a few or more months for the recovery of factories, due to substantive damages caused to machinery equipments, etc.

Thailand's Prime Minister Yingluck has announced a comprehensive response package of Thai government consisting of emergency measures, short-term measures and long-term measures. Board of Investment has also made decisions such as the application of tax exemption system in case of disposing raw materials, etc. within Thailand which had been imported under the tax exemption system for raw materials and parts used for the manufacture of exports, and permission for outsourcing all or some part of manufacturing process. Labor Ministry, too, has taken measures such as the provision of employment assistance allowance of 2,000 bahts (about ¥5,000) a month per worker under certain conditions.

As for Japan, the chief cabinet secretary announced its response policy in October, including three countermeasures for the protection of Japanese residents, economic and industrial recovery of Thailand and assistance for Thailand. Among these, economic and industrial recovery measures for Thailand include both short-term measures and medium- to long-term measures. The short-term measures are being implemented as a form of a relief package consisting of fund procurement, recovery of production system and legal, labor and tax-related measures.

As part of the newly established measures, Japan has started the issuance of visas for Thai workers who work for affected Japanese companies for the alternate production within Japan to complement the production in Thailand, and some of them have already come to Japan. As a measure for long-term equipment funds and operating funds, Japan Finance Corporation, etc. has started to implement the upgraded financial assistance programs with relaxed requirements. The government as a whole is also implementing measures for the procurement of short-term funds, including the opening of an account at the Bank of Japan for the Bank of Thailand to accept Japanese government bonds as collateral.

- **Izumi ARAI, Vice President, Japan International Cooperation Agency**

• Conventional cooperation through ODA • Japan's assistance and future direction

Large part of the floodwater has receded in and around the central part of Bangkok, and the drainage work at the largest industrial park has been completed. While the drainage is almost completed within the King's Dike, Don Muang airport is still under water, and drainage work is being implemented not only in industrial parks but also residential districts near the airport.

Various countries have provided emergency assistance through ODA so far. However, Japan's cooperation is characterized by that it has provided not only relief supplies but also engineers who have provided adequate advice, as well as tangible cooperation such as dispatch of pumper units. At present, in addition to the emergency response, Japan is requested to assist the development of a blueprint for recovery.

As an emergency response, Japan has provided water purifiers, etc., along with experts from the Osaka Water Supply Authority, who have made a large contribution to the securing of an important utility, by preventing the flood water from entering the Bangkhen water treatment plant, which supplies about 70% of drinking water for Bangkok residents.

As a short-term response, we are currently researching the needs for a temporary flood countermeasure and rehabilitation of public facilities, in consideration of the next rainy season starting around May.

We will also have to review the master plan of flood countermeasures for Chao Phraya River established in 1999, and consider the provision of technical support for the drastic improvement of flood prevention facilities, and financial support, if necessary.

The government of Thailand established the Strategic Committee for Water Resource management for the implementation of medium- to long-term measures, chaired by Deputy Prime Minister Kittirat, who has come to Japan to visit the Prime Minister, the Minister of Economy, Trade and Industry, Japan Federation of Economic Organizations, etc. On this occasion, Dr. Virabongsa, former finance minister and current chairman for the Strategic Committee for Reconstruction and Future Development, also came to Japan to visit private companies, insurance companies, etc. and JICA President Mrs. Ogata.

(2) Discussion highlights

Main views expressed by committee members and others during the Q&A session, involving voluntary as well as government testifiers, are summarized below.

● Flood damage and response by the government of Thailand

- Although two dams located in the upper stream of Chao Phraya river are intended for power generation, the flood damage could have been mitigated, if they had been adequately operated.
- Dams played a certain role in the mitigation of the flood, but they did not perform operations such as water level adjustment depending on weather or discharge from dams as monitoring the downstream water level.
- Japanese government should ask the government of Thailand for the adequate implementation of measures such as the improvement of embankment, in consideration of the serious damage caused to industrial parks in which numerous Japanese companies has been operating.

● Support by Japan for flood damage recovery

- Considering the frequent reports made in Japan on the flood damage situation in Thailand, Japan should have provided support prior to receiving the support request from Thailand.
- Summit-level government officials have conveyed Japan's concerns and provided support since the early stage of the disaster, by dispatching government personnel to Thailand for the assessment of the situation and opinion exchange with the Thai government personnel, regarding the countermeasures that the government can implement.
- The prolonged flooding in Thailand has raised concerns for the spread of infectious diseases due to the worsening of sanitary conditions. Japan should provide support in case Thailand cannot take adequate countermeasures by itself.
- At present, pandemic spread of infectious diseases has not been detected. However, if there is a request from Thailand, Japan will provide technical cooperation such as the dispatch of experts.
- Japan should promptly consider and implement JICA's yen loan program and overseas investment and loan program, for the support of flood damage recovery in Thailand.
- Thailand hopes to take countermeasures within its own financial framework as much as possible, however, in the medium- and long-term, it will expect financial cooperation from Japan when they need to review the master plan and implement large-scale countermeasures based on it.
- For the maintenance of good relationship between Japan and Thailand, Japan should provide active cooperation for the mitigation of flood damage in Thailand, utilizing its excellent technologies such as dam.
- When assisting the flood control plan of Thailand, Japan should propose reliable plans such as the construction of embankment designed to endure the rainfall that is 150% more than the anticipated amount, recognizing the fact that unanticipated disasters are actually

happening.

- If we raise the flood control safety level only at a certain point, flood damage will spread to the entire area. Instead, we try to raise the overall safety level by slightly underestimating the flood damage level.
- In Thailand, children are severely affected by the flood disaster, therefore it is important to provide educational support as well.
- In Japan, the fact that Japan is providing assistance for Thailand as a whole is not reported enough. Instead, media reports are unfairly focused on Japanese companies' damage situation.
- Japan should cooperate with international agencies and NGOs, at the same time utilizing Japanese technologies, for the provision of relief materials and medical assistance that support the life of residents towards the recovery and restoration of Thailand.
- In the medium- and long-term, Japan is planning to provide a disaster prevention package consisting of hardware such as embankment, as well as software such as provision of disaster prevention information and development of warning and evacuation system, land-use regulations and comprehensive control system for the whole river system.

● Trends of Japanese companies operating in Thailand and support for them

- In light of the importance of Thailand, Japanese government should have provided prompt and active support for the affected Japanese companies operating in Thailand.
- Japan conveyed to the Thai government its intention to provide the flood disaster-related information. However, as a result of respecting the intention of Thailand, Japan could not provide sufficient information.
- Japanese companies were largely affected by the flood in Thailand. Amid growing anxiety about unclear long-term countermeasures announced by the Thai government, is there a trend for those companies to withdraw from Thailand?
- The recovery has just started and there is a long way to go, but we understand that companies in general plan to restart the business as soon as possible after the completion of drainage and machinery replacement.
- A lot of the flood-affected Japanese companies announced the acceptance of Thai workers, but it is being delayed due to the prolonged immigration procedures. It may be necessary that we increase the number of immigration officials.
- Maintenance of international supply chain is crucially important for the globalized Japanese companies. Japanese government should also work on the disaster prevention measures for the maintenance of supply chain.
- Based on the lessons learned from the Great East Japan Earthquake, we should mitigate the impact of the flood in Thailand on manufacturing through the diversification of

procurement methods, etc.

- Japanese companies expanding to Thailand should also take its own flood countermeasures, such as raising the floors of buildings located in farming areas.
- It is important to secure the safety of industrial parks for the business continuation of affected companies. We hope that the Thai government realizes the severity of the problem and adequately implements recovery and recurrence prevention measures.

● Flood impact on agriculture and relevant support

- The flood in Thailand might adversely affect the price of the food imported from Thailand. Shouldn't we take some measures for this problem?
- The flood caused great damage to the agricultural production of rice, etc. in Thailand, Laos and Cambodia. Shouldn't we implement JICA assistance program for the field of agriculture in the future?
- We will consider the provision of livestock feed, etc. in disaster affected regions in cooperation with FAO. We will also assess the damage situation and consider the countermeasures in cooperation with the Ministry of Agriculture and Cooperatives.

● Flood risk for companies expanding to foreign countries

- How much has the government given the flood and other risk information to foreign companies expanding to Thailand?
- The government collects basic information on various global investment environment, etc. and provides it to companies via its website.
- Basically, companies considering foreign expansion should consider flood and other potential risks when calculating the cost for the expansion, and the government, too, should consider these risks when supporting companies' foreign expansion.
- Despite its financial stability with sufficient internal reserves, Japanese companies tend to focus solely on low-cost and intensive manufacturing system. They should work on the establishment of robust risk management strategy, so that they can deal with risks independently.
- We have a perception that companies expanding to foreign countries are independently considering how they would control risks and what they would do to continue their business in case of emergencies.
- The government should provide adequate risk management framework for companies expending to foreign countries, including small and medium-sized enterprises. It should also strengthen the mutual collaboration of the government offices overseas for the support of Japanese companies expanding to foreign countries.
- Overseas expansion of small and medium-sized enterprises is very important, therefore the

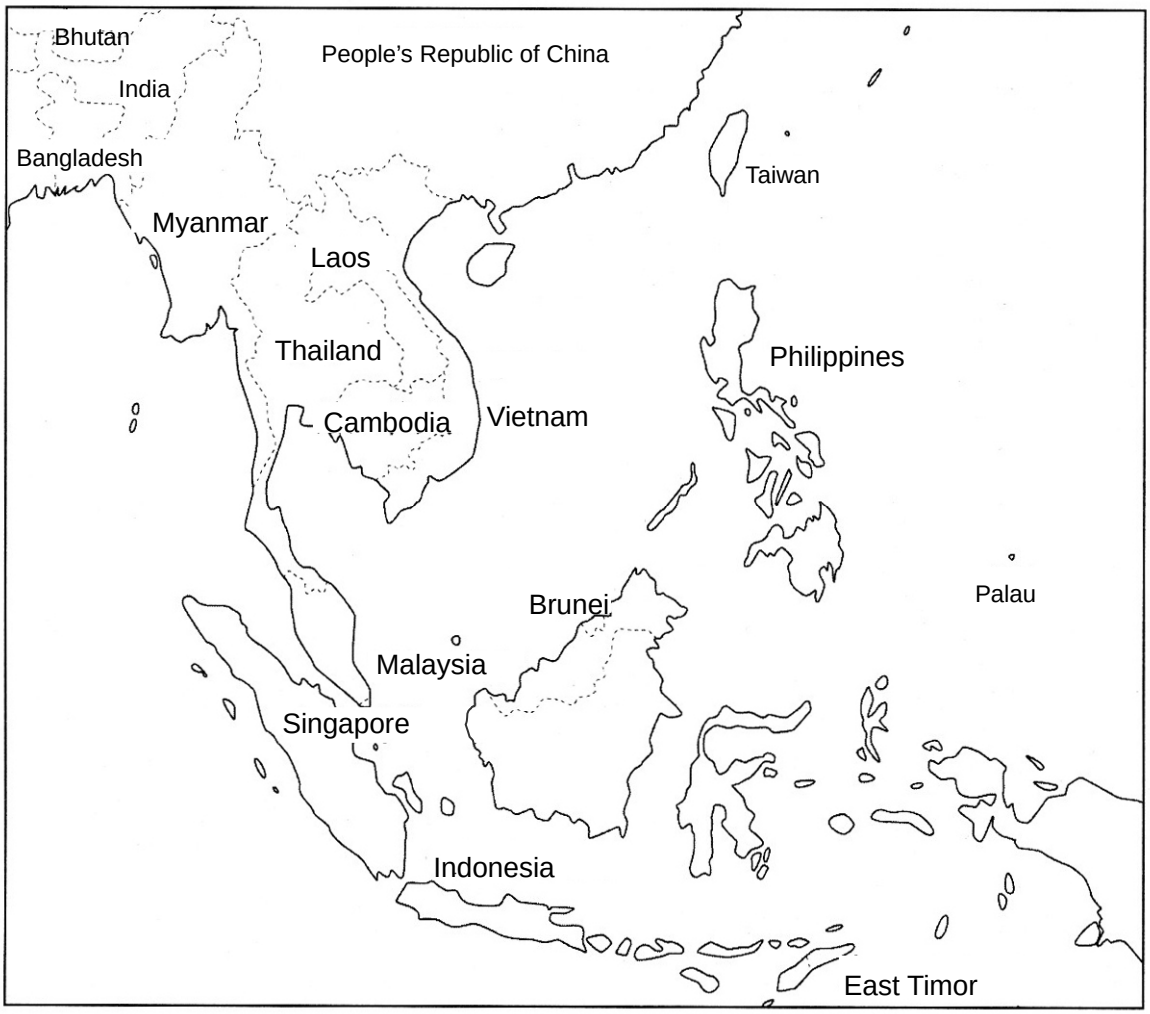
government should provide sufficient explanation on risks associated with overseas business expansion and enhance collaboration of government offices overseas.

- Does the flood damage occurred in the Mekong region affect the implementation of the local infrastructure package that the government is working on?
- Infrastructure development in the Mekong region is very important, therefore both the government and companies should offer utmost cooperation through the discussion with the Thai government based on the lessons learned from this flood disaster.

● Japan's disaster prevention cooperation

- Undoubtedly, we are living in the century of disaster, with water-related disasters such as heavy rains and droughts occurring in many places worldwide. It is crucially important that we consider appropriate security measures against future climate change.
- The disaster prevention package consisting of hardware and software such as disaster prevention information, warning and evacuation system, infrastructure and land use regulations that Japan is providing for worldwide nations is important and excellent. Japan should lead the global disaster mitigation measures, through the utilization of information from JICA, JBIC and JETRO, as well as JAXA which provides information from space, thereby serving as a global fire brigade.
- Japan offers a suitable combination of disaster prevention hardware and software for respective countries. For example, it offers flood forecast information for Pakistan.
- We dispatched experts to the flood affected areas in Thailand. However, we may as well consider the international version of TEC-FORCE, which is formed for the dispatch of personnel to the disaster sites within Japan.
- How will the excellent technologies of Japan such as the reprocessing of sewage be utilized in the joint implementation of long-term measures such as the review of master plan with the Thai government?
- Thailand seeks for something like an entire simulation data from the upper stream to the lower stream. Thailand will seek for Japan's scientific and technical expertise such as the simulation data of the impact of climate change on water conducted by the Institute of Industrial Science, the University of Tokyo, as well for countermeasures based on the simulation results.

2. Current status and challenges of water issues in Indochina and other regions of Southeast Asia



Southeast Asia belongs to the tropical monsoon climate region, where the annual rainfall is high, but the amount varies considerably from rainy season to dry season. Impact of climate change has increased the seasonal fluctuations in the rainfall amount and led to the frequent occurrence of draughts and flood, thus adequate control of water has become an important issue.

In most of the regions, main industry is still agriculture and other primary industries. With the rapid economic growth coupled with industrialization and urbanization, demand for agricultural as well as industrial and daily life water has expanded, which led to the land subsidence due to excessive pumping of groundwater. In addition, delay in the improvement of water-related infrastructure such as sewage facilities has led to the increase of surface water and groundwater contamination and consequent health hazards.

Japan has a long history of relations with Southeast Asian countries, and they are becoming more and more important investment destinations for manufacturing and other Japanese companies. Japan is also deepening political and diplomatic relations particularly

with ASEAN and ASEAN countries.

Japan has worked for the resolution of water issues in Southeast Asian countries, providing support for water and sewage system improvement and technical cooperation, mainly thorough ODA. Recently, Japan is trying to achieve the growth of Japan itself, while contributing to the resolution of water issues through the cooperation for disaster prevention and public-private partnership (PPP) in the water-related infrastructure improvement.

Based on these circumstances, the research committee decided to deal with water issues in Southeast Asia, following the research on Thailand's flood damage and its countermeasures. The committee has sought views from voluntary testifiers and had a Q&A session, regarding Japan's international contribution utilizing its advanced flood control techniques, flood situation in Thailand and Japan's contribution, future issues and co-creation of water business in Asia with developing countries taking advantage of Japanese characteristics. In the Q&A session, opinions were exchanged regarding water issues in Southeast Asia and Japan's cooperation, prevention of water-related disasters and its countermeasures, current status and issues of water business, Japanese countermeasures for water-related issues and improvement of foundation for international cooperation in the field of water.

(1) Summary and outline of views of voluntary testifiers

Views expressed by voluntary testifiers during the committee meeting are summarized and outlined below.

- **Tadashi YAMADA, Professor, Faculty of Science and Engineering, Chuo University**

- Importance of international contribution utilizing Japan's advanced flood control techniques
- Importance of transmitting Japanese engineers' ethics in international cooperation in the field of flood control.
- Importance of developing human resources who can contribute in foreign countries.
- Necessity of enhancing disaster prevention education

As is the case with Holland that has developed the national land of today after 400 years of flood control projects, flood control projects never end. It is especially true for lands such as Japan, which is prone to earthquakes and tsunamis, with a lot of rainfall, steep mountains and low-lying areas. We need to think about the measures for low-lying areas such as zero-meter areas in Koto Ward, Edogawa Ward, Katsushika Ward and Adachi Ward in Tokyo and Nagoya and Osaka. Research on Japanese cases can be applied to Thailand and other foreign countries. Measures such as the establishment of evacuation spots and construction of parks on hills are directly applicable to issues in low-lying areas in Bangkok and other Asian

cities. Japan can contribute to Asia through the research of related technologies.

At present, the civil engineering industry is not popular among young people in Japan, and civil engineering departments of universities are failing to attract enough students. It has led to serious problems such as the shortage of civil engineers after the occurrence of the Great East Japan Earthquake.

Japanese engineers have high ethical standards. It is important that they not only export their technologies but also transmit and disseminate such ethics to Asian countries. Japan should export its water system to Asian countries, and about half of the mission should be selected from the Japan Water Agency. Less dams are being built now, so their tasks have been reduced to the maintenance and operation. So its employees and engineers can be utilized for the contribution to the resolution of water-related issues in Asia.

Today, it is problematic that many young Japanese don't want to work aboard. So we need to develop young human resources who can contribute in foreign countries. Among politicians, the number of experts on water-related issues is too small. I think they should conduct in-depth research on water-related issues.

If China carries out its planned construction of 15 dams in the upper stream of the Mekong River, five countries in the lower stream become tributary nations of China in terms of water. The U.S. Congress is sending a message for China to stop the construction of dams, but Japan is not making any actions. If we regard that hydropower generation is better than fossil fuel or nuclear power generation in China, we should make China promise at the International Committee that it would return the collected water and let it flow downstream if they are to construct dams. Mekong River Commission (MRC) is not effective since China is not participating. Under such circumstances, it would be effective that Japan serves as a secretariat for Asian international rivers, as Denmark serving as one for the Nile River Commission.

Japan has achieved prosperity through the numerous battles with natural disasters, accumulation of wisdom and development of human resources. With that in mind, we should respect disaster prevention education as the very foundation of the nation.

- **Kimio TAKEYA, Visiting Senior Advisor of JICA**

- Recent trend of recurring natural disasters
- Flood situation in Manila in 2009 and Japan's contribution
- Importance of combination of structural measures and nonstructural measures for disaster prevention
- Flood situation in Thailand in 2011 and Japan's contribution and future issues

The flood by typhoon that attacked Manila in 2009 caused the most serious damages in years to the center of a nation's capital. In that disaster, only maintenance-free structural measures such as discharge channel were effective, and we understood the difficulty of achieving nonstructural measures.

In light of frequent occurrence of disasters due to climate change and worsening damage due to population increase and concentration and economic growth, we should develop a foundation of basic structural measures and basic infrastructure, on which we shall develop nonstructural measures. Main components of basic infrastructure are control and prevention, while nonstructural measures consist of mitigation measures such as forest conservation and restoration, adequate land use regulations, lifestyle that mitigates flood damage, flood forecast, early warning and insurance and compensation system supported by government. As for multi-donor, etc., discussions will be held regarding the composition of regions that ensure high safety level and regions that have high resilience and therefore permit flood and disaster, for the implementation of flood control investment that leaves no regrets.

