

First Year of 9th Term Research Committee

Research Report on International Affairs, Global Environment and Food Issues

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Introduction — Why Investigate Water Issues Now?

Water is a precious resource that is indispensable for the conservation of ecosystems and continuation of socioeconomic activities, not to mention the maintenance of human life and health. However, there is a limit to the amount that can actually be used, and, today, more than 700 million people live in a precarious water environment around the world due to population growth, rising food demand, progress in urbanization and industrialization, climate change, and other factors. By 2050, this number is expected to reach 1 billion.

Water shortages lead to food shortages and famine, and many people suffer from ill health due to diseases caused by unhygienic water. Water even contributes to international conflicts as can be seen from confrontations over water resources that are occurring in international drainage basins, such as the Aral Sea Basin.

It was in Agenda 21, adopted at the United Nations Conference on Environment and Development held in 1992 (Earth Summit), that the international community took on water issues for the first time, and these became a main theme of discussion at the World Summit on Sustainable Development held in 2002 (Johannesburg Summit). Subsequently, they were discussed at the UN, G8 and other forums, and, today, water is recognized as an important human security issue. 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.

As part of this process, the international community expects Japan to make a contribution using its outstanding water-related knowledge, technologies and experience, encompassing water purification, wastewater treatment, desalination of seawater and other fields, and Japan has been making efforts in various assistance areas, such as comprehensive water resource management, safe water supply, and water use in food production. At the same time, Japan faces challenges in the area of engaging in business activities in the expanding global water resources market as a solution to water issues.

The significance of these efforts cannot be overstated in the context of Japan playing a leadership role in the resolution of water issues and enhancing its international presence by fulfilling its responsibility as a member of the international community. Given the worldwide expansion of the water resources market, they also represent important tasks for Japan in terms of ensuring its own continued sustainable growth. On the basis of such understanding, this research committee conducted research into water issues.

I. Background and Deliberation Process

Research committees of the House of Councillors 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, they are, to a considerable degree, interrelated, with water identified as one of the common links. Water is a precious resource that is indispensable for the conservation of ecosystems and continuation of socioeconomic activities, not to mention the maintenance of human life and health. As the international community undergoes changes, various issues and problems are arising over water. To solve such issues and problems, cross-cutting efforts are essential. In the context of maintaining stability in the international community and ensuring its own prosperity, therefore, it is very important for Japan, as a member of this community, to work towards their resolution by making the best use of its knowledge, technologies and experience. For this reason, the research committee decided to proceed by focusing on water in its first year.

In investigating water issues, the research was divided into the present state, overall efforts, detailed activities, tasks and challenges associated with those activities, and desirable forms of efforts. In each of these segments, views and explanations were sought from experts, practitioners, and government testifiers, each with outstanding knowledge and experience, followed by a free Q&A session and exchange of views among committee members.

In addition, to ascertain the actual state of water-related R&D, the National Institute for Environmental Studies and the National Institute of Advanced Industrial Science and Technology were visited. At each of those sites, a briefing was given on water-related research projects and other topics, with an inspection tour of related research facilities conducted.

II Research Summary

1. Present State of Water Issues

As attested to by the expression “Earth is a water planet”, the Earth is awash with water. However, the actual amount that is available for human use is limited to only 0.77% of the total, including groundwater. As has been pointed out, population growth, rapid economic development, progress in urbanization and other similar events, which center on emerging nations, have given rise to a tight water supply-demand situation and water pollution, while global warming, including its associated changes to climate patterns, is forecast to severely impact on water resources on a region by region basis. For these reasons, interest in water issues is rising around the world.

To deal with these issues, the international community is making various efforts. For example, the Millennium Development Goals (MDGs), adopted by the United Nations and other international organizations, include an international target to halve the proportion of the population without sustainable access to safe drinking water and basic sanitation by 2015, but it is considered difficult to achieve this target.

Water issues are cross-cutting in nature, and require a comprehensive solution. However, these issues are growing in complexity and becoming increasingly obscure as to their true nature amid a change in the world order, in the form of a reduced influence of developed countries as a result of a rise of emerging nations in recent years, and increased economic interdependence resulting from accelerating economic globalization.

For these reasons, the research committee decided to first investigate the present state of water issues, and the views of experts well-versed in hydrology, food, agriculture and population issues were heard, followed by a Q&A session. Among the points made by voluntary testifiers were: Japan’s role in international efforts to deal with water issues, the need for an integrated solution to water, food and energy issues, major water issues relating to food and agriculture and associated efforts and challenges, Japan’s efforts in the water sector in developing countries, and need for a comprehensive policy approach that balances Japan’s national interests and global interests. During the Q&A session, various issues, such as Japan’s response to water issues, tasks relating to the improvement of Japan’s self-sufficiency rates for water and food, potential of Japan’s entry into the water business, impact of population growth on water issues and solutions, role of the Government in the establishment of a water fund in Japan, promotion of rain water use, including the importance of legislative measures, need for support regarding the management of international rivers, and action needed to deal with irrigation facilities that are approaching the end of their service lives, were raised.

Through the above process, the close interrelationship between water, food and energy became clear.

(1) Summary of views of voluntary testifiers

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

● Taikan OKI, Professor, Institute of Industrial Science, University of Tokyo

Only a fraction of the water that exists on planet Earth is available for human use. As water is a cyclic resource, it is important to think about it in terms of flows rather than stocks. Water is unevenly distributed, both in time and space, and certain regions, such as those with distinct dry and rainy seasons and arid belts, are prone to water shortages. As water is very cheap, it is more economical to supply it continuously via pipelines than transport it on vehicles and other means of transport, as is the case with other commodities.

Apart from drinking, people need a lot of water for various purposes, including the maintenance of health and hygiene (e.g. bathing and washing) and irrigation of crop fields. Although major cities in developed countries maintain their water supply by supplementing their own sources with transfers from other areas, those in developing countries are unable to do so. They therefore need to develop public infrastructure for water supply.

As water issues have implications for health, education, the economy, food security, and resource security, Japan needs to work towards the resolution of overseas water issues. Once developing countries develop adequate public infrastructure for water supply, people no longer have to walk long distances to fetch water. This frees up time for other activities, thus facilitating social participation at the personal level and economic development at the country level. As climate change is expected to increase environmental refugees and trigger the exodus of populations by altering the natural environment and accessibility to water, Japan will need to help people to stay where they live on a sustainable basis by transferring its knowledge and experience in water management, providing technical/financial assistance, and dispatching experts. Rather than simple aid, there is a need for a business approach. Namely, instead of transplanting high-cost cutting-edge technologies, Japan will need to enable people to collect water rates and deal with water theft, water leaks and other problems systematically through a partnership with local companies.

In the future, there will be a need to ascertain the distribution of water resources and levels of water dependence, likelihood of the occurrence of water problems as a result of social upheavals or climate change, and the like, both domestically and internationally. To maintain current levels of water supply, it is necessary to optimally balance the securing of funds and continuation of investments, as well as estimating the impacts of overseas water-related disasters on Japan and preparing for them.

Regarding charging for international water use, it is necessary to insist that imposts be proportionate and reasonable. To manage water sources, there is a need for public

administration for integrated water management that also covers groundwater, in addition to legislative development, but groundwater observation/measurement technologies are still not up to the scratch. To realize a sustainable society, it is necessary to take an integrated approach to water, food and energy issues.

● **Tsugihiko WATANABE, Professor, Research Institute for Humanity and Nature**

The cultivation of plants is the basis of food production, and water is an essential element of it. Crop production takes place on farmland, and water conditions determine crop growth. Irrigation is a technique to boost agricultural water supply when there is a shortage of water. Japanese paddy fields are normally fully irrigated, while upland fields are only 20% irrigated. Worldwide, 18% of farmland is irrigated, and this irrigated farmland accounts for 40% of cereal crops. For crop growing, the role and effects of irrigation is substantial.

Among the major water issues relating to food and agriculture is the need to use large amounts of water. For example, the use of massive amounts of irrigation water on the upper reaches of the Huang He (Yellow River) in China led to a loss of adequate flow on the lower reaches of the river. Similarly, the Aral Sea, located in the Central Asian region of the former Soviet Union, has mostly dried up as a result of large-scale irrigated agricultural development in the drainage basins of the tributaries to the lake. In Japan, a reduction in paddy field area is having a serious impact on groundwater recharge and ecosystems. Moreover, the maintenance of the functions of large-scale irrigation facilities built during the postwar period presents a challenge as they are entering their renewal periods.

Among the tasks to deal with water issues relating to food and agriculture is the ascertainment of water behavior in rural areas. In this regard, there is a need to sort out basic water information and dynamically assess the impact of rural water on the global environment and water cycle. This applies to both domestic and overseas efforts. In light of the reduction in paddy field area and other agricultural land, it is necessary to work out a basic approach to the management of future water demand. Moreover, since agricultural water is intertwined with rural life and culture, rather than simply being tied to farmland, there is a need to investigate its historical/cultural background, making it an important task to foster researchers in this area. Other urgent tasks include the elucidation of the assessment mechanism for the environmental impact of global warming, encompassing, among other things, the effects of temperature changes on water conditions, rice cultivation, and the disease and pest situation, and taking appropriate action.

● **Kiyoko IKEGAMI, Director, Tokyo Office, United Nations Population Fund**

The world population is projected to reach 9.2 billion by 2050, at a rate of 79 million per year. Importantly, 95% of population increases are occurring in developing countries. As

population growth outpaces increases in food production, food prices are steadily rising, exacerbated by speculative investments in recent years.

At present, South Asia and Africa have difficulty securing safe water, and only 62% of the world population will have adequate access in 2025. Although the cause of water shortage varies, it tends to occur in countries with a large population and high total fertility rate.

Before being able to embark on economic development, developing countries are confronted by environmental and population problems, and this makes social development, aimed at developing infrastructure and securing resources, including human resources, crucial. Goal 7 of the MDGs includes the halving of the proportion of the population without sustainable access to safe drinking water, and this target is difficult to achieve in the Sub-Saharan region, although it is achievable in other parts of the world. Basic sanitation, on the other hand, is out of reach for 39% of the world population. This means that there is a need to provide 1.3 billion people with access to safe drinking water and 1.7 billion people with access to basic sanitation in the future. As well as improving health, the achievement of this target is needed to cut the hour and 40 minutes that women and children spend daily to fetch water and enable them to have more education and family time. *The State of the World Population 2009* discusses the effects of investment in women on the improvement of the environment.

To solve water problems, the Japan International Cooperation Agency (JICA) installed more than 100 water towers in Senegal, and this helped reduce diseases and stillbirths and improve the school attendance rate, centering on girls. Among NGOs, JOICEF has been working to introduce a school health program, centering on stool tests for children, and promote oral rehydration therapy (ORT) in Guatemala.

Developed countries' combined percentage share of CO₂ emissions has been falling, while the proportion attributable to developing and newly industrialized countries has been rising. Moreover, by 2050, the ten most populous countries in the world are all expected to be developing countries, with the sole exception of the United States. To achieve the MDGs, it is necessary to step up assistance for developing countries, and the cost involved would only be a fraction of world military spending. Japan is expected to make a contribution in such areas as technology transfer, environmental conservation and infrastructure development, as well as national census as an essential tool for the collection of data needed for development. Japan needs to develop a comprehensive policy framework that balances its national interests and global interests on the basis of a relationship of mutual benefit with developing countries.

