

lawns and home gardens or by our diversified agricultural industry.

In closing, I would like to extend an invitation to all of you to visit Honolulu, to share information on our respective wastewater systems and to be able to discuss shared technology firsthand. I'd also like to invite all of you to the first Mayors' Asia-Pacific Environmental Summit which is going to be hosted by Honolulu in February of 1999. Conferences such as this Asian-Pacific City Summit and the Environmental Summit in Honolulu next year, I believe, are an effective forum for sharing both successes and our ongoing challenges in these environmental areas. I look forward to continuing the friendships that we've established in these meetings and to sharing ideas for the benefit of our people and the benefit of our future. I hope to welcome all of you in Honolulu in February. Thank you once again.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you very much, Mr. Jeremy Harris, Mayor of Honolulu. I see that wastewater treatment plants that are not quite in harmony with nature cause rejection. It was a wonderful report about your beautiful city. Next I would like to ask Mr. Yoshinori Akasaki, Mayor of Kagoshima City, to speak.

**[KAGOSHIMA]**

**Mr. Yoshinori Akasaki, Mayor of Kagoshima**

I would like to talk on the theme of "Cities and Water Distribution and Sewerage" in relation to Kagoshima City. The water distribution and sewerage system of a city provides the basis for its day to day life and the well being of its citizens. In order for cities to develop healthily and sufficiently, the improvement of those systems is of the utmost importance. I would like to give a brief chronological introduction to the water distribution and sewerage system in Kagoshima City, mentioning three phases from the establishment of the municipality to the present day. It can be divided into three phases:

Phase One is the creation of the city to the end of the war. The administrative district of Kagoshima City was established with the organization of the municipalities in 1889. The population at that time was approximately 58,000.

By 1943, following the city's development and the integration of surrounding towns and villages, the population had increased to 200,000. At the time of the establishment of the municipality, the waterworks were those that had been constructed by the Lord of Satsuma. Water was conveyed via stone ducts to public buildings such as the City Hall, the Prefectural Office, the Court and schools, as well as to specific places such as distilleries and factories making soy sauce and soy bean paste. A modern waterworks system was not constructed until 1915. In 1919, spring water was first used as a source for the water supply. However, only about 2,500 had running water. As the population of the city rose, the areas to which water was supplied gradually increased and, in 1943, approximately 130,000 people had running water. On the other hand, it was not until 1937 that the first assessment was taken into constructing a sewerage system.

Phase Two is the development of the city from after the war to the year 1970. During World War II, 93% of central Kagoshima City was burnt to the ground. Due to the war, the population fell to 93,000 people; however in the following ten years as the reconstruction of the city progressed, it recovered to 270,000. In the following ten years, the population reached 400,000 partially due to the integration of the surrounding

cities. Until the middle of the 1960's both ground and spring water were used for the source of the city's water supply. As I previously mentioned, the city was developing and the demand for water was also increasing rapidly, however the groundwater and spring water sources were unable to fulfill that demand. As a new water source, it became necessary to take water from the city's rivers, so in 1965 a water purification plant was constructed at Kogashira and supply from Kotsuki River began. With regards to the sewage treatment, it was introduced as part of the reconstruction work after the war; in 1952, the construction of the treatment plant in the suburban area started. By 1955, the sewerage system and its treatment plants were opened and started operation from the downtown area of the city; it was the first such system in western Japan and the seventh one in the whole country.

Phase Three is the maturity of the city from 1971 to the present day. In the years following 1971, the population was increasing at a rate of more than 10,000 people per year. This steady growth has continued and the city's population has now surpassed 550,000. Due to population growth, the demand for water was still in excess of supply, so a further plant was built at Takinokami. Also, a plan was put forward to transport water in from the Manose River, which lies outside the city's boundaries. The 21 kilometer water conveyance system, including a special tunnel, and a purification plant at Hirakawa were opened for use between 1982-1989, enabling the water to be supplied from outside the city for the first time. A stable water supply to the city has therefore been guaranteed and the threat of water restrictions resolved. Work has also been continuous on improving the main sewers and broadening the entire system, taking the sewage out of the main part of the city to the suburbs. In order to cope with the increase in the amount of sewage, the Nanbu sewage treatment plant was put into operation in 1979; it has the largest treatment capacity of all the treatment plants in the city. Furthermore, a new plant is being constructed in Taniyama. In 1981, a plant was built to dispose constantly of the treated sewage in an environmentally friendly and effective way. The treated sewage is allowed to ferment producing compost. At present, all of the treated sewage produced in the city is turned into compost.