JICA conducted a development research on Chao Phraya River in 1999. Its downstream basin including Bangkok had been traditionally protected by the flooding in midstream basin and agriculture had taken advantage of the upstream flooding. However, the extensive damage of this flood was caused by the concentration of assets and construction of industrial parks in the basin, bought by the recent remarkable economic growth. JICA offered various proposals in 1999, but the development of flood control measures was delayed, with the investment devoted to the basic infrastructure development for the economic growth.

Thailand itself considers that flood prevention is a major issue that could shake the foundation of the national economy. JICA has won the trust of Thailand, by offering proposals based on technical background, so that they can securely implement the measures that JICA believes in. We will keep pace with the decision-making of the Thai government, and develop a maser plan for new flood countermeasures, based on the knowledge of Thailand and integration of Thai technology and Japanese technology. Our proposal for long-term disaster prevention measure for the upstream basin can be summarized as "water storage and discharge", which contributes to the production of rice, through the storage of water in an effective and less damaging manner and reuse of the water for rice cultivation as much as possible.

Overall issue is the difficulty of preliminary investment, though proactive prevention cost is far lower than the cost required for post-disaster restoration. JICA is currently considering the mainstreaming of disaster prevention, by crosschecking all the measures and policies from a disaster prevention perspective. We will need to check the development and target regions from a disaster prevention perspective, since most of the Asian megacities are located in river months and therefore are similarly vulnerable to flooding.

- **Hajime MORI, President & CEO, Kisui Water Treatment Japan, Inc.**

• Importance of water-related business in Asia through co-creation with developing countries taking advantage of Japanese characteristics. • Drinking Water Project initiative in Cambodia through collaboration of small and medium-sized enterprises • Importance of power conservation, reverse innovation and BOP business perspective in water-related business

Water is a strength of today's Japan, in that Japan is the only nation where the water facilities are so developed and you can get water anywhere. With a strong spirit of volunteerism, I want to launch a peculiar water-related business of its own, based on such strength of Japan. Water-related business is suitable for Japanese, in that it is based on volunteer spirit and aims at social contribution. It pursues benefits, regarding them as the tool for continuation of business.

Specifically, we aim to establish "Drinking Water Project team" which involves local people, and launch a water-related business that serves for revitalization of agriculture and farming community, through the creation of small-scale and distributed water supply system required by local residents, starting from rural areas in Cambodia and other Mekong basin countries. Local people need safe and reliable drinking water. In order to realize such water supply system sustainably used by local residents, it should be the one that they themselves are willing to maintain. So, we want to realize a real "co-creation" through the exchange of water-related opinions with people in Asian countries. If there is a clear objective, we can form a team. And such team requires leadership. We'd like to make contributions by further improving the past Japanese ODA.

Southeast Asia is an enormous market, but we should provide truly necessary infrastructure assistance by hearing the local opinions. In order to realize the long-term supply of safe and reliable drinking water, we need to develop low-tech, low-cost and low-return system. Such system requires detailed maintenance service work and hygiene education from a common standpoint. We would like to seek for the assistance of JICA, in terms of the utilization of the Japan Overseas Cooperation Volunteers for human resource development, local business liaison office and funds.

Key words are "energy conservation", "reverse innovation" and "BOP business". Regarding energy conservation, we need to consider small-scale and distributed water supply system, instead of large-scale and intensive system that requires massive amounts of electricity. Reverse innovation, which is an innovation originally developed in developing countries and later used in advanced countries, is effective for cost reduction, so we should consider the incorporation of it in our business plan. BOP (base of the pyramid) business,

which involves the global poverty group of more than 4 billion people, seems to arouse a mind of compassion and mercy which are inherited in Japanese DNA. We aim at BOP business based on the collaboration of small and medium enterprises that possess and be able to utilize necessary technologies.

(2) Discussion highlights

Main views expressed by committee members and others during the Q&A session, involving voluntary testifier, are summarized below.

● Water issues in Southeast Asia and Japan's cooperation

- In Cambodia, many people live on rain water. Japan is conducting well-digging project and embankment construction project, but what can we do for Cambodia as politicians?
- Politicians can help to create the network, since Cambodia is highly interested in Japan and business relationships will grow into relationships between two countries.
- I've heard that China is constructing 15 dams in the upstream of Mekong river. Doesn't it pose an ethical problem?
- Due to the strong incentive for economic growth, China is faced with an urgent need for power generation. I think China is progressing with dam construction without any ethical consideration.
- Regarding the master plan of Thailand as of 1999, could any correction be made that could have mitigated the damage of the current flood? And what are the particular considerations in the development of the new master plan?
- Master plan of 1999 was developed under the agreement with Thailand, in which their request was fully satisfied. It was taken for granted that the master plan would be implemented. However, Thailand placed its focus on infrastructure development for the economic growth such as railroad and airport. Japan could not follow the implementation phase since Japan's ODA program then was restricted to assistance in response to request. In the new master plan development, we have discussed not only technical proposals but also securing of policy implementation, and decided specific policy measures, though it may be a slight deviation from ODA framework.
- Is it true that weather radars were installed in Laos and Thailand through Japanese ODA, but information is not mutually exchanged, therefore southern Laos, which lacks radar, is not covered? If that is the case, is there any countermeasure?
- We don't know about the area lacking radar, but understand that linkage among aided countries is not necessarily good in case of multilateral assistance such as the Asian Development Bank's program for the Greater Mekong Subregion. That is also the case with the situation within one country. For example, data of each district of Chao Phraya

basin in Thailand is not horizontally linked. When providing assistance, we should bear in mind that even things that look effortless often cannot be completed due to various reasons.

- Relations among Asian countries have not been matured enough, so countries do not give weather forecast information to neighboring countries, since it is a basic national intelligence. It is difficult to install rain gauge and radars, due to the risk of robbery and high price. Satellite rain information service has been advanced by a group of Civil Engineering Research Institute, so Japan may be able to contribute to Asia through the effective use of artificial satellites.

● Prevention of water-related disaster and countermeasures

- What is the statistical difference between occurrence of earthquakes and floods? What is "penetrating intelligence?"
- Earthquakes and floods are largely different in that earthquakes occur with a certain periodicity, since they are caused by accumulated strain energy, while floods can occur anytime. In Japan, people tend to convince themselves based on insufficient understanding, but the phrase "penetrating intelligence" means "public ability to have correct awareness based on thorough understanding of the actual risk".
- In the monsoon region of Southeast Asia, should we regard the flood as substantial country risk?
- I think country risks of countries in Asian monsoon region are generally high, since the flood control investment level is not keeping up with their economic growth level. However, country risk varies widely depending on country. For example, Pakistan has a huge embankment constructed from the mouth of the river to the upstream basin.
- Stationary stochastic process of river is beginning to be shaken, therefore the river planning and flood control planning will be inevitably affected. From a civil engineering perspective, what can we do to deal with this issue?
- Japan has started to review its flood control plan in consideration of the impact of global warming and non-stationary climate. However, impact of global warming has not been fully reflected in the current flood control plan of Japan.
- Deviation of natural phenomena from the conventional statistical analysis data is often discussed as a main theme at the international conference. Under such circumstances, in the development of a future master plan for Thailand, for example, Japan should take advantage of its leading-edge expertise in order to incorporate the impact of climate change, in addition to the consideration of stationarity, so that we can help to improve the safety level of areas where a number of Japanese companies are operating.
- In the Ji Lin Province of China, for example, people tend to think that floods are far better

than drought and dry weather, but in case of Japan, recent typhoon caused torrential rains in Wakayama and Mie, which led to serious strata collapse. How should we react to the massive floods in Thailand and Manila? Should we regard the concentrated heavy rain as an ordinary state brought by global warming and establish measures accordingly? Or, Should we regard that it is caused by a certain way of social and economic development? Where do the problems lie and how should we accept the situation?

- I think similar disasters will increase from now on. The weather conditions are strange in Thailand this year, too. Once the conventional stationarity is shaken, weather conditions will be significantly unstable until they go back to normal again.
- For the quick securing of resiliency for areas that can't choose but permit disasters, it is very important that we introduce social system such as disaster insurance as early as possible.
- Insurance system is one of the main pillars of nonstructural measures for flood damage. Flood insurance does exist in Thailand, but individuals are not accustomed to, nor can afford to buy one. It seems that World Bank and Asian Development Bank are considering something like a national insurance system, in which a nation buys the insurance to enable the immediate recovery of infrastructure at the time of disaster.
- We should also transmit the ethics along with technologies. It shall be extremely difficult due to the difference in education, culture, tradition, nationality, etc. of respective countries. Are there any specific methods for the transmission of ethics?
- We can transmit the Japanese ethics only through steady efforts. We can teach our ethics step by step, by actually visiting the site and working hard and sweating with local people.

● Current status and problems of water business

- In business, it seems more important to set targets than to clarify the purposes. What purposes does Kisui Water Treatment Japan, Inc., run by Mr. Mori, have for the coming five years? What purposes should Japan have with regard to infrastructure and water business five years from now?
- I believe priority should be given to visions, which would lead to the setting of targets and the formation of action plans. Kisui Water Treatment Japan, Inc. originally started as a manufacturer of water purifiers. We would like to promote the "Drinking water project" as the third pillar of the management of our company, following the traditional business in purified water for beverage manufacturers and the filtration of hot spring water, together with hot spring water purification. Through such efforts, we want to realize a fivefold increase in our water purifier business. As for the overall goal of the "Drinking water project," we would like to achieve satisfactory results in Cambodia first and establish water supply systems in many places in the basin of the Mekong River within five years, through cooperation among small and medium enterprises.

- Water and sanitation are important subjects. Governments and private companies have different attitudes toward the offering of water supply services as a business. There are various issues, including financial problems with governments as well as requests for further support from companies. Also it is difficult for private enterprises to share information on their technology with competitive companies.
- In the first place, water businesses have many different meanings for Japanese companies. There are no water companies such as Veolia or Thames in Japan. Japanese companies sell respective parts or technology, which makes it difficult for them to expand their businesses overseas although they have excellent products and technology. However, if the national government presents its policy, it will become easier for them to communicate with each other. What is needed now for cooperation in the creation of a product is mentality.
- In carrying out “Drinking water project,” we have to check how well enterprises in each industry are cooperating with each other. It is also necessary to confirm what is being promoted only by private companies and what with ODA support, as well as how companies, the government/international institutions, and universities have been cooperating with each other.
- My ideas is to create a project team to make a table of the needs of respective regions and corresponding technology types held by companies in Japan and other nations for matching. Industrial-academic-government cooperation is absolutely necessary. The emergence of the concept of BOP businesses has led to the expansion of cooperation and support by JICA, JETRO, the Ministry of Economy, Trade and Industry, and so forth. We would like to take the first action, which I would like you to evaluate and support.
- It is important for Japanese small and medium enterprises to watch BOP businesses from a global point of view. It is also true that small and medium companies can take action in response to the needs at job sites. Most of them, however, cannot expand its businesses overseas due partly to various concerns including those about risk. Do you have any ideas about policies to support them including those in terms of mentality?
- I would like to cooperate with small and medium companies with leaders who seriously hope to develop their companies aiming to offer services and products contributing to society. “Drinking water project” should be an opportunity for people with such an ambition to get together. If they want to join the project, they themselves should take action. I don’t think we need to support people who blame society or politics.

● Responses to water problems in Japan

- There have been many sudden downpours in different places, causing extensive damage, which has made it important to improve the observation system and mechanism. It is even more important to consider which measures should be given priority and carried out promptly.

- As for support to other countries, the establishment of ground observation networks is the most important, although such networks need not be based upon modern telemeters or radio waves.
- The most important is forecasting. Japan has considerably advanced radar systems to detect sudden downpours. The Ministry of Land, Infrastructure, Transport and Tourism (MLIT), in particular, has one of the latest X-band MP radars, which is of the highest grade in the world. The Meteorological Agency is getting ready for offering detailed short-term forecasts based upon data provided by the MLIT. Some experts have suggested that the Meteorological Agency and MLIT should forecast the flooding of small and medium rivers all over Japan in cooperation. However, no development has been observed concerning this proposal. The second most important is the redevelopment of sewer systems and small and medium rivers whose capacities were set according to the amount of rainfall in the old days. In the meantime, X-band MP radars, which are useful for predicting sudden downpours in cities such as Bangkok, will be suitable for technology export.
- Reverse innovation is an important viewpoint, as well. I also feel it necessary to reconsider rainwater harvesting and make the most of it in Japan.
- We should pay more attention to rainwater as a source of water. It is true that it sometimes rains but it doesn't at other times. In Japan, however, it won't be a big problem as long as we store it. Also, we should be more willing to use gray water. For example, even in Sumida Ward, where the residents show more interests in use of rainwater, they find it difficult to take the first step to use gray water after filtering. We would like to make more efforts to expand our business in this area.
- We can share the concept of the long-term measures shown in the master plan for water control of Thailand, which is based upon the idea of storage and discharge of water. When storing rainwater, it is also important to consider how to use it. Some water tanks have been built in Seoul, which now function as mini-dams. I believe the purpose of this is to prolong the reaching time of rainwater, which can be used as resources when stored but could cause flooding if allowed to flow without being controlled. How should we consider the issue of using rainwater?
- "Storage and discharge of water" means storage of water in upstream dams and intentional pouring into farmland in the middle reaches. From a comprehensive point of view including all the reaches of rivers, the basic concept of the master plan of Thailand for controlling water is to redistribute rainwater to respective areas as useful water, instead of allowing it to cause harmful flooding. In urban areas such as Bangkok, however, the priority has been given to drainage, and it has not yet established a system for using it. Its idea is to drain rainwater and not to allow water from other reaches of rivers flow into urban areas.
- The redevelopment of sewer systems, which were designed based upon the rainfall amount

in the old days, to cope with sudden downpours could be realized only by large-scaled development of infrastructure. Practical measures will be to prolong the reaching time, let rainwater penetrate into the ground, and create water storage tanks.

- Small and medium rivers do not have enough capacity to absorb increased rainwater, while public works in urban areas require huge costs. As a result, various measures need to be taken in Tokyo, including storage and penetration. The establishment of storage facilities in urban areas, however, would be very expensive unless tax preferences are given, while there won't be enough space, either. It may become impossible to create new normal storage facilities, which means our only option will be rooftop storage facilities. For example, research is under way to put very cheap water-retentive ceramics on roofs and let them absorb water. Maybe this technology can be exported to other countries in the future.
- Sewer systems in many places of Japan are getting superannuated, making it necessary to replace them with disaster-resistant ones efficiently at low costs. What sewage treatment systems are available to cope with the issues facing Japan?
- Sewer pipes and storm drains are considered to be in charge of local governments including municipal offices. It is impossible, however, to take measures to counter floods, including the maintenance and management of drain pumps to provide against a great flood caused by the crumbling of an embankment, without the involvement of the national government. Investments in sewerage systems, which are out of our sight, tend to be left over unless they are put in charge of the national government. It is also necessary to establish a new scheme, instead of introducing local grant taxes, to ensure that the development of such systems is continued. The revision of the division of roles between the national and local governments is a common issue in Asia.
- The idea of flood control shown in the master plan of Thailand is to protect particular areas which they really want to protect by not only building higher embankments but also allowing some other areas to be flooded. Could this idea be applied to future flood-control measures in Japan?
- The basic idea in Thailand is to set different safety level targets, or civil minimums, for urban areas and rural districts, and secure safety in downstream areas by compensating farmland for losses caused by floods. First of all, it is necessary to have structures to protect people's lives and property as long as the frequency is within the expected limit. Then, it is necessary to consider what compensation could be offered and how security could be guaranteed in case of a flood exceeding the designed level. Both of them have to be discussed at the same time. A civil minimum without basic infrastructure may deny economic development itself.
- Foreign countries, mainly China, are purchasing more and more preserved forests together with water resources in Hokkaido, which has already led to the development of water businesses. In response, the prefectural and other local governments of Hokkaido have

started discussions about environmental problems and possible restrictions on use of water resources so that they can be preserved. What measures can be taken to cope with such scrambles for water resources or water wars?

- The problem of who should manage underground water including that in forests and how it can be managed, as well as that of how water business should be operated, was the starting point of Team Water Japan. There are some problems with the current law stipulating that the owner of the land should own the groundwater as well. However, it is a matter of the civil law and it will be difficult to discuss the matter. It is necessary to grasp the flow of groundwater and the realities of its use on a national level. It is also necessary to have some legal restrictions, like Water Basic Law. I don't think any progress can be expected unless the House of Councillors encourages a fact-finding survey of underground water.

● Establishment of foundation for international cooperation concerning water

- I am very much concerned about the fact that students show less interest in civil engineering, which would seriously affect the development of the nation and urban planning. What measures are being taken by societies of civil engineers and other organizations for making civil engineering more attractive, including the offering of information to junior high and high school students?
- It is necessary to consider more seriously what amount of public investments and how many people are needed on a national level to stably maintain respective areas.
- Many people say fewer and fewer students are going abroad. Don't you think there are some political measures that can be taken so that more students will go abroad?
- There still are some young people who really want to go abroad and work there, but I feel the number is decreasing. It is true that international background has not been highly appreciated at government offices. Everyone in Japan needs to cooperate with each other to create an atmosphere where young people feel international businesses are the only choice for Japan to survive.
- How can Japan take the initiative to unite Asia? Can politicians organize their ideas into one proposal and put it into practice? If you can think of any, I would like you to present us a specific proposal.
- It is a difficult question. We can only find one while taking action. Japan's strength is its ability to serve customers making the most of its technological ability, rather than technological ability itself. The creation of a big organization in light of this could not be achieved without the power of politicians. For example, they agreed to set a specific goal, or to try to offer water to areas where no water is available, at the Water Council. I feel that Asian people will expect Japan to take the leadership if Japan keeps making such steady efforts.

3. Water Issues in Central and South Asia and Efforts Made by Japan

Most of Central Asia is arid or semiarid and irrigation farming accounts for most of the water use in the region. In recent years, more and more areas are facing water shortages while the deterioration of the aquatic ecosystem has become even severer, as a result of an increase in population, the expansion of urbanization, increased production of agricultural products, increased hydropower generation, and so on, as shown by the example of the Aral Sea. In addition, a conflict of interests concerning water arose between upstream and downstream nations along international rivers. The solution of these problems has become an important issue.

In the meantime, we cannot ignore the influence of climate changes and deforestation upon water resources in Central Asia. To cope with this problem, it is important to introduce comprehensive water resources management in respective nations. However, Central Asian countries do not have adequate technology, human resources, or funds necessary for the

introduction of such management, which makes it difficult for them to put it into practice without the cooperation of international society including Japan.

In addition, conflicts have arisen among nations in river basins concerning use of water resources offered by international rivers. It is important to establish a cooperative system covering related nations.

In the meantime, South Asia has suffered water disasters every year, including floods, droughts, and cyclones, while its economic development has been slower than that in other areas of Asia. As a result, more than 35% of the total population of over 1.5 billion remain to be in the poorest class. As for industries, they rely heavily on agriculture and agricultural water accounts for more than 80% of the total water use. As a result of the progress of urbanization in recent years, however, they are now faced with new problems such as the concentration of population followed by water shortages in urban areas and large-scale health damage caused by the deterioration of groundwater quality due to fluorine, arsenic, etc. The solution of these problems has become an important task.

In light of these, experts were asked for their views at the Research Committee meeting about the water issues currently facing Central Asia and South Asia and efforts made by Japan, which was followed by a question period. In the question period, they discussed water issues in Central and South Asia and what support should be provided for the solution of such problems, the rights in international waterways and international developments, water issues and efforts for their solution, how water businesses should be expanded overseas, overseas expansion of water businesses by local governments, and so on.

