CHALLENGES FOR ASIA IN WATER MANAGEMENT AND SUSTAINABILITY

TUESDAY, JANUARY 23, 2007

by

Mr Wilson Chan

Group Chief Executive Officer, Salcon Pte Ltd (Panel speaker from Singapore)

> “ …about 80 countries, comprising of 20% of the world’s population, are already suffering from serious water shortages. ”

Thank you very much for the introduction. Senator Cayetano, Mr Ishigaki, all the Senior Officers of Hitachi, honorable guests, ladies and gentlemen.

It is my great pleasure to be invited by Hitachi to give a talk in the field of water management. I especially feel honored to have the privilege to share my experiences with the top students, the young potential leaders in Asia.

When Hitachi first approached me for today’s topic of Challenges in Water Management, I thought it will be an interesting topic. Singapore, being a small country with very limited water resources, will always face big challenges in the area of water management. For all practical purposes, the amount of water on earth has neither decreased nor increased over time; it is a relatively fixed commodity that we must learn to manage more carefully. However, water resource planning is a broad field that necessarily requires knowledge from many areas and the contributions of many professions. The basic planning and management requirements are to understand the fundamental characteristics and processes of the resource, and to know the laws, policies and the institutions dealing with the resource.

We all know that water is the essence of life. Without water, human beings cannot live for more than a few days. Water is essential for various manufacturing industries and for the economic growth for a country. Water is so much a part of our lives that it is often taken for granted, even though it is unequally distributed in time and space, thereby causing problems of either “too much” or “not enough”. There are more than 1.4 billion cubic kilometers of water in this planet, which is enough to give each of us more than 230 million cubic meters if we were to divide it evenly across the world’s population.

However, more than 98% of the world’s water is salt water or sea water in the ocean. Most fresh water is locked in the polar ice caps. Only less than 1% of the Earth’s freshwater is accessible in lakes, rivers, and ground water. That vital 1% of available freshwater is constantly in motion: either flowing in rivers, evaporating and moving around as vapor, or falling from the sky as rain or snow.

The UN Committee on National Resources noted with alarm that about 80 countries, comprising 20% of the world’s population, are already suffering from serious water shortages. For example, the northern part of China and Mongolia has medium to high water stress conditions. By 2025, the global population will expand from today’s six billion people to almost eight billion, and more than 80% of the world’s population will be living in developing countries. Also, the number of countries facing water stress will increase from 29 today to 34 in 2025. It is expected that the scarcity of water resources has become the limiting factor for economic and social development.

Fresh water is a limited resource, but our population keeps on growing. Therefore, the main challenge facing the management and sustainability of water resources is that the rate of extraction both from ground and surface water sources should not exceed the rate at which the resource is renewed. Furthermore, its extraction must not jeopardize the biodiversity of the ecosystem. Another definition of “sustainability” is the concern over the impact of today’s actions on future generations. Today, in Asia, the unsustainable use of water resource and the pollution of fresh water have become major environmental

problems. Rivers in this region are badly polluted, and the overuse of groundwater is adversely affecting the availability of safe drinking water in Asia countries. Water availability therefore becomes an important factor in constraining national development in a number of Asian countries: either to the countries as a whole, or in certain regions only.

THE CHALLENGES TO WATER MANAGEMENT IN TODAY'S ASIA

1. Inadequate water infrastructure to cater for the unequal distribution of rain water and allocation of water resources

This problem arises from supply-demand mismatches, caused by inadequate water infrastructure that can not regulate flood flows and store water in the rainy seasons. The problem is compounded by limited financial resources for the development and expansion of water distribution facilities. This will create tremendous pressure on water availability, even for countries with abundant water resources. For example, in Indonesia, the availability of water resources varies from island to island. Java, which is home to 65% of the country's population, has only 4.5% of the available water resources during the dry season. In China, more than 80% of the water resources are located in the southern part of the country. The Chinese government has already invested heavily to proceed with the South-to-North Water Diversion mega-project, to transfer river water from the south to the north.