As explained, water distribution started about 110 years ago, at the same time the city was established. The area and population that the system served increased with city's urbanization and the population growth, and presently water is supplied to 500,000 people. The source, once sufficient from groundwater and spring water, is now rivers in and outside of the city. The sewage system construction progressed parallel to the reconstruction after the war. Now Kagoshima has the highest service rate among local cities with two treatment plants. In the rural area outside of the service system, water is serviced through the public water system of the area and sewage is treated in small scaled combined treatment facilities at each household. In conjunction with the city's development, the water distribution and sewage has also been improved; at present 92% of the population of the city receives its water through the city's distribution system, and 80% of the population is or is able to be connected to the sewerage system. With the lessons learnt from the Great Hanshin Earthquake, we are encouraging the construction of disaster-proof water pipes. Furthermore the city is also endeavoring to provide safe drinking water by taking measures on disease-causing microorganisms.

Ladies and gentlemen, once nature and the environment become polluted they will never regain their original beauty. I think it is our responsibility to protect the environment for the generations to come. I feel most

attention has to be paid to the environment, enabling it and people to live comfortably side by side. This can be done by promoting the recycling of resources and protecting the water cycle etc. From now on the term "environment" will no doubt become a keyword in water distribution and sewerage systems.

In closing, I wish for the continued development of every city and their respective water distribution and sewerage systems.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you very much, Mr. Yoshinori Akasaki, Mayor of Kagoshima. I totally agree with your city management policy of co-existence between nature and humanity. Next I would like to ask Mr. Yatim Ishak Ahmad, Deputy Director of Drainage & River Management Department, Kuala Lumpur, to speak.

**[KUALA LUMPUR]**

**Mr. Yatim Ishak Ahmad, Deputy Director, Drainage & River Management Department, Kuala Lumpur**

I would like to give an overview of the tourist system in Kuala Lumpur. First of all, I would like to introduce for those who have not been to Malaysia or to Kuala Lumpur, this is a map of West Malaysia. In the north we have our good neighbors Thailand and in the south we have Singapore. The size of Malaysia is about 3,290 sq. kilometers and the capital city is Kuala Lumpur. The population of Malaysia is about 17 million and the population of Kuala Lumpur is about 1.5 million. This is a map of Kuala Lumpur. The size of Kuala Lumpur is about 250 sq. kilometers. It is situated on a gentle plain averaging about 30 meters above sea level. Kuala Lumpur experiences a typical equatorial climate with a relatively high uniform temperature and humidity. Temperatures range from 22 to 30 degrees Celsius and the humidity between 50% to 90%. We have a heavy rainfall with a minimum of 80 millimeters to a maximum of 280 millimeters per month. Annual rainfall is about 2,500 millimeters. These are old landmarks of the city. This is where the City Hall was before, but this has already been taken over by the high court of Malaysia. This is the new City Hall building. This is the new landmark of Kuala Lumpur. In the background we can see the Kuala Lumpur Tower and the Kuala Lumpur Twin Towers.

Next, I would like to give a brief historical background of the sewer system of the city. Proposals for the main sewer system of Kuala Lumpur were made several years before the Second World War. Subsequently, in 1948, Kuala Lumpur was declared a municipality. In 1950, a consultant, Messrs. J.D. & D.M. Watson of London, was requested to prepare a report for a sewer system for the new municipality of Kuala Lumpur. The construction of the first sewage for Kuala Lumpur was carried out from 1953 to 1958. The slide shown is the Pantai official waterworks which was the first treatment plant in Kuala Lumpur, probably in the country, commissioned in 1959. The Pantai water treatment plant consists of six aerated lagoons and two oxidation ponds which are capable of treating about 72,000 cubic meters per day of domestic sewage. It caters mostly to the central planning area of the city which is about 7 kilometers from the treatment plant. This is Bunos residential treatment plant, one of the 8 treatment plants in our master plan. These very different methods in Kuala Lumpur can be divided into two systems: one is the centralized system where wastewater from all the areas will go through the regional treatment facilities. The other system is a local

work system; this caters to the residential and commercial areas which are not connected to one of the regional plants and they have their own individual treatment system.

In December 1963, a concession agreement was signed between the government of Malaysia and the water consortium, to plan, design, consult, operate and maintain the sewage system within 143 local authorities in the country. The concession period is 28 years at an estimated cost of RM six billion. A government regulatory body has been formed to oversee the sewer services in the country. As to financing, the total cost of the project is estimated at about RM six billion which will be incurred over an 18 year period. It was proposed that the financing of this amount be matched by equity funding and a government soft loan. To date, the government has already given a loan of about RM 1.5 billion through the concession only. This is one of the 8 treatment plants located in Damansara, and promises to be one of the most modern treatment plants in the city. This is also treatment available at the Damansara treatment plant. This is one of the off-site treatments, which is located to cater to the areas which don't have the facilities of the central sewer. This is an oxidation pond. This is a fourth type treatment plant located in the areas with central sewers; it performs the same function as the oxidation pond. This is the railway station of Kuala Lumpur.