(1) Summary and outline of views of voluntary testifiers

Views expressed by voluntary testifiers during the committee meeting are summarized and outlined below.

● **Manabu SHIMIZU, Professor, Faculty of Economics, Teikyo University**

- Prior conditions for considering water problems in Central Asia (the former Soviet Union area)
- Disputed points between countries in the upper reaches and those in lower reaches of international rivers in Central Asia
- International situations surrounding water and power issues and recent changes
- What role should Japan play in water issues in Central Asia?

Central Asia was divided into five independent nations as a result of the dissolution of the Soviet Union. The dissolution meant that they no longer had any coordinators concerning water, energy, oil and other issues, resulting in conflicts of national interests. Thus, the

dynamics of separation remain to be stronger than those of integration.

Central Asia, which is arid or semiarid, relies upon water from rivers and groundwater for agricultural water, instead of rainwater. Syr Darya and Amu Darya, which are the main sources of water, are no longer domestic rivers but international rivers. Also, only Kyrgyzstan and Tajikistan in the upper reaches have sources of rivers. They are also faced with the problem of the drying up of the Aral Sea, which is a negative legacy of the former Soviet Union.

In the former Soviet Union, there was a scheme controlled by Moscow, under which downstream countries provided hydrocarbon fuel to upstream countries, which managed agricultural water used by countries in the lower reaches. After becoming independent, however, upstream countries promoted hydropower generation, which led to reduced discharge of water for agricultural use. Thus downstream countries including Uzbekistan got into trouble. In addition, large-scale hydropower generation projects are under way in view of export, which has intensified disputes concerning water management.

Furthermore, the water issues in Central Asia have caused tension partly due to its relationships with peripheral countries such as Russia, which wants to obtain electricity supply, China, whose presence has become stronger in Central Asia, and the US, which counts on power and agricultural water supply due to the problem of Afghanistan. The tension caused by the water issues is not likely to be eased for a while.

Under such circumstances, it will be difficult for Japan to play a direct role in the water issues in Central Asian countries for some time more. Instead, modest cooperation in water- and energy-saving technology and management should be promoted for common interests of the five Central Asian nations. It is also important to improve small irrigation facilities, which are now in very bad conditions due to poor maintenance. In the meantime, farmers tend to shift from large-scale farming to small-scale farming, amid the transition to a market economy. Some local farmers insist that they should learn from Japanese small farmers' experience in the management of their farms. "Central Asia plus Japan" dialogue proposed by Japan in 2004 gives priority to support for basically strengthening the unity of Central Asia on a long-term basis. However, developments going in the opposite direction are also observed in Central Asia now. It is necessary for Japan to consistently express its attitude hoping for the unity of Central Asia.

In the meantime, irrigation associations are not working effectively in many countries. In light of this, some administrative officials in Central Asia argue that they should find some hints in the water management law following the Islamic law, which practically vanished around the 1930s. I am interested in such developments because past wisdom that was available in the Soviet Union era might help Japan to offer some kind of support.

● **Junpei KUBOTA, Assistant Professor, Research Department, Research Institute for**

Humanity and Nature

- Outline of arid and semi-arid regions in Central Eurasia
- Water environment problems around the Aral Sea, the Ili River, Lake Balkhash, and the Caspian Sea
- Influence of global warming upon water environment problems in Central Eurasia
- Background of water environment problems in Central Eurasia and process to solve such problems

Central Eurasia consists of China, Xinjiang Uygur Autonomous Region, and the five nations in Central Asia. In the region, the water levels of many lakes started to decline around 1950 and 1960. Most of the declines were due to agricultural development in the upper reaches. In Central Eurasia, fluid society involving multiple races and cultures has been formed while people have changed places for farming and nomadism to survive in accordance with the changes in environment. In recent times, however, economic, ecological, and cultural borders have become inconsistent with political borders.

The Aral Sea problems were caused, in a sense, artificially as expected. There are some irrigated farms along the Syr Darya and Amu Darya, which were developed during the Soviet Union era. The wider farmland is expanded, the further lakes shrink. It is impossible to carry on with agriculture without causing any effects. This problem cannot be solved solely with technology. It is a serious issue which can be solved only by stepping into politics, economy, social structure, and people's life. With international cooperation, Kazakhstan set to the preservation of Small Aral Sea by constructing a dam on the Syr Darya, which has worked well as shown by the returning of a significant number of fish and the recovery of the ecosystem. However, it is difficult to hope for further improvement.

In addition, the water dispute concerning the Ili and Irtysh Rivers running from China into Kazakhstan is the only stinging issue between the two nations, which are otherwise basically on favorable terms. Lake Balkhash was saved from the crisis similar to that facing the Aral Sea, as a result of the decline of agriculture in the 1990s. Farmers, however, are seriously troubled. The lowering of the water level of Lake Balkhash is said to be half due to the dam. The construction of a dam for controlling the water volume in arid land leads to the loss of water. The Caspian Sea is the only lake in Central Asia that has not experienced a significant drop in the water level. However, it has caused a dispute among the countries along its coast concerning how to draw border lines. Oil spills from some of the oil fields developed along the coast in the 1970s and 1980s when the water level temporarily declined have caused critical problems.

Also, the shrinkage of glaciers is rapidly progressing in Central Eurasia. Glaciers are thought to be excellent natural dams, temporarily storing water and discharging a large

amount of it when they don't have much rain. The disappearance of glaciers is likely to cause sudden floods and droughts.

The problems expected to arise in the future include less advanced technology, the collapse of observation data networks covering weather and river conditions, and environmental education, as a result of the breaking up of the Soviet Union. The improvement of agriculture is also strongly related with environmental issues. In the meantime, warning systems based upon analyses of satellite photos are effective to counter the burst of glacial lakes. Japan is expected to provide support in this area, as well as for observation networks. It is vitally important for Japan to persevere in playing a particular role for coordination and cooperation among multiple nations including China.

- **Masataka NAKAHARA, Director General, South Asia Department, Japan International Cooperation Agency**

- Increase in population, poverty, millennium development targets, and the present state of water issues in South Asia
- Examples of JICA projects and scheme collaboration for the solution of water issues in South Asia
- Support provided by JICA for water supply and sewerage in South Asia
- Collaboration between JICA and local governments, universities, etc. for the solution of water issues in South Asia

South Asia, mainly India, has the largest population in the world. Not only the amount of agricultural water but also that of industrial water and domestic water is expected to increase. It is also the largest destitute region, with the poor people in the region accounting for 40% of all the poor people in the world. There still are significant needs for the improvement of sanitary environment including safe water as well as toilets and sewerage. The number of people in South Asia who cannot continuously use safe drinking water is 207 million, which accounts for 23.4% of the world total and the second largest in the world following Sub-Saharan Africa. The number of people in the region who cannot continuously use basic sanitary facilities such as sewerage and toilets reaches 1,079 million, which accounts for 42.6% of the total, or the highest.

South Asia is faced with such problems as the gap between the water supply capacity and demand as a result of an increase in its population particularly in urban areas, the high rate of non-revenue water due to antiquated facilities and poor management ability, the securing of safe water free of fluorine or arsenic, and the low sewerage diffusion rate. JICA has been carrying out a variety of projects to cope with these problems. Under the water supply and drainage improvement project in Delhi in India, the agency aims to make it the

first big city in India to realize 24-hour incessant even supply of water, by repairing existing facilities. It is also engaged in a project to support the improvement of antiquated facilities and that of the capacity of a water business entity in Pakistan. To be specific, it is providing mechanical equipment and materials to improve the drainage capacity, including the renewal of drainage pumps, and aims to upgrade the ability of the corporation in Lahore which is in charge of water supply and drainage. JICA is also engaged in a project in Bangladesh, making continued efforts to deal with arsenic. Under the project, residents play the main role, with the support of the central and local government organizations, in developing deep wells over 150 meters underground which are less contaminated and installing facilities to remove arsenic. Under the project to improve the sewers in Kandy, Sri Lanka, JICA is contributing to the improvement of living and health conditions of local people, by improving the sewage treatment systems and sanitation facilities for poor people with repayable aid of loans. As for yen loans, 21.3%, representing the largest share, go to water supply- and sewerage-related projects, while 13% of the grant aid is used for water supply and sewerage.

Japanese local governments are also positively striving to solve water problems in South Asia. JICA held a seminar in January 2012 on the management of water supply and sewerage businesses and the cultivation of human resources in Asia, jointly with Yokohama City. Fifteen people from five countries in South Asia participated in the seminar. Also, the Tokyo Metropolitan Waterworks Bureau visited Bangladesh in January this year to consider the possibility of offering support in the future.

In South Asia, water supply and sewerage businesses, which affect the security of people, are strongly needed and given high priority. We would like to continue organizing and supporting highly efficient and continuous projects, taking advantage of technology of Japanese companies and management know-how of local governments and by combining financial and technical cooperation.

- **Masaru OZAKI, Executive Director, Japan Water Works Association**

- Outline and activities of Japan Water Works Association (JWWA)
- Issues of water supply business in Japan and efforts made by JWWA
- Issues faced by Japan in overseas water business and international contributions and overseas development by water business entities
- Efforts made by JWWA in South Asia

Water service in Japan is at one of the highest levels in the world. It is faced with some problems, however, including weaker management foundations of small and medium water business entities as a result of reduced revenue from water charges, measures to counter natural disasters including earthquakes which have frequently occurred, damage caused by

water contamination accidents, and succession of technology to make up for massive retirement of skilled workers. Efforts are being made to solve such problems through the promotion of wider area management and public-private partnership.

In developing countries, problems in accordance with the development stages of respective nations have surfaced, which has made it essential for developing countries themselves to make efforts and for other countries to offer support. Many of the emerging nations, which have achieved remarkable economic development in recent years, promote water service development through public-private partnership (PPP), while obtaining support from international organizations and ODA by JICA. Japan lags behind with this regard. In Japan, water service is provided by local governments and therefore, the private sector does not have know-how for the operation of water service at large. As a result, Japanese entities could not expand their operations overseas. Under such circumstances, a governmental exploratory team led by the Ministry of Internal Affairs and Communications presented its views, which allow the operation of water services abroad as an incidental line of business on condition of meeting some requirements. The establishment and promotion of measures for overseas expansion of activities by public-utility organizations such as waterworks bureaus is stated as one of the goals in the new growth strategy of June 2010.

There are two forms of operation of water services overseas. Sometimes, the third sector of the waterworks bureau forms a consortium in cooperation with private companies. Or, a waterworks bureau forms a consortium in direct cooperation with private enterprises. More and more business entities are engaging themselves in overseas businesses. Tokyo has a third-sector organization, Tokyo Suido Services Co., Ltd. While the Tokyo Metropolitan Waterworks Bureau approaches the central and local governments of the country they intend to advance into and offer technical advice, the third-sector company and private entities operate water businesses. In the meantime, Osaka City Waterworks Bureau has established Osaka city Water & Environment Solutions Association in cooperation with the sewerage/environment divisions and economic circles and is engaged in overseas water service. Yokohama City has also established Yokohama Water, aiming to start overseas businesses. Kitakyushu City is promoting efforts in friendship cities under JICA projects.

Japan Water Works Association (JWWA) joined International Water Supply Association (IWSA) aiming to support the activities of water business entities and other industries and engages itself in the collection and offering of information, strengthening of cooperation with water associations of other countries. It also offers cooperation in international projects carried out by JICA and the Ministry of Health, Labour and Welfare (MHLW) and engages itself in committee activities of ISO. JWWA's activities are conducted mainly in Southeast Asia and not many are carried out in South Asia. However, the MHLW is also engaged in some projects in South Asia, and JWWA has been promoting cooperation and exchanges with the Indian Water Works Association (IWWA). JWWA has reached an agreement with the

IWWA and agreed to offer cooperation in a project to realize 24-hour continuous water supply.

I hope that the activities of waterworks associations and water business entities will contribute to the solution of problems with water supply in Asia and other areas of the world. I also hope that such activities will lead to the activation of water businesses and other industries in Japan, and furthermore, to the solution of problems and even higher-level water supply services in Japan, creating a virtuous cycle.

(2) Discussion highlights

Main views expressed by committee members and others during the Q&A session, involving voluntary as well as government testifiers, are summarized below.

● Water issues in the Aral Sea

- The problem of drying of the Aral Sea is really serious. It is a matter of concern that the agricultural zone around the sea, which uses irrigation water, is in a state of devastation.
- The International Commission on Irrigation and Drainage (ICID) and its national committees are engaged in the solution of the problem of drying up of the Aral Sea. However, the problem has turned into a political issue and they are not functioning as intended. It is important to create an opportunity for discussions. Maybe the only way is to have a third-party organization promote an investigation or another action that can persuade both parties.
- The most crucial aspect of the Aral Sea problem is the conflict between Kyrgyzstan and Uzbekistan. Kyrgyzstan does not accept the proposed reconciliation due to energy problems, while Uzbekistan cannot abandon agriculture or does not want gas fields dipped in water as a result of the returning of water to the Aral Sea. It seems practically difficult to restore the Southern Aral Sea.
- There may be some sort of support Japan can offer in light of the actualities surrounding the Aral Sea, in a way which is different from the restoration of the Aral Sea.
- The first steps for the solution of water disputes will be the sharing and securing the transparency of information. The network which used to be operated by the Soviet Union is now disappearing. If Japan makes positive efforts with this regard, it will be highly evaluated internationally.

● Current conditions of water supply and necessity for support in Central Asia

- JICA is installing water meters in Uzbekistan. Some of the families, however, do not understand the necessary of paying for surface water. It is necessary to ask the government and municipality for cooperation in instructing them of the value of water.

- The water pipes in Uzbekistan were installed in the Soviet Union era and have become superannuated. They cannot drink tap water, which needs to be treated to become drinkable. Therefore, it is necessary to think of supporting water businesses with Central Asia in mind.
- Water supply facilities in Central Asia have become superannuated, and therefore, it is necessary to investigate the deterioration of water quality.

● Water issues in Central Asia and problems in support

- How is China's presence in Central Asia expanding? How are the governments and ordinary citizens of respective nations in Central Asia reacting to the expansion of China's presence?
- A large amount of Chinese products are flowing into Central Asian countries, which has led to the failing of many small and medium local companies and caused a big problem. In Central Asia, difference in treatment between local and Chinese workers has caused dissatisfaction among some of the local workers. Because of this and partly due to the national border problems, they are considerably cautious about China's presence, although the national governments are accepting its support.
- Uzbekistan was forced to start cotton production as part of monoculture during the Soviet Union era. Won't it be possible for Japan to be more active in offering instructions and technology to help the country grow as an agricultural nation in a proper sense?
- Uzbekistan as well as other countries hopes to grow out of monoculture by diversifying agriculture and the industrial structure. Japan should offer carefully planned support in such areas. The support to agricultural high schools, which was promoted by Japan, gave them a chance to make agriculture more attractive and is highly appreciated.
- It may be a good idea to gather people from Central Asia or students studying in Japan to give some instructions concerning water problems.
- It is very important to start with education when offering cooperation. The US and UK established colleges in Kazakhstan, mainly business schools. Japan cannot make similar investments in Central Asia. However, there is a large demand for support, particularly in agriculture.

● Current conditions and problems in Japanese diplomacy towards Central Asia

- How are Japan's diplomatic policies in the form of Central Asia plus Japan evaluated? How much has Japan, which does not have international rivers, been able to contribute to local cooperation in environment and water supply in the region? Is there anything in need of improvement?
- Central Asia plus Japan is rather an opportunity for dialogs. Central Asian countries are

new nation-states and are strongly pursuing national interests when establishing economy. However, their situations are similar and they have many problems in common. It is important for Japan as an outside party to keep on insisting on the importance of Central Asian nations getting together, although such efforts may not produce noticeable results very soon, and that is where Japan should play a role.

- Central Asia plus Japan is highly appreciated, as it shows that Japan and the five nations in Central Asia are on equal terms.
- Japan is not a direct donor of some of the international organizations related to the Aral Sea, and therefore, its presence is slightly smaller than that of EU. On the other hand, only a few countries besides Japan have sent people to the spots of afforestation projects in the dried-up Aral Sea. This has led to high evaluation of Japan.

● Rights in international watercourses and international developments

- It is of vital importance to arrange international agreements concerning non-navigational uses of international watercourses in consideration of both private rights and public property rights.
- People from water resources ministries and cabinet members of Central Asian nations have exchanged opinions, which, however, have not produced significant results. It seems that Central Asian countries have not yet reached a common understanding of international rivers.
- The characteristic of water as international public goods has been emphasized since the 1990s, while some developments are being observed towards the commercialization of water which is regional commons. In recent years, some resolutions concerning the rights in water have been discussed at the UN General Assembly, as well. How is the UN acting with this regard?
- How are the rights in water of international rivers being treated?
- As for water, there are no international treaties which have duly come into effect. According to the internationally accepted understanding, upstream countries are much stronger in principle. If any problems arise, they usually try to solve them through negotiations. As there is no international judicial system in compliance with the international law, nothing can be done for some of the issues.

● Water issues in South Asia and how to support the region

- Measures to cope with naturally-derived fluorine and arsenic in South Asia including India and Bangladesh include the development of technology that is appropriate for the situation of the relevant area and reverse technology. What are the ideas about the expansion of use of rainwater and how far has it spread?

- The project carried out by JICA in Bangladesh is the largest to handle arsenic problems. The efforts made under the project include the installation of equipment for the removal of arsenic in rainwater storage tanks. However, use of rainwater and underground water close to ground surface is often influenced by droughts and other climate changes.
- For the solution of non-revenue water problem in South Asia, the improvement of services is the most important. Water should be supplied when needed and efforts should be made for the collection of fair charges. Also, charges should be set so that even the impoverished classes can pay them. Thus the matter should be discussed from a viewpoint of water supply administration as a whole.
- In South Asia, as well, some local governments are starting to get involved in water businesses in cooperation with private entities.

● Water issues and efforts for their solution

- What problems would the drying up of fossil groundwater cause?
- The underground water in China, India, and Pakistan, where people are engaged in irrigation farming, is actually drying up. We should be aware of the fact that Japanese people are considerably dependent on fossil groundwater in the US as virtual water through the import of foods.
- Most of the efforts for appropriate management of water started after Agenda 21. Twenty years after that, how should Japan cope with international developments including Rio+20?
- The current extremely severe situations, including shortages of water, are results of people's activities. You point out that what people want now is a drastic change in people's way of thinking. What are your ideas?
- We know that the earth could not survive if we continued expanding and developing human activities. I don't mean to say we have to live frugally, but we need to know that we are in such a stage.

● Problems with overseas expansion of water businesses and its support

- The international standardization of water-related technology is entering a very important phase. It is necessary for Japan to take the initiative in promoting strategic efforts for establishing international rules concerning how to set standards and so on.
- Japan's technology for water supply and sewerage is at one of the highest levels in the world. Although other countries are ahead of Japan in standardization, I think Japan can play a leading role taking advantage of its high technological level.
- While overabundant private funds are going to investments in foods and energy, developing countries are short of funds to cover a huge demand for infrastructure. It won't

be easy to counter these problems only through the introduction of PPP. We will have to consider how we can solve the problem of fund shortages, including the establishment of funds.

