

Groundwater Technical Study Visit South Korea

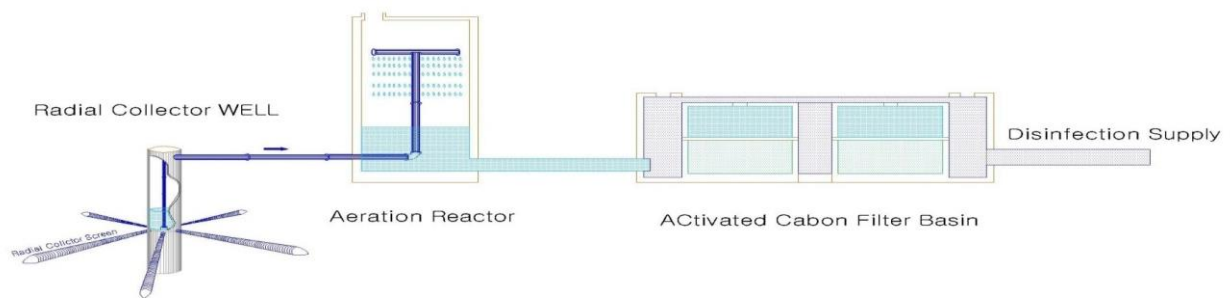
One of the members of Water Watch Penang, Lim Han Khim had been invited to join the groundwater technical study visit in South Korea organized and sponsored by Sime Darby Energy and Utilities from March 27 to April 3, 2010. This technical study trip involved 22 persons who were 18 persons from Malaysia and 4 persons from Dajoo Construction Co. Ltd. Moreover, the details of Malaysia delegates are given in the table as follows:

No.	Name	Designation/Organization
<i>Government Official</i>		
1.	Tham Yee Kiong	Head of Technical Services, Pengurusan Aset Air Bhd. (PAAB)
<i>NGOs</i>		
2.	Ahmad Othman	President, Kelantan Consumer Protection
3.	Kamaruzaman Ghazaly	Secretary, Kelantan Consumer Protection
4.	Lim Han Khim	Committee Member, Water Watch Penang
<i>Broadcast Media</i>		
5.	Ganes Sanjay Kumar Krishen Lal	Reporter, RTM
6.	Mohd Shariffudin bin Mohd Arshad	Cameraman, RTM
7.	Mohd Junaidi Suboh	Reporter, TV3
8.	Jasme Saidin	Cameraman, TV3
9.	Ahmad Khairol Shafizan Johari	Reporter, Astro Awani
10.	Noor Fahmey Md Azhar	Cameraman, Astro Awani
11.	Khairulanuar Mohamed	Reporter, Bernama TV
12.	Ahmad Azmai Awang	Cameraman, Bernama TV
<i>Bloggers</i>		
13.	Mohamed Zakhir	Blog Owner, Big Dog
<i>Media Consultant</i>		
14.	Michael Poh	Senior Consultant, Acorn Communications

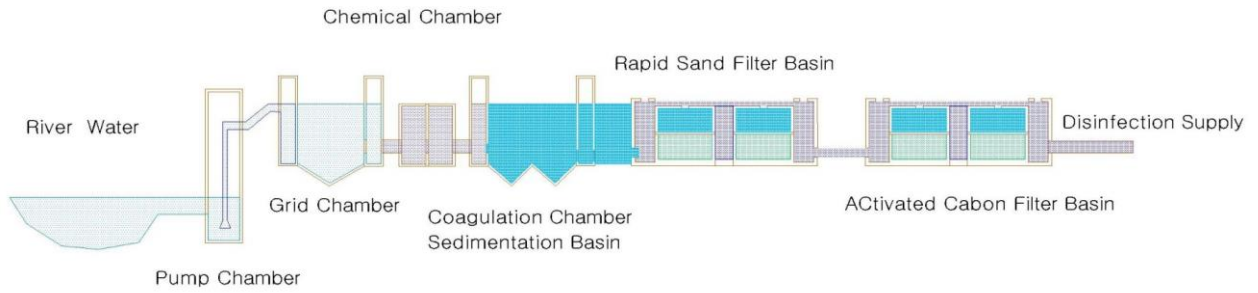
No.	Name	Designation/Organization
<i>Sime Darby Energy & Utilities (E&U)</i>		
15.	Dr. Azuhan Mohamed	Head, Water Management, E&U Division
16.	Azlan Ramli	Head, Business Development, E&U Division
17.	Othman Abu Bakar	Head, External Communications, Sime Darby Berhad
18.	John Agama	Head, Corporate Communication, E&U Division

Day 1: Riverside Filtration System Visit

Dajoo Construction Co., Ltd which is a specialized construction company focusing on riverside, riverbed, and filtration facility has developed a radial collector well at Hangang river side to collect the alluvial formation water. The alluvial formation water refers to the water which is naturally filtered when river and underground water passes through an aquifer. Groundwater that is collected at the radial collector well from Hangang River is pumped to the upstream of two rivers, Hongjaechon (river) and Pulkwangchon (river) for human daily usages. The implementation of this riverside filtration system has improved the water quality and overcoming the water issues in dry and wet seasons. Moreover, the cost and operating system of the groundwater treatment beneficial the environment and the consumers since the alluvial formation water which is collect from the radial collector well undergoes a simple treatment process and chemically free as compared to the treatment of surface water.



Radial Collector Well Filtration System (Groundwater)



River Water Filtration System (Surface Water)

Additionally, the pumped groundwater is also being used in the preservation construction project (man-made waterfall), an interesting place to visit for the locals and foreign tourists.