Also, I would like to touch a bit on the waterworks of the city. Most areas in Kuala Lumpur are served by a reasonably adequate water supply system even though about 20% of the population is being served by the public standpipes. The water supply system in Kuala Lumpur is managed by the Selangor Waterworks Department. The department is responsible for planning and implementation of waterworks projects in Kuala Lumpur but, of late, the operation and maintenance of the water supply in Kuala Lumpur has been privatized. The problems that we are having in Kuala Lumpur are as follows: 1) Estimated leakage has been identified as high as 40%. 2) Lately Kuala Lumpur has been experiencing a bit of drought even though Kuala Lumpur used to have a lot of rain, but for the last one year or so we are getting less rain. The source of water for our water supply is from rivers and a founding reservoir.

In conclusion, I would like to mention that even though we bettered our sewage system quite some time back, we're still having some problems with the system. Only 50% percent of the population of Kuala Lumpur is being served by the so-called modern treatment system. We are under progress to achieve the maximum-maybe in the year 2005. In conclusion also, I would like to invite all of you to Kuala Lumpur in September from the 11th to the 19th because we are hosting the Commonwealth Games for Commonwealth Countries. I would like to thank all of you for the patience you've had with me this morning. Thank you very much.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you very much, Mr. Yatim Ishak Ahmad, for your specific comments on sewage treatment. Next I would like to ask Mr. Huang Yue-jin, Secretary General of Shanghai

**[SHANGHAI]**

**Mr. Huang Yue-jin, Secretary General, Shanghai**

First of all, I'd like to express my thanks to the city of Fukuoka for deciding on such an important and interesting subject for the conference. I am quite happy to be able to have a chance to discuss with you and

brief you on Shanghai.

Water supply and wastewater treatment is an important subject in respect to the rational use of water resources and effective protection of water environment during the course of a city's development. In accordance with the basic policy of "sticking to sustainable and coordinated development of the economy, population, resources and environment", in its modernization, construction and management of recent years, Shanghai has given an important position to the increase of water supply and wastewater treatment capacity and has gained the positive effects of this. At the same time, it has been active in studying and solving the new problems which it is facing in striding towards the new century.

Since the 1990's, great progress has been made in Shanghai in the construction of water supply and wastewater treatment facilities. Shanghai has dense river networks and is comparatively rich in water resources. It is one of the earliest cities in the Far East to have modern water supply facilities. And like other cities in the world, with the development of the economy, the growth of population, the expansion of urban areas and the enhancement of industrialization, it is also facing the problems of increasing its water supply capacity and strengthening water environment protection. Since 1990, urban infrastructure construction has been regarded as a strategic priority in Shanghai's economic development and we have made great progress in the construction of an urban water supply and wastewater treatment facilities. First, in the urban water supply sector, capacity has obviously been increased. In the last seven years between 1991 and 1997, Shanghai has constructed and improved a lot of water works and increased water supply capacity by 2.2 million  $\text{m}^3$  per day, thus increasing the total water supply capacity in the urban area to 6.8 million  $\text{m}^3$  a day. Correspondingly, the urban water supply service covers an area of  $690\text{km}^2$  and a population of 8.25 million. The average water consumption is 230 liters per person a day, equivalent to the level of medium developed countries. Second, Shanghai has paid great attention to the improvement of water quality. In order to improve water quality, the Municipal Government of Shanghai has put a lot of investment into several raw water projects such as the first phase of the water delivery project on the upper reaches of the Huangpu River, the first and second phases of the water delivery project at the Yangtze River and the second phase of the water delivery project at the Huangpu River. The capacity of these projects accounts for more than 90% of the total amount of the city's water supply. The raw water quality in the upper reaches of the Huangpu River reaches Class II-Class III of the national surface water standards and the raw water quality of the Yangtze River reaches Class II of the national surface water standards, which provide favorable conditions for the improvement of the city's water supply quality. Meanwhile, the Government departments responsible for the water and environment sectors have strengthened the inspection and testing of water quality. As many as 89 items (the most in the country), are included in their water inspection and testing. In 1997, 99.93% of the urban pipe water was up to standard. In the wastewater treatment sector, the construction of large and centralized discharge facilities has been carried out. In order to thoroughly solve the pollution problems of water sources, Shanghai has scheduled to construct three combined sewerage systems with a total discharge and treatment capacity of over 5 million  $\text{m}^3$  a day. The first phase of the Shanghai Sewerage Project was completed in 1993. It was the first large sewerage system consisting of wastewater collection, treatment, discharge and dilution into river and sea. With the completion of the first Shanghai Sewerage Project, the