(2) Discussion highlights

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

● **Japan's efforts to deal with future water shortages**

- To earn foreign currency through infrastructure projects by recognizing overseas water shortages as an opportunity, there is a need for broad government support for private companies.
 - Future water shortages will provide an opportunity for us to reweave our knowledge about water use and we can use this new knowledge in international cooperation.

● **Water fund**

- While Japan has not established a national policy-driven water fund, overseas water funds are believed to be chasing after Japanese public funds.
- When Japanese companies establish overseas water business operations, they do so without relying on a water fund. This means that overseas water funds are not necessarily enjoying a flow of funds from the Japanese Government.

● **Need to promote rain water use**

- There seems to be a need to change our rain water management strategy from flow-based to stock-based and promote rain water use through legislation.
- During a severe drought, rain fails to fall over a very wide area, so increased rain water use does not reduce drought risk. Some local governments have already made rain water use mandatory through local ordinances.
- Rain water use represents artificial intervention in the natural water cycle, and the task here is working out how to distribute the extra water made available by it. While the basic legislative framework for rain water use is important, there is also a need to sort out information on the outcomes of different management methods.

● **Virtual water**

- Water used to produce food imported by Japan may be offset by water used to produce industrial products exported by Japan.
- Water use in overseas food production could involve so-called “external costs”, such as the use of water resources expected to be depleted soon, monopolistic use of water, and adverse impact on ecosystems, so it is important to ensure that there are no such costs when Japan imports food and other products.

● **Management of international rivers**

- It seems there is room for international organizations and individual countries to provide assistance in the management of international rivers, a task that takes more than one country.
- Managing international rivers subject to a bitter rivalry between upstream and downstream countries is very difficult, and this may make it important for researchers to get involved using second-track diplomacy or a similar approach.

● **Future outlook of water situation**

- When figuring out the future water situation, there is a need to consider the best and worst-case scenarios.
- The best-case scenario is steady advances in technological innovation, such as the development of a low-energy seawater desalination technology. The worst-case scenario includes skyrocketing food prices due to population growth, fights over water, poor harvests, and intensification of climate change.
- The best-case scenario is an increased ability to collect/predict water information resulting from the development of new technologies. Taking water use in rural areas as an example, this involves water distribution and food production according to water conditions and international information sharing as a basis for cross-border mutual food supply and the like.
- Both the best and worst-case scenarios seem to be contingent on the degree to which technological innovation can offset the water stress brought on by population growth and rise in the standard of living.

● **Change in distribution of water resources due to global warming**

- Given that global warming is likely to change water cycle patterns by changing the distribution of water resources, both the areas to be endowed with more water resources and those to be deprived of all or part of their water resources will have to change the way they manage water.

● **Present state of Japan's water business and challenges**

- Japan's entry into the global water market does seem to have potential.
- Japan has world-class technologies in reverse osmosis, seawater desalination, ultrapure water production, and other areas, but these technologies are high cost. Japan is not good at providing "adequate" services at affordable prices to meet overseas needs.
- Investment in water and other public infrastructure is not determined by technology and price alone. Government-to-government top-level diplomacy is crucial.

● **Desirable forms of Japan's technical assistance**

- Japan's technical assistance for developing countries is not only scrutinized by Japanese taxpayers but also appreciated by local residents as immediate beneficiaries of such assistance, so it should continue in appropriate forms.
- As well as sending Japanese citizens to developing countries and passing on accumulated know-how, it seems important to share Japan's technologies with them. It is also important for Japanese national lawmakers to have a firsthand look at project sites in developing countries.

● **Desirable forms of disaster-related assistance**

- In July 2010, severe floods struck Pakistan and destroyed irrigation channels. As this has permanently incapacitated wheat cultivation, the irrigation system needs to be redeveloped in the medium to long term. It is important that Japan get involved in this.
- It is very important that Japan provide assistance in the development of water infrastructure in Pakistan. However, as Japan is also providing assistance in Afghanistan, there is a need to set priorities, most likely on the basis of a political decision.
- As the occurrence of disasters overseas is an ongoing risk, it is important that Japan pass on its know-how in a disaster recovery system as part of its assistance.
- As emergency assistance provided in the immediate aftermath of a flood or tsunami has only a limited effect in improving the situation, it is important that a framework for disaster recovery and development assistance that looks six months or a year into the future be jointly developed by the government of the disaster-struck developing country and Japanese experts.

● **Food self-sufficiency rate**

- Importing food is equivalent to indirectly using other countries' water. In the face of overseas water depletion and conflicts over water resources, therefore, it is necessary for Japan to increase its food self-sufficiency rate.
- Japanese food imports include those produced using non-renewable water resources, known as "fossil water", and this may be significantly impacting the global environment.

● **Measures to reduce energy consumption and costs in food production**

- It is important to look into effective ways to reduce energy consumption and costs in food production.
- The visualization of food information (food mileage) and utilization of nitrogen contained in imported food will lead to a reduction in energy consumption. Other examples include new, more efficient ways of using agricultural facilities, such as small hydro power generation based on systems installed in irrigation channels.

● **Renewal of irrigation facilities**

- There is a need to investigate large-scale irrigation facilities that are approaching their renewal periods.
- The role of large-scale irrigation facilities extends beyond agriculture, and the conservation of the local water environment is part of it. Maximum efforts should therefore be made to renew those facilities, including a thorough functional audit of the facilities to ensure efficiency.

● **Need for agricultural and rural development program**

- The severe budget cuts for the agricultural and rural development program may put the brakes on irrigation projects for new upland fields.

- The Government should provide various forms of assistance for upland field irrigation, as long as there are real local needs.

2. Overall Efforts to Deal with Water Issues

The water issues that confront the international community are cross-cutting in nature as they are closely related to population, food, energy, health & hygiene, economic growth, urbanization and the environment. They also present challenges for the international community as a whole, including Japan, which relies on imports for much of its needs for food, energy and other resources.

The resolution of water issues requires comprehensive and diverse efforts, particularly the development of innovative water use and reuse systems based on, among other things, the efficient use of water resources, reclamation of sewage, and desalination of seawater. In this regard, individual countries, major international organizations, and others need to make concerted efforts.

Spurred on by rising public awareness of water issues in recent years, Japan has been actively participating in water-related international conferences, including the World Water Forum, and making a contribution to the international community's water-related efforts. As an individual country, Japan has also been working in such areas as the comprehensive management of water resources, supply of safe drinking water, and development of environmentally friendly sewage treatment facilities by taking advantage of its advanced technologies and know-how.

The global water market is expected to grow in size from the present 36 trillion yen to 87 trillion yen by 2025. Today, Japanese companies are making a contribution to the resolution of world water issues by engaging in business activities in the areas of the manufacture of parts, components and equipment, design, assembly and installation of systems, and system operation and maintenance by taking advantage of its advanced water use and reuse technologies, such as seawater desalination and membrane water treatment. However, for Japan to stay competitive in the expanding water market, it needs to tackle various challenges.

Keeping the above in mind, the research committee heard the views of experts well-versed in Japan's efforts to deal with water issues and held a Q&A session. Among the points made by voluntary testifiers were: Japan's international contribution to the resolution of water issues based on its experience and knowledge, desirable forms of Japan's contribution regarding water resource problems involving international rivers, and the presence of Japanese companies in the expanding global water market & challenges. During the Q&A session, various issues, such as challenges associated with international efforts to address world water issues, Japan's stance in its efforts, challenges associated with efforts based on ODA and business activities, and desirable forms of Japan's efforts towards its own water issues, were discussed. Through these discussions, various challenges associated with Japan's efforts became clear.

(1) Summary of views of voluntary testifiers

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

● Mikiyasu NAKAYAMA, Professor, Graduate School of Frontier Sciences, University of Tokyo

There are about 270 international drainage basins across the world. They account for about half of all the land area and about 60% of the world population. To avoid disputes over water resources, national, regional and world-level strategies and coordination are essential, and this has largely become a consensus view.

After the end of the Cold War, the number of cross-border contacts and negotiations over water surged. Until the end of the 20th century, water-related international relationships were mostly friendly, but the situation may not remain so benign in the future, and the greatest risk may be the Middle East. Although there is a prediction that water resources will trigger conflict by the end of this century, it may not be worth the cost to resort to war over water, unlike oil or mineral resources.

Of all the factors that lead to problems involving an international river, the first and foremost is the existence of people who incite war. There have been a number of attempts made by politicians of a country situated on the lower reaches of an international river to rally people's support by accusing upstream countries of causing a water shortage or any other problem to cover up their own mismanagement. The second factor is a lack of information transparency. An international conflict is quite often triggered by suspicion held by a downstream country against an upstream country, and some of those conflicts could have been avoided if the upstream country had properly conducted environmental impact assessments for its projects and shown their results to the downstream country. In many cases, a consultation mechanism is nonexistent or nonfunctional for countries sharing an international river. The third factor is the impact of development assistance. For example, the drying up of the Aral Sea was partly caused by an increase in water demand in Afghanistan, an upstream country, due to agricultural rehabilitation aid provided by the former Soviet Union.

Other factors include a lack of a framework for coordination for international rivers. The treaty on the uses of waters of international rivers adopted in 1997 is yet to take effect. In the meantime, an argument in favor of demanding the implementation of environmental impact assessments and disclosure of their results for all development projects involving international rivers is becoming mainstream, and the Espoo Convention has taken root in Europe, with moves to adopt a similar framework being afoot for several drainage basins, including the Caspian Sea.

In this regard, Japan is in a position to take actions such as the following: (i) provision of assistance geared towards the establishment of a framework for coordination (e.g. a contribution made through the Mekong River Commission), (ii) ratification of the treaty on the uses of waters of international rivers or facilitation of the ratification process, and (iii) establishment of environmental impact assessments based on a model provided by the Espoo Convention in the international community. In the ODA area, Japan may make a contribution by (i) ensuring that its assistance involving international rivers will not trigger disputes among basin countries and (ii) driving home the necessity of a framework for coordination to basin countries and providing assistance geared towards its establishment.

● **Kotaro TAKEMURA, President, Japan Water Forum**

In the 21st century, global environmental problems will manifest in the form of water. Typical examples are the disappearance of the Aral Sea and pollution of the Bohai Sea, caused by the mass production of cheap cotton and other goods, and Japan has been benefitting from the importation of those products. This and the fact that Japan relies on imported food for 40% of its water needs on the back of a meager water self-sufficiency rate of 60% make those global water problems Japanese problems.

Japan should make a sustainable contribution in world water issues and win the respect of the international community. It has a historical and cultural heritage of overcoming obstacles to water sharing through technology and a track record of developing high-quality water infrastructure. It can make a contribution by spreading these practices across the world, as well as lessons learned from environmental pollution, including the achievement of an industrial water recovery rate of more than 80%. Developing a recycling-oriented civilization capable of manufacturing fertilizer via sewerage infrastructure can solve the world's fertilizer problem.