2. Over-exploitation of ground water and its insufficient recharge

When there is overexploitation of ground water, the water table goes down progressively, until a stage is reached where the rainfall will not be able to replenish it within a reasonable time. In coastal areas, this induces salt water from the sea into the underground fresh water. In years of drought, the overexploitation of ground water becomes inevitable, leading to irrecoverable damage to the ground water table. For example, there are a large number of villages in India that suffer from excess salinity, fluoride, nitrate and bacteria contamination of ground water. With more than five million tubewells in operation in India, the pumping of ground water is now nearly double the rate of rainwater recharge. The water demand in India will increase by 50% over the next 20 years, while the population is expected to reach 1.7 billion by the year 2050. This means the population's demand for water will rise from 800 billion cubic metres to 1,500 billion cubic metres.

3. Pollution of water quality due to disposal of domestic and industrial waste without adequate treatment

One of the main issues challenging sustainable water resource development is the increasing deterioration of the water quality. The trend is increasing with the rapid pace of industrial development and the increasing global population. For example, in China, more than 50% of the rivers are found to be highly polluted. About 80% of the water is currently used for irrigation, but this figure is expected to decrease as the demand for domestic and industrial uses of water increases.

RECOMMENDATIONS

1. Setting up of a National Master Water Plan

This provides a framework for the planning of water development schemes, and ensures the optimization of economic and social benefits while minimizing the environmental impacts. This should be followed by the formulation of national water strategies and policies, and the establishment of effective legal instruments and institutions. This will aid the integration of water resource development and management into each country's overall socioeconomic plans, thereby facilitating the achievement of sustainable water resources development. In addition, governments should encourage larger public investment for developing new water infrastructures, and also increase the private sector's participation in the water service industry.

2. Ground water pollution control

There should be greater control over the prevention of ground water pollution, beginning with a comprehensive evaluation and assessment of the negative impacts of the over-extraction of ground water. This would be carried out with the view of establishing a unifying management plant for the rational utilisation and development of ground water resources, in different areas of each country. There should also be legislation over the utilisation and protection of ground water resources, which would eventually improve the process of ground water recharge. In addition, countries should take the initiative to survey and explore for new utilisable ground water sources, and introduce the necessary measures to prevent over-extraction. It is also important to manage and make use of both surface water and ground water resources in conjunction with each other.

3. Enforcement of laws, regulations and technical standards for water pollution control, for both surface water and ground water

The enforcement of laws and regulations is vital, and very important to the sustainability of water resources. This would entail the strict control of the discharge of industrial and domestic wastewater and agricultural fertilisers, the disposal of solid waste as well as poisonous and hazardous matter, so as to prevent surface water and ground water pollution.

4. Increase public awareness to water conservation

It is important to raise awareness and interest in water conservation, in all of Asia's countries. By 'water conservation', I refer to the actions taken to further the efficient use of water. This entails two concepts. The first one is the conservation of water resources, which includes the efficient management, storage, allocation and transfer of all water. The second concept is the conservation of water supply – this entails the distribution of water with minimum losses, and the consumption of water without wastage. If I may refer back to the case study of Singapore, a very small country with scare water sources, the Singaporean government has been promoting high awareness of water conservation for many years. As a result, the water loss rate in Singapore is a mere 5%, one of the lowest water loss rates in the world.

5. Use of water pricing policies

The concept of water as free common goods must be re-assessed, and water should be given a proper economic value. While we must of course safeguard the needs of the poor, we need to recognise that water can no longer be treated as free goods. Rather, it should be regarded as a resource to be carefully managed, in order to fully maximise national benefits and minimise negative environmental effects. It is becoming increasingly clear that water will become more expensive, and that economic forces will play an increasingly role in the use and allocation of water. Such an approach requires the establishment of a balance between economic, social, technical, managerial and legal measures and skills.