wastewater treatment capacity of Shanghai has increased by over 100%, averaging 3.4 million tons a day. In addition, we also have constructed and renovated quite a few local wastewater treatment facilities and systems. Moreover, the comprehensive treatment of industrial wastewater has been strengthened. Between 1991 and 1995, with the readjustment of urban planning, industries and product structure, Shanghai implemented more than 6,000 treatment projects and relocated more than 500 factories, raising the wastewater treatment capacity by more than 1.6 million tons per day. As a result, 86% of the industrial wastewater in the city is treated. The construction of the centralized discharge facility and the strengthening of the industrial wastewater comprehensive treatment have effectively controlled the water quality environment in this period.

Laying equal stress on construction and management to form an urban water supply and wastewater treatment system compatible to Shanghai's target for the new century is an important subject for the improvement of the city's modernization level, for which the Municipal Government of Shanghai has made a general plan and arrangements. Firstly, the increasing of water volume and the improvement of water quality will be implemented simultaneously. Emphasis will be gradually shifted to the improvement of water quality to further promote urban tap water supply. In the run-up to the 21st century, Shanghai will carry out water infrastructure construction and rehabilitation in a continuous way, in order to increase the urban water supply capability to 5-10% higher than actual social demand. It is projected that, by the year 2010, there will be a population of 11 million in Shanghai's urban area. Therefore, new increment of water supply capacity will be more than 3 million  $\text{m}^3$  per day and planned water supply capacity will be about 10 million  $\text{m}^3$  per day. On the basis of wholly reaching national standards for water quality for the year 2000, tap water quality in Shanghai will start to be integrated with European Community Standards. Thus, firstly, water resource protection must be strengthened. Supervision and management must be reinforced within urban areas and water resource area protective projects must be implemented. Pollution problems from nearby upstream provinces must be studied and solved. Secondly, new water resources must be actively developed. From a long-term point of view, an overall strategy must be studied and implemented for the construction of the Yangtze water resource area. Thirdly, water works treatment technique must be improved to raise the quality of water supplied. Advanced processes such as biological pre-treatment will be popularized in order to guarantee the turbidity of water reaching stability standard (less than 0.5 NTU). Fourthly, secondary pollution in tap water conveyance and distribution systems must be strictly controlled. Not only shall pipeline networks be renewed and rehabilitated, but feasibility studies of direct water supply to multistory buildings shall be carried out. Besides this, by utilizing partial deep purification method, we shall mitigate the water quality problem. In order to further promote tap water supply standard within Shanghai's urban area, a vast amount of money must be invested. Therefore, according to the principle of "giving consideration to both public welfare and market characteristics", a sound water pricing mechanism will be studied and established by the relevant government authorities to accelerate the healthy development of urban water supply.

According to the principle of "combining centralized treatment and decentralized treatment with centralized treatment as the main form", urban wastewater treatment capability will be further enhanced in order to continuously improve the aquatic environment of Shanghai. With economic development and population growth, it is estimated that by the year 2010 the total volume of urban wastewater will be 8 million  $\text{m}^3$  per

day. The set objective for urban wastewater treatment is that the treatment rate for urban wastewater will be higher than 80%. The treatment rate and the standard-reaching rate for industrial wastewater will be 80% and 90% respectively and those for domestic sewage will be 85% and 100% respectively. To achieve this objective, we shall, while readjusting the industrial structure, shifting the strategy for the prevention of industrial pollution, promoting the reduction of pollution from farming and livestock, and calling for the whole society to conserve water, continue to carry out the construction of wastewater treatment facilities and the comprehensive realignment of the key polluted rivers. Wastewater from the downtown area is mainly discharged into the Yangtze Estuary. On the basis of fully utilizing and improving the capability of the existing wastewater treatment plants as well as the conveyance, treatment, and disposal capabilities of the Combined Sewerage Project of the East, West and South trunks, the second phase of the Shanghai Combined Sewerage Project and some new sewage disposal projects will be completed. As a result, the daily sewage conveyance and disposal capabilities will be 1.7 million m<sup>3</sup> per day and the capacity of centralized sewage disposal facilities will account for 80% of the city's total sewage treatment capacity. Secondary wastewater treatment plant will be built at the outfall of the first phase of the Shanghai Combined Sewerage Project in order to discharged wastewater into river and sea after secondary treatment. Accordingly, sewers should be laid in 90-100% of the urbanized area. The comprehensive rehabilitation of Suzhou Creek, which runs through downtown Shanghai, will be implemented as a symbolic project in urban aquatic environment treatment. According to the principles of "focusing on aquatic rehabilitation, overall planning, combining long-term and near-term objectives, giving priority to key projects and phased implementation", black and malodorous waters will be basically eliminated in the year 2000, and waters in the river will reach Class 4 quality standard by 2005.