To make all this happen, close collaboration between government and business sectors is necessary, but Japan lags behind in this area. Besides, bureaucratic sectionalism is rife. Institutional systems to merge traditional wisdom and cutting-edge technology are inadequate, and no clear roadmap to the future has been shown. There is a need to build a social system that fills the gaps created by bureaucratic sectionalism through the cooperation of players from outside the government sector, such as private companies, NPOs, political leaders, and experts. This Team Water Japan, which centers on a virtual organization that has a high level of expertise worthy of being the “Water Security Strategy Organization” but lacks a formal organization or legal status, is a vehicle for collaboration between a suprapartisan group of Diet members, private companies, and others. As ODA has budgetary limitations, private sector participation is essential for a sustainable international contribution.

Meanwhile, the aging of domestic infrastructure is reaching a critical stage, with the number of cave-in accidents increasing rapidly. Nevertheless, renewal continues to be put off,

as the redevelopment of out-of-sight water infrastructure arouses little interest in the heads of local governments, especially given the tight budgetary and staff conditions of local governments, particularly small to medium-size ones. This will make a wide-area management of water supply and sewerage systems necessary in the future, while there is a need to put in place a mechanism to utilize domestic private-sector funds as funding sources since there is investor interest in investment in low-risk water infrastructure. To this end, it is necessary to pursue a new form of public infrastructure projects through public private partnerships.

● **Kazunari YOSHIMURA, Representative of Global Water Japan, United Nations Technical Advisor, and Visiting Professor at Azabu University**

Although the global water market is projected to expand to 110 trillion yen by 2025, Japan's presence is a mere 1 trillion yen. Japanese products are purchased cheaply by American and European companies for use as parts, so sales growth does not translate into profit growth because of falls in unit prices.

At present, Veolia Water of France and Thames Water of the United Kingdom are the two most profitable companies in the global water market. French companies' competitiveness is attributable to business diplomacy involving economic missions headed by the President. In Germany, the Ministry of the Environment plays the central role in fostering water-related industries. The South Korean President plays an active marketing role to earn foreign currency, while Singapore has created a water hub based on an alliance between the Government and 140 water-related businesses from around the world.

Japan, on the other hand, has excellent technologies. In the low-tech area, Japan's water leakage prevention technology is the best in the world, while it also leads the world in the operation and maintenance of water purification plants and sewage treatment plants. In the high-tech area, it has excellent seawater desalination, sewage recycling and trace analysis technologies. Japan, therefore, should have a strategy that takes advantage of those technologies.

Meanwhile, the Japanese water supply and sewerage market has been steadily shrinking after peaking in 1997. Although the aging of water supply and sewerage systems is quite advanced, both the National Government and local governments are short of funds, making infrastructure renewal a challenge. Private companies also face problems, such as overcompetition and bid rigging. This domestic situation has driven some companies to look overseas, but, without being armed with an effective business strategy, they cannot be successful in overseas markets. At present, reverse osmosis membranes for seawater desalination are the only Japanese technology that sells overseas. This is attributable to the misguided belief of Japanese companies that they can win in overseas markets as long as they have technological excellence as well as the absence of a coordinator for various strategic

initiatives. Overseas infrastructure development projects are based on government-to-government promises, so there can be no meaningful business opportunities without a visible government presence.

At present, relevant ministries and agencies are running various study meetings aimed at promoting the water business. In particular, the Study Group on an Overseas Expansion of the Water Infrastructure Business of the Ministry of Economy, Trade and Industry has been deliberating a winning formula for Japan. In its draft report, the study group concludes that it is important for Japanese companies to enter overseas markets to accumulate experience by establishing a joint venture with an overseas company, acquiring an overseas company, or establishing a joint venture with a Japanese local government.

(2) Discussion highlights

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

● Attitude, structure and basic vision to tackle water issues

- There is a suprapartisan move to establish a basic law for water reuse and recycling to overcome bureaucratic sectionalism and other obstacles to tackling water issues.
- Legal status comes with formal powers, but formal powers lead to time-consuming coordination with relevant ministries and agencies. For this reason, the Water Security Strategy Organization engages in problem-solving activities without seeking formal powers. Although a basic law for water reuse and recycling is welcome, there should be a suitable division of roles among players.
- When proceeding with an overseas expansion of the water business with the Government at the helm, it may be necessary to first develop a vision as to whether water is a human right or human need.
- Until around the 1960s, it was understood that upstream countries of an international river had the right to use 100% of river water, but, today, the rights of downstream countries are also recognized, with upstream countries required to avoid causing a markedly adverse impact on downstream countries. The UN convention adopted in 1997 is based on the same philosophical view. Nevertheless, some countries still act in a manner that can only be seen as a blatant disregard for the needs of other countries.
- The Water Security Strategy Organization stays away from the need-or-right debate to avoid being bogged down in abstract arguments. Instead of taking a European Rationalism-style black-and-white approach, we discuss more subtle ways of pursuing water business on the basis of respecting diversity in terms of the community, culture, tradition, and the like to take advantage of Japanese strengths.
- We have not reached a conclusion on the argument as to whether water is a human right or economic good. Since water is consumed where it is produced, it is necessary to look into the

possibility of local recycling. Unlike air, water requires storage and transportation systems, and they are costly to run. It is therefore necessary to work out strategies on a locality by locality basis.

● **Japan's contribution in world water issues**

- With regard to the problems that have arisen in Central Asia over the transformation of domestic rivers into international rivers, Japanese support, which steps back from European Rationalism, is valuable, and its contribution will be appreciated.
- There is a geopolitical difficulty specific to Central Asia in that water sources are located in small countries. Nevertheless, for countries situated in international drainage basins, maintaining high information transparency in terms of flow rate, etc. is generally considered more beneficial as it provides better access to international assistance and investments. In this regard, Japan can make an active contribution by taking advantage of its strength in the development of systems for the collection, processing and disclosure of data, such as precipitation and flow rate.
- Having entered an era of regional conflicts, conflicts are occurring in the Middle East over international rivers. It is questionable that Japan has a role to play in any of the initiatives going on in the region, given its focus on a technological approach that keeps a distance from the political framework.
- Just inviting scholars from countries that are parties to a dispute and discussing the water resource situation can make a considerable contribution to the development of a common understanding as a basis for negotiations. It is therefore important that Japan look into non-diplomatic channels and put this idea into practice.

● **Significance of overseas expansion of water business**

- In pursuing water business overseas, it is important to ensure that Japan's action contributes to the genuine development of partner countries. Such being the case, it is questionable that this business can generate enormous profits.
- Under Japan's ODA, water purification plants can be built, but their maintenance is outside the scope. As a result, overseas companies that engage in maintenance are sometimes wrongly, and regrettably, credited for the construction of the plants themselves. Still, huge returns cannot be expected from maintenance contracts, so it makes more sense to pursue them in the context of utilizing the manpower of retiring baby boomers and building a mechanism for a sustainable international contribution.
- Japan has a reputation for being honest and sticking around until the job is done. With this advantage, it does stand a chance to succeed in the water business in Asia, which is experiencing rapid population growth and urbanization. Nevertheless, huge profits seem to be out of the question, so it may be necessary to settle for a more modest goal of just recouping personnel costs for technology transfer and making a small profit.

● **Challenges in Japan's overseas water business expansion**

- Japanese companies lack speed and efforts to identify local needs. For Japan to be a winner in the global water market, it is necessary to avoid direct competition with the water majors and ascertain local needs.
- In an infrastructure business where the public sector is the end user, Japan's past successful business experience, where the customers were individual consumers, means little, and there is a need for a national-flag company. Attempts by individual companies to get in touch with potential customers would just confuse them. Amid a need to sort out projects, prefectures and municipalities have begun sharing information, and things have finally started moving.
- The failure for a national-flag company, as a necessary condition to win in the infrastructure market, to emerge in Japan is believed to be attributable to the size of the domestic market, which is large enough to support three to four companies, thus making it difficult for the Government to focus on one company.
- To be competitive in the overseas market, corporate alliances and mergers are necessary. Still, Swing Corp. and Metawater Co., Ltd., two companies created in the last five years, do not measure up to overseas competitors in terms of financial resources. The National Government and corporate alliances need to have a clear national-flag vision, with the National Government taking the initiative in creating a national-flag company from around three companies.
- Bureaucrats, who are obvious candidates to lead infrastructure business and other activities, do not have the coordination skills needed to put together a new team and plan and implement projects, so Japan needs to foster personnel who have those skills.
- Water engineering staff at local governments skillfully put together systems using excellent cutting-edge technologies developed by Japanese companies. For this reason, it is important to offer complete systems designed by a team built around a local government or governments, rather than by individual companies. This understanding is already spreading among local governments, and what is needed now is the sharing of information and provision of support by society.
- At present, Japan does not have personnel with a sound knowledge of the water infrastructure market and the ability to provide leadership. This necessitates resorting to political power and authority to get things moving. As soon as bureaucrats find a vice minister-class politician at the helm of overseas business promotion efforts, they will follow.

● **Combination of infrastructure business and ODA**

- JICA experts dispatched under technical cooperation projects are believed to have identified developing countries' needs, but that information may not have been passed on properly.
- With waterworks projects in Southeast Asia, it is essential to prevent water leaks, water theft and payment delinquency, but Japanese experts are equipment specialists, so they do not touch management issues, such as water theft and payment delinquency. Another fact is that

Japan does not hang on to engineers and technicians it has trained in developing countries to form a human network. It also tends to look at the needs of developing countries on the basis of its own infrastructure situation, rather than theirs.

- As has been pointed out, obstacles to the overseas expansion of the Japanese water business include poor knowledge of domestic situations and legal requirements of potential partner countries and absence of a leader and top-level government marketing efforts, and this makes it an important task to work out the best manner of involvement by the Government and JICA.
- The most crucial element of overseas expansion is the ascertainment of local legal requirements and needs, so it is necessary for the Diet to closely monitor the performance of the infrastructure project specialists recently appointed by the Ministry of Foreign Affairs in terms of the gathering of relevant information

● **Global standards for water treatment and Japan**

- Japan's weakness in the international standardization battle lies in the absence of experts in the affairs of the International Standardization Organization (ISO), and this has led to its failure to cultivate allies who can be counted on at times of crucial voting. To win votes, it is not enough to attend formal meetings. Informal contacts, such as chats, dinner and coffee breaks, are also important. The current budget does not pay for much beyond the English translation of proposed ISO documents. A proper strategy should be developed by allocating more funds.

● **Influence of Trans-Pacific Partnership (TPP) on water business**

- The TPP covers water issues, and this is believed to reflect the intention of the United States to sell its water business model. In this regard, Japan should keep in mind the need to protect its own national interests when taking part in discussions.
- To counter the US move to sell its water business through TPP, Japan should offer comprehensive assistance that encompasses the whole water use cycle, including irrigation water, rather than narrowly focusing on the traditional water business. To this end, it is important to take advantage of the reputation Japan has built among Asians that it is a friend with the same eye and skin color who always honors their trust.