- It is true that India also has policies to promote PPP projects as it is difficult to use public funds to cover a huge need for water supply and sewerage services. On the other hand, such policies are opposed by some people insisting that people working for the waterworks corporation might lose their jobs, while being faced with other problems such as some regulations and the division of roles between the state and local governments. As a result, PPP in water services lags behind that in any other area. As for funds, there is a recent trend to create funds combining ODA from Japan and private funds for the operation of joint projects between Japan and India, although they are not in the water industry.
- Some experts argue it is possible to reflect the growth of Asia in that of Japan by developing integrated infrastructure including water businesses. Don't you think, however, most of the materials needed for the establishment of infrastructure might be procured locally in actuality and workers might also be employed locally?
- Water businesses based upon integrated infrastructure have not been established in South Asia. For a business to be profitable despite competition with local companies, it is necessary to procure good technology at low prices. It is expected that local materials and human resources will be employed to a considerable extent.
- Is it possible to assume that a BOP-type business can be profitable only in countries and areas at a high stage of development and it is difficult to make it profitable in poor areas?
- To make a BOP business profitable in poor areas, it is necessary even for Japan to try to reduce costs for labor and materials as far as possible. It will also be necessary to offer products in smaller packages and lower specifications so that local people can afford the product.
- Water businesses are attracting increased attention and people in Japan are more and more interested in such businesses. Under such circumstances, won't it be necessary for JICA to make positive efforts for the creation of environment to allow the development of water businesses using ODA?
- JICA has established Office for Private Sector Partnership to support feasibility study for BOP businesses as well as businesses through PPP, and when the feasibility is confirmed, it actively helps private companies with their efforts for starting local operations through overseas loans and investments.

● Overseas development of water businesses by local governments

- Without an established incentive encouraging overseas operations, overseas business activities by public enterprises may not be expanded, as overseas development of

businesses by public enterprises involves risk. If it is impossible for public enterprises to expand overseas operations as public entities, it may be necessary to privatize water businesses in Japan, while having the public sector assume the final responsibility.

- When a local government starts a water business in an Asian country in need of such a business, is an adjustment in some form made to avoid competition among different local governments, whether or not a waterworks association is involved?
- Respective municipalities are promoting support in water businesses abroad with their own know-how, based upon sister-city exchanges or relations created through JICA's projects. JWWA and local governments have shaped platforms and local governments are exchanging information among themselves so that no overseas support in water businesses will be redundant.
- In case of an overseas water business, whether through ODA or by other means, won't it be necessary for the public sector to take the initiative in negotiations with the other country to make it successful, rather than relying upon public-private collaboration?
- When a local government starts a water business, how does it reconcile profit making aspects of the business and its role as a public entity in the promotion of public welfare?
- I understand major water companies are being criticized about some of their ways of conducting businesses. Priority in water businesses should be given to the solution of world water problems, and making too much profit will not be morally acceptable. However, I feel they should be allowed to gain some profits in exchange for their support.
- I don't think it is possible for a local government to make a profit from a water business in very poor areas, such as slum areas in Lusaka, Zambia with some families which cannot pay 24 yen to buy 12 liters of water a day.
- When supporting a water business in a developing country, it is important to consider whether superior technology can be offered at a low cost and such technology will be accepted in the area. One of the other important aspects is how to set water charges.
- As they are under different economic conditions, it might be difficult in some countries to develop it into a successful business.
- When I was the Director General of the Tokyo Metropolitan Waterworks Bureau, we planned to offer support basically as part of international contributions and add an aspect as a business when the area accepting our support and its economy have developed as a result of the realization of water supply and can bear water charges.
- Water supply services are necessary as social infrastructure. However, it may be difficult for the national government of a developing country to accept a water supply business due to financial restrictions.
- Major water companies once started businesses in Bolivia. After their advancement, however, water charges soared, causing strong opposition from poor classes, and they were

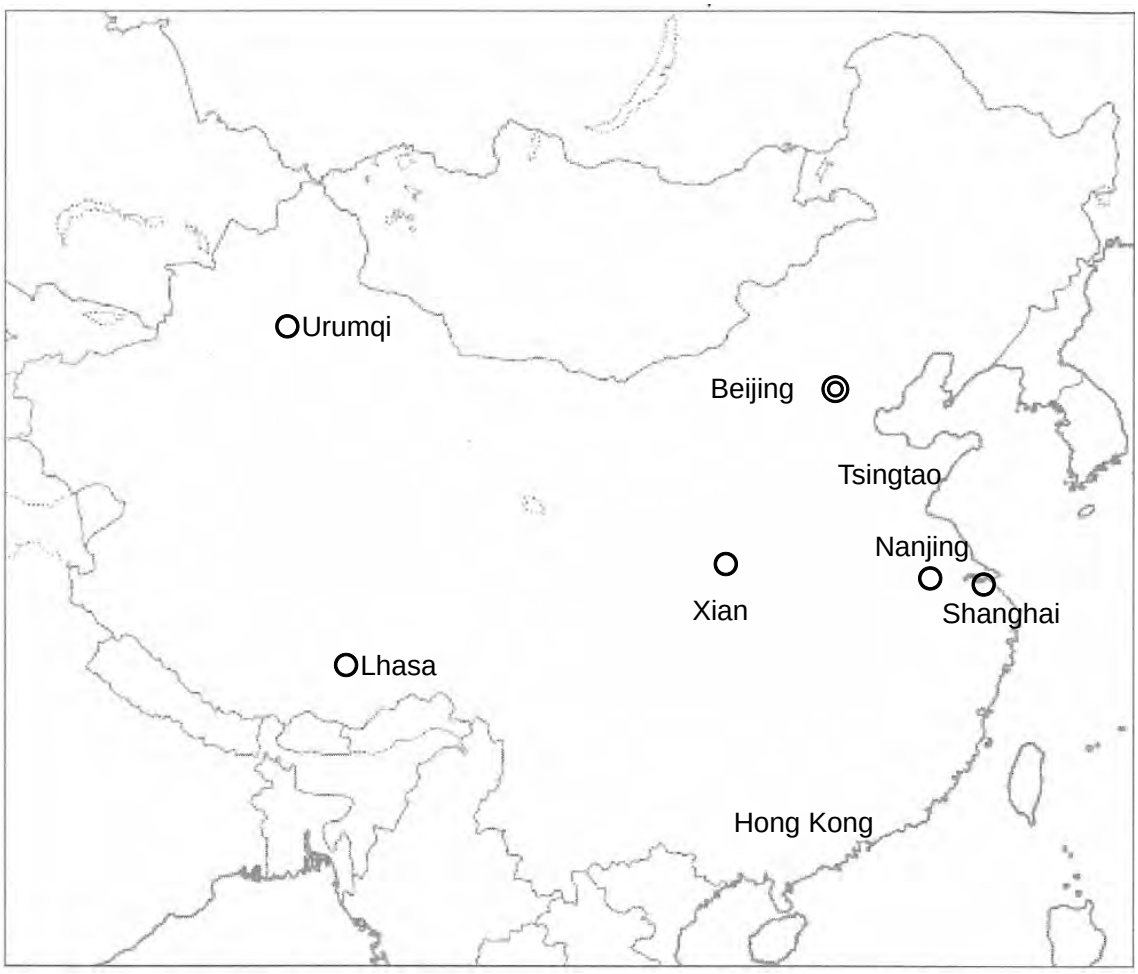
forced to withdraw. What do you think are the causes of failure of overseas water businesses?

- It is true that there are some criticized aspects in major water companies' way of carrying on water businesses abroad.

● Privatization of water service

- What are the conditions for successful privatization of water businesses in advanced nations and the merits/demerits of the privatization of water businesses?
- The public sector should assume the final responsibility. On the assumption that the public sector makes it sure that people's lives are protected, it may be acceptable to let the private sector apply its excellent technology and take charge of the operations and management of water filtering plants. In the meantime, water service engineers are going out of small and medium cities. It won't be possible in the future to keep the water businesses going without the help of the private sector.

4. China's Water Issues and Japan's Efforts



China is a neighboring country closely related to Japan from historical, geographical, and cultural points of view. With the size of country 26 times as large as Japan and the huge population of over 1.3 billion, China's economy has been growing rapidly for a long time.

In China, the volume of water resources is declining, and these water resources are distributed unevenly across the country. While the demand for agricultural water, representing roughly 70%, has remained flat, the demand for household water/industrial water have been increasing due to improving quality of life, increasing urban population, and expanding industrial production. Consequently, the supply and demand of water became tight, causing the surface water reduction in rivers, lakes, and marshes; and the fall in the groundwater level via use of groundwater, which resulted in a serious water shortage problem in some regions. In addition to the volume-related problem discussed above, China is faced with serious water quality issues, including water pollution due to industrial and household wastewater, and insufficient water purification process in the water supply and sewerage system. Further, sediment discharges, together with the surface soil discharge due to recessions of forests and grass fields, are increasing in various locations in China.

These water issues are recognized as important environmental issues for China, and

remain serious, despite the Chinese government's efforts under the series of five-year plans, including large-scale dam construction projects, South-North Water Transfer Project, development of wastewater treatment facilities, and water conservation projects. In such circumstances, water-related businesses in China have shown significant growth in recent years. While this could mean major business opportunities for Japan's water-related industry, it is noted that Japanese companies in water-related businesses in China have not been fully successful due to various reasons.

Based on the above, the research committee conducted hearings on experts of their views regarding: China's water issues and Japan's efforts, water business strategies in various countries including China, and China's environmental policy and water businesses. These hearings were followed by Q&A sessions, where the following topics were discussed: China's actions to deal with water issues; current situation of water businesses in China; Japan's efforts concerning China's water issues; Japan's challenges in dealing with the water sector and ideal involvement; water supply and sewerage services overseas, and the desired structure of water supply and sewerage services in Japan.

(1) Summary and outline of views of voluntary testifiers

Views expressed by voluntary testifiers during the committee meeting are summarized and outlined below.

- **Hidefumi IMURA, Contract Professor, Yokohama City University**

- Current situation and background of China's water issues
- China's actions in relation to water issues
- Trend of water businesses in China
- Japan's cooperation towards China's water issues

Water and environmental issues are critical for China's future. To describe major environmental problems, the Chinese government refers to three rivers, three lakes, two major projects, two air pollution controlled areas, one municipality and one sea (expressed as "3,3,2,2,1,1"), most of which are linked to water issues.

China's water issue is not uniform across the country; completely different between southern and northern regions. In the northern region where rainfall is limited, water shortage is serious. On the other hand, the southern region benefits from the abundant water supply from Changjiang River. Although the southern region experienced severe floods in 1998, the region's flood situation has been well under control owing to the construction of the Three Gorges Dam. It should also be noted that the land subsidence caused by pumping ground water has been a serious concern in various locations in China.

Water pollution caused by a number of xiangzhen companies has led to a serious condition in the Huai River basin. Also, water pollution by domestic wastewater in urban areas is an ongoing problem. Water supply system is in place but water is not drinkable as it is. Also the sewerage system is not up to the standard that wastewater is collected and processed at a sewage treatment facility. In addition to rivers, underground water is also contaminated with fluorine and arsenic, a large number of people have no other choice than drinking such contaminated water.

Further, unique to China, there is a problem of run-off and sediment discharge, which occurs all at once when the rain falls on the dry area in the northern region. In this area, the government is encouraging people to give up farming and promoting afforestation. It is noted that Japan has a track record of supporting afforestation in the form of people to people aid.

As for the relationship between water issues and economic growth, balancing between agriculture and industrial manufacturing has become important. Measures taken in this regard include: faming technique for water conservation, securing water for urban area, and forced closure of factories in violation of pollution control regulation. With contaminants flowing in from all over the country, water pollution in Bohai Bay and East China is also concerning.

Although the regulatory framework is in place in China, lack of satisfactory monitoring function at times triggers the central government to invoke the state power and reinforce the framework. The government's latest attempts include the introduction of the ecological compensation scheme such as compensation payouts to the Three Gorge Dam refugees, and the trading of water access rights.

There is a massive water supply and sewerage market in China, where British and French water companies are implementing projects under the PPP scheme. Japan's typical ODA approach is no longer effective. Also, with the business model that packages the water business as part of the project is increasingly sought for, Japan is left behind. On the other hand, the use of small-scale water supply system and onsite sewage treatment system will potentially become the mainstream in the regions with limited financing capability. Japan is keen on this and conducting research.

Academic cooperation in relation to water pollution has been active among universities. The gap between China and Japan, in terms of knowledge, skills, and financial strength, are not huge. The Chinese government is actively promoting national environmental projects, for which universities cooperate and conduct research. As such, Japan should be well aware of China's very strong problem-solving ability.

- **Toshiyuki HATTORI, Representative Director, Env Biz Tec Inc.**

• Types of Public Private Partnership (PPP) scheme in relation to water supply and sewerage services, and background for water business gaining prominence • Current trends in operation style and strategies for water supply and sewerage services in various countries • Unique feature of water supply and sewerage services when expanding globally • Strategies to be taken by Japan in developing overseas operations for water supply and sewerage services

PPP takes various styles of operation; but it generally means the transfer of part of public business to the private sector in order to improve economics and services. Water supply and sewerage services were historically operated by the public sector in various countries. Following the full privatization in the U.K. in 1989, however, operation by using concession scheme and leases increased in 1990's. China saw its first privatization in Chengu City in 1999.

One of the major changes in operating under the PPP scheme is typically the method of recovering the initial investment. In Japan, where relevant municipalities operate and manage the water supply service, tax revenue covers majority of costs, and only a part of expenses are covered by water revenues. Thus the rate of recovery via water revenue is not as high as other developed countries. As the PPP scheme becomes widespread, tax revenues cease to be the source of recovery beyond a certain stage, thus total costs will likely decline via the introduction of the principle of competition.

In many developing countries, public-owned or state-owned utilities typically run services and the initial investment costs are recovered via tax revenues and financial assistances from developed countries. Post 1990, we have seen the use of the PPP scheme in the counties and cities with high rate of economic growth.

Apart from other industries such as automobiles and home appliances industries, water business is unique in the following ways: suppliers are normally the government or a municipality in partner country; an operator is in place in addition to product manufacturers; and the supply chain is fairly simple, with a large number of low-tech parts in use. As a result, in water business strategies, government procurement rules are important factors when considering trade related issues. Additionally, economic policy issues for the exporting countries include a potential ideological rivalry between neo-liberalism and the state capitalism, as there may appear public- or state-owned companies that will push for overseas development by bringing political power into play while monopolizing the domestic business. Further, the business model for water business is simple; equipment is manufactured by the companies in the importing country, and the exporting country provides funding and

know-how through a business operator. As such, controlling factors are cultural, historical, and political issues including language problem, rather than geographical issue.

Japan's mid-to long-term strategy, although in the interim overseas market development will be carried out jointly by municipalities and the private sector, is to nurture private companies under the domestic PPP scheme, and send private companies with strong capability to develop into the global market. In order to promote the PPP scheme, there should be a third party agency which evaluates municipalities in terms of finance, management, and technology, and binds those not meeting the standard to introduce the PPP scheme. Also, regulating body and operating entity should be completely separated. Water issue, together with food and energy issues, is one of the largest problems in 21th century. In this regard, significant contribution can be made by Japan, and national strategies should be outlined on a mid-to long-term basis.

- **Meguri AOYAMA, Scholar in China Study, Researcher at KEIO Institute of East Asian Studies**

- Growing awareness of Chinese people on water issues and background
- Chinese political structure and systems
- China's water-related system reform and current situation/prospects of water business
- Measures for Japanese companies to enter into water business in China

The demand for water in China has dramatically increased on the back of industrialization, information technology, urbanization, shift to market economy, and globalization. The shortage of water supply is a continuing problem, and Chinese people's awareness of water issues are growing as water pollution becomes widespread.

The Chinese government takes a centralized structure, with four administration levels under the central government: 34 provincial-level governments including provinces, autonomous regions, and municipalities reporting directly to the central government; over 3,000 counties; townships and town. Policies are made by the central government with experts acting as opinion leaders. However, due to various numbers of gaps within the structure, farming areas, so-called silent majority, is not part of creating public opinion. From the market economy point of view, the distinction between government as a rule maker and companies as market players is unclear, inducing collusive relationship of the two. As such, the concept of corporate social responsibility (CSR) is not ingrained, and companies do not easily take the responsibility of contaminating water.

While as many as 660 cities are potential clients for the water business in China, it is difficult to penetrate the concept of the water business, given the municipalities' weakening financial condition as a result of the tax reform. Also the price of water is controlled at low

level under the regulation related to water pricing; hence it is difficult to shift costs to the price of water. By the system reform including franchise management allowing business transfer from the government to the private sector, parties related to water business have only started recognizing water business as service industry rather than infra-construction industry, and the definition largely remains unclear. Going forward, however, there should be a room for growth for Chinese water business if hurdles such as the government's administrative issues, and the financial stability necessary for sustainable business entity, are cleared.

Water companies are faced with challenges including the contamination of water resource, obsolete facilities, and enhancement of the standard for water quality. That said, Japanese companies still have the opportunity to enter the Chinese market, for example, by forming alliances with local and foreign companies. While it is essential to have better understanding of the target industry segment as well as China's system and policies, policy dialogues for appropriate business environment is also important. Japanese government should endeavor holding these policy dialogues effectively.

There is a Chinese slogan saying "first class companies sell standards, second class brands, third technologies and fourth products". Therefore, it is critical for Japan to participate in setting up standards and systems effectively. To achieve this, Japan should target China for infra exports, and utilize available means such as mutual financial cooperation, ODA, concessionary yen loans, JBIC untied loans, and JICA's investment and lending. Japan's policy finance can be useful considering municipalities in China often lack funding ability for water business. Additionally, advertisement of Japanese companies is necessary; for example, by sponsoring an exhibition of eco-products "Japan-China Green Expo", and communicating Japan's superb achievement in relation to environmental issues in China.

(2) Discussion highlights

Main views expressed by committee members and others during the Q&A session, involving voluntary as well as government testifiers, are summarized below.

- **China's actions to deal with water issues**

- Considering the unevenly distributed water resources and the shortage of the absolute quantity of water in China, we are assuming that the central government controls the use of water as a whole. How successful are China's large-scale projects such as Three Gorges Dam and South North Water Transfer Project?
- The Chinese government considers both of the above large-scale projects successful, but it seems too early to make decisions. The completed Middle Line under the South North Water Transfer Project sends relatively less dirty water to Beijing but we need to wait a little while to generate viable assessment. As for Three Gorges Dam, overall judgment should be made by future generations, in view of the effects of water hydroelectric power

generation which was the major objective along with water utilization, significant losses made on historical heritages, and refugees counting to a few million.

- Given the vast size of the country, the central and local government (e.g. provinces, autonomous regions, etc) seem to play important roles in coordinating the water use. Please explain role-sharing between these two?
- Water resources have been allocated by Water Resource Commission, a river basin management authority appointed for each river by the government. However, the allocation of water rights is considered vested interests; therefore making adjustment to it is extremely difficult. Requesting water conservation by paying cash from the downstream province to the upstream province under the government's supervision is being considered.

● Current situation of water business in China

- Veolia Water, a French water company, employs 9,000 people and provides water to 30 million people in China, What is the benefit of operating water business in overseas market for Veolia Water?
- Social mission, not just for Veolia Water but for water companies in general, is to secure a stable supply of hygienically clean water. The same applies to overseas market if there are needs for such companies' technologies and know-how. The rationale behind overseas development of water business operation is their sense of duty, rather than benefits.
- Under Chinese regulation, foreign companies are required to operate through a joint venture in Chinese market. What are your views per this requirement?
- The regulations concerning foreign companies have been lifted significantly. I understand the regulatory requirement that foreign companies are not allowed to operate and manage their water supply business on their own, and they can provide water to Chinese citizens only through a joint venture with local companies.
- Even after acceding to WTO, the said joint-venture requirement remains intact in various industries and major sector in China. The Catalogue of Guidance to Foreign Investment categorizes foreign investment as: "encouraged", "restricted", and "prohibited". Foreign investment is further regulated by industrial policies. In certain sectors, we have recently seen the expansion of stated-owned companies, which resulted in private companies withdrawing from the market. Some economists view this as problematic. Foreign companies are also exposed to such risk; hence we need to monitor the trend closely.
- Veolia Water's joint venture in Shanghai started supplying water to 2 million people. Did this contribute to achieving lower pricing as compared to other area in the city and is this business profitable?
- Profit/value can be generated on a short term basis, but it should be noted that companies are to recover initial investments within the contract term of 50 years. Since water business

is part of public utilities, it does not generate massive profit as generally imagined – this is not just in China. It should be viewed reasonable to generate just enough profit to cover expenses while building a sustainable business. For Veolia Water, majority of its businesses are in Europe, with Asian business including China representing 10% of the company's total businesses.