Ladies and gentlemen, since the 2nd Summit in Guangzhou in September 1996, new social economic and urban development has been realized in various cities in the Asia-Pacific region. At the same time, new urban problems are also emerging. We hope to study and solve these problems together with various cities in the Asia-Pacific region to promote the prosperity and development of this region. Finally, I'd like to express my thanks to Fukuoka City for her elaborate and effective preparations for the successful convocation of this meeting. Thank you!

## DISCUSSION

### **Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you very much Mr. Huang Yue-jin, Secretary General of Shanghai, for your presentation of the problems of treating the wastewater that is discharged into the Yangtze River and other struggles of a city with a population of over 10 million. I am a professional engineer in urban designing, and for 25 years I have dealt with planing and construction in Seoul, Korea, a city of 10 million people. Today, each city reported their struggles, and I am sure the information contained was beneficial in addressing the problems of each city. We human beings, live without appreciating the air. What will happen to us if the supply of air stops even for one minute? The urban problems include that of traffic, housing, and pollution and so forth,

but a problem with increasing importance is the securing of clean water-the water supply problem. Also, assuring clean water after treatment and sustaining a comfortable environment are of great importance. I am sure this conference is very meaningful in the exchange of the information and friendship. Now, we will move to free discussion. Do you have any questions? Mayor of Kagoshima, please go ahead.

**Mr. Yoshinori Akasaki, Mayor of Kagoshima**

According to the presentation by Kuala Lumpur, the management and maintenance system of water supply and sewage treatment have been privatized. Could you explain the water rate system you have adopted? In Japan, the responsibility falls on each city, and it is performed in the form of a public enterprise; but finances have been tight and price increases must be avoided. What is the situation with regards to your privatized enterprise operation?

**Mr. Yatim Ishak Ahmad, Deputy Director, Drainage & River Management Department, Kuala Lumpur**

The sewer system in Kuala Lumpur has already been totally privatized-only the sewers; whereas for the water supply only the maintenance of treatment plants has been privatized. But the running of pipelines and the charging of the public is still with the government. With regards to the sewage, in fact only certain cities in Malaysia have proper sewage treatment facilities: Kuala Lumpur, Penang, and one or two others. But, since the sewers have been privatized for the whole nation now, the whole population of the country has to pay for their sewage surcharge. Definitely, after sewage was privatized, the rate which used to be charged before had to be increased to meet the high expenditures incurred by the private companies. But as I mentioned earlier, prior to privatization, the government had already given the understanding that it was going to give a soft loan to whatever private companies took over the privatization. This, in a way, lessened the burdens of the companies. Subsequent to privatization we feel that the companies that have the concessions now have a problem in collecting the money. Because before, as the local authority, we had the power to collect the money directly, meaning that before, when sewage was also under the government, we somehow managed to have a common bill for water supply and sewage. But we realize now that the private companies are having problems because as private companies they cannot put the full bill under water supply. So what's happening now is that domestic housing owners-a certain percentage of the people-just pay the water supply bill but not the sewage bill. That's quite a glaring problem that is increasing with these privatized companies.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you for your explanation in response. Now, I would like to invite Mr. Ignacio Armillas, Director of UN Centre for Human Settlements Fukuoka Office to speak.

**Mr. Ignacio Armillas, Director of UN Centre for Human Settlements (HABITAT) Fukuoka Office**

First I would like to say that I was very much impressed by what is being done to meet the demand for water and sewage treatment in the cities represented. It does raise some questions in my mind though. Although in addition to making efforts to meet demand through expanding water systems and sewer systems,