● **Challenges faced by domestic water supply and sewerage services**

- To ensure that water supply and sewerage infrastructure continues to be properly maintained amid a national government move to replace purpose-specific subsidies with general grants as local governments' fund sources, it is important that heads of local governments recognize its importance.
- As general grants were introduced not long ago, it is too difficult to comment on them, although they do raise concerns. This issue really puts the judgment of the heads of local governments to a test, given that water infrastructure is out of sight.

- Local governments are also nervous about general grants. Small-scale local governments are unable to draw up a three-year plan as a precondition for a budget request. There is a risk that the money is used to build waterside recreational parks, aquariums, and the like as part of mayoral and other local election promises. To avoid a crisis from arising, we want the government to make the grants conditional on the renewal of at least 2% of the infrastructure each year.
- The renewal of water supply and sewerage systems is very important and should be undertaken systematically. It might be a good idea to pursue their integrated redevelopment through the use of common ditches.
- An unfortunate fact is that infrastructure is largely out of sight, out of mind, and water supply and sewerage systems, which are installed underground, are typical examples. Given this, we now need heads of local governments and local administrative services that are capable of explaining the need of their redevelopment in a tangible manner.
- Although we keep consuming water as if there were an infinite supply, water infrastructure is in a critical situation. If this crucial infrastructure falls apart, the very survival of Japan will be in jeopardy.

● **Introduction of private funds into water supply and sewerage services**

- Although the argument for a need to introduce public funds into water infrastructure development has some merit, it could lead to rate hikes and other disadvantages to community residents, making it essential to ensure that this does not happen.
- In the 1990s, the privatization of water services around the world brought about skyrocketing water bills and other problems, particularly in Latin America. More recently, however, the water majors have switched to public private partnerships (PPP) and other approaches. In Japan, full privatization should not be introduced. The optimum choice is public ownership and private operation.
- The introduction of private funds does not mean the transfer of infrastructure to private ownership. Since the management of facilities at small-scale local governments with limited human and financial resources and utilization of the manpower of retired baby boomers require wide-area systems, we have begun debating more open ways of raising private funds than local government bonds.

● **International efforts to tackle water issues**

- We hardly ever hear about instances of an international organization successfully mediating an international dispute over water. It is not the settlement of ongoing international disputes that the United Nations and other international organizations are useful for. Rather, it is the establishment of international frameworks, such as principles that apply to the sharing of a river by multiple countries.
- As part of the MDGs, the United Nations has set a target to improve access to safe drinking water and basic sanitation by 2015, but, due partly to population growth and funding

difficulties, progress has been at a snail's pace. As a result, the only tangible achievement has been increased public awareness.

● **Sharing of benefits from river between up and downstream parties**

- How to distribute the benefits provided by the ecosystems of a river between up and downstream parties is an important issue. One approach is to impose a forest environment tax as has been the case with some local governments.
- In the case of an international river, things are a little more complicated. For example, although water source conservation efforts by upstream countries benefit downstream countries, it is difficult to get this "debt" repaid through monetary payment. Nevertheless, since countries situated in the same drainage basin have close economic ties involving many sectors, it is possible for downstream countries to return the favor by offering comparable benefits in non-water sectors. A similar approach, such as the establishment of a drainage basin fund, may be useful for domestic rivers.

● **Role of environmental impact assessments in water issues**

- Although environmental impact assessments are a useful tool to improve the relationship between upstream and downstream countries, they alone cannot settle disputes. What is needed here is to look into ways to use them effectively.
- If there is no trust between the parties, environmental impact assessments are basically useless. Nevertheless, given that it is downstream countries' paranoia about upstream countries that often inflame cross-border relationships along an international river, the disclosure by an upstream country of the results of its environmental impact assessments to its downstream neighbors can go a long way towards resolving the problem, as it will at least let the downstream countries know about the upstream country's development plans, even if there is not much trust in what is written in the reports.

● **Challenges in use of water as energy source**

- Despite the importance of harnessing the energy held by water, there are considerable regulatory restrictions on small hydro power generation. These restrictions must be eased.
- To promote small hydro power generation, sweeping deregulation is required. Despite the fact that installing a small turbine in an irrigation channel enables a farm to generate its own power, which is available no matter how high oil prices rise, regulations prevent this from happening. To put an end to this problematic situation, it is important that relevant ministries and agencies work towards deregulation.

● **Challenges in utilization of groundwater**

- Of all fresh water that exists on planet Earth, surface water is said to account for only 0.01%, compared to groundwater's 0.76% share. For this reason, when investigating water issues, the

problems associated with the use of groundwater must be elucidated, as well as its future outlook.

- As the scientific knowledge about the impact of groundwater withdrawal on aquifers shared across national borders is limited, there has been hardly any dialog between the countries concerned. Nevertheless, awareness of its need is growing, and Japan may be able to make a contribution in the area of data collection.
- The use of groundwater is a right. However, many newly established large-scale facilities, including manufacturers, are shunning tap water and using groundwater instead. This has resulted in a sharp fall in local government water revenues, creating a difficult situation where the bulk of the cost of the renewal of water infrastructure needs to be borne by community residents. For this reason, Team Water Japan has proposed a system whereby funds are set up through drainage basin councils and companies make contributions as part of their CSR activities. A scheme along these lines has been established in Hokuto City, Yamanashi Prefecture.
- There is a need for legal provisions that stipulate that groundwater is public water, i.e. a common asset of all Japanese. To enable local governments to maintain their waterworks amid falling water revenues and shrinking staff numbers, the concept of a fund or universal rate must be introduced through public-private collaboration.

● **Water issues and food self-sufficiency rate**

- Through the importation of food, Japan places a burden on the global environment, and this makes it necessary for Japan to transform itself into a recycling-based society that makes the best use of its land. In the context of water issues, therefore, Japan may be able to make an international contribution by increasing its food self-sufficiency rate.
- If Japan increases its food self-sufficiency rate, the amount of water used for food production overseas will indeed fall, but questions may remain as to whether it is the best possible solution from a global perspective, when its impact on the environment is considered in terms of a water footprint.
- For Japan to increase its food self-sufficiency rate by 10%, approximately 16 billion tons of irrigation water would be needed. Yet, there is an ongoing argument questioning the need for dams. When looking at the dam issue, therefore, it is necessary to take a broad view that encompasses the food self-sufficiency rate, as well as landslide and flood control. Otherwise, we may get our water policy wrong.

3. Detailed Activities

In addition to the traditional water issues of inadequate access to safe drinking water and shortages of water resources, another water-related challenge is emerging. That is, the demand for agricultural, industrial and domestic water is rapidly rising in China, India and other newly industrialized countries and developing countries in South East Asia, the Middle East, North Africa and other regions due to population growth, progress in industrialization, rapid economic development, and other factors. With the water market expected to grow from about 36 trillion yen in 2007 to 87 trillion yen in 2025, seawater desalination, industrial water supply & sewerage, and water recycling are attracting attention as subsectors holding a promise of rapid growth in the future, in addition to the tap water supply and sewerage subsector, which is by far the largest component of the water sector.

So far, major European companies have held large shares in the overseas water market, although competition is intensifying as a result of entry by companies from newly industrialized countries and local companies. Japan has a large number of water-related companies, including those which have built large shares in overseas markets on the back of their technological prowess. However, few companies offer comprehensive packages, encompassing the manufacture of parts and equipment and system design and installation, as well as operation and management.

In the future, Japan will face a growing need to expand its water business overseas and engage in other activities as a means to contribute to the resolution of world water issues, in addition to keeping up its ODA program. To this end, it is important to establish an alliance of a local government, with a wealth of experience and know-how in the operation and management of water supply and sewerage systems, and private companies, with advanced technology in water treatment, and strengthen the collaboration between such an alliance and government bodies that are privy to the water-sector situations of various countries and have the know-how in overseas investment. Other important issues include the securing of the finances.

Keeping the above in mind, the research committee heard the views of experts involved in the water business and overseas development assistance at a private company or government body and held a Q&A session. Among the points made by voluntary testifiers were: future tasks relating to an overseas expansion of the water business, efforts of the Japan Bank for International Cooperation (JBIC) with regard to overseas water infrastructure projects, and JICA's efforts aimed towards the resolution of water issues, including the improvement of access to safe water, and provision of support for an overseas expansion of the water business. During the Q&A session, cost cutting measures, trends in international standardization & potential, Japanese companies' potential for success, and management of the risks associated with the running of water supply services in foreign countries were discussed. Through these discussions, tasks relating to an overseas expansion of the water

business and implementation of the international cooperation program, measures to be introduced in the future, and the like became clear.

(1) Summary of views of voluntary testers

Views expressed by voluntary testers during the committee meeting are summarized below.

● Masami ITO, Head of Steering Committee, Global Water Recycle and Reuse System Association Japan

In response to the recommendations made by the “Council on Competitiveness Nippon” to help transform the Japanese water business into an export industry, the Global Water Recycle and Reuse System Association Japan was launched in November 2008. With 50 companies from a diverse array of water-related industries having joined to date, the council is thinking about offering solutions tailor-made to the needs of potential partner countries, including seawater desalination and other fresh water creation projects, as a way to create business opportunities. To this end, it has assumed the role of a launch pad to develop a business model for overseas markets that encompasses operation, as well as equipment supply and plant construction, and is currently engaged in various activities, including the accumulation of management know-how for operation through (i) market research, international cooperation, and policy recommendations, (ii) technological development, and (iii) model projects.

The largest segment of the global water market is operation and management, so, without capturing it, there is no prospect of a viable water business. Japan has strengths in various technical areas, including the management of membranes and pipelines. Yet, it has fallen behind in overseas business expansion because of the absence of a player who can put together comprehensive water use and reuse systems from components, and this has made it essential to collaborate with local governments, which, while having operational know-how, are subject to legal restrictions. With regard to cost reduction, the council is working on halving the cost of seawater desalination under the National Government’s Funding Program for World-Leading Innovative R&D on Science and Technology. Cost reduction requires a sweeping review of the current operation, encompassing both the hardware (machinery) and software (human) elements, and this is an area for which the private sector should take responsibility. Given that Japan does not have experience in implementing overseas system operation projects, the New Energy and Industrial Technology Development Organization (NEDO) has launched 10 demonstration study projects to support overseas expansion efforts. In this regard, a feasibility study (FS) is also important, and we request government funding so FS experiments can go ahead in various parts of the world.

In addition to technology, government assistance is desired in other areas, such as financing and contract affairs. In the case of ODA, for example, the Government should consider, for example, changing the proportion of tied aid, expanding the cooperation scheme to include maintenance, and establishing a mechanism whereby information collected by infrastructure project specialists can be utilized by the council to find promising projects.

● **Takashi HONGO, Special Advisor and Head of Environment Finance Engineering Department, Japan Bank for International Cooperation, Japan Finance Corporation**

At present, overseas water infrastructure projects are a focus of attention in Japan, with many companies looking to join in on the action. Factors behind such a development include little prospect of an expansion of the domestic market and rapid growth in infrastructure demand in newly industrialized countries, particularly those in Asia, as well as a desire to preserve Japanese technologies by embarking on a business expansion overseas and subsequently use them for domestic water infrastructure redevelopment.

