Possible solutions water crisis in china

It is not easy to link a vast country having two over 5000-km-long rivers with a massive water shortage. According to the UN Food and Agriculture Organization data (FAO 2007), China has only one quarter of the world's average per capita share of fresh water per annum. Based on the huge population, uneven water distribution on time and space as well as widespread pollution, the limitation of water resource can be a barrier to the process of economic growth for the next decades. This essay will focus on China's current water resource status and attempt to make evaluations among the following solutions: dams and reservoirs, inter-basin water transfer and wastewater reuse to find out the most appropriate methods for China to avoid future water crisis.

Constructing Dams and Reservoirs is a universal solution to uneven water distribution on time. Rainfall dramatically differs from seasons and years. About 70% of precipitation in China occurs in four consecutive months, roughly during summer (China Ministry of Water Resource 1992). Moreover, when it comes to a long-term review, the ratio of maximum annual rainfall is generally 2-6 times to the minimum year. These disparities lead to alternate floods and droughts. From China's Minister of Water Resource's speech, since the last decade of 20th century, the average loss owing to frequent disasters has amounted to about 2. 5% of GDP of the same period in China (Chen 2009). Dams and reservoirs are widely used there to avoid floods and provide sustained freshwater in dry seasons. The technology which had been used for centuries is still being carried forward. So far, there are 280, 000 km of embankment, 86, 000 reservoirs and 97 key flood retention areas in commission building up an effective defence line to floods and droughts. One

of the most outstanding existing facilities is Three Gorges Dam, located in Yangtze River. This project is designed to lessen inundation and aridity, generate power to support industrial development. By the end of 2006, it provided 3% of electricity production in China (Lamm 2006, 9). On the other hand, it is not only known as the largest dam in the world, but also in relation to many concerns. Derrick Lamm cited the replacement of rural people who used to live in dam side would increase wealth disparity. Furthermore, the environmental impacts could not be taken lightly as well. Firstly, due to micro-biotic activity under elevated temperature, the greenhouse gas emissions can be 5 times as that of a reservoir in the north. Secondly, because of the rise in water level, many extinct species are losing their habitats and historical sites are now submerged (Lamm 2006, 9). Such adverse impacts are inevitable, but being aware of them can be helpful to minimize them.

Besides the unbalanced distribution on time, the majority of available fresh water is concentrated in the south (China Ministry of Water Resources 1992, 241). Under the circumstances, one possible solution is being carried out, known as south-north interbasin water transfer. The scheme aimed at divert water resource from water-abundant area to water-lacking area. According to Interbasin water transfers and water scarcity in a changing world (Pittock 2009), the project consists of three routes from upper to lower reaches of Yangtze (Liu 1996, 900) – the world third largest river. The immense project began in 2002, Eastern Route and Middle Route planed to be completed approximately in ten years. However due to complex geographic features of Western Route, it is unlikely can be finished before the first half of 21st

century. After completion, it hopefully diverts water of 50 km^3/yr (Pittock 2009, 34). From current situation of applying this project, it relieved severe water shortage in the north to some extent, but still needs substantial input of fund and time. The gap of water amount between supply and country's demand for development is still apparent. Furthermore, this scheme is estimated to cost as much as 59. 9 billion USD but also involve 400, 000 migrations due to rise in reservoirs (Pittock 2009, 34). Due to its exorbitantcost and extensive social impacts, since the immense project was put into practice, an inconsistent coexistence of praise and criticism never disappear. It is considered " with fewer benefits compared to the alternatives" (Pittock 2009, 34).

Apart from reallocating traditional water resource, recycling water and using water rationally is the current mainstream. Rapid economic growth in China has a severe consequence to environmental security, seeping heavy metal and animal excreta can be fatal to human's health. But wastewater or polluted water can be reused after appropriate treatment. Management of wastewater depends on different types of wastewater, reuse applications and expenditure. Greywater can be reclaimed for potable use. During water filtration, suspended solids, organic matter and nutrients can be easily removed rather than pathogens, especially in developing countries (Mara and Karmer 2006, 12). After futher treatment to reduce the concentration of pathogens, the price of reclaimed water usually surpasses that of portable water. However, it can be purified in a lower standard used for irrigation in water-lacking area to save drinking water. In addition, the outcome of nutrients such as nitrogen and phosphorus can be showed as an additional

fertiliser (Kelliher 2005, 3). In terms of using water efficiently, one possibility is drip irrigation. Agricultural use of water comprises the largest proportion of water demand in China, accounting for 70% (Amarasinghe et al. 2005, 8). Rather than sprinkler irrigation or flooding irrigation, drip irrigation can save a considerable amount of water. However, the cost of pipe construction is not affordable for every farmer.

As a result of uneven distribution of water resource on time, building dams and reservoirs is the conventional method. This is a mature technique for centuries and we benefit from it a lot. A newly developed technology called interbasin water transfer captures our attention due to its scale of scheme. The project is still not proved whether it is an intelligent alternative. Above reallocating water resource, recycling water and using water rationally is the most sustainable method. Taking developed countries as an example, that is the trend in the future. Only by expanding the coverage and depth of