there have been efforts to preserve water and Fukuoka is a very good example. If I'm not wrong, the representative from Fukuoka mentioned something about a 20% savings in water. However, the citizens of Fukuoka are still consuming about three times as much water per capita as Ho Chi Minh City. So the question is; what are the limits? How far can they go to dispose of their sewage? How far can they go in terms of conserving water until we reach a more sustainable level of consumption? Also, practically every city around the table here is neither a mega-city nor a city in a developing country. There are two exceptions, Shanghai being a mega-city and of course Ho Chi Minh City being in a developing country. And these cities face much greater challenges in terms of water supply and sewage. So, I think that in order to be realistic in terms of impact of cities on the environment, we must go beyond conservation and expansion of systems, to truly changing consumption patterns of urban areas as far as the need for water and the disposal of sewage is concerned. In developed countries the cost of water keeps on rising to meet increasing demand. So, perhaps the cost effectiveness of other methods would help other methods to be more popular or be accepted. But in developing countries, the struggle for water in urban areas will increase and, in my mind, there is no way of addressing this very severe need for water in cities of developing countries. Thank you.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you Mr. Ignacio Armillas. There are quite distinctive differences between the waterworks and sewer system problems of developing countries and those of developed countries. These lie in aspects of supply quantity and quality improvement. As for the City of Pusan, we have reached our limit, the limit in source water. We have concerns about water reuse and water quality due to pollution; both require attention at the same time. The Director's opinion is very useful. Next, I would like to listen to the opinion of Mr. Yonekawa, UN Programme Coordinator of the Department of Economic & Social Affairs.

**Mr. Yoshinobu Yonekawa, UN Programme Coordinator, Department of Economic & Social Affairs**

This is the third time I attend this summit, and every time there is much to learn. I heard the report on the measures for water resources with interest. It gave me an impression that the water problems are really challenging. They relate to various problems such as environment, industry, agriculture, health, hygiene and welfare. So there are many organizations of the public sector that are involved. I am sure each city has many departments that deal with water supply and sewage treatment. And in addition to that, there are many organizations involved at the regional level and at the country level. The situation is the same with UN and I had a concerned party list up all the UN organizations and affiliates that deal with this problem. They totaled up to 22. They include HABITAT, and the Secretariat that I belong to, also UNICEF, UNDP, World Bank and others. These organizations might need some readjustment, but I felt that water supply and sewage treatment are challenging issues. That is my first comment.

Another of my comments is about the privatization as mentioned by the Mayor of Kagoshima City. This time, the presentations from Brisbane, Ho Chi Minh, Kuala Lumpur, and Shanghai included the report or discussion of privatization in various forms. Specially, Ho Chi Minh City reported on BOT issues, which not only include private organization in tasks but also utilize the private capital in construction and management

of the water supply and sewage treatment system. This is what is called the project finance method. What concerns us the most is that privatization has a tendency to cause higher billing rates, thus making service to the low income bracket, the most vulnerable people, more difficult. I was considering one option. I am not an expert on this matter since I have not studied it long. But I was wondering if it is possible to combine other privatized projects of infrastructure improvement and BOT of water supply and sewage treatment. One example might be a BOT project that addresses a traffic problem in Vietnam. I hear that highway construction is underway in Hanoi. There can be many others such as, electricity problems and projects for port and harbor facilities. By combining those and waterworks and sewage treatment system BOT, we might be able to conduct the projects more efficiently, and the money saved can be allocated to sewage problems, for example, and bring in private capital there. There are so many problems in the field of waterworks and sewage treatment that require individual attention. However, I thought that by viewing the matter in a larger scope, we might be able to find solutions to the problems.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you very much Mr. Yonekawa. The involvement of many organizations implies the difficulty of this problem. We have experienced problems in the area of fee collection caused by privatization. It is not easy to collect utility fees once privatization takes place in our country. The cause for this is differences such as the public authority intervention. I visit Bangkok often. There, the electric utilities have the private information of the citizens, and the government receives the information from privately owned companies. In Korea and similar countries, things can be accomplished with the intervention of the public authority, and the funds acquired can be put into construction and maintenance. Thank you, Mr. Yonekawa, for pointing out a very important aspect.

**Ms. Sheryl Okuma-Sepe, Deputy Director, Waste Water Management Department, Honolulu**

This is a question really for any of the countries who are here today: In Honolulu with the increasing state and federal regulations, it has become more and more expensive for us to build and operate and maintain our treatment facilities. What I'm interested in knowing is if there are any programs or technologies being implemented by any of the countries in order to achieve less costly and more efficient operations and maintenance of the facilities. And I have a question in terms of any program or technology that would be helpful in containing the cost of constructing such facilities, for example, Mayor Harris mentioned the micro-tunneling technology which we have begun to use in Honolulu as one way to save construction money; so I present this question to any of the representatives who are here today. Thank you.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

If you have any ideas on how to reduce construction cost and public allotment, please present the case.