Investment in overseas water infrastructure can take various forms, including the launch of a joint venture company by Japanese partners, formation of an alliance with an overseas company with a proven track record, and acquisition of an overseas company. From the perspective of financial institutions, the difficulty with investment in water infrastructure lies in (1) the long investment payback period, (2) the formation of projects in local currency (as the norm), and (3) heavy government involvement, both at the central and local levels.

There are a few main challenges Japanese companies must overcome. The first is finding good projects. For this, they need to find good information sources, and one way of accomplishing this task is to form of an alliance with an overseas company with a proven track record. To provide assistance in this area, JBIC has established a cooperative relationship with Hyflux of Singapore and the Spanish Government. The second challenge is collaboration with Japanese local governments, which are experienced in the maintenance and management of water infrastructure. Along these lines, JBIC has signed business cooperation agreements with Tokyo Metropolis, Kitakyushu City and Yokohama City, targeting the environment and water sectors. Japanese companies are looking at seeking help from local governments when investing in partially or fully privatized infrastructure projects overseas. The third challenge is the financing of operations, including the raising of external funds.

It is also important to develop a new model for water infrastructure projects. Since such projects have a long investment payback period, a change in the service rate is bound to become necessary at some point after the completion of the infrastructure. For this reason, it is crucial to have a rate change and other systems established with Japanese government assistance as a means to improve the local investment environment or go a step further and engage in a policy dialog with the government there. Considering the public-private financial

partnership to be a business model that may be applicable to water infrastructure projects, JBIC has been eagerly looking into it.

● **Shinya EJIMA, Director-General, Global Environment Department, Japan
International Cooperation Agency**

Despite the fact that access to water is an issue that has direct implications for basic human rights and human security, 800 to 900 million people around the world still do not have access to safe drinking water. Countries in which these people live are characterized by low income and low social development indicators, and it is difficult for them to secure a supply of drinking water on a commercial basis. For this reason, there is a need for ODA and other publicly funded international assistance programs.

In addition to drinking water, global population growth has been impacting on the supply of irrigation and industrial water. There is real concern over a shortage of water in the sense that there is simply not enough water to meet all the demand, and the development of facilities and technologies cannot provide the answer to this problem, no matter how extensive the effort may be. This necessitates more efficient water use and comprehensive water management, in addition to the development of new water sources.

Population growth has been concentrated in cities, and this is having a serious impact on water supply. To help expand urban water supply services in developing countries, JICA has been providing assistance that combines the construction/expansion of facilities based on financial cooperation and capacity building based on technical cooperation.

JICA also promotes the entry of Japanese companies into the global water business by proposing methods in which Japan has strengths when assisting in the formulation of water supply service plans in developing countries. When Japanese government assistance is part of the package, the door to negotiations opens even in countries that are not very accessible to private companies. For this reason, JICA is conducting a preliminary survey geared towards the introduction of a PPP scheme that combines a public infrastructure project funded with a yen loan and a private-sector project involving Japanese companies.

However, while the water engineering technology of Japanese companies is highly regarded by developing countries, the operation and maintenance capability of Japanese local governments is hardly recognized. In the future, if a large local government takes part in ODA projects as a contractor and builds an overseas track record, it will lead to an attractive business package that combines the technological prowess of Japanese companies and operational capability of a local government.

In this regard, JICA accepts overseas trainees to let them have a firsthand look at water supply services run by Japanese local governments. Hopefully, such efforts will pay dividends

eventually as the capability of Japanese local governments is recognized in business settings in trainees' home countries.

(2) Discussion highlights

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

● Relationship between water business, ODA, and government bodies

- If Japan succeeds in expanding its involvement in water infrastructure built with ODA by also taking on its maintenance, it will probably not only enhance its profile as aid donor but also enable it to gather various local information.
- Water infrastructure built with ODA is traveling along a privatization path, centering on large cities, and the likelihood of Japanese companies taking part in such projects is high. In this regard, JBIC may be able to provide speedy, flexible and systematic support.
- Given that Japanese companies' combined success rate for clinching a contract for an ODA project is only 30%, there needs to be a mechanism that gives Japanese companies an advantage in the bidding process, e.g. involvement in the project from the planning stage.

● International standardization in water business

- It is important to promote the international standardization of the maintenance of water supply and sewerage systems under ISO, etc. and develop relevant JIS standards.
- While a debate is underway on how to incorporate the quality of water infrastructure into ISO, the standardization of energy efficiency, durability, and other performance indicators could help differentiate Japanese technologies.

● Place of PPP in domestic water projects

- There is a need to recognize the importance of how private funds are raised to ensure the smooth implementation of domestic water projects under a PPP framework.
- The privatization of domestic water supply services would make rate setting an important issue. As a water rate contains a social cost component, it is important to work out who should bear this cost and how.

● Brand power of Japanese water business

- Japanese technologies are highly regarded for their excellence and reliability and do seem to have brand power. Still, there is a need to think about how big a segment of the water market Japanese advanced technologies can actually command as technical excellence does not necessarily translate into contracts.

● **Desirable ways to participate in water business in future**

- Japan does not have a company capable of taking on a water project over its entire life cycle from design and construction to operation and maintenance, and the only option available at this stage is to form a joint venture to mobilize the expertise of various companies.
- The Global Water Recycle and Reuse System Association Japan has brought together diverse industries. It is therefore entirely possible to foster a future national-flag team by combining the best of selected members, although some issues raise concern over a conflict of interest.
- In addition to the Middle East, East Africa is an important region in terms of long-term prospects, as it contains a number of countries with high precipitation.

● **Challenges in overseas expansion of water business**

- When engaging in the water business overseas, there is a need to think about how to ensure a balance between risk management and genuine development of partner countries.
- Involvement in various projects will inevitably bring to the fore various risks, such as difficulty dealing with the partner local government, exchange rate fluctuations, and a natural disaster, but planning how to respond to all conceivable risks in advance is virtually impossible. It is therefore important to form alliances with capable local partners and try various solution methods if and when any of the risks becomes a reality.
- Before JICA decides to provide assistance in a water project, it conducts a thorough study and puts in place a mechanism to strike an optimum balance between the profitability of the utility and rate levels that residents are prepared to pay to ensure the sustainability of the service.

● **Transfer of Japan's advanced water supply and sewerage technologies to Central Asian countries and others**

- There is a need to pitch Japan's technologically advanced water supply and sewerage systems harder to Central Asia, the former Soviet Union and other regions.
- In Uzbekistan, for example, there have been no significant Japanese activities in the water sector. One way of addressing this problem is for a private company to propose a locally tailored low-cost solution to JICA and work on it under the BOP business assistance scheme. If Japanese companies win contracts to build pump stations, pipelines, and other facilities, JBIC will be able to provide financial support.

● **Future outlook of JICA assistance under BOP business assistance scheme**

- The BOP business assistance scheme launched by JICA is designed to help establish the viability of business proposals targeted at the poorest section of the community in developing countries by funding studies conducted by proponent companies. If a business proposal is found to be viable through a study, it will go ahead as a private-sector project. JICA wants to play an intermediary role between Japanese companies and developing countries, particularly the poor section of the community.

● **JBIC financial support for alliances between Japanese and overseas companies**

- With frameworks for project alliances between Japanese companies and Singaporean, Spanish and other overseas companies established, match-making efforts have made considerable progress. In the future, JBIC will look into actual project financing.

● **Export promotion framework for water and other packaged infrastructure**

- It is important that an export promotion framework for packaged infrastructure for the water and other sectors be put in place within the Global Water Recycle and Reuse System Association Japan.
- Although urban development-type infrastructure packages are envisaged, the association has a problem as it does not have a consultant well-versed in that area. At any rate, with packaged infrastructure, ideas count much more than technology or price, so we believe that establishing an appropriate framework within the association is an approach that can lead to victory in the water market.

● **Cross-industry collaboration in water sector**

- Amid rising demand for PET bottle drinking water as a result of public concerns over the safety of tap water, collaboration with the bottled water industry may be worth looking at.
- As bottled water manufacturers produce water products, they basically have no business relationships with plant manufacturers and others.

● **Future outlook of global food and water shortages**

- In view of global population growth and the level of food production needed to support it, there is a distinct risk of extreme food and water shortages, especially taking into consideration the fact that irrigation water accounts for a large portion of water demand.
- To deal with water shortages, a greater use of groundwater, which is more abundant than surface water, should perhaps be considered.
- To counter water shortages, efficient water use and recycling have an important role to play, and this will enhance Japan's business prospects. In addition, a whole lot of more mundane water management efforts, such as the management of paddy fields, need to be made on an ongoing basis.
- Although water is always recirculating, pollution reduces the amount that can actually be used. However, greater water reuse can recover a significant portion of this lost water. For this reason, it is not appropriate to rely on energy-intensive desalination.
- In the future, water use is expected to increase sharply in Asia. Since this region is highly urbanized, there is a need to increase the amount of available water through the recycling of sewage as a source of water, water saving, and other efforts.

● **Japan's involvement in international river issues in Middle East**

- If Japan is to be involved in Middle Eastern issues, particularly international river issues, from the policy stage, special care may be needed to ensure neutrality.
- International rivers or not, conflicts between upstream and downstream parties are triggered by a dispute over the amount of a water resource, and this makes its accurate assessment essential. In this regard, Japan can contribute through the supply of objective data based on satellite technology. Even in the Middle East, which has graduated from ODA, there is still room for more commercial Japanese technical cooperation.

● **Great Eastern Japan Earthquake recovery project in water sector and overseas expansion**

- The introduction of PPP to water supply and sewerage projects to be implemented under the disaster recovery program for the Great Eastern Japan Earthquake may pave the way for an overseas expansion through the accumulation of experience in this area.
- The Global Water Recycle and Reuse System Association Japan has a vision to develop something like the Tohoku Model, which covers the entire water sector, through participation in disaster recovery and extend it to overseas regions with similar living standards, and has been working towards this goal.
- Disaster recovery provides an opportunity to look at water supply and sewerage systems as an integrated whole. This may set the stage for utilizing that experience overseas as demand for integrated development is also emerging in Asian developing countries and newly industrialized nations.

● **Water issues relating to Great Eastern Japan Earthquake**

- It is necessary to properly carry out salt removal from paddy fields flooded by the tsunami triggered by the Great Eastern Japan Earthquake.
- The only issue here seems to be how to remove the salt as cheaply as possible.
- While the problems caused by the use of seawater for the cooling of nuclear plants have been highlighted, it is really important to work out how to desalinate polluted water.
- As Japan does not have experience in treating high-concentration radioactive water with membranes, the only way forward is trial and error. Realistically, the only way to remove radioactive material from seawater may be to capture it with salt by filtering the water through a membrane or something similar.

4. Tasks and Challenges

While water is absolutely essential for human survival, the amount of water available on the Earth for human use is limited. The supply of drinking water and non-drinking safe water suitable for use in food production is even more limited, and amid a forecast of a tight supply-demand situation in the future, securing adequate access to water will be a big challenge for every country.

In Japan, public awareness of water safety has been increasing. It has been pointed out that Japan's efforts towards the resolution of this and other water-related issues on the back of its outstanding knowledge and experience will not only contribute to the stabilization of the international community through improved public health and hygiene, reduction/alleviation of poverty and food shortages, and resolution of energy problems (achievement of MDGs) but help ensure the continued prosperity of Japan itself.