- **Japan's efforts concerning China's water issues**

- Although it is fine to utilize the capability of private sector, we should keep in mind that water business cannot be operated only by business mind. Water is essential for life; thus minimum supply should be guaranteed. As such, the government should take a leading position even under the PPP scheme. In this regard, should Japan's technological cooperation be promoted at a government-to-government level?
- There are four levels of administration in China, it is important to have discussions at central government levels as well as local government levels. Policy dialogue also plays very important role when starting water business. For example, it may be useful to try organizing Japan-China high level economic dialogue, energy conservation/overall environment forums, and environment model city solely focusing on water issues. When detailing specific cooperation for China's sensitive projects, such as its construction project where information should not be disclosed carelessly, policy dialogue can be extremely effective to bring the industry and the government's policy to a favorable direction.
- Are Japanese companies able to conduct business negotiation adequately to develop businesses in China? Is there a need for cooperation from governmental agencies such as JICA?
- JICA's value is in its human network gained through exchanges among experts and communications with Chinese universities. Aside from the argument whether to involve JICA directly in the business negotiation, at least JICA's network can be utilized, for example, to organize a public-private forum to discuss issues among related parties, incentivize China, and ultimately generate good cycle of communication. It should be noted that surprisingly, China at times is not aware of Japan's knowledge and experience, which can be complemented by these discussions. This in turn will create political connections and opportunities to give advice, potentially leading to business opportunity.
- Considering that the price of water in China is controlled at low level under the regulation related to water pricing, will water business be sufficiently profitable?
- If the price of water increases, people will conserve water; and to some extent the water supply department will shift towards market economy. However, the market principle cannot adequately function in the environment that the price is controlled at low level and cannot be raised easily. System reform is essential to cope with this situation.

- **Japan's challenges in dealing with the water sector and ideal involvement**

- While China is faced with water pollution, Japan has unique technologies to build onsite sewage treatment system, especially the maintenance technology. It is perhaps important that Japan achieve international standardization for this as soon as possible, and strengthen and improve the country's international competitiveness.
- In China, building sewage system is more advantageous in larger cities. Currently, priority is placed on building sewage system in the cities before farming areas. The onsite sewage treatment system is the important option for farming areas. However, in China, situations are different between southern and northern regions, thus it does not make sense to introduce Japanese products outright across the country.
- United Nation Development Programme (UNDP) estimates that as many as one billion people will be affected by water shortage in 2050, indicating the need to control water usage. The concept of water footprint has been introduced, and criteria suggested by EU will likely be the International Organization of Standard (ISO) standard. Should Japan be taking action on this?
- Water is the precious natural resource, thus EU and UN are attempting to incorporate the water footprint calculation in the ISO standard as a way to address the eco-friendliness of water-related products. I think further discussions are under way in these directions.
- If environmental business market of over JPY100 trillion is created between Japan and China, how will this contribute to Japan's economic growth and expansion of domestic demand?
- China's environmental business has been growing rapidly. It is expected to catch up with Japan by around 2020, forming a sizable JPY100 trillion market together with Japan.

- **Water supply and sewerage services overseas**

- In c.2000, Singapore, which used to import 100% of water supply from Malaysia, started sourcing water domestically. What is Singapore's current self-sufficiency in water?
- Singapore's self-sufficiency in water is considered significantly high as a result of the introduction of "four national taps strategy", where water supply is secured via: local catchment, reclaimed/recycled water from local wastewater (NEWater), desalinated water from the sea, and imports from Malaysia.
- Large amount of funding is necessary to set up sewerage system. In the case of the build, operate and transfer (BOT) scheme in China, under which a private company first develops and sets up a sewerage system, then transfer it to the government upon becoming profitable after the transition period - what is the time frame for the private company to recover investments?
- In the case of water supply system, the recovery period is 30 years at the longest. However,

the recovery can take longer for sewerage system as it requires awareness of people as to cleaning water, as well as relevant regulations. Also it is difficult to shift costs to pricing. As such, it is desirable to take an integrated approach and operate sewerage services together with water supply services.

- Since it takes a long time to introduce a large-scale water supply and sewerage system, some foreign companies see the opportunity in using technologies for building onsite sewage treatment system to build a smaller scale system that works to circulate water in the small town or inside buildings. In relation to this, cooperation with Japanese companies with superior technologies is often sought for. If these projects are led by foreign companies, is there a risk that the said smaller scale system will be recognized as made by these foreign companies, even if a lot of Japanese parts were used?
- Although I am not familiar with the details of such smaller scale system, China is probably at the stage of finding various opportunities. Japanese companies should seek for opportunities through communications with China, exhibition, joint research between Chinese and Japanese universities. It is crucial to establish a standard by involving the national government.
- The optimum sewerage systems differ between urban areas and farming areas, noting that the small-scale dispersed system is suitable for farming areas. Further, Japan has strong capability in human waste treatment system, although categorized as centralized system. Communicating such information to the relevant companies is important.

● Desired structure of water supply and sewerage services in Japan

- Water business should be shifted to the PPP scheme both in Japan and overseas. In promoting the PPP scheme in Japan, there are various types of constraints, including funding problem. What are your views on factors hindering the effective promotion of the PPP scheme?
- Japan has thus far made satisfactory regulatory reform for PPP promotion. On the other hand, there are impediments against making transitions to PPP: the strong sense of responsibility of municipalities to run water business and their fear of job loss as a result of outsourcing water business to the private sector. Promoting a shift to PPP is not achievable only by relaxing regulations; it is necessary to introduce a mechanism that will trigger to force an automatic employment of PPP scheme, such as use of evaluation results by a third-party assessment company.
- There are different styles of operating water supply and sewerage services globally, with United Kingdom taking full privatization approach and Argentina/the Philippines half-way between public and private. What is the ideal positioning for Japan?
- Taking the view that the PPP scheme should be promoted within Japan thereby nurture water-related business, Japan should seek for privatization and full cost recovery. However,

it is noted that the full privatization in the UK called for companies to expand into overseas market, foreign companies to enter the UK domestic market, and corporate mergers. In Japan, the water system is considered important asset of the country, thus the full privatization will likely be resisted in fear of the potential ownership transfer to foreign companies. Considering the above, privatization through a concession scheme or a lease, under which the private sector operates the water business for certain period with a relevant municipality keeping the ownership of water system, may be suitable and realistic.

- Is privatizing water business a realistic way to reduce cost and price? Also, we have misgivings specifically about ensuring the safety of water, given the entry of foreign companies. What are your views on the domain and role for each of the government and private sector in the PPP scheme?
- For water business, the sources of cost recovery are tax revenues and water revenues. As such, judgment on the validity of privatization should not be made just by referring to water revenues. It should be mentioned that the increase in water price in the UK is not necessarily the result of privatization. Other factors, such as inflation as well as the required but restrained investments, should be taken into consideration.
- Water business is a public utility, and the government involvement is essential to ensure stable and safe supply of drinking water and at the same time maintain good river environment. In terms of roles in water business, the government should take the controlling function, and the private sector the operation and management function.
- Different from the UK and other countries, Japan’s water price varies depending on municipalities. One of the important tasks of the government is to get involved in controlling water price at an appropriate level.

5. Tasks and challenges related to water issues in Asia

Asian region covers a vast area of the world. With many emerging nations showing dramatic economic growth, the region has established a global presence economically and politically as today's world's growth center. Mainly in East Asia and South East Asia, the economic interdependency between the countries in the region has dramatically increased, leading to an establishment of supply chain through active investments and trades by countries such as Japan. As a result, the awareness of regional interests rather than national interests, as well as a sense of unity as a region, is gradually growing.

The Millennium Development Goals (MDGs) adopted by the United Nations at September 2000 Millennium Summit stipulated that in order to "ensure environmental sustainability", "reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation". According to the March 2012 report jointly prepared by UNICEF and World Health Organization (WHO), the MDG target of sustainable access to safe drinking water was achieved. However, the report also highlights that as many as 780 million people are still without access to safe drinking water, and achieving the MGD target

of sanitation may be unlikely. The Asian region has a population of about 3.7 billion, accounting for roughly 60% of the world population. The region is still faced with the regional disparity although it has improved significantly. Therefore, supply of safe water and set-up of sanitary facilities continue to be urgent issues.

Also, many Asian countries belong to the Monsoon climatic zone, where the amount of rainfall varies greatly season to season. Countries where the population is concentrated in the flood plain in the coastal area are at risk of extensive damages due to water-related disaster, such as heavy rains and flooding. As much as 80% of total death due to water-related disasters in the world occurs in this area. Also, the continuing global climate change is closely tied with the recurrent water-related disaster in Asia and the destruction of the natural environment/eco system. The climate change has impacted food production activities which use massive amount of water and energy, thereby adversely affecting the life of people in the region.

In addition, there are several international rivers in Asia, with the largest being Mekong River, encompassing as many as six countries. Mekong River is an extremely important river for Indochina countries. In view of the limitation of Mekong River Commission (MRC)'s coordination capability, a solid cooperation among related countries is needed for the appropriate river management.

Although Asia is faced with various water-related issues, a number of Asian countries are not able to resolve these issues on their own due to lack of information, technology and knowledge regarding water resource development/management, appropriate regulatory framework/organization for water resource development/management, water rights, and water allocation. Further, they lack investments in the water sector. In this regard, support and cooperation from the international community is considered key. As a result, it has been pointed out that Japan should contribute to resolving Asia's water issues by appropriately utilizing its superb knowledge and water-related technologies, and ultimately achieve human security, protecting individuals from grave threats to their existence, lives and dignity.

Based on the above, the research committee conducted hearings on experts of their views on: the current situation of water issue in Asian region and efforts towards overseas development for water business, water issues in relation to the global food supply/demand, and issues associated with Mekong River basin development. These hearings were followed by Q&A sessions, where a wide range of topics were discussed including: the current situation and future of water issues, Japan's role for resolving Asia's water issues, challenges/ideal operation of water business, Japan's role in Mekong River basin management, issues associated with privatization of water business, issues related to Japan's ODA in terms of the water sector, and the importance of improving food self-sufficiency.

(1) Summary and outline of views of voluntary testifiers

Views expressed by voluntary testifiers during the committee meeting are summarized and outlined below.

- **Satoshi TAKIZAWA, Professor, Department of Urban Engineering, Graduate School of Engineering, the University of Tokyo**

- Current situation of water issues in overall Asian region including China
- Japan's efforts regarding water issues to date and the future direction
- History of global water business and future outlook
- Japan's efforts for successful water business development

The state of Asia's water resource has been unstable, including the 2011 flooding in Thailand and the 2010 large-scale drought in upper Mekong basin in China. Under such environment, while the demand for both household and industrial water in city areas is dramatically increasing, China is faced with a serious problem of water pollution in rivers, lakes, and marshes, which continues to adversely affect the country's overall economic activities and people's lives. As much as 30% of the population lives in slums in the cities with increasing population, and health hazard, such as escherichia coli (e.coli) problem, is being caused by unsanitary use of rivers. Underground water is also contaminated by e.coli, fluorine, and arsenic.

Japan's tasks in contributing to such water issues is to utilize its well-appointed water supply and sewerage system and solid experiences in the use of high volume of water for industrial manufacturing and farming, and at the same time, to stay business-oriented, that is, in addition to ODA, Japan needs to increase partners for the water business within Asia and other regions through more advanced techniques.

Water business has expanded in 1990's, driven by the growth of the water supply business via PPP. Many cases of business failure are found in Africa and Latin America.

Market share of five water majors has eroded gradually, whereas other companies including local companies have been actively pursuing businesses.

It is considered key for Japan to provide services that match with the purchasing country's needs at the lowest possible price. Also, in developing countries, there are potential markets in the water-related infra construction business and other categories. However, this will not materialize without central and local government's securing source of funding as a project implementing body, and the payment ability/willingness of individuals/companies.

There are two ways to cope with the above issues: first to expand water business such as desalination of sea water and industrial water recycling in the already established markets, for

example, in the middle-east oil producing countries; the second to make efforts to actualize potential markets by providing support to: establish a legal/regulatory framework for the water sector/PPP scheme, secure a funding source for partner countries and municipalities, promote regional development including development of local companies which will lead to a profit-sharing with Japanese companies, and educate local people to improve willingness to pay. A strong participation by the central government, local government and universities can be expected for the latter.

Also, the dispersed water system has been widely accepted overseas. Should this become standard, the large-scale concentration type water system that considered good in Japan will no longer be considered as an option. For this reason, it is important to maintain effective communication with the government and other related parties of the partner country.

Further, Japan's competitive advantage is said to be in parts supply. It is essential to build up a good track record and have a clear understanding of the market.

- **Akio SHIBATA, President, Natural Resource Research Institute Inc.**

- Trend and background of tightening global food supply and demand
- Expansion of global water demand and the possibility of water issues becoming pressing problems in Asia
- Global water issues and Japan's use of water resources
- Current situation and challenges of Japanese companies regarding the water business

Japan's food production is characterized as coexisting shortage and excess. Japan imports 30 million tons of grains, and has become a burden to the international community due to the high volume of virtual water associated with the import.

The century of globally cheap food supply has ended; the food supply and demand has been tightening largely due to China's increasing food consumption along with the population growth, and the increasing ethanol production in the U.S. and other countries, leading to the increased conflicts between nations, between the food and energy markets, and between farming and industrial manufacturing/urban life. Expansion of land for cultivation is no longer feasible and with the crop yield per unit area slowing, many international organizations forecast that the global food supply and demand will remain tight for a long time.

While water is circulative and does not increase or decrease, the demand for water is increasing at a rate exceeding the population growth. There resides 60% of world population in Asia, showing rapid economic growth. However, with freshwater accounting for only 27% of total water, water issues will likely become pressing problems going forward.

Considering such situation, it is necessary for Japan to shift to a full utilization of water available domestically by, for example, transporting or exporting spring water in the coastal

area to other area or other countries, utilizing rainwater for farming, transferring water purification plant to upstream area thereby conserve energy, and utilizing water conservation forests.

In line with the phases of economic growth, a country's needs for water business shift from water supply system, sewage system, and creation of water such as via desalination, to wastewater treatment facility. Although businesses related to water supply and sewage system will be sizable, the advanced use of water such as water conservation and recycling, and Base of the Pyramid (BOP) business targeting lower income class are also of note as potential water businesses in future. Also it should be mentioned that costs of desalination have declined due to the expansion of film water treatment market, thus, going forward, there is a good opportunity in desalination business as well.

Funding issue is one of the major challenges in pursuing water business. In addition, fundamental questions have arisen as to the relationship between the concepts of business and the water as the essential element for life, and whether or not to consider water as regional commons to which people in the region have equal rights or commodity.

Water-related companies in Japan have shown solid capability in such areas as equipment, engineering, and trading companies. However, they have yet to display their strength in an integrated approach involving various stages from R&D to commercialization.

These resources-related problems including water are perhaps the results out of the human activity exceeding the Earth's limited capability.

- **Kenichi NAKAGAMI, Professor, College of Policy Science, Ritsumeikan University**

- History and current situation of Mekong River basin development
- Current situation and appraisal of Mekong River Commission (MRC)
- Policy issues in Mekong River basin
- Important point of views regarding the governance of Mekong River basin and Japan's role

The history of the development of Mekong River basin can be divided into the following parts: the history as a strategic point since the dawn of history, the development period following World War II, the stagnant period including Vietnam War, and the period highlighted by the end of cold war and economic growth which includes the establishment of MRC in 1995.

MRC has been developing programs for the management of Mekong River basin focusing on the theme "sustainable development", which has been increasingly influenced by China since 2002. In that connection, the Mekong-Japan Summit Meeting in November 2009 reaffirmed the importance of Japan's role: Tokyo Declaration, together with the action plan, introduced the principle of sustainable development, conservation of environment, and

comprehensive water management. However, the MRC's activities have been limited only to list each member country's development themes, functioning merely as a support contact for member countries. Also, MRC initiated a dam construction in the main stream of Mekong River, claiming that such construction is a sustainable development compatible with minimal burden to the environment. As a result, MRC is experiencing a strong opposition from assisting countries, the lower Mekong countries, and environmental NGOs. While intensions of Thailand, the most influential country in the Mekong region, and Laos that wishes to export electricity are in alignment, MRC is getting caught in the middle of the conflict between Thailand/Laos and the opposing countries. Moreover, MRC is not functioning to coordinate interests of related parties in fear of the conflict becoming evident through real damages. MRC is in the crisis, with its "reason d'etre" in serious question. Also, going forward, the conflict between the lower Mekong countries and China, which is claiming the equal right to utilization of Mekong River and implementing number of dam construction projects in the upper Mekong, will likely intensify. It is also noted that measures are urgently sought for to cope with the water related disasters and drought caused by the climate change.

Policy issues concerning the Mekong River basin include the necessity to establish inter-dependent relationship with China and India for sustainable growth, for which Japan's leadership is critical considering its close connection with the countries involved. Additionally, for the development of water resources, it is necessary to introduce strategic environment assessment, and strategic adaptation/water crisis management plan aligned with human security issues such as protection of living standard of ethnic minorities and infectious diseases. Further, it is critical to achieve consensus about integrative water resources management within stakeholders including international organizations, national government, local government, corporations, citizens, and NGOs.

Important factors to be considered as to the governance of Mekong River basin include: good balance between preservation of the basin and economic growth; development of new mindsets toward Mekong River development ("Mekong Sprits") reflecting the relationship among China, India, and Japan; Japan's presence backed by its technology and economy, and establishment of water security system for so-called century of water/Asian century. Japan should be involved in transferring its environment improvement technologies including the highly-recognized water supply technology. In addition, Japan's technologies to defend against the climate change, such as the water control technology, dams for flood control, super levees (high standard levees), underground reservoir, and systems for both rainy and dry seasons, are effective measures for water security in a true sense, contributing to improving Japan's presence at the same time.

(2) Discussion highlights

Main views expressed by committee members and other during the Q&A session, involving voluntary as well as government testifiers, are summarized below.

● The present state and future of the water issue

- Water is a strategic material, just as petroleum, oil and gas are. Whether or not it possesses strategic materials is of tremendous significance to a nation with few natural resources such as Japan.
- In the future, will mankind use knowledge, restraint and care to overcome issues such as water shortages, or will it converge in a certain direction only after dreadful chaos involving the intervention of financial businesses and so on to strike a balance?
- I believe that humans can live with moderation, but in order to do so education and lifestyles that can make them aware of how vital water is will be important. In the water business too, the government and politicians must emphasize the importance of properly retaining an ethical outlook about the fact that life is dependent on water, and a framework of sorts is essential.
- Joint management mechanisms for water would be welcome, but market mechanisms are already progressing in the face of globalization, and the reality is that there are some difficult aspects. In the midst of this state of affairs, surely Japan's role is to contribute through technical innovation.
- When regions are classified by whether or not they have water, or money or resources, solving water issues in the regions that do not have water, money or resources is very difficult, and it is important that the international community, including Japan, sits down together and considers measures to redress the problems of these countries in particular.