**Mr. Tim Quinn, Deputy Mayor of Brisbane**

I guess Brisbane too, like Honolulu, is looking carefully to reduce the costs in both water and sewage areas.

In Australia-apart from the need to be very careful with city budgets-that's also being driven strongly by a national competition policy which is aimed at containing the costs of water and sewage supply systems around the country. Brisbane too has been involved in experimenting with and working with advances in micro-tunneling, in relining existing sewers rather than replacement, and in looking for ways to reuse sludge material from sewage treatment plants. Also, another technology that Brisbane has been looking at carefully is we have some difficulties in our city with the potential collapse of 9 facilities-over time the development of voids around those mains underground and the development of technology to discover those voids in the system across the city, to assess the risks associated with them and to be able to intervene much earlier. I guess they are similar to Honolulu, some of the sorts of technology that Brisbane is looking at. Again, it's probably in that area particularly where Brisbane would be most open to initiatives and assistance and advice from the private sector. Often the private sector is at the leading edge of some of those advances in technology rather than city governments. In response to the comment made a little earlier from the gentlemen from the United Nations, I just wanted to clarify that the situation in Brisbane is that the national competition policy at the Australian level is driving an agenda of more cost effective water supply and sewage services. Our own conclusions within Brisbane City are that we should continue to supply water and sewage systems as a municipal authority. We have not moved in the direction of privatization; what we have done is to work strongly to make our delivery of those services much more economically effective and competitive. We have done that by establishing a business totally controlled by the city council known as Brisbane Water, but it's a publicly owned company owned through the council. The council is therefore able to control more carefully some of those sensitive issues you discussed about water pricing which may move away from public control if facilities were to be totally privatized. As a matter of policy, our city at this point in time believes that the supply of water and the treatment of sewage should remain in public ownership because of the demands of public interest; but we are open to cooperative ventures with the private sector in carrying out those activities more effectively.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Mayor of Auckland, please go ahead.

**Mr. Les Mills, Mayor of Auckland**

Just addressing the question from a non-technical viewpoint-by a viewpoint that tends to find solutions. Auckland has separated the bulk supply of water and the bulk treatment of sewage into companies that are not privatized but incorporated. That means that the business of management is taken out of the hands of the city, or regional bureaucrats, and put into the hands of appointed directors from the private sector who tend, we believe, to be more at the cutting edge of decision making, looking for innovation and new methods of doing things, and finding technologies that perhaps individual councils and authorities are not so driven to do. I'm not saying that that necessarily solves all of the problems but it certainly has moved us in the direction of cost-cutting and keeping prices down.

I guess I'd like to ask for a little bit of information from around the table because I believe that at the core of

what we are doing is how much it costs an average residential household for its water and sewage services as a percentage of that households income. For instance, Auckland City households, on average-and of course there are very wide ranges here-spend about 2% of the annual household income on water and sewage and storm water services. Now, that's very approximate but I'd be interested in hearing what it costs other cities households to buy those services.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Mayor Jeremy Harris, please go ahead.

**Mr. Jeremy Harris, Mayor of Honolulu**

To respond to the Auckland mayor's question, in Honolulu the water/sewer cost would be approximately 1% of the median income for a family in Honolulu. I have one follow-up question. Honolulu is starting to shift in its disinfection program from the typical chlorination to ultra-violet disinfection and I wonder if any of the municipalities have experience in ultra-violet disinfection and whether they could give advice to Honolulu in the implementation of this technology.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Thank you Mr. Jeremy Harris. Are there any questions? City of Ho Chi Minh, please present your question.

**Mr. Le Thanh Hai, First Deputy Chairman of Ho Chi Minh City**

As far as the private sector is concerned, as well as private investment is concerned, Ho Chi Minh City has long encouraged them to participate in water supply and water drainage. However, we have succeeded only in attracting foreign investment through their invested projects with the total capital valued at over ten billion U. S. dollars and we have also succeeded in attracting private investment in water supply. But as far as sewage projects and water drainage projects are concerned, it's very difficult to attract investments in this field and I would hope that at this subsession that you would give us some advice on how to do it. Ho Chi Minh City is very lucky in that we are endowed with two large rivers that can provide about 30 billion cubic meters of water per year and that's why we don't need to use underground water for water supply. However, at the same time, the underground water is just only about 3 meters below the ground surface. The problem that we are facing right now is that our underground water is heavily polluted and that also indicates the level of pollution in the water that we are suffering now. In order to exploit the underground water, we have perhaps to dig deeper-up to 100 meters below the ground surface. In general, right now, we do not have efficient adequate wastewater treatment plants particularly, for treating domestic waste effluents. Right now what we can do so far is to require all the factories to do wastewater treatment at their plants. Therefore for us, wastewater treatment is an acute problem, not only in terms of environmental effects but also in terms of social problems. As we have mentioned before, in this aspect the governments efforts alone are not enough and therefore we are trying to encourage the private sector as well as private businesses to participate in the development of water drainage systems by giving attractive incentives in terms of land rent or tax holidays.