Water issues are cross-cutting in nature, and their resolution is believed to require concerted efforts in diverse areas. The Japanese Government has set up the Liaison Committee of Ministries and Agencies concerned with Water Issues as part of its efforts to facilitate cooperation through, for example, the exchange of information and views on water issues, both domestic and international. It has been supporting private-sector water business activities through PPPs and assisting local governments in an overseas expansion of their water supply and sewerage services by identifying the water business as an important pillar of the country's growth strategy.

At the meeting of the research committee, voluntary testifiers made points about the radioactive contamination resulting from nuclear accidents at the Fukushima No. 1 Nuclear Power Station and assessment of radioactive contamination of water and radiation health risk. In addition, the Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Foreign Affairs, and Ministry of Health, Labour and Welfare reported on the Government's efforts relating to water issues. In more concrete terms, the reports focused on the present state of government efforts geared towards the resolution of water issues, encompassing, among other things, an overseas expansion of the water business, water resource management, including water infrastructure development, international cooperation in the water and hygiene sector, and ensuring the safety of tap water, as well as challenges associated with them. During the Q&A session, the safety of water in terms of how to handle contaminated water, radioactive contamination of soil, groundwater and ocean, and so on, as well as the impact of the earthquake on the water business, unification of the governmental action framework relating to water issues, public-private collaboration in efforts relating to water issues, and significance and challenges of an overseas expansion of water supply services, were discussed. Through these discussions, tasks relating to the ensuring of water safety and future operation of the water business became clear.

(1) Summary of views of voluntary testifiers

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

● Masaharu HOSHI, Professor, Research Institute for Radiation Biology and Medicine, Hiroshima University

In the immediate aftermath of the nuclear accidents, large amounts of radioactive materials were released from the nuclear power station. Although radiation levels subsequently subsided, low-level release continues today. The quantitative measurement of radioactive materials using the System for Prediction of Environmental Emergency Dose Information (SPEEDI) has revealed that scattered iodine and cesium end up in different areas. While the Ministry of Education, Culture, Sports, Science and Technology currently only releases the measurement results for cesium, we also want iodine data released.

Some of the radioactive materials released into the atmosphere fall onto ponds, rivers, and other bodies of water, but cesium is stopped at water purification plants, so it does not enter the tap water supply to push up the radiation level beyond its limit. Cesium that lands on soil becomes trapped within the top 5 cm layer so there is little impact on groundwater. Radioactive materials scattered over the ocean will gradually concentrate as they go up the food chain, from seaweed to plankton to small fish to large fish.

Although Japan has introduced provisional safety limits for iodine and cesium as applicable to food, its safety limits for drinking water are more or less the same as the EU and US figures. Similar limits have also been established for milk.

In the event of the release of radioactive materials, it is important to avoid unnecessary exposure, minimize the exposure dose, keep the number of people exposed to radiation to a minimum, and avoid a breach of the safety limit to the individual dose. According to these radiation protection principles, I think that the decision on the evacuation of Iitate Village residents should have been made much earlier to avoid unnecessary exposure.

To properly monitor the state of radioactive contamination, it is necessary to urgently conduct a ground surface iodine contamination survey based on the preparation of a wide-area contamination map, soil sampling, and collection of crop samples in contaminated areas and a resident exposure dose survey based on whole-body cesium measurement on a large scale in a systematic manner. In particular, iodine exposure dose measurement should be carried out within three months of the initial high-dose exposure, namely by the end of June.

It is also necessary to integrate all radioactive contamination data and compile it into a viewable database.

● **Gen SUZUKI, Director of Clinic and Professor at Graduate School, International University of Health and Welfare**

External exposure is relatively long-range radiation exposure involving radioactive rays emitted by a radiation source/radioactive materials present outside the body. Internal exposure, on the other hand, is radiation exposure involving radioactive rays emitted by radioactive materials that have entered the body. Internal exposure characteristically occurs slowly and continuously.

If the DNA of a stem cell or precursor cell that is part of body tissue becomes damaged due to radiation exposure, the probability of the person developing leukemia or cancer in the future increases. In the case of Chernobyl, the number of childhood thyroid cancer patients rose several years after the accident, and this is attributable to the high-level exposure that occurred during the first two weeks as a result of the ingestion, inhalation or absorption of airborne iodine, contaminated water, and milk produced by cows that had drunk contaminated water. In this case, however, a local factor may have been at play in that the thyroid intake of radioactive iodine could have been unusually rapid because Belorussia and Ukraine are located in an iodine-deficient region.

Although low-dose long-term exposure is a cancer risk, studies conducted in India's Kerala Province and other regions with high naturally occurring gamma ray radiation have shown no elevated incidence of cancer.

Provisional safety limits have been set for radioactive cesium contained in water or food. In this regard, since humans have been taking in naturally occurring radioactive potassium and other radioactive materials, it may be necessary to review provisional safety limits for some types of food. It may also be necessary to consider setting safety limits for strontium in the future. Strontium is a radioactive element that deposits on bone and increases the risk of bone cancer and leukemia, and there is a possibility that it concentrates as it goes up the food chain from seaweed and plankton to small fish to large fish and is eventually ingested by humans as they eat fish.

Exposure risk needs to be assessed rationally by putting it into a proper context and deciding whether it is acceptable, rather than just saying "Such and such millisieverts would be safe." A 5 mSv/year whole body exposure to cesium, for example, would increase the cancer risk of a 10 year-old child by 0.05%, whereas obesity would increase it by 6%. Having established the magnitude of the risk, it is then necessary to thoroughly debate whether it is acceptable to the Japanese people or the safety limit should be lowered.

The International Commission on Radiological Protection (ICRP) recommends that the safety limit for existing exposure situations be set at an optimum level within the 1 to 20 mSv range.

(2) Summary of government explanations

Explanations provided by the Government during the committee meeting are summarized below.

● Ministry of Economy, Trade and Industry (Masaichi Ichikawa, Deputy Director-General for Policy Coordination, Minister's Secretariat)

The water market has a number of segments, including the manufacture of parts, components and equipment, design, assembly and installation of systems, and running of utility services, and the activities of large overseas companies called water majors encompass all these areas. While Japan is renowned for advanced water treatment equipment and technologies, companies are relatively small and numerous and operate in their niche markets, with utility services provided by local governments. For this reason, the challenges and tasks of Japan's water-related industries boil down to the following three points: a need to foster companies capable of handling risk management and managing/implementing entire projects, acquisition of a business track record needed to participate in international bidding, and offering of prices that are internationally competitive and suit overseas needs.

To promote the Japanese water business, the following four viewpoints are important: (i) early fostering of private-sector players with an adequate business track record for international bidding, (ii) involvement in projects from their formation stage, (iii) demonstration of the superiority of Japanese technologies to the international community in terms of their high efficiency and energy-saving performance, and (iv) use of a business model linked to the acquisition of resources. With regard to (i), Mitsubishi Corporation and others are involved in a move to acquire an Australian water business company using an investment loan from the Innovation Network Corporation of Japan and use it as a springboard to expand to other regions. Moves relating to (ii) include the promotion of entry by Japanese companies into the Saudi Arabian market through the identification of local needs via dialog and involvement of the Government from the planning stage using the Japan-Saudi Arabia Water Policy Dialog, which began in 2010.

As the first task in the future development and implementation of water business policy measures, it is necessary to further enhance policy-based financing. The key to success may be the formation of the so-called "Japan Initiative", which seeks to implement projects in collaboration with local companies, rather than Japanese companies doing everything. There is also a need to introduce private-sector vitality to water supply services being run by local governments, and one way of doing this may be to pick a particular local government as a model and run its water supply service through a public private partnership to accumulate experience, thereby building a foundation for an overseas expansion of the water business.

● **Ministry of Land, Infrastructure, Transport and Tourism (Yoshihiro Fujimori, Counsellor for Engineering Affairs, Minister's Secretariat)**

To promote systematic water use and water-related disaster control overseas, the Ministry of Land, Infrastructure, Transport and Tourism has been practicing the kind of water resource management that tackles various tasks relating to water resources, including the development, operation and maintenance of facilities and integrated management of flow rate and water quality, in a comprehensive and integrated manner on a basin-wide basis. As well as utilizing the conventional ODA schemes, i.e. technical cooperation, grant aid, and loan aid, the ministry has decided to adopt PPP as a new assistance regime.

Regarding efforts based on public private partnerships, various assistance measures have been implemented according to the stages of individual partnerships. First of all, at the project formation stage, the relevant ministry or agency of the Japanese Government engages in policy consultations with the partner country and signs a memorandum of understanding. This is followed by the implementation of a project formation study and the proposal of a concrete project. At the contract awarding stage, a PPP council is set up to provide active and concerted public-private support for the Japanese team, with top diplomatic marketing efforts also made. At the project implementation stage, follow-up support is provided by utilizing an overseas construction project hotline set up as a help desk for private companies experiencing problems, with seminars designed to help improve the partner country's management capacity held.

The Government plans to engage in efforts aimed at promoting an overseas expansion of the water infrastructure business. In more concrete terms, given that more than 90% the operation and management of sewage treatment plants and other facilities is being outsourced by local governments to private companies under contracts based on prescriptive specifications that set detailed inspection frequency, machine type and other operational details, the Government intends to contribute to overseas expansion by transforming such contracts into multi-year comprehensive private-sector outsourcing contracts based on performance specifications as prevalent in overseas markets. It also intends to actively take advantage of the track records of local governments as part of the sales pitch to partner countries.

As part of international water-related disaster prevention and management efforts, the Government has been implementing measures based on the utilization of UNESCO and other international networks so as to help mitigate the adverse impact of climate change on water-related disaster risks. In the area of water control, the Government intends to support Japanese companies planning to enter overseas markets by signing memoranda of understanding and other agreements with other countries and persuading them to adopt Japanese technologies through top diplomatic marketing and other efforts.

● **Ministry of Foreign Affairs (Shiro Sadoshima, Director-General, International Cooperation Bureau)**

As of 2008, safe drinking water is only available to 13% of the world population or 16% of the combined population of developing countries. This means that nearly 900 million people do not have access to safe drinking water, and more than a third of them are located in the Sub-Saharan region. Sub-Saharan Africa, South Asia and South East Asia have low tap water access rates.

About half of 5 billion people living in developing countries do not have access to improved sanitation, and most are located in Asia and Sub-Saharan Africa. As Asia has a large population, a significant number of people, approx. 1.9 billion, live in a poor hygiene environment.

The international community has two debate forums: the UN and G8.

In 1997, the World Water Forum set off a debate on water policy, and, piggybacking on this initiative, the UN has since launched various actions, including the hosting of the “Water for Life” International Decade for Action, which runs through to 2015, as a platform to direct the priority and attention of various countries to water-related policy. In 2008, a UN resolution to designate the year 2008 as the International Year of Sanitation was passed under Japan’s leadership. Japan also provides leadership for a follow-up resolution on the International Year of Sanitation.

From the viewpoint of what it can do to help provide decent services by mobilizing its funds, know-how, and technologies, G8 has been urging various countries to raise the priority of water policy by promising assistance as an incentive for good governance on the part of recipients.