● Japan's role in resolving Asia's water issues

- There are hardly any nations where you can drink the water straight from the tap as you can in Japan. Would it be possible for Japan to exert an influence on solving water issues in Asia in the future through the use of its excellent technologies and manpower?
- From now on in Japan the water and sewerage engineers will be rapidly approaching retirement age, and as the workforce will decline there are real fears that if we go on like this there will be a depleting of human resources. Japan needs to carefully foster manpower in order to take advantage of water business opportunities and make a contribution to solving water issues.
- For example, surely there are areas that Japan should be involved in so it can help to solve poverty issues through water such as developing joint waterworks in slum regions, even if these are difficult on a private sector base. In what sort of fields can the Japanese

government play a role?

- Water is sensitive to political influence; as it is difficult for Japanese companies to independently become involved in the water business overseas the Japanese government needs to enter into dialog with foreign governments about the creation of systems such as setting tariffs for water usage.
- The government must create systems for compiling all sorts of information about bodies of water that are in fragmented locations and are not being effectively utilized, and for imparting knowledge and experience to the young people working for the Japan Overseas Cooperation Volunteers or NGOs in regions that cannot be covered by businesses.
- It is not at all easy for water businesses to make a profit overseas, in the face of great risks, and the government must become involved in this.
- Water has a quality of being part of the regional commons, and there is a problem in the fact that if it is commercialized and charged for some people will be unable to purchase it. The intervention of governments is therefore necessary.
- It is often claimed that one of the reasons that water projects in developing countries struggle is that the structure of these nations makes corruption widespread, but are the same problems occurring in Asia?
- Since the governmental institutions themselves often do not pay their water tariffs, the collection rate of water tariffs in Indian cities is extremely low. Japan's ODA should not just support the technical side; it is vital that opportunities are provided for exchanges of opinion with senior government officials in developing nations about the issues of governance and management.
- In order that Japan can fulfill a role in water issues perhaps a governmental department should be established to take charge of the question.

● Issues in the water business and its desirable forms

- What concrete steps can be taken in order for Japan to turn the developing nations' latent markets into emerging markets? For example, how can we turn ODA into business chances?
- There are some success stories in which the improvement of service levels led to an increased awareness among residents about paying water tariffs, such as those in Cambodia's Phnom Penh and Manila in the Philippines, and it is vital that there are more stories such as these. Furthermore, there is the issue that no regulations, system or framework have been prepared in some developing countries, and progress is sometimes not realized due to the weakness of plans and their tie-ups with finance. It is important that the Japanese government emphasizes how vital finance is, and offers consulting from the earliest stages of the planning process.

- Securing access to safe water should be made the absolute priority, and starting with the business side will not succeed. At the stage prior to pursuing business interests cooperation will be required in creating mechanisms for supplying safe water with scarce resources.
- It is difficult to secure the necessary finance when turning latent markets in low-income regions into emerging markets. Surely we could consider a water business in which the business itself vitalizes the regional industries and economies, and leads to finance in the future.
- A mechanism in which only Japanese companies profit from overseas water markets is impossible, and it is important to try to invigorate the industries of the target country by first of all nurturing water related businesses in that nation and collaborating with them.
- The water required varies from nation to nation, according to their state of development. In some cases in which safe water needs to be secured it is sufficient to clean water using stone rather than membrane filtration, and it is vital that the requisite technologies are provided in line with the local needs.
- What sort of potential is there for the use of PPP and BOP in the water business in low- to medium-income nations?
- The water business has hopes for BOP but the question of profitability remains, and it is thought that support will be required for aspects outside of market mechanisms.
- In the case of the developing nations, I think that decentralized water treatment or concentrated water treatment, which are easily maintained and require vast areas of land would be appropriate, but which treatment system suits which region?
- Decentralized water treatment is cheap and hard to make a profit from, but if Asia moves in that direction Japanese companies need to think about securing profits on a small scale. Moreover, since Asia’s fluvial and underground water quality is poor there are very few places where easily maintained treatment plants can be used, and this represents a business chance for Japanese companies to conduct maintenance work.
- It is important that Japanese companies humbly learn from the local residents about their knowledge and ingenuity when conducting water business overseas, but are there any success stories about the significance of giving the local residents a leading role?
- In order to make the local residents forget the idea that water should be free and get them thinking about what sort of price they are willing to pay for what level of service, it is vital that they are quickly given an array of opportunities to become involved. There are examples from East Asia of local residents trying to become involved in water and sewage management.

● Japan's role in the management of the Mekong River watershed

- The more international a river is the more important is the coordination of interests among the nations throughout the watershed, but this is an extraordinarily difficult task. There has been a decline in the coordinating functions of the Mekong River Commission (MRC), which coordinates interests among the nations throughout the watershed, but what sort of role should Japan play here?
- While China and India are strengthening a strategic approach toward Southeast Asia, it is important that rather than just following that sort of approach Japan makes a sincere effort to address problems such as water issues, buses, traffic infrastructure and education, on a one-by-one basis.
- In the case of an international river such as the Mekong River, creating mechanisms for the coordination of interests is even more important than technical cooperation, and surely it would be possible for Japan to put to good use all the knowledge and experience it has cultivated over the years in coordinating interests.
- Despite its technical superiority it will be difficult to solve the question of how a country such as Japan, located a long way away from the actual river, can coordinate interests among the nations in the Mekong River watershed. However, looking at the precedents of the Rhine and the Nile, Japan could surely take the initiative by suggesting, at a meeting this year between Japan and the Mekong River nations, the creation of international standards and rules that at least the nations in the watershed should obey.
- Surely there is a role for Japan to play in coordinating the interests of the nations in the watershed precisely because it does not have any direct interest in the Mekong River.
- Students from Laos and Cambodia are studying all sorts of systems in Japan and then returning home to take up posts in the MRC or within their governments; the fostering of human resources such as these is vital. Japan needs to fulfill a long-term role by following the example of Holland, which invites students from all around the world, offers them high-level education in areas such as flood control technologies, and nurtures new generations of human resources.

● The desirable ways for cooperation in Laos

- In the midst of Laos's increasing dependence on China, while Laotian requests for cooperation and assistance in the construction of dams appear to be a good chance for Japan, what sort of points should we bear in mind while pursuing the task in the event that Japan does provide support for the construction of dams in that country?
- The dam construction issue is one of the most important topics of debate in the Mekong River watershed, and Laos, although it has suffered from the impact of China, is looking towards constructing its own dams to fuel development of the country. If the MRC simply

consents to construction in the future its authority will become weakened and conflict will escalate in the lower Mekong basin between Laos, Vietnam and Cambodia. Moreover, if it appears that Japan has given the green light for projects then it is quite likely that we will bear the brunt of worldwide criticism. Japan must conduct itself responsibly and make suggestions using its experience in environmental assessments and so on.

- Laos is a nation that has an extremely favorable attitude towards Japan, but how should Japan conduct relations with Laos in a day and age when China is investing heavily in the country?
- Japan should build relations with Laos by polishing the nation's innate strengths through support for forestry and agricultural in the form of ecotourism and agribusiness. Furthermore, discussions should also be held concerning a framework for curbing CO_2 emissions.

● The water situation in China

- What is China doing about its own serious water pollution problems? How much of their sewage, for example, is being treated?
- China is trying to lay down nationwide water regulations but they are not in fact being properly observed, and there are governance problems. The fact is that China is making huge investments in sewage treatment in major cities, and while they can't quite catch up with the pressures exerted by urban expansion and a rising population there are staring to make some improvements.
- How is drinking water provided in China? Is it covered by bottled water?
- Some drinking water is in plastic bottles, and in luxury apartments there are many ways of obtaining water with decentralized water treatment systems having become popular. However, this variety of methods has in a way led to an obstruction of a consensus on the resolution of the fundamental water issues, and it is possible that this may damage the progress of the development of centralized water treatment facilities.
- There is also the problem of water tariffs being too cheap in China, and water conservation and effective use of water are making no progress there. Surely it is important that we show the Chinese the example of Japan's method for setting water tariffs and the Japanese people's high awareness of water conservation.

● Issues surrounding the privatization of water and sewage businesses

- Probably the countries with the most successful water businesses are the United Kingdom and France, which privatized their water businesses at an early stage. Would it be beneficial in pursuing water businesses overseas to privatize business in the way theses nations have? What do you think about the possibility of Japan privatizing its water

business in the future, and what would be the merits and demerits of that?

- There is an array of views on whether or not privatization is a good thing. However, it is difficult for Japanese companies that have no experience of managing water within their own country to then go and do so overseas. It is vital that at some stage in the future the private sector is somehow more involved in water and sewage projects. The idea held in the 1990s that privatization was definitely a good thing has been reconsidered in many ways, and the importance of local players rather than big water companies has increased, so the views and mechanisms have changed over the years. Japan still has a chance if we take a proper overview of the current situation and the future.
- What sort of discussions and actions have taken place at the United Nations and so on concerning how to deal with the problem of water tariffs becoming expensive and poor people unable to afford water as a result of overseas companies' projects?
- Pursuing water and sewage projects while at the same time listening to the opinions of the local residents is a safe approach; reconciliation is not possible after the projects have been carried out.
- Unlike financial products, water and sewage works are not something that generate huge profits, but as they do offer stable profits some investors are putting money in them for that reason.

● Issues in Japanese ODA in the water area

- Some areas of Japan's ODA projects lack integration, and there are sporadic cases of things that people have gone to the trouble of making but have remained unused – what can be done to rectify this?
- Japan's ODA suffers from the problem that its information on the issues in each country, precedent cases and so on, is not properly coordinated or shared between the relevant stakeholders, and this is an issue that needs to be addressed. Moreover there is a lack of measures that properly consider building mechanisms for creating business through the collection of tariffs from users, rather than just providing water.
- In order to make ODA effective we need mechanisms to identify the problems areas and incorporate them into general rules, while at the same time pursuing local support.
- To some extent Japan's ODA lacks speed and sustainability. We need a relationship in which not just one thing is built, but in which the people in charge live in the region for ten or more years, and continue to provide aid until all the locality's problems have been solved.

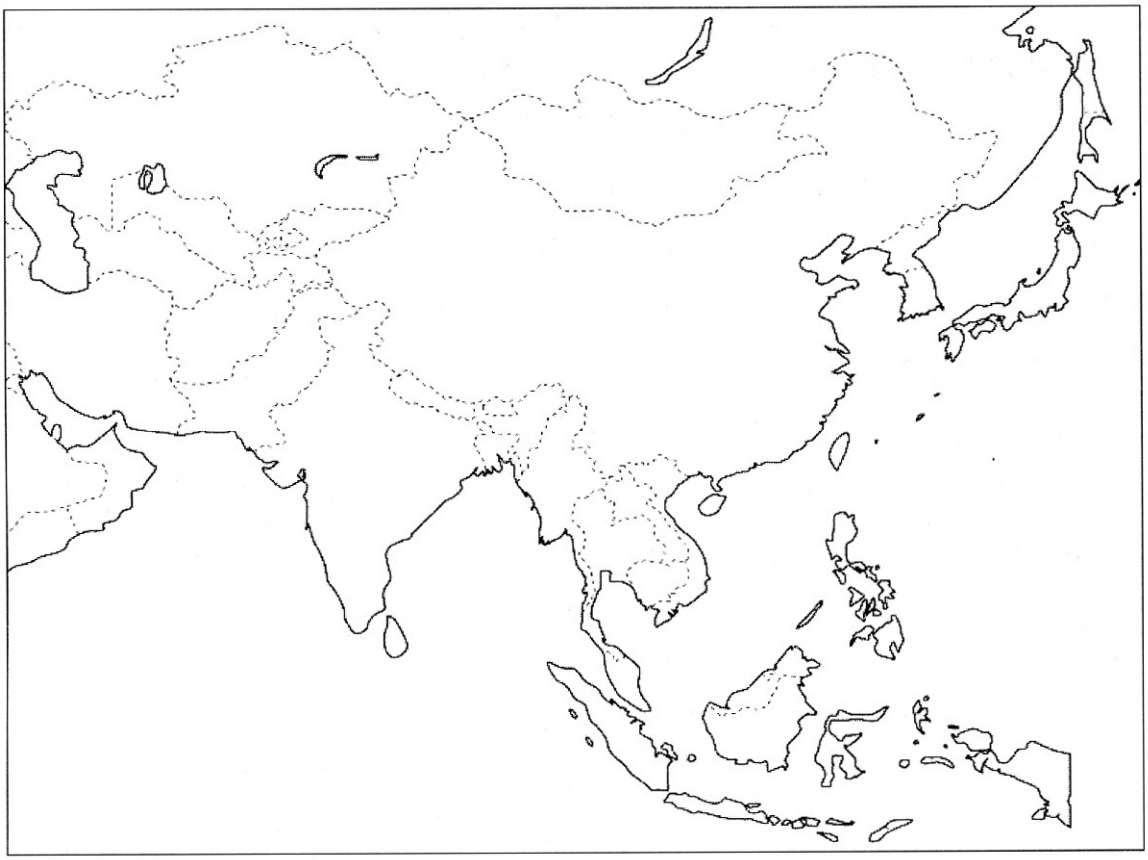
- **The importance of increasing food self sufficiency rates in Japan**

- If we think in response to the trend of global food prices typified by the crop price bubble, which is the result of venture capital and expanding demand in the emerging nations, Japan needs to increase its food self sufficiency rates. What are the major domestic political points and what sort of diplomacy should we follow in order to increase production?
- We should urgently conduct some stress tests having first altered the domestic production adjustment policy for rice, switched to full rice production and clarified water shortage problems and so on arising from such a move. This might lead to an improvement in self-sufficiency, but the objective is to raise productivity, and there is a need to conserve all the regional resources required for agriculture. If full production leads to huge increases in production then we will need to try to open up export routes.
- I believe that water restrictions in America, the world's largest food exporter, will be a major reason for pressure on food supply and demand, but what are the Americans doing to address this issue?
- Since the end of the Cold War America has switched to a market fundamentalist strategy of low inventories, which have actually dipped below 10% with crop production at its lowest level. Water is one of the restrictions that make it difficult for any increase in production in the future. Restrictions on water in America also include the issue of fossil water depletion, and while countermeasures using drip irrigation and GM crops are underway, it's a complex structure with the extraction of shale gas consuming vast amounts of water.
- It is possible that in the future water shortages will cause food shortages in various nations, and competition in food exports and imports will be generated. In the face of this, Japan, which is comparatively well endowed with water resources, must improve its food production capability as an obligation to the rest of the world.
- It is feasible that America may cease to be a reliable food exporter for Japan in the future, so it is important for Japan to reexamine its domestic agricultural resources and try to increase crop production.
- In order to protect the lives and assets of the Japanese people we need to fully secure food within Japan, but what is the outlook for Japan's current agricultural policy and future food safety?
- The strong yen is cancelling out the rising food prices, but in the future it will become difficult to procure good quality foods at low prices from overseas. Although there are moves to reconsider domestic agricultural policy, agriculture such as rice production, which uses land, is in steady decline, and we need to quickly use all of our agricultural resources and raise productivity.

- **The impact of climate change on agriculture and food supply**

- What sort of impact has climate change exerted on the ecosystem in the Mekong River in recent years, and what sort of damage is expected to be caused to agriculture and food supply?
- Climate change impact is a concrete issue in the Mekong River watershed nations, and there are figures about the impact of damage last year to forests, fields and rivers in Thailand, Laos and Cambodia. The damage in these places to agriculture and fisheries has been enormous, and is also a problem in terms of ethnic minorities and the cultural life environment. In the midst of a situation in which international coordination is difficult, there will be a need in the future to sort out what points are important, and through discussions to create unified rules on policy to secure accountability, transparency, fairness and efficiency. Japan and the other developed nations should pursue these efforts on a continuous basis with the Mekong River watershed nations.

6. The desirable forms of dealing with water issues in Asia



Around 60% of the world's population is concentrated in Asia, but the continent has only 27% of the world's freshwater resources and just how that water can be efficiently used is becoming an issue. Moreover, underground water resources are becoming seriously contaminated with arsenic and fluorine, and there is a need to strengthen the measures to deal appropriately with this. In this sense, Asia's water usage is in a bleak environment.

Japan, understanding that water is essential to life and that the supply of safe water is very important in order to reduce poverty, has a track record of providing $11.2 billion of ODA over a five-year period from 2006 to 2010 for water and sanitation projects in Asia and other parts of the world.

Though the ODA environment in Japan is becoming increasingly tough as the nation struggles with a persistently severe economic and fiscal situation, in order for it to show its presence in the international community – particularly within Asia – and exercise leadership, it has been pointed out that it is vital for Japan to use its abundant experience and sophisticated knowledge in sewage and water facility development and water treatment, and provide superior ODA in the fields of water and sanitation.

Moreover, while the water issues that the Asian nations and regions face are diverse in their nature, and there are needs for various solutions, it is difficult for Japan to appropriately respond to all these needs with its limited ODA budget alone, and it is far from easy to turn

that ODA into growth or the expansion of employment in developing countries.

Currently, there is a huge market in Asia and other parts of the world for the development of sewage and water facilities and sea water desalinization, and in the future with increasing populations, urbanization and industrialization, it is expected that the world market will be worth around 87 trillion yen by the year 2025. Japanese companies maintain a comparative technological superiority with their technical prowess in the fields of the water processing membranes used in desalinization, the production of ultra-pure water, pumps, earthquake resistant technologies, leakage prevention technologies and sewage recycling. However, in Japan it is usually local municipalities that manage and operate waterworks, and since Japanese companies do not have any knowhow or experience in management and operations, it has been said that the Japanese water business has not been adequately developed overseas.

In view of this state of affairs, it has been pointed out that ODA efforts in the water and sanitation fields should be continued with, and it is important that international contributions in the water field are pursued through business using various collaborations between national government, local government and the water companies themselves. There is also a need to deal with various issues including the development of systems to encourage these efforts.

In addition, though it is vital to increase the number of people with sophisticated water technology skills in order to eagerly pursue international contributions in the fields of water and sanitation, Japan does not do enough to foster high-level human resources, and the systems at universities and so on for accepting foreign students or enabling study overseas are inadequate. In order to redress this situation a national effort must be made to foster these sorts of human resources and improve the budgets and systems necessary for them. Likewise, there is a need to thoroughly strengthen through these steps the advancement of science and technology relating to the solution of water disaster prevention and polluted water treatment issues.

Taking all of the above points into account, the Research Committee held an exchange of opinions between its members. During this exchange the opinions of the members were voiced and debate ensued regarding topics including the basic thinking behind measures regarding water issues, the domestic system for these measures, the issue of international cooperation, the issues in developing the water business and the importance of preparing a system, the utilization of technology in international cooperation and business, and the relationships between food production and water.

The main opinions expressed during the exchange of views held by the Research Committee regarding the desirable forms of dealing with water issues in Asia are summarized below.

● **The principles behind measures to deal with water issues**

- When we think about measures to deal with water issues in Asia, the question of how we maintain a balance between aid and business is important.
- There are conflicts over the Mekong River watershed between China and all of the Southeast Asian nations, and frictions of national interest regarding water resources in the Middle East too. We need to maintain a proper awareness that water is an extremely strategic resource from the perspective of security, and a major area in which Japan can use its technology to make a contribution to international peace and safety. In this sense, it is vital that Japan's ODA and private sector investment is approached from the viewpoint of making a strategic contribution to security.
- In July 2010 when the UN Human Rights Council adopted a resolution on the human right to water and sanitation it declared that safe and clean drinking water and sanitation was a human right that people of all races had right to enjoy. The background to that declaration was a move to rethink the water issue in the light of the trend for multinational companies to use water as a profit-making product. Domestic and overseas countermeasures are required that reflect the fact that safe and clean drinking water is a universal right requisite to human life.

● **The desirable form of domestic systems for water issue measures**

- Water issues involve disaster prevention, diplomacy, money, agriculture, science and technology, sanitation, relationships between private sector companies and many aspects that touch upon the remits of various government ministries and agencies. We need to concentrate on aid in the field of water from the perspective of breaking up Japan's sectionalist governance system. Moreover, in the midst of a situation in which the public's interest in water is generally low, we surely need to work on aid in the field of water on a nationwide basis and plug that gap.
- There is an array of projects relating to water conducted by institutions such as JICA, JBIC, JETRO and the Ministry of Foreign Affairs, but there is a painful lack of coordination between them.