Because Ho Chi Minh has a very limited budget to spend on water supply and drainage, we are very interested in attracting private investment. At this subsession I would like to learn more from all of you on how to attract the private sector or how to privatize this service in the most efficient and the most beneficial way, not only for enterprises but also for people in general. Thank you.

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

Regarding the problem expressed by Deputy Mayor of Ho Chi Minh, it may become clear as to what kind of cooperation can be made through the presentation of the specific project plans of each participating city.

**SUMMARY BY CHAIRMAN** //

**Chairman Mr. Ahn Sang-young, Mayor of Pusan**

I would like to conclude the free discussion for the time is now up. I am grateful for your honest opinions. Thank you. Also, I appreciate the many detailed reports everyone gave in such a limited time. I would like to express my appreciation to you all. I would like to sum up the content of Subsession 3.

This is the summary of the presentation from each city. The cities of Auckland, Kagoshima, Shanghai introduced the methods which they have adopted to develop sources of water with adequate quantity and quality outside of the city, and convey the water through pipelines. This is in order to secure clean water in quantities necessary to accommodate rapid urban development. On the other hand, the cities of Brisbane, Pusan, and Shanghai, having to secure water in the vicinity, reported their policy aimed at enhancing tap water safety by strengthening the standards and inspection of the water. Specifically, Pusan introduced their measures to ensure the safety of tap water by applying the advanced treatment process and by the time consuming water quality improvement project implemented at the source. The cities of Brisbane, Fukuoka, and Pusan reported on the difficulty of securing adequate water quantity as well as on their drastic water quality and environment management measures such as water conservation campaigns taken to reduce the amount of wastewater. Fukuoka City also introduced the diffusion of water conserving equipment and their computerized water distribution control systems and the resulting leakage ratio reduction, and other efforts made as a water conservation type city.

As for sewage treatment, various cases facing the cities were reported, for example, sewage pipe improvement; expansion of treatment facilities; and other efforts to ensure the quality of city wastewater and coastal waters, and to create a city that aims at a comfortable urban life and rich natural environment. Auckland City and Kagoshima City explained to us the importance of the diffusion of separate sewer pipelines, for their systems are combined sewer pipelines, which collect both storm water and wastewater together. Pusan City introduced to us their methods of installing intercepting sewers on both sides of the stream to prevent river pollution in the city, supplementing the difficulty of expanding the separate sewage pipelines. Honolulu City introduced to us the jet grouting method they adopted to minimize traffic disruption while laying sewage pipes. Kuala Lumpur, Shanghai, and Ho Chi Minh reported on the relocation of

scattered factories to form a specialized zone and the structuring of an effective wastewater treatment system by implementing a separate treatment plan for each densely populated area. In all cities, measures have been taken to expand wastewater treatment facilities to prevent pollution in rivers and coastal areas. Specifically, Brisbane, Pusan, and Fukuoka have adopted advanced treatment methods to remove nitrogen and phosphorus in order to prevent pollution caused by tides. Honolulu discharges treated wastewater into the ocean, and has put great efforts into studies to evaluate the impact of this practice on marine water quality. Pusan introduced to us their successful cases in getting the consent of local residents regarding the construction of sewage treatment plants. One was by constructing the facility underneath the natural park; and the another case was overcoming the objection of local residents by building an exercise park in the upper part of the facility as the Local Residence Assistance Program.

On the other hand, there were discussions about private investment in order to secure the financial resources necessary to expand the water supply system. Also reported was the method of managing treatment facilities more efficiently through a corporation which is owned by the local community as seen in Auckland. Ho Chi Minh and Kuala Lumpur proposed various methods to secure the huge financial resources required to improve the water supply system such as BOT method and concession method. Also in relation to this matter, there was discussion between gentlemen from UN HABITAT, UN Department of Economic & Social Affairs, and the participants today about the effective management of water supply and wastewater treatment facilities. Just like the circulatory system in the human body, the problems of water supply and wastewater treatment in the city need systematic resolutions more than anything, so that comprehensive measures can be established. I would like to present this summary of the content of the 3rd sub-session in the Plenary Session. Would you express your consent with your applause if you have no objections?

(Applause)

Thank you very much. With your consent, I would like to report the summary as I just presented.

(Applause)