Summary of Dr. Wang Qiming's presentation on Three Gorges Dam

On Wednesday June 12 2012 Dr. Wang Qiming, Science Counsellor from the Embassy of the People's Republic of China spoke to the CCFS-O on the topic of the *Three Gorges Dam: Development and Conflicts.* His Power Point slides are posted on the CCFS-O web site for those who wish more details.

The Three Gorges dam, completed in 2009, is well known both as an engineering marvel and for the controversies that surrounded its construction. It holds a number of world records including: largest dam, largest hydroelectric generation facility, and largest displacement of population for the construction of a dam.

Dr. Wang began by setting the historic and geographic context for water management in China. China is and has been an agricultural nation for thousands of years. As far back as 256 BC China built the Dujiangyan dams and irrigation systems to irrigate over 5,300 square kilometers of farmland near Chengdu. That system is still on operation today. In 609 AD China completed the Grand Canal, between Hangzhou in the south and Beijing in the north. This ambitious north south venture linked six river systems in order to move shipping between the south and the north of China.

Both the need and the potential for these water management systems arise from China's geography and climate. In geographic terms China is composed of 3 tiers: a low eastern plateau, a middle plateau and the high plateau of Tibet and Qinghai. China's rainfall is largely in the southern regions with peak rainfall during the monsoon season. The heavy rainfall in the south has historically led to flooding, and often significant loss of life and damage to farms and cities, which has led successive Chinese governments to build flood control dams and diversion canals along China's 3 major river systems

Contrasting with the ample rainfall in the south of China are the dry lands and deserts in the north. To balance the surplus of fresh water in the south with the relative lack of water in the north, China is currently in the midst of a $62 billion South-to-North Water Diversion Project. It is anticipated that three separate routes will bring up to 44.8 billion cubic meters of drinking water to urban centres in the north.

The Three Gorges Dam is on the Yangtze River, 40 kilometers up-stream from the Gezhouba dam, which was previously constructed in 1988. The primary goal of both dams is flood control. Downstream of the Gezhouba dam a testament to the destructive power of the Yangtze floods can be found in the 180 km long Jingjiang Dyke, between the cities of Jingzhou and Wuhan. This major piece of infrastructure

is intended to limit the damage from flooding on the most dangerous part of the Yangtze River. Between 1560 and 1949 the dyke burst over 36 times killing millions of people. As late as 1998, after the completion of the Gezhouba dam, there was the threat of a dyke break which caused the evacuation of 500,000 people. It is anticipated that with the completion of the Three Gorges Dam there will be adequate capacity to limit flood damage to extraordinary circumstance that would arise only once in a 100 years.

Dr. Wang presented details of the construction of the Three Gorges Dam from its initial conception in 1919 by Sun Yat-sen; to a 1947 survey by American civil engineer, John L. Savage; to a detailed feasibility study financed by CIDA and executed by 500 experts from Quebec Hydro, BC Hydro, SNC Lavalin, and ACREC; to a decision in 1992 by the Fifth Plenary Session of the Seventh National People's Congress; and, finally through the 3 phases of the 17 year construction project.

The completed dam has a height of 180 meters, a length of 2,335 metres, a width of 40 meters at the top and a base width of 115 metres. It was constructed at a cost $US 26 billion. The reservoir behind the dam has a capacity of 39.3 km^3, a surface area of 1,045 km^2 and is 600 km long with a maximum width of only 1.1 km. The power station in the dam contains thirty two 700 MW generators and two 50 MW generators that provide a maximum capacity of 22.4 GW of electricity and provide 80 TWh annually. The Three Gorges electrical power provides 5 % of China's needs, and is roughly equivalent to the total electrical power generated in Ontario.

The Yangtze River has long been important for the transportation of goods. To enhance shipping the Three Gorges Dam includes a double-line five-step ship lock to facilitate this function. The annual one-way transportation capacity is 500 million tons. The lock improves the 660 km navigation route from Yichang city to Chongqing city, and has reduced shipping costs by 35%.

Dr. Wang's presentation concluded with a summary of the negative effects of the Three Gorges Dam. The most visible negative effect arose from the flooding of more than 600 square kilometers of land. The inundation of many farms, towns and small cities displaced approximately 850,000 people. 85% of these displaced people were relocated the new city of Chongqing. For peasant farmers the policy was to relocate them to the upper hills close to their original farm; however 125,000 peasants were relocated outside the region and fully 40% of the displaced rural population left agriculture.

Chinese officials also acknowledge that the Three Gorges Dam will have physical and geological consequences for air, soil, and water. For example, the dam has caused a decline in the populations of three endemic ancient fish species: Chinese

sturgeon, Yangtze sturgeon and Chinese paddlefish. In addition, the dam appears to be triggering landslides around the reservoir and accelerating silting behind the dam as well as altering downstream ecosystems.

Downstream there are impacts on terrestrial and aquatic biodiversity and ecosystems including: the decrease and loss of floodplains and riparian wetlands; the regression of river deltas and ocean estuaries; the elimination of beaches and backwaters; and acceleration of the intrusion of salt water into the estuary region. These environmental problems have the potential to adversely impact the lives of the millions who live in the dam's environmental shadow.

Following Dr. Wang's presentation there was an extensive question and answer session, which in turn was followed by a refreshments and many spirited discussions.