● **The issue of international cooperation in the field of water**

- Japan is spending vast amounts of money on ODA aimed at solving water issues in Asia and other parts of the world, but in order for us to continue to be a top donor and provide adequate international contributions in the fields of water and sanitation, and exercise our presence on the international stage, we will need to accurately ascertain information about the trends in water supply and demand in each region and nation, the state of their water quality, their systems and facilities for combating or alleviating water disasters, and their requirements for aid. It is absolutely imperative that Japan pursues measures that use its

knowledge, experience and technology through even more sophisticated ODA programs.

- The developing nations and small island states in particular are at the stage of systems for collecting and using rain as a water resource, and countermeasures for this are an issue. Moreover, in the face of the risk of disasters a natural disaster insurance system, which has been introduced in some parts of Asia, is also essential.

● The significance of international development of the water business and issue it faces

- Currently, there is a massive water market in Asia and other parts of the world, and the scale of this market is expected to grow as populations rise. Although Japanese companies have advanced technologies in the field of water membrane filtration and so on, in the future they will need to build up more experience a management knowhow in general water and sewage treatment.
- The government must provide proper backup to encourage the development of Japanese companies' overseas water businesses.
- If the populations of the emerging nations suddenly increase then the need for more water will also rise as a result. Looked at on a worldwide basis the water business will become a 100 trillion yen market, and if for the sake of argument Japan corners a 10% share that would mean 10 trillion yen. As the export of nuclear power will be difficult in the future, water is one of the few business opportunities still left open to Japan.
- All sorts of other water businesses are currently joining the major water business companies, and joint government and private sector ventures in Singapore and South Korea are reaping the rewards, but the Japanese government and private sector with their sophisticated technologies and enormous experience have a considerable superiority. Moreover, Japan should become involved in the water infrastructure business by making good use of the trust and track record built up through the human network resulting from ODA and the activities of JICA over the years.
- Japan is trying to tie in Asian growth with domestic growth in a new growth strategy, but if Japanese companies enter the overseas water business market it will put them in competition against local companies, and if local staff and materials are used isn't it going to be difficult to connect this with Japanese employment countermeasures?
- As publicly owned companies it is vital for the local municipalities not to be carrying any risks, and with a reluctance in some quarters to invest or participate in water infrastructure projects, there is a difference between the government and companies' keenness on the water business. In addition to the risk issue, there are many other topics requiring examination, such as the status of local municipality officials.
- Aid consists of disaster prevention and water supply, but it is the latter which has potential

to be developed into business in the future. If aid is turned into business, we have to split up the long-term fields, and there will have to be a decision at government level about how to proceed. For example, in the event that it is difficult to provide aid for a major water and sewage project there is a method in which water can be carried in distribution trucks from the treatment plant to the supply tanks of each village, and it would be possible to use the latest reverse osmosis membrane permeation technology to provide pure water. It's about time that we sat down and drafted a picture of how this could be developed over various regions and periods.

- It's important to try to achieve the international development of water and sewage projects as an integrated and unified system. Excellent technologies are obviously important in order to develop globally, but de facto standards are fine if we consider how standards are going to be clarified and how ISO standards are going to be met. We need to think about the ideal formats for the future, including the current technology-centered aspects.
- We need to consider how the funds for infrastructure development are going to be secured. In Japan, for example, the Pension Fund Association has assets of 20 trillion yen, but how could this be developed including infrastructure development? In the midst of a situation in which it is reckoned that 53 trillion dollars will have to be spent on global infrastructure development by 2030, we need to discuss how Japan is going to corner a niche in the market.
- While expanding the creation of mechanisms to deal with country risks such as the flooding damage caused recently in Thailand, we need to consider the international development of the water business and the entry into it of Japanese companies.

● The importance of preparing systems in the international development of the water business

- Japan lacks major strategies and vision, and the absence of a command center to conduct the whole picture is an issue. The Research Committee must examine the creation of mechanisms for the topic in its entirety.
- When companies launch overseas developments for the water business, there is a need, in addition to ODA, for business support mechanisms such as finance and JETRO, and a system that promotes comprehensive policy and includes diplomatic entities such as embassies.
- In order for Japan to develop its water business, it is vital that a good integrated balance is achieved between the government, companies and NGOs, and that they work together in a coordinated manner.

- **Technological use and support in international cooperation and business relating to water issues**

- As Japan has sophisticated technologies in the fields of water disaster prevention and mitigation, when we conduct diplomacy or international cooperation related to water we should make more enthusiastic use of these technologies.
- In order to provide advanced support for the development of technologies such as membranes and so on at Japanese universities, it is important that the government's activities are followed. Moreover, making a contribution to the international community is an important perspective with regard to technology, and we should be aiming for a way of doing things in which business is formed through these developments. Japan has a mission to clearly show to the international community how it contributes to developing nations with regard to water, a resource that is vital to human life.

- **The relationship between food production and water**

- Food importers can also be described as major water importers; questions are being asked about Japan, – a nation with abundant water resources – being reliant on food imports, particularly in the face of a situation in which water is becoming depleted and conflicts are arising in other parts of the world. In response to the reality that Japan is not fully using its water resources by production coordination and so on, it is vital to emphasize the viewpoint that the government must make policy changes and in order to raise production should provide complete protection and conservation for regional resources such as farming, water, human resources and local communities.

Conclusion

Research in the second year revealed that Asia has diverse water issues depending on country or locality, and that although Asia's rapid economic growth in recent years has resulted in population growth, urbanization, industrialization and improvement of living standards in many countries and localities, problems that potentially hinder these growths are also emerging, one of which is the water issue.

It was pointed out that in order for Asia to maintain its economic growth into the future, it is essential to solve these water issues, and that it is crucial for the prosperity of Asia and Japan that Japan, which is located in Asia and has close relationships with countries in the region, contributes to the solution of water issues through international cooperation that utilizes the technology, experience and knowledge it has hitherto developed, as well as capital.

On the other hand, it was also pointed out that because Asia is a vast region, and water issues vary in nature and substance from one locality to another, any international cooperation needs to be conducted in a way that is appropriate to the living standards, styles and technological levels of local residents, based on an understanding of actual conditions and needs gained from detailed surveys of situations in each locality.

Asia is also prone to water-related disasters, which makes the establishment of disaster prevention and monitoring systems, as well as disaster mitigation measures essential. Since Japan has an accumulation of excellent knowledge, science and technology in these fields, it is called upon to play an even more active part in international cooperation in the field of disaster management, and contribute to the training of disaster management specialists in Asian countries.

In the final year we intend to also take up water issues in Africa and other non-Asian regions in the world, water issues in Japan, and food problems, which are closely related to water issues. Based on our research to date, we also intend to conduct studies from many perspectives, such as strategies and future measures for solving water issues in Japan and throughout the world, and investigations into desirable forms of domestic systems for international cooperation in the field of water, and international expansion of water businesses.

Reference 1 Summary of Visits by Committee Members

The Research Committee visited Hyogo Prefecture and Osaka Prefecture for two days, from October 5 to 6, 2011, to investigate the present state of efforts to address water issues. Information obtained from hearings administered at visited sites is summarized below.

● Kobe City

1. Kobe City's efforts pertaining to international cooperation in the areas of water and infrastructure-building

(1) Principles

Kobe City has engaged in international cooperation by sharing—through international conferences and by providing technical assistance to Japan International Cooperation Agency (JICA)—its water processing technology encompassing water intake, purification, supply, distribution, sewage treatment and reuse, as well as its experience and knowledge from the Great Hanshin Earthquake. In recent years there are also moves that call for new roles to be played by Kobe City's international contribution in the field of water and infrastructure-building technology, such as "The New Growth Strategy" adopted by the Cabinet in June 2010 endorsing the promotion of overseas export of infrastructure packages under public-private partnerships. In response, Kobe City drafted what is called the "Basic Policy for New International Cooperation Efforts pertaining to Water and Infrastructure-Building" in November 2010, which lays out Kobe City's basic principle of utilizing its wealth of knowledge and experience in the field of public works, such as water-cycle systems and urban development, as well as lessons drawn from its earthquake-disaster experience, to actively assist the overseas expansion of local businesses, when requested by local companies looking to expand overseas.

(2) Approach and method of assistance

Under the "Basic Policy for New International Cooperation Efforts pertaining to Water and Infrastructure-Building," Kobe City has a program in place involving the conclusion of reciprocal cooperation agreements, covering water and infrastructure businesses overseas, between Kobe City and local businesses seeking to conduct water and infrastructure businesses overseas. Currently, Kobe City has agreements with Kobelco Eco-Solutions Co., Ltd. and Shinyei Kaisha, respectively. Under these agreements, Kobe City's construction, waterworks and other relevant bureaus join forces to collect, catalog and provide information related to water and infrastructure businesses, conduct public relations activities, and organize exchanges between municipalities, on the strength of Kobe City's track record of maintaining operations for a city of 1.5 million inhabitants. In addition, the Kobe City Urban Development Corporation provides assistance by assigning dedicated personnel to water and infrastructure-development support, who carry out commissions for companies, providing

advice and consultancy on business planning, facility development, business operation, maintenance and management, and risk management pertaining to water-cycle systems, urban development and other public works. In July 2011 Kobe City concluded a memorandum for cooperation in the field of water supply and sewerage systems with Kien Giang Province, Vietnam, to promote exchange and technical cooperation for the maintenance of the Province's urban environment and improvement of its water-cycle systems. Kobe City currently extends maximum support and cooperation toward the drafting of a business plan as part of a preliminary survey for a public-private partnership infrastructure cooperation project adopted by JICA and carried out by Kobelco Eco-Solutions in Phú Quốc Island, Kien Giang Province.

Kobelco Eco-Solutions, which has a reciprocal cooperation agreement with Kobe City for overseas water and infrastructure businesses, is a Kobe Steel Group company. Its main lines of business include water and sewage treatment plants, sewage sludge treatment, industrial water treatment, and desalination of seawater. It has expanded its business to water markets beyond Japan, including those in Vietnam, India and the Middle East. In November 2010 it established a local subsidiary in Vietnam, which acts as a base for its business expansion, and is already engaging in projects such as an industrial estate wastewater treatment facility, and a water treatment facility for a steel business. In the future it expects to continue receiving know-how from Kobe City under the public-private partnership, while expanding its water-treatment businesses, including the operation, maintenance and management of water supply and sewerage facilities. It intends to work toward the business implementation of the aforementioned JICA public-private partnership infrastructure project survey, and conduct basic surveys of each region in Vietnam to narrow down potential water supply and sewerage projects, so as to expand business to provinces beyond Kien Giang.

2. Exchange of views with Kobe City Waterworks Bureau and Kobelco Eco-Solutions

The discussion with Kobe City Waterworks Bureau and Kobelco Eco-Solutions is summarized below.

A committee member inquired after the purpose of conducting overseas water and infrastructure businesses under public-private partnerships between Kobe City and its local companies. Kobe City explained that it believes that public-private partnerships are beneficial to the mutual growth and development of Kobe's businesses and municipal government, because by using its accumulation of public works experience and know-how, such as those pertaining to water-cycle systems and urban development, and lessons from the earthquake disaster, to actively assist overseas business by local companies, the city can not only hope to make "international contribution" in the forms of improvement of living standards and development in the partner countries, but also hope to "boost Kobe City's economy" by encouraging expansion of its local businesses overseas. The city believes that the partnerships are also beneficial in "preserving technologies and skills" pertaining to Kobe City's water and

infrastructure operations.

A committee member also asked about the effects of the reciprocal cooperation on the preliminary survey for the public-private partnership water supply and sewerage infrastructure project conducted by Kobe City and Kobelco Eco-Solution in Phú Quốc Island, Kien Giang Province. Kobelco Eco-Solutions explained that not only did the reciprocal cooperation agreement between themselves and Kobe City allowed them access to Kobe City's know-how, but the memorandum for cooperation in the field of water supply and sewerage exchanged between Kobe City and Kien Giang Province was also effective in making business with municipal authorities in Vietnam proceed smoothly.

A committee member mentioned moves by other local governments in Japan to conduct water and infrastructure businesses overseas under public-private partnerships, and asked whether this will create competition with Kobe City. To this Kobe City explained that they believed a competitive relationship unlikely, because although there are many cities overseas with potential, each local government in Japan is conducting projects based on past records of reciprocal exchange with the country or locality.

Furthermore, a committee member inquired after the profitability of overseas water and infrastructure projects by Japanese local governments. Kobe City explained that they do not intend to invest or participate in the business itself, because avoiding risks is important for a public enterprise. Instead, support is provided by the city in the forms of gathering, cataloging, and providing information to local companies looking to expand overseas, and consultancy and other commissions carried out for companies by the city's auxiliary organizations, in which the city sees profitability.

Views were exchanged also on potential overseas destinations for water and infrastructure businesses, necessity of support measures by the national government and Japan Bank for International Cooperation (JBIC), fiscal condition of Kobe City's waterworks, and the issue of replacing aged water supply and sewerage facilities.

- **Kobe University Center for Membrane and Film Technology**

1. Activities of the Kobe University Center for Membrane and Film Technology

Today membrane technology has found many industrial applications, which are used in everyday life. These include reverse osmosis membranes (RO membranes) for desalinating seawater, hollow-fiber membranes for making water potable, and separation membranes for filtering industrial wastewater. Functional improvement of membranes is also becoming essential for purifying water and increasing its chances of reuse amid rising concerns for a global-scale water shortage. In response to this background, in April 2007 Kobe University established, within its Graduate School of Engineering, Japan's first Center for Membrane and Film Technology, which aspires to lead the world in membrane technology. The Center plans and provides specialized education in membrane technology, supports and develops research

in membrane technology, provides guidance and advice, and collects and shares latest scientific information. It also conducts international exchange, by networking with membrane centers overseas, by dispatching young researchers and by promoting international joint research.

In July 2007, the Research Organization for Membrane and Film Technology was also established, for the purpose of promoting industry-academia partnerships in both advanced research and human resources training in membrane technology, since the field calls for the well-balanced development of both basic research and industrial applications, as well as the training of people capable of engaging in membrane technology. The Organization, which currently consists of over 40 corporate and other members, provides monetary assistance to the Center for Membrane and Film Technology, disseminates research findings to its members, promotes partnerships between the Center and member corporations on specific topics, and through such activities reflects the needs of industry on the Center's research and education.

2. Exchange of views with Kobe University Center for Membrane and Film Technology

The discussion with Kobe University Center for Membrane and Film Technology is summarized below.

A committee member asked how intellectual property resulting from research was managed. Kobe University regards it reasonable that patent management for intellectual property with wide applications, or those likely to have wide applications, was as a rule conducted by the university, while patents of applications were held by respective companies. However, attention must be paid to protecting the rights of researchers involved in the invention. The university also explained that they are currently engaging in joint research projects with membrane centers at Chung Yuan University in Taiwan, and with Hanyang University in South Korea, and that in the future they will need to address the issue of how to protect and manage intellectual property obtained from such joint research projects with overseas universities, on equal terms.

A committee member also inquired after the Center for Membrane and Film Technology's research funding and research environment. Kobe University explained that the Center receives approximately 30 million yen per year in support from corporate members of the Research Organization for Membrane and Film Technology, and combined with public funding, the Center's budget amounts to nearly 100 million yen. This, however, is still one digit short of the budget for instance at the membrane research institute at Chung Yuan University in Taiwan. Furthermore, Chung Yuan University, which already has three buildings dedicated to membrane research, is currently building another new research building, which is expected to house Europe's major water corporations as well. Funding from the major water companies is expected to further accelerate Chung Yuan's research. According to the university, in order for Japan to carry out research that would lead the world, there is a need to give due consideration to research funding and research environment as well.

● Osaka City

1. Present state of Osaka City's efforts to address water issues

In addition to its international contributions to date, Osaka City considers overseas water projects under public-private partnerships an important part of the affairs of its Waterworks Bureau. The city is investigating the possibility of expanding water businesses to Asia, and is promoting overseas expansion of water businesses for the purpose of improving the sustainability of its water supply operations and invigorating the economy of the Kansai region.

(1) Present state of Osaka City's water supply operations and international contribution toward addressing water issues

Historically, Osaka was Japan's fourth municipality to commence the supply of tap water, which began in 1895. After a period of expansion of water supply during the postwar years, the size of the population receiving tap water has dropped today to roughly 2.66 million, and the total amount of water supplied per day to about 1.35 million square meters. Emphasis has correspondingly shifted from expansion to maintenance and management. From March 2000 the city has introduced advanced water purifying systems to its entire water supply. The city has also made improvements to its water quality, for instance by completely removing mold odor, and has manufactured and sold bottled tap water. The city makes efforts to provide stable supplies of water based on detailed water-demand projections, and achieves a 6-percent leakage rate. On the back of such knowledge and expertise, the city engages in international cooperation for solving the world's water issues. Under technical cooperation requests from JICA, etc., the city has so far dispatched a total of 65 municipal employees to 16 countries as waterworks specialists, and has accepted a total of 182 trainees from 58 developing countries.

(2) Osaka City Water and Environment Solutions Association

Osaka City has experienced overcoming, through various public and private efforts, the numerous environmental issues that accompanied its urbanization, such as water and air pollution, and waste disposal. Public-private partnerships that combine the experience of the municipal government with Osaka and Kansai companies' prowess in element technology to proactively engage in overseas water businesses are considered to have high public benefit, because they contribute to the mitigation of water issues in the world, especially Asia. Based on this idea, Osaka City and the business community in Osaka and Kansai established the Osaka City Water and Environment Solutions Association to make coordinated efforts for developing new overseas projects.

(3) Partnership with Ho Chi Minh City, Vietnam

Osaka City concluded in December 2009 a technical exchange memorandum with Ho Chi Minh City, Vietnam. Projecting the future growth of Ho Chi Minh City's water demand, brought about by the city's population growth and economic development, Osaka and Ho Chi

Minh under the memorandum will exchange technical delegations to promote amicable relationships between Ho Chi Minh City Water Supply Company and Osaka City Waterworks Bureau, encourage mutual development, and contribute to training human resources for addressing water supply issues in Ho Chi Minh City.

(4) Execution of New Energy and Industrial Technology Development Organization (NEDO) project

Osaka City undertook Phases 1 (FY2009) and 2 (FY2010) of NEDO's "Water Saving and Environmentally-Friendly Water Recycling Project." For a comprehensive, source-to-tap water supply system for Vietnam's Ho Chi Minh City, Osaka City investigated the possibility of applying Osaka City Waterworks Bureau's leakage-prevention and effective water utilization know-hows, made proposals for the introduction of a water distribution control system that includes the installation of a distribution reservoir, and investigated the feasibility of a pilot-scale demonstration research facility (Phase 3, which involved establishing the demonstration research facility and providing operation management between FY2011 and 2013, was not adopted).

(5) Survey for public-private partnership water businesses

As part of the Ministry of Economy, Trade and Industry's "FY2011 Small and Medium-Sized Business Support Survey (Survey on forms of sustainable public-private partnership water businesses in ASEAN countries)," Osaka City carried out studies of business models, risk surveys, studies on the present state of water supply operations in Ho Chi Minh City as well as studies of local accounting and legal systems, based on Osaka City's work to date in Ho Chi Minh City, with a view to conducting in the future businesses centered on the utilization of water distribution control systems.

2. Exchange of views with Osaka City Waterworks Bureau

The discussion with Osaka City Waterworks Bureau is summarized below.