Group photo taken at the man-made waterfall

Day 2:

a) Groundwater Management Study Visit at KRC, Jeju Island

Korea Rural Community Corporation (KRC) is a public corporation contributing itself to the enhancement of agricultural productivity and the economic and social development of Korean farming and fishing villages. The KRC authorities are responsible in groundwater management for the agricultural activities of Jeju Island. The groundwater resources management projects aim to increase rural incomes, improve the living environment and develop stable water supply for agricultural activities using groundwater. In addition, this project includes measures to prevent drought, groundwater survey for stable water supplies, agricultural water supply for high-tech agriculture and upland farming, domestic water supply for improving living conditions and securing safe drinking water, and the prevention and management of groundwater pollution. Furthermore, the Jeju Provincial Government also established some management principles to create a scientifically based groundwater management system such as (1) groundwater designated as a public resources, (2) promote research and exploration to determine size and hydrogeologic controls on groundwater resources, (3) classify land on susceptibility to contamination of groundwater and to create protected zones, (4) construct multi-regional water supply system for the efficient economical water usage and to replace small private wells, and (5) promote active conjunctive use of surface and ground water resources.



Group photo taken in front of KRC building

b) Production well visit (located about 30m from the coast of Jeju Island)



Lateral drilling work (construction process) Ground characterization based on depth



The view of storage plant and production well

Day 3: Daesan Purification Plant Visit in Changwon City

The water sources for the Daesan purification plant is from the Nakdonggang River that undergoes river bank filtration. The surface water of the Nakdonggang River is naturally infiltrated into ground water through the river bed or bank(s) and is recovered via pumping/collector well (50~100 days for groundwater to reach the pumping well). Microorganisms and other particles are removed by contact with the aquifer materials during the bank filtration process.

The process of the bank filtrate supplied to the community (water treatment process):

- **Surface water** – River water (Nakdonggang)
- **Pumping well** – A well from which bank filtrate is pumped up after having surface water filtered via sand layer
- **Aeration reactor** – Oxidizes iron and manganese by supplying oxygen to the pumped water based on the spray-drop method
- **Rapid sand filter basin** – Removes ferrous and manganese components using iron- and manganese-oxidizing bacteria living in cake
- **Activated carbon filter basin** – Removes the residual (e.g. iron, manganese, taste, and odour) and minor organic pollutants
- **SodiumHypoChlorite feeding chamber** – Disinfect water filtered through activated carbon filter basin using chlorine generator and proportional controller
- **Service reservoir** – A reservoir for stable supply of tap water to the hillside residents

The advantages of bank filtration:

- Stable water temperature throughout four seasons with easy maintenance
- Stable water quality and volume during rainy or dry season
- Environmental-friendly facility with reduction of water pumping and treatment cost and sludge
- Easy to secure safe water even at sudden water pollution or unexpected disaster



Photo of Daesan Purification Plant

Day 4:

a) Rainwater harvesting system visit in Suwon City

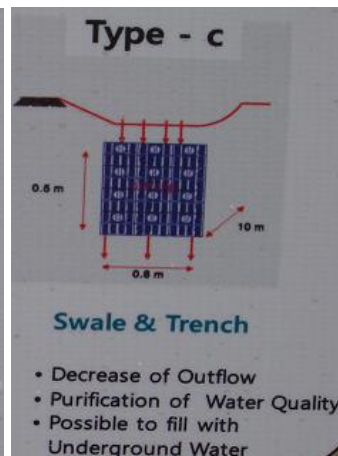
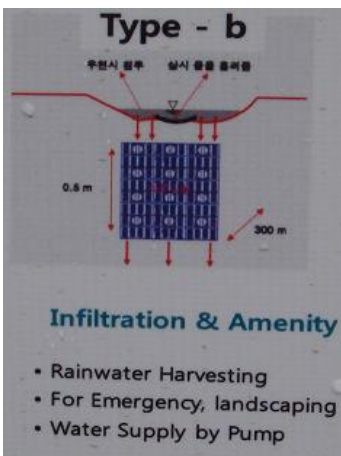
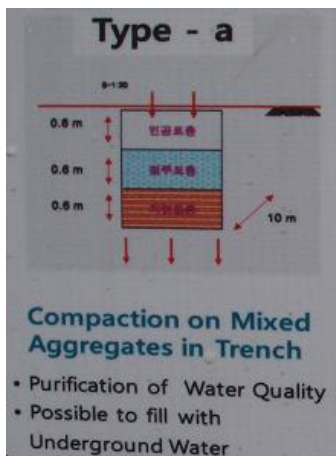
Suwon City is currently recognized as “Rain City” where Rain City is defined as a city identifies the importance of rainwater, collects rainwater instead of draining away, and utilizes rainwater for various purposes such as for irrigation, portable water and so forth. The Rain Citizens will get benefit by increasing reliability of water supply, reducing the risk of inundation by sudden heavy rainfall, reducing energy consumption. Rain City idea in Suwon City is spreading worldwide via ICLEI, WWC, and IWA in corporation with Rainwater Research Centre of Seoul National University. Moreover, other stake holders including City Mayor, City Council, Citizen group, Academic and Business sector take initiative to make Rain City idea successfully. The rainwater harvesting system that been visited was constructed at the sport complex in Suwon. The design and construction details of the rainwater harvesting system were explained by Mr. Kim Jeong Han (CEO of GeoMarine Corporation) while the research part of the rainfall harvesting system was further explained by Professor Han Moo Young (Professor in Seoul National University).



Installation of rainwater harvesting system (proposed area)



Corrugated steel storage tank



Infiltration trench



Photo of Mr. Kim Jeong Han



Photo with Professor Han Moo Young



Group photo with Suwon City Vice-Mayor

b) Reception by Malaysian Ambassador in Seoul



Photo at Embassy of Malaysia in Seoul



Photo with Malaysia Ambassador