In the water and sanitation sector, Japan has been working hardest among the developed countries. Various ministries provide a diverse range of assistance, encompassing, among other things, the supply of water supply and sewerage systems, waste management, and comprehensive management of water resources, by making the best use of their know-how, with Asia accounting for about 80% of such assistance.

Since 2006, Japan has been extending cooperation based on partnerships for water and sanitation under the title “WASABI”. This initiative has been built on the five pillars of sustainable water use, human security, emphasis on capacity building, cross-cutting problem solving, and selection of appropriate technologies.

● **Ministry of Health, Labour and Welfare (Yukimasa Shinoda, councilor for the Minister)**

To date, Japan's involvement in overseas waterworks development projects has been mainly through ODA, centering on Asian countries. In the last few years, however, new moves have been underway. For example, Japan has been contributing to hygienic water supply in other countries through the provision of its water technologies. On the basis of the idea that transferring Japanese technologies and experience to other countries will help drive the economic growth of those countries, Japan has begun stepping up its overseas assistance.

As part of a marketing drive aimed at overseas markets, Japan has been running waterworks seminars in Cambodia and Vietnam to pitch Japanese water supply technologies and companies to water utilities of the partner countries. In the future, there is a need to expand the scope of target countries. Also, to enable partner countries to deal with energy-saving water transfer, distribution management & leakage control, and other tasks, the Government has been developing a water supply system that suits local needs by proposing technologies, management techniques, and the like as a package.

Given that, in Japan, water supply services are almost always provided by local governments, there is a need for a public private partnership whereby local governments and private companies work together by combining their know-how if various Japanese technologies and management know-how are to be supplied to overseas customers in the future.

Meanwhile, local governments have been asked to monitor the safety of tap water following the nuclear accidents, with the results made public. Consumers have therefore been kept informed as water continues to be supplied. If the benchmark value is exceeded, the Ministry of Health, Labour and Welfare will request water utilities to limit the consumption of tap water and inform the public accordingly. Back in March, such requests, particularly the restriction of tap water intake by infants, were made in Fukushima Prefecture, Tokyo Metropolis, and other areas, but all restrictions have been lifted by now. At any rate, according to monitoring data, tap water contamination with radioactive iodine and cesium appears to have come to an end, except for a small number of places, even where contamination levels are very low.

(3) 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.

A Water Safety

● Handling of contaminated water at Chernobyl and health damage assessment

- We are interested in what kinds of measures were taken at Chernobyl to deal with contaminated water.
- Five years after the accident, the contamination of tap water and groundwater was almost at undetectable levels. It is reasonable to assume that contamination will be contained within the 5 cm layer from the surface and will not seep down further.
- At Chernobyl, cesium persisted in lakes and marshes, so the contamination of fish caught in those bodies of water continued.
- Given that expert opinion is split on the relationship between the Chernobyl nuclear accident and the rise in the incidence of childhood thyroid cancer, how can we reach a reasonable assessment of the situation?
- According to an epidemiological study that included WHO, 4000 to 6000 people contracted thyroid cancer, mostly papillary adenocarcinoma, around Chernobyl. Since this was out of a population of about 10 million, it could be considered relatively small. Still, the situation could be seen as serious as children normally rarely develop such a cancer.
- The present state of Chernobyl seems to provide a good reference for the future impact of radiation, doesn't it?
- Outside the 30 kilometer zone around Chernobyl, soil contamination has improved to a point where crops that are close to satisfying international safety limits can be harvested, thanks to measures such as the boosting of the use of potassium fertilizer. Cesium intake by cows and cattle has also been controlled by administering Prussian blue.
- Although some places may require major decontamination operations, I think most places will be made habitable again relatively easily.

● Radioactive contamination of ground water and ocean

- I am concerned about groundwater contamination by radioactive materials.
- The contamination levels of groundwater were measured from wells, but cesium was not detected. Strontium is believed to penetrate to a depth of around 1 m, but groundwater is located much deeper, so I consider it safe.
- Due to the absence of relevant standards, possible future response to the radioactive contamination of the sea is not clear. Still, I'm interested in what kinds of impacts it may have.
- In the long run, radioactive materials that have entered the sea are diluted and migrate to deep layers. However, the food chain does not stop while this is happening so there is a need for monitoring. In addition to the impact of iodine and cesium on seaweed, such monitoring should also cover strontium.

● **Radioactive contamination hot spots**

- I'm interested to know whether contamination hot spots form in the sea.
- The formation of hot spots in the sea is a possibility, so oceanographic experts are currently analyzing the movement and spread of radioactive materials.
- I'm interested to know how often soil contamination maps should be updated as I've heard that hot spots move or disappear.
- Cesium attaches itself to soil so hot spots don't move. However, new hot spots could still form as radioactive materials are still being released, though in small quantities. If such new hot spots are discovered, it will be necessary to take detailed measurements on site.

● **Testing of tap water for contamination with radioactive materials**

- Following the nuclear accidents at Fukushima No. 1 Nuclear Power Station, local governments are conducting tests on tap water for contamination with radioactive materials. In this regard, if there is inconsistency between local governments in term of the selection of measurement sites and testing method, there is a need to establish a uniform testing method and set of test conditions.
- The Ministry of Health, Labour and Welfare has specified de facto official methods, and has been training water utilities in them. Therefore, it appears that test results are more or less the same no matter who conducts the tests.

● **Rehabilitation of soil after radioactive contamination**

- Although we've heard that cesium stays within the top 5 cm layer, rain, soil type and other factors could affect this, couldn't they?
- Throughout this year, some cesium will infiltrate the soil, but next year onwards, most cesium will firmly attach itself to the ground surface. This is evidenced by the fact that at Semipalatinsk, where a nuclear test site of the former Soviet Union was located, cesium is still only located within the top 5 cm layer after 60 years.
- Why does soil contamination require special attention? Also, while soil contamination is measured by area by international organizations, it is measured by weight in Japan. Isn't this a little confusing?
- Soil contamination provides a benchmark because we can measure radiation dose and extent of contamination most accurately. When looking at a fallout problem, per-area values are used, whereas crop contamination is measured on a per-weight basis to take into account absorption from roots. These quantities are mutually convertible.
- The mechanism whereby high-level soil contamination is transferred to crops is not well-known in Japan due to a lack of data. I hope that studies will be conducted in the future to look at things like the effects of soil characteristics and fertilizer application methods.
- With fuel meltdowns found to have occurred as part of the nuclear accidents, the risk of highly contaminated water infiltrating into soil is of a different order of magnitude now. Even

in this case, is it enough to remove the top 5 cm layer of soil? What about the risk of contamination spreading over a wide area?

- I think most of the contaminated water will stop at the ground surface, but if just 1% seeps into the soil, the level of contamination will be considerable if the contaminated water is highly concentrated. As we do not know exactly what kinds of paths such contaminated seepage water is taking, there is concern about the present state of contamination and where contaminated water might end up in the future.

● **Significance of spread of radioactive materials**

- Two months after the nuclear accidents, radioactive cesium is being detected in tea leaves produced in Hakone and other areas. This may spread to other crops such as fruit in the future. There is a need to investigate how contamination spread so widely, i.e. due to the fairly serious explosions we've had or migration characteristics of radioactive materials.
- Until now, the focus has been on radioactive materials released around March 15 as a source of problems. However, if tea testing has been ongoing and contamination had not been detected until the recent incident, newly released radioactive materials are likely to be responsible. Appropriate response changes depending on when such radioactive materials are released.
- Collecting information such as whether the radioactive materials detected in tea has been absorbed from roots or deposited on the surfaces of leaves will help decide how to handle the second tea crop.

● **Impact of accumulation of released radioactive materials**

- Apart from nuclear accidents, significant amounts of radioactive materials are released during the operation of fuel reprocessing plants and nuclear power stations, and this gives rise to concern over the adverse impact of accumulated radiation in the future.
- Since the release of certain amounts of radioactive materials from nuclear power stations is unavoidable, the approach has been to set regulatory limits to atmospheric and water concentrations of those materials and permit their release within those limits.
- While the Nuclear Safety Commission has set provisional limits that are tougher than limits set by international organizations and others, limits to child exposure to iodine and strontium exposure have not been set. This issue should therefore be properly addressed in the future.
- Of the radioactive materials that are harmful to health, the most potent are cesium 137 and strontium 90, but their radiation will diminish to about a hundredth in 100 years as they will have three half-lives in that period. Hundreds of years from now, therefore, their radiation will not matter. As far as I know, there are no radioactive materials whose accumulation will pose a threat.

● **Variation in contamination range and risk by radioactive materials**

- Why do cesium and iodine have different contamination ranges even if they are released under identical conditions? Although there has been very little media coverage of strontium, isn't there a need to know its contamination range and risk?
- ICRP has set safety limits to strontium exposure. While Japan is likely to follow suit in the future, radioactive materials that have a tendency to create local hot spots should be regarded as high risk and tightly controlled accordingly.
- It is possible that iodine and cesium have spread in different distribution patterns because of the presence of multiple reactors that underwent different accident situations. As strontium is not volatile, it is not released in large quantities. Though this makes its measurement difficult, it should nevertheless be measured in the future.

● **Radiation safety standards for schools and measures**

- Compared to the provisional limits for water and food, which have been set with a considerable safety margin, safety standards for schools, where children spend a lot of time, don't seem to be stringent enough, do they?
- If the limit to children's external exposure was set at 1 mSv, the only option would be evacuation. I'd recommend a more realistic approach of settling for 20 mSv and thinking carefully about what concrete measures should be taken. When devising measures, it is important to strike a balance between the advantages and disadvantages of regulatory restrictions.
- The measurement of radiation over the ground surface and scraping of surface soil at schools are effective measures and therefore should be given more consideration, shouldn't they?
- Given that, at Chernobyl, workers and children fell victim to radiation exposure, child-focused measures should be considered, in addition to geographical area-based ones, shouldn't they?
- As cesium firmly attaches itself to soil, scraping off the top 5 cm layer and storing swaths of that layer by stacking them, while making sure the top of the heap does not become loose and scattered, would be a realistic measure, as the radiation emitted by soil located in the middle of the heap would be blocked by the heap itself.
- There is a need for a comprehensive set of measures aimed at reducing radiation exposure across the affected area, including measures targeted at spaces under the eaves of houses where radioactive materials tend to accumulate and swapping of upper and lower layers of farmland. In this regard, it is important to give preference to schoolyards, parks and other areas where children spend a lot of time.

● **Health effects of radiation exposure and risk**

- Residents of the communities located near the nuclear power station, who should have been evacuated as soon as the nuclear accidents occurred, have already been exposed to radiation,

so the Government should specify emergency protective measures. In this regard, the distribution and administration of iodine tablets is one issue that needs to be considered.