Firstly, a committee member inquired after the present state and issues pertaining to local governments making independent efforts to conduct water businesses overseas, instead of collaborating with one another. Osaka City explained that the possibility of collaborating with other local governments can be explored if their fields match. However, homegrown technologies and systems differ slightly between municipalities, and client countries tend to form partnerships with municipalities possessing systems suited to their circumstances. Much can be learnt from programs by other municipalities and for that reason information is exchanged between municipalities, but collaborations have yet to be achieved. Furthermore, Osaka City commented that systems for assistance by the national government will probably become important as well, because overseas water businesses not only present business opportunities to Japanese companies and more tax revenue for local governments, but are also beneficial to the client country in that they improve the living environment of citizens.

A committee member asked what made Osaka's proposal for Phase 3 (intended as a follow-up to the feasibility study for introducing a water distribution control system conducted as part of Phases 1 and 2) of the NEDO project in Ho Chi Minh City unsuccessful. Osaka City explained that they were unsuccessful because NEDO's tight budget made continuation difficult for all but packaged proposals leading directly to business yields. However, fruits of the studies were reflected on the Ministry of Economy, Trade and Industry's adoption of their survey proposal.

A committee member inquired after the necessity of applying international standards to overseas water businesses by local governments. Osaka City explained that applying international standards to water businesses by local governments will increase Japan's international competitiveness, and will be advantageous for winning businesses, and as such is being studied by a Japan Water Works Association committee dealing with the International Organization for Standardization (ISO). Osaka City regards this as a very important aspect for solidifying the foundations for conducting overseas business.

A committee member also inquired after the possibility of setting up a forum for drafting international standards. Osaka City replied that since it will be difficult for Japan to create international standards on its own, it would be necessary to involve other Asian countries, for instance by inviting representatives from Asian countries to overseas water infrastructure public-private partnership conferences for discussion.

A committee member presented the view that in public-private partnerships, an important principle would be to conduct water infrastructure building as part of international contribution, and only seek business opportunities subsequently. Osaka City presented the view that their basic principles pertaining to conducting public-private partnership water businesses overseas include paying due attention to risk management, such as by obtaining the understanding of assembly and citizens, ensuring that the enterprise has profitability, and ensuring that the enterprise does not affect their main operations adversely, because such enterprises are considered incidental operations under the Local Public Enterprise Act.

Other topics of discussion included contents of the feasibility study for water business in Ho Chi Minh City, present state of maintenance and management of water supply and sewerage facilities, the issue of replacing aged facilities, prospects of adopting membrane technology for filtration treatment, background of the manufacture of bottled tap water, and improvement of Osaka citizens' confidence in tap water.

- **Nagaoka International Corporation Kaizuka Plant**

1. Present state of Nagaoka International's overseas water business

Nagaoka International Corporation aspires to make international contributions in the fields of water (groundwater intake screens), the environment (environmentally-friendly screens, water treatment systems) and energy (screen internals), based on its accumulation of

screen technology. The company engages in projects to build underground dams for collecting groundwater, projects for the intake of seawater, and river-water purification on water-poor islands. The company also engages in developing new water sources, as well as improving existing aged or blocked water sources by utilizing the technology involved in its superior-strength, wide-opening ringbase screens, which were developed using the technology for its Nagaoka Screens for petrochemical plants. The company understands that utilization of the International Water Association (IWA) and collaboration among Japan's industry, government, academia and IWA are important for conducting water business overseas, and that it is necessary for these parties to unite in promoting overseas businesses by Japanese companies. To make active inroads into the Chinese market, the company is strengthening technical exchange and other collaborations with the Chinese Ministries of Construction and Water Resources. It is making proposals for model water businesses for China's rural areas, composed mainly of small-scale water supply facilities, and conducts field surveys, trade shows, and technical exchange meetings in partnership with the Japanese Ministry of Health, Labour and Welfare.

2. Issues pertaining to Nagaoka International's overseas water business

Nagaoka believes that in order for companies to conduct water business overseas, it is important for them to utilize the Japanese government, industry-government-academia partnerships, and also IWA, which has a global network for developing and disseminating sustainable and safe systems for supplying water, and the maintenance and technical expertise involved. To this end, Nagaoka feels that it may be a good idea to consider inviting IWA to set up a Tokyo office, so as to create an easily accessible environment for facilitating the utilization of IWA resources.

Nagaoka explained that in order to conduct sustainable business in the Chinese market, it is important to deepen mutual exchange and collaboration through forums, seminars, and trade shows with the Chinese government agencies involved with water supply, such as the Ministries of Construction and Water Resources. It is also important to grasp the needs of the Chinese market through such occasions, involve multiple companies to make proposals for addressing issues in a comprehensive manner, create model projects — no matter how small their scale — involving the collaboration of Chinese and Japanese companies, and at times make top-down decisions to address situations swiftly. As an example, Nagaoka cited its project for proposing a comprehensive system provided by Kansai HANDs, composed of the four companies of Hitachi Zosen, Daiki Ataka Engineering, Nagaoka International and Daicen Membrane-Systems.

After the above explanation, requests to the Japanese government pertaining to conducting water businesses overseas were mentioned: current national government assistance toward such enterprises is centered on major companies, and there is a need to consider establishing slots for small and medium-sized companies; the national government

should take initiatives in deepening business discussions and exchange pertaining to overseas water businesses, thus leading the way for private companies; the government should re-acknowledge the need for groundwater utilization and consider relaxing regulations on groundwater use.

- **Nitto Denko Corporation**

1. Nitto Denko's water treatment membrane business

Nitto Denko manufactures reverse osmosis (RO) membranes and other separation membranes for various uses, including desalination of seawater and reprocessing of wastewater. The company has three major separation membrane production bases, one in Japan, one in China and another in the United States, which was obtained by acquiring Hydranautics in 1987. It has sales and technical service bases, as well as R&D bases in more than 20 countries. In 2008 it became the first Japanese company to establish an R&D center dedicated to water treatment in WaterHub, a so-called special zone for water technology managed directly by Singapore's Public Utilities Board (PUB). At the same time, Nitto moved its headquarters for membrane treatment and water-related businesses to the U.S., from where it operates a global business. The market share of Nitto's RO membranes is 29%, second to Dow Chemical's 40%, but it nevertheless achieves the world's top share in membranes for use in desalination of seawater and reuse of wastewater, which are essential for mitigating global water shortages. The company projects that future growth of the RO membrane market will be driven by general industry, wastewater and mini-elements markets. Although the market for seawater desalination has growth potential, near-term large growth is deemed unlikely due to politically unstable situations and other concerns in the Middle East, which is a growth market. As such, the company also puts efforts in technology development for new membrane businesses, such as osmotic power.

2. Exchange of views with Nitto Denko Corporation

The discussion with Nitto Denko is summarized below.

A committee member inquired after the kind of management involved in preventing engineers passing to overseas companies technology obtained in the course of participating in water treatment membrane projects. Nitto explained that although they maintain tight control on rights to technologies, the same level of control is not necessarily maintained by all water companies. Nitto therefore understands that even under strict control it is not possible to completely prevent leakage of technology wanted elsewhere, and prefers to focus on creating the next new technology.

A committee member asked about the power generation system employing osmosis membranes, which Nitto has commenced developing jointly with a Norwegian energy company. According to Nitto, osmotic power requires securing stable water sources with large

discrepancies in concentrations of salt, such as estuaries, where river water meets seawater. There are more than 30 potential locations in the world, including those in Norway and Japan, which is surrounded by the sea and has large rivers. The project aims to build a power plant by 2020. Nitto explained that although the project hopes to build a pilot plant in 2012, and determine future directions based on demonstrations conducted at that plant, a significant amount of time is expected to be required before they can overcome issues such as profitability, and commence supply of electric power.

A committee member asked about potential issues with regard to the way water treatment membrane companies sell membranes and membrane technology. Nitto explained that materials of water treatment membranes currently in production are basically common to all companies, which puts them in a competitive relationship with one another, possibly leading to a dead end. For this reason, it will become necessary to create completely new membranes, examples of which are forward osmosis (FO) membranes used in osmotic power. Nitto believes it is also important to not simply sell water treatment membranes alone, but to sell water treatment systems including membranes as a comprehensive package.

Furthermore, a committee member asked about desirable forms of associations for promoting collaboration between companies in order to conduct water businesses overseas, and national government roles in public-private partnerships. Nitto explained that for the purpose of collaboration between companies, they already have the Global Water Recycling and Reuse System Association (GWRA). However, because many members are rival companies, it would be necessary to organize it so as to allow the creation of a system conducive to collaboration. In the case of Singapore, its Public Utilities Board (PUB) manages water policies in an integrated manner, provides facilities for demonstrations and environments for turning the outcome of demonstrations into business opportunities. Japan too, may need to consider creating such a model city for conducting water membrane demonstration experiments.

Reference 2 Summary of Briefings at Sites Visited

On February 27, 2012, the Research Committee conducted fact-finding visits pertaining to water issues to the Public Works Research Institute (PWRI) Tsukuba Central Research Center, and the International Centre for Water Hazard and Risk Management (ICHARM). Explanations provided at the sites are summarized below.

- **Public Works Research Institute (PWRI)**

The Public Works Research Institute (PWRI), marking its 90th anniversary in 2012, was set up in 1921 as a civil engineering laboratory under the former Ministry of Internal Affairs. It has conducted research and development for successfully and effectively constructing and maintaining rivers, roads and other social capital. It has also sent experts to locations affected by natural disasters such as earthquakes, heavy rain and landslides, to provide technical assistance toward reconstruction. In 2011, PWRI dispatched experts on the occasions of the volcanic eruption of Shinmoedake (January), Great East Japan Earthquake (March), landslides caused by tropical storm Talas (September), and the flooding of Chao Phraya River in Thailand (November). PWRI itself sustained damage from the Great East Japan Earthquake in 2011, and repairs of its laboratory facilities received funding from the first supplementary budget for 2011.

As of April 1, 2011, PWRI has four board members and 458 members of staff (of which 331 are researchers). The budget for FY2011 was 9.5 billion yen. The organization of PWRI is made up of Tsukuba Central Research Center, International Centre for Water Hazard and Risk Management (ICHARM), Center for Advanced Engineering Structural Assessment and Research (CAESAR), and Civil Engineering Research Institute for Cold Regions (CERI), located in Sapporo.

PWRI's research activities has four goals based on the Science and Technology Basic Plan, namely, a) Realization of safe and secure society, b) Realization of sustainable society through green innovation, c) Achievement of strategic maintenance and long service life of social capital, and d) International contribution through civil engineering technology. To achieve these goals, PWRI's R&D places emphasis on the following six areas: research pertaining to the prevention and mitigation of natural disasters, which are increasing in severity and diversity, and to the swift recovery from natural disasters; research pertaining to technologies for the green innovation of social infrastructure; research pertaining to watershed infrastructure management technologies for realizing a society in harmony with nature; research pertaining to the strategic maintenance and management of social capital stock; research pertaining to improving the functionality and service life of social capital; and research pertaining to assisting countries in Asia and elsewhere through Japan's strengths in civil engineering technology.

Research on flood control and dams is conducted as part of these priority areas.

Examples of research topics pertaining to the prevention, mitigation and quick recovery from ever severe, diverse natural disasters include, “Technology Development for Preventing and Mitigating Water-related Disasters with Increased Severity due to Climate Change and Other Causes (Flood Prevention),” and “Research on Securing the Functionality of Diverse Structures Based on Seismic Capacity (Dams).” An example of a research topic pertaining to watershed infrastructure management technologies for realizing a society in harmony with nature is, “Research on the Characteristics of River Sediment Movement, Their Influence on River Environment, and Conservation Technologies (Dams).” An example of a research topic pertaining to the strategic maintenance and management of social capital stock is, “Research on Developing and Systematizing Maintenance and Management Technologies for Improving the Service Life of Social Stock (Dams).”

- **ICHARM**

ICHARM is a research center established in March 2006 under an agreement between UNESCO and the Japanese government. It is housed within PWRI. It was established in Japan because international expectations toward the knowledge and experience of Japan, a disaster-prone nation situated in Asia, which has high frequencies of water-related disasters, was high.

The mission of ICHARM is to provide strategies appropriate to actual conditions in each region, and serve as a global center for supporting the implementation of such strategies, in order to prevent and mitigate water-related disasters throughout the world.

The three pillars of ICHARM’s activities are “research,” “education” and “information network.” By employing these in an integrated manner, it promotes development and dissemination of advanced technologies, conducts capacity building to develop human resources, and assists implementation on the ground.

One of the advanced technologies developed by ICHARM is the Integrated Flood Analysis System (IFAS) for forecasting floods and planning flood control. IFAS calculates when and to what extend river flow will increase after a heavy rainfall. It performs runoff analyses based on satellite and ground-based rainfall data, calculates river flow and water levels, and makes flood projections, which are posted on Google Earth so as to be accessible to the public. The forecasts can also be incorporated into hazard maps to aid implementation of disaster mitigation plans.

A background to the development of IFAS was the insufficient availability, maintenance and management of hydrological stations for rivers in developing countries. For localities where evacuation and alert systems involving flood forecasts and warnings are difficult, IFAS can provide supplementary flood forecasts free of charge via the internet, and assist flood control planning.

IFAS’s forecast values are obtained by calculating river flow, obtained by adjusting the

satellite-based rainfall data using an algorithm developed by ICHARM. To further improve precision, there is a need to increase the number of observation satellites, and increase the amount of ground-based data.

As for utilization of IFAS overseas, local seminars for using IFAS took place in six Asian countries (Indonesia, Thailand, Vietnam, Myanmar, Pakistan and India), utilization at Solo River in Java, Indonesia was adopted for a joint project with Asian Development Bank, and there are plans for developing a flood forecast and warning system for the Indus River as part of a UNESCO project.

In response to the flooding of the Chao Phraya River in Thailand, flood forecasting was performed using the rainfall-runoff-inundation (RRI) model, which provides integrated analyses from river flow to flooding using rainfall as the input data. For the Chao Phraya River, as of October 2011, simulations of flooding up to the end of November was performed and published. Issues regarding the RRI model include the need to increase data collection for enhancing the accuracy at which geographical and other features are reproduced.

ICHARM also focuses on training human resources, and has an array of training programs intended for the improvement of skills of people already working in their respective countries. Courses include short courses (such as IFAS seminars), master's program (leading to a master's degree in disaster management, conferred in partnership with the National Graduate Institute for Policy Studies and JICA), and doctoral program (supported by PWRI, where program participants also engage in part-time work to obtain their degrees). ICHARM also provides follow-ups to assist those who are back in their home countries upon completion of the programs.

A future issue is the need to consider risks when making policy decisions in the areas of land use planning, development planning, and infrastructure building. ICHARM also believes that Japan should place disaster management at the center of its science and technology diplomacy. For this it is important for ICHARM to improve its international competitiveness, thereby increasing the international contribution it can make through disaster management technology.

Reference 3 Timeline of Second Year Deliberations

Diet Session	Date	Outline
178th	September 30 (Friday), 2011 (No. 1)	1. Resignation of Director and election to fill vacancy 2. Request for continuation of research 3. Dispatch of committee member
179th	November 30 (Wednesday), 2011 (No. 1)	1. Election of Director to fill vacancy 2. Request for attendance of voluntary government testifier 3. Request for attendance of voluntary testifier 4. Report by dispatched committee member 5. Research on International Affairs, Global Environment and Food Issues: Water Issues in Asia (damage caused by flooding in Thailand and responses to the disaster) [Government explanations, statement of views by voluntary testifier, Q&As] Ministry of Land, Infrastructure, Transport and Tourism Ministry of Economy, Trade and Industry Izumi ARAI, Vice President, Japan International Cooperation Agency
	December 9 (Friday), 2011 (No. 2)	1. Election of Director to fill vacancy 2. Request for continuation of research 3. Dispatch of committee member
180th	February 15 (Wednesday), 2012 (No. 1)	1. Election of Director to fill vacancy 2. Request for attendance of voluntary testifier 3. Research on International Affairs, Global Environment and Food Issues: Water Issues in Asia (present status and issues pertaining to water issues in Indochina peninsula and other parts of Southeast Asia) [Statement of views by voluntary testifiers, Q&As] Tadashi YAMADA, Professor, Faculty of Science and Engineering, Chuo University Kimio TAKEYA, Visiting Senior Advisor, Japan International Cooperation Agency Hajime MORI, President and CEO, Kisui Water Treatment Japan, Inc.
	February 22 (Wednesday), 2012 (No. 2)	1. Research on International Affairs, Global Environment and Food Issues: Water Issues in Asia (water issues in Central and Southern Asia and efforts by Japan) [Statement of views by voluntary testifiers, Q&As] Manabu SHIMIZU, Professor, Faculty of Economics, Teikyo University Jumpei KUBOTA, Associate Professor, Research Department, Research Institute for Humanity and Nature Masataka NAKAHARA, Director General, South Asia Department, Japan International Cooperation Agency Masaru OZAKI, Executive Director, Japan Water Works Association
	February 29 (Wednesday), 2012 (No. 3)	1. Research on International Affairs, Global Environment and Food Issues: Water Issues in Asia (water issues in China and efforts by Japan) [Statement of views by voluntary testifiers, Q&As] Hidefumi IMURA, Professor, Global Cooperation Institute for Sustainable Cities, Yokohama City University Toshiyuki HATTORI, President, Env Biz Tech, Inc. Meguri AOYAMA, China scholar, Researcher, Keio Institute of East Asian Studies
	April 18 (Wednesday), 2012 (No. 4)	1 Research on International Affairs, Global Environment and Food Issues: Water Issues in Asia (issues pertaining to efforts to address Asia's water issues) [Statement of views by voluntary testifiers, Q&As] Satoshi TAKIZAWA, Professor, Department of Urban Engineering, University of Tokyo Graduate School of Engineering Akio SHIBATA, President, Natural Resource Research Institute Inc. Kenichi NAKAGAMI, Professor, Ritsumeikan University College of Policy Science
	May 31 (Thursday), 2012 (No. 5)	1. Research on International Affairs, Global Environment and Food Issues: Water Issues in Asia (desirable forms of efforts to address Asia's water issues) [Exchange of views among committee members]
	June 13 (Wednesday), 2012 (No. 6)	1. Research Report 2. Interim Report

Appendix List of Committee Members

as of June 13, 2012

Chairperson	Masashi FUJIWARA (DP-SR)
Directors	Kusuo OSHIMA (DP-SR)
	Itsuki TOYAMA (DP-SR)
	Aiko SHIMAJIRI (LDP-SPJ-GI)
	Toshio YAMADA (LDP-SPJ-GI)
	Shuichi KATO (NK)
	Kota MATSUDA (YP)
Members	Satsuki EDA (DP-SR)
	Ryo SHUHAMA (DP-SR)
	Marutei TSURUNEN (DP-SR)
	Toshiro TOMOCHIKA (DP-SR)
	Shinkun HAKU (DP-SR)
	Tetsuro FUKUYAMA (DP-SR)
	Kenzo FUJISUE (DP-SR)
	Yasue FUNAYAMA (DP-SR)
	Haruko ARIMURA (LDP-SPJ-GI)
	Yutaka KUMAGAI (LDP-SPJ-GI)
	Masahisa SATO (LDP-SPJ-GI)
	Kyoko NAKAYAMA (LDP-SPJ-GI)
	Tetsuro NOMURA (LDP-SPJ-GI)
	Seiko HASHIMOTO (LDP-SPJ-GI)
	Toshiei MIZUOCHI (LDP-SPJ-GI)
	Kenta WAKABAYASHI (LDP-SPJ-GI)
	Hirotaka ISHIKAWA (NK)
	Tomoko KAMI (JCP)

Notes:

DP-SR:	The Democratic Party and The Shin-Ryokufukai
LDP-SPJ-GI:	Liberal Democratic Party, The Sunrise Party of Japan and Group of Independents
NK:	New Komeito
YP:	Your Party
JCP:	Japanese Communist Party