6. Wastewater Recycling and Reuse

As the water availability is going to reduce due to the increase in population, the wastewater generation in any city is going to be the source of water supply for those located downstream. In view of such a situation, there is a need to treat 100% of wastewater as possible within each region and country, in accordance with stringent environmental and health standards.

The recycling and reuse of wastewater would guarantee the availability of water for process needs and low-end uses, which would help to bring down the volume of water required from ground water and surface water. It will also help to ensure compliance with pollution control regulations, and contribute to a cleaner environment through the reduction of waste discharge.

The rise of membrane technology has enabled us to derive good quality water from sewage as well as industrial wastewater. In many industries, ultra-filtration and reverse osmosis have successfully been used to obtain high quality water from sewage and wastewater sources. Such technologies are vital in the recycling and recovery of as much as 99% of wastewater. In many instances, this leads to serial discharge. Let me illustrate this using the case study of a textile and dye manufacturer in India. We have recycled all the dye, which constitutes about 85% of the wastewater produced, and we are able to concentrate the dye and sell it back to the manufacturer. This is a multi-win situation: for the dye manufacturer, for the wastewater treatment vendor, and for the environment.

Of all the above-mentioned recommendations, the setting up of a national master water plan is the most important step for all countries to ensure the long-term strategic development and usage of water resources. However, such a measure can potentially take a longer time to implement successfully, based on the different situations in the various Asian countries. Countries that wish to achieve faster short-term results should prioritise the implementation of wastewater recycling. Recycled wastewater can often be further treated for use in industries, which will add to its economic value. For example, it can be used in industries that consume large amounts of rinsing water – electronic industries, power plants and steel mills. Today, there are many different technologies for the purpose of recycling wastewater, with different construction costs and operating costs. Many water treatment companies are spending a great deal of resources in research and development to improve their wastewater recycling technologies, because they recognise that there is tremendous market potential.

I would like to share some details about the current water management policy in Singapore. As I mentioned at the beginning, Singapore is a small country with very limited water resources. To ensure that the nation has sufficient water supplies for potable and industrial usage, Singapore has been trying ways and means to maximise its water resources.

Singapore has four sources of fresh water, which we call the "Four National Taps" strategy:

Tap 1: Importing water from Malaysia
This constitutes 60% of Singapore's freshwater supply

Tap 2: Rainwater catchment
This constitutes about 30% of Singapore's freshwater resources. Singapore has about 700 square kilometres of land area, of which two-thirds is used as reservoirs for the catchment rainwater. Singapore receives about 240cm of rainwater in each yearly catchment.

Tap 3: NeWater technology
With this technology, water is reclaimed from industrial waste and sewage. NeWater currently constitutes 5% of the freshwater supply.

Tap 4: Seawater desalination
This constitutes another 5% of the water supply.

Of the four water sources, we believe that NeWater technology has the most potential to become an important water resource for Singapore, simply because the operating cost is low and because there are a lot of wastewater sources to make use of. Singapore intends to increase NeWater production until it constitutes about 15-20% of the country's freshwater.

Not only has Singapore tried to maximise its water resources over the years, its government has also been developing the country as a water technology hub by encouraging technology companies, both from Singapore and from overseas, to establish water technology R&D centres in Singapore. I believe that innovative water technologies will be one of the most important solutions to help Asia to renew its water resources in the future. It has been well recognised in Asia that the availability of water for domestic, industrial and agriculture requirements will be a serious constraint to economic development and human health in the coming decades. As such, Asia has a growing need for developing and introducing science- and technology-based water treatment systems and wastewater recycling systems that will be economically and environmentally sustainable.

I believe that the cost of investing in water conservation and sustainability is much less than the cost of not doing so. I encourage you, our young leaders, to take an interest in the water management industry, which I strongly believe is an industry that will remain evergreen. Together, we can build sustainable resources for the next generation.

Thank you.