- Iodine tablets would be useless unless taken when radioactive iodine enters the body. Also, according to tests conducted in Fukushima, exposure doses were very small, and none needed the administration of iodine tablets.
- What should we make of the health impact of the nuclear accidents at the Fukushima No. 1 Nuclear Power Station?
- At this stage, no one has exceeded 50 mSv in terms of the internal exposure of the thyroid glands. However, in light of the experience of Chernobyl, the most likely impact will be childhood thyroid gland cancer, so a more systematic approach will be needed in the future.
- The cancer risk associated with the radioactive materials released from the accident-stricken Fukushima No. 1 Nuclear Power Station would be easier to grasp when compared to the cancer risk of cigarette smoking, wouldn't it?
- Blamed for 80% of lung cancer cases in Japan and 90-95% in Europe and North America, cigarettes are extremely dangerous cancer-causing products. Still, I used obesity for comparison, rather than cigarette smoking, because I wanted to highlight the fact that fortifying oneself indoors for fear of radiation could lead to obesity and increased cancer risk.
- The fear of radiation needs to be kept in context. Namely, even with radiation, the argument should focus on an accurate estimation of the health risk posed and decision-making as to whether that level of risk is acceptable.
- The released SPEEDI data, which is an estimate of the radiation dose the thyroid glands are exposed to through internal exposure, is of a different order of magnitude from external exposure or environmental exposure. What should we make of the relationship between them?
- Apart from the thyroid gland exposure dose of a child, SPEEDI outputs a whole range of data, including the thyroid gland exposure dose of an adult, external exposure dose, the contamination density of the ground surface, and so on. So, if a request is made, I think all the other data will be made available.
- In the estimation of the exposure dose of the thyroid glands, the sensitivity of the glands has been taken into account and that's why the safety limit has been set higher by about a factor of 10. Please take note of the difference from external exposure.

● **Response to social anxiety towards potential radiation exposure**

- Amid reports of worsening conditions of the nuclear reactors, anxiety is growing about potential radiation exposure in society. Don't the public need to be given a proper and easy-to-understand explanation?
- First of all, the upper end of the risk should be shown, and then the most important thing is to drive home that, if the exposure dose fluctuates at low levels within that limit, health risk will not change much.

- Regarding radiation exposure, a sure way to lose public confidence is to downplay the risk initially and upgrade it later to fit reality, and this is exactly what has happened. The approach should be to explain the actual situation honestly in relation to the worst-case scenario.

- **Time of return for evacuated residents and necessary measures**

- How long will it take for contamination to subside to levels low enough to allow residents who have been forced to evacuate in the wake of the nuclear accidents at the Fukushima No. 1 Nuclear Power Station home? Is there a way to decontaminate trees and other contaminated objects?
- We won't know when residents might be able to go home until at least the release of radiation materials stops. Even then, we will still have to first talk about things like the removal of the surface layers of the ground wherever possible and a ban on entry into forests, given that the half-life of cesium is 30 years.

- **Disposal of debris contaminated with radioactive materials**

- Regarding the disposal of debris generated in disaster-hit areas, the technique to gasify it for use as a fuel to generate electricity is attracting attention. Would it be safe to burn debris contaminated with radioactive materials to gasify it?
- As long as contaminated debris is burned properly, radioactive materials will not scatter, so there won't be a problem. The only thing to think about is how to dispose of the ash.

- **Safety and effectiveness of Prussian blue**

- Apparently, Prussian blue is used to help flush out the radioactive materials that have entered a body, even for humans. Are there any problems with its safety or effectiveness?
- According to experiments conducted by the National Institute of Radiological Sciences, the only problem seems to be a slight depletion of rare metal elements, and the effectiveness of Prussian blue in quickly getting rid of radioactive materials has been verified during a Brazilian nuclear accident. International organizations also recognize its effectiveness for humans.

- **Legal framework to ensure safeguarding against spread of radioactive contamination, etc.**

- Drafted during an era when the Nuclear Safety Myth was still alive and well, the Nuclear Disaster Special Measures Law and its associated cabinet orders and ministerial ordinances now seem to be inadequate in many respects, particularly the problem with provisional safety limits, don't they?
- I think that, in light of the experience of the latest accidents, proper safety limits should be set for food and other items.

B Government Efforts to Deal with Water Issues

● Impact of Great Eastern Japan Earthquake on overseas expansion of water infrastructure business

- Apart from the diversion of funds, manpower, energy and resources to disaster recovery activities, tell us about the impact of the Great Eastern Japan Earthquake on the overseas expansion of the water infrastructure business and ODA, including groundless rumors about safety risk. What about the future outlook and challenges?
- The Government's efforts are based on the concepts of the Japan Initiative and Core Japan. Namely, we believe that taking the "core" overseas will enable us to integrate the whole business. Manpower-wise, there is a possibility that some Japanese companies considered for the overseas expansion may be mobilized elsewhere. However, with various production facilities being restored, I think this is the time where we have to keep up our efforts. If, on the other hand, we are to abandon projects now, the "Japan" portion will be greater than the "Japan Initiative" in one or two years, when construction work will start.
- Although ODA funding has been under strain, we will divert part of the capital of yen loans and other non-essential funds, while maintaining direct and indirect funding for frontline operations. Although it will be difficult to launch new projects in a grand style, we are trying to keep the already-announced initiatives.

● Significance of export of packaged infrastructure

- While there is a view that large returns cannot be expected from the water business, the Government is advocating the export of packaged infrastructure to Asia. How is it different from conventional ODA?
- Packaged infrastructure encompasses both hardware (machinery) elements and software (human) elements, including operation, and our strategy is to sell this to Asia through public private partnerships.
- In a typical ODA project, services provided through the supply of goods are not repayable, while in an overseas business expansion, the recouping of investments is an integral part of project implementation.
- Packaged infrastructure projects will contribute to the growth of the Japanese economy as Japan will receive direct and indirect income from partner countries through payment for consumable parts imported from Japan during the operation and management stage, royalty payment, and so on.
- If operation and management, carried out by special purpose companies (SPCs) set up in partner countries, produces profits as a return on investment made through policy-based financing, Japan will receive dividends. This will be part of Japan's economic growth strategy in the sense that it will generate foreign currency income.

- **Fund sources for policy-based financing in infrastructure export**

- If assistance is to be provided for infrastructure export by mitigating the associated business risk through policy-based financing, an investigation needs to be made into how to secure the necessary funds.

- **Japanese assistance in water resource policy and operation & management**

- When Japan's assistance in the water and sanitation sector is looked at by purpose, water resource policy and operation & management have very small shares. What is the bottleneck?
- Assistance in water resource policy and operation & management centers on paying travel costs incurred to move people to and fro, so the contribution looks small in monetary terms compared to infrastructure projects. As developing countries show a preference for infrastructure, Japan has been advising them to combine it with the introduction of know-how and policy.

- **Assistance in sewage treatment in developing countries**

- With regard to assistance in sewage treatment in developing countries, Japan should focus on things like the introduction of onsite sewage treatment systems from an appropriate technology viewpoint and in consideration of Japan's competitive advantage in selling a home-grown technology. In this regard, international standardization through ISO may be important.
- Through a PPP involving an NPO, a small-scale experiment on the introduction of onsite sewage treatment systems is underway in China. Alongside the experiment, people have been invited to Japan to learn how to manage such systems on a small village or town scale.
- In foreign countries, it is important to develop facilities that suit local conditions, and, taking Indonesia as an example, seminars are being run jointly with the Ministry of the Environment.

- **Business promotion through enactment of Rainwater Use Promotion Law**

- Given that torrential rains more easily lead to floods nowadays, there is a need for an effective deployment of rain water storage and infiltration facilities across cities, and the proposed enactment of the Rainwater Use Promotion Law should be used to stimulate business activities, shouldn't it?
- It will be necessary to look into the most optimum use of stored rain water according to local conditions, taking into consideration the entire local inventory of water resources, and I hope that we will be able to put in place a suitable mechanism for this, including public/industry feedback.

- **Japan's efforts relating to MDGs**

- Is the Japanese Government planning to announce any strategy to achieve water-related goals and targets at the MDGs follow-up meeting scheduled for June 2011?

- The June meeting is designed to be a forum for the discussion of concrete efforts to be made over the remaining five years on the basis of the sharing of various successful examples brought along by participating countries as agreed upon at the high-level preliminary meeting held in the fall of 2010.

- **Water issues in Central Asia and business potential**

- In Central Asian countries, water supply and sewerage systems have become quite aged, and this provides an ideal opening for making a move with a business proposal though few seem to be paying any attention. While there is a need for a comprehensive approach, what are the associated challenges and tasks?
- There is demand for water infrastructure in Central Asia. Under ODA, we've been making a conscious effort to devise projects that allow the participation of diverse sectors in partner countries in an integrated manner through the development of laws relating to water administration and other activities, in addition to the building of facilities.
- Although we were slow to come to the party in Central Asia, we have been in negotiations with Mongolia and Kazakhstan, offering assistance in resources development. We intend to include water as part of this. We have also received a request from Ukraine, and are currently looking into the possibility to combine this with other environmental projects.
- The Asian Development Bank and the Japan Water Agency are about to launch joint research on water resources development in Central Asia. Japan has an excellent technology to reinforce old pipelines with resin from inside without the need for excavation, and we plan to hold seminars on this technology.
- Is there any room for Japan's involvement in the "Water for Life" International Decade for Action proposed by Tajikistan? Is it possible to take part in, for example, the international committee for the management of Lake Sarez?
- We would like to get involved in Tajikistan or any other country in the region whenever an opportunity arises. Still, international relations, particularly water issues, are complex because of the involvement of the interests of different countries, so we've been a little careful, taking our time monitoring the situation.

- **Importance of interministerial collaboration in promoting overseas expansion and integration of administrative intervention**

- To pursue water projects overseas, interministerial collaboration is essential. Does each ministry have a department or subordinate body to facilitate collaboration?
- The PPP Council for Overseas Water Infrastructure will be established, with the Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Health, Labour and Welfare and Ministry of Economy, Trade and Industry as a joint secretariat. The council also includes the Ministry of the Environment, Ministry of Foreign Affairs, and Ministry of Public Management, Home Affairs, Posts and Telecommunications.

- To resolve various domestic water issues and seriously pursue water business opportunities overseas, a dedicated ministry or agency for water administration should be established, shouldn't it?
 - To help a company grow its water business, it is appropriate to look at it as a manufacturer, including the relationship between the water and non-water businesses. For this reason, I don't think integration is the answer, though this is just my personal view.
 - My view is that different industries, such as agriculture and manufacturing, use water differently, so integration is technically difficult. The desirable approach will be to find common ground by letting different sectors express their views and move forward together. Meanwhile, the Ministry of Land, Infrastructure, Transport and Tourism has decided to merge its River Bureau, Water Resources Department, and Sewerage and Wastewater Management Department in June 2011 as a means to strengthen its organizational framework for international activities.
 - This is a matter of which matrix to put the organization through first. If it is put through a water matrix first, a boundary will be created between water and all other elements, giving rise to a feeling of inefficiency. For this reason, it may be a better idea to adopt a more reconfigurable organizational framework.
 - The way interministerial coordination is done has been changing, and it is a lot more flexible than before. While I think the organizational framework is a matter for a high-level decision, time and effort can be saved as long as smooth coordination is possible.
- **Collaboration with local governments in overseas expansion of water business**
- In Japan, local governments possess advanced know-how in the operation and management of waterworks. So, to broaden Japanese water policy and the scope of operation and management, the involvement of local governments in ODA, FS and project formation is essential, isn't it?