

After the devastating natural disasters that have hit China recently, another crisis is looming. Drought, pollution and heavy usage in the fast-developing megacities have resulted in a shortage of water. A huge construction effort is underway to divert water from the south to the north. But experts warn that it will not solve China's structural water problems.

China's water crisis

| by Bert van Dijk

Liu Guangxiang unrolls his fishing net in a shallow pool of water, just across a bridge near the Huairou reservoir, some 60 kilometres north of Beijing. Liu is a local fisherman who has been fishing in these waters for many years. 'There used to be a lot more water around here', he says as he slowly walks towards the bank to pack his things for the return trip home. 'Six to seven years ago, this area was all under water,' he says, pointing at a vast area of dry land surrounding the small pool of water. 'Now everything has dried up.'

The Huairou reservoir is one of many lakes around the capital of Beijing that has seen its water level drop. Plagued by decreasing rainfall and increasing water usage in cities like Beijing, the reservoirs are rapidly turning into dry and dusty pieces of land. The nearby Daning reservoir, for example, has dried up completely.

The biggest reservoir in the area, Miyun, an hour and half drive north of Beijing, risks a similar fate. About 40% of the water Beijing uses every year comes out of this

reservoir. But Miyun is visibly drying up. 'The water level in the Miyun reservoir now is only 25% of its total capacity. And the level is still decreasing as we speak,' says Zhang Junfeng in Beijing, a water expert with Green Earth Volunteers, an NGO, who keeps a close watch on China's rivers and lakes.

'There is a very severe shortage of water in the northern part of China,' says Zhang. He argues that the biggest culprit for China's drought is climate change. 'There's less and less rainfall every year. Rainfall in

process. Economic development means that more and more people live in cities, where they consume a lot of water. As a result of that they have drained the water resources.

Chinese citizens now have on average 300 cubic metres of water available to them each year. Anything less than 1000 cubic metres is considered by the United Nations as a shortage of water and less than 300 cubic metres, as is the case in North-East China including Beijing, is being labelled as severe or extreme shortage, says Zhang.

The reservoirs are turning into dry and dusty pieces of land

China has been below average every year since 1999. Meanwhile, groundwater levels in northern China are decreasing at a rapid pace. It's nothing artificial.' While the water shortage problem might not be artificial, Zhang believes that human behaviour has definitely accelerated the

Not only is the level of China's naturally available water one of the lowest in the world, there is an enormous disparity in terms of accessibility within the country. The north of China is home to roughly 42% of the population – who only have access to just 14% of China's water resources.



Miyun reservoir north of Beijing. Photo: Frans Schellekens

Drought-proof Olympics |

The situation is especially dire as Beijing prepares for the Olympic Games this year. To prevent a water shortage in the capital, huge amounts of water from neighbouring provinces and regions are tunnelled through newly dug canals into the city. The Olympics are now the top priority for the government and it is important that water can flow with abundance during the three week sporting event. Labelled by China itself as the 'Green Olympics', everything is done to ensure a sustainable use of natural resources, such as the recycling of water. The glitzy new sports Aquatics Centre is fitted with an advanced water collection and treatment system that enables rainwater to be filtered and used inside the pool.

All of these efforts will lead to a 'drought-proof' Olympics, says Professor Zhang. 'During the Olympic Games Beijing won't experience any water shortages. But all those new canals and tunnels won't solve the water shortage in the long term.'

The new canals, bridges, tunnels and dams that will feed water into the systems of the

water companies in and around Beijing are just a small part of a much larger and more ambitious water-diversion project named the 'South to North Water Diversion Project'. In October 1952, when Mao Zedong was inspecting the Yellow River, he for the first time proposed an ambitious plan to divert water from the water-rich south to the north. 'Water is abundant in the south and scarce in the north. We may borrow some from the south to the north if it's feasible,' he famously spoke.

The feasibility studies took five decades. Groundbreaking of the project took place in 2002 – exactly 50 years after Mao initiated it. The project will be constructed in phases and finally completed in 2050, says Zhang Jiyao. The former vice-minister of water resources now is director of the South-North Water Diversion Project Construction Committee, which falls directly under the State Council, China's highest political decision-making entity. 'The South to North Water Diversion project aims to divert water from the Yangtze River valley to the northern regions of China to ensure the water

supply for farming, industry and life.' The estimated cost of this project, according to Zhang, will be around 500 billion yuan, or around €50 billion.

New diversions |

Three routes are planned: the east line, middle line and west line. The three diversion lines will link together four of China's seven major rivers: the Yangtze, Yellow, Huaihe and Haihe river. The east line is to transfer water from the lower reach of the Yangtze River to the north along the Beijing-Hangzhou Canal, then to the eastern part of the Huanghuaihai Plain. The destination is Tianjin, a large coastal city to the east of Beijing. The finished project will be about 1,200 km long. 23 new pumping stations will be constructed with an installed capacity of more than 453.7 MW. 'Because the quality of the water in the eastern line is not good, this line mainly is for industrial use,' says Project Director Zhang.

The middle line is to divert water from the Danjiangkou reservoir via new canals near the west of the Huanghuaihai Plain to flow

through Henan and Hebei Provinces to Beijing. This diversion route will eventually total almost 1,300 km in length.

The east and middle lines now are under construction. The west line, which would divert water from three sub-rivers of the Yangtze (the Tongtian, Yalong and Dadu) nearly 500 km to northwest China, still has to be approved. 'This line will have a big impact on nature. Therefore, everything should be taken in consideration very carefully,' says Project Director Zhang.

'The ground activity in the region is also very high. Reviewing this project therefore will take a lot of time.'

Although the recent earthquake in the Sichuan province didn't cause any damage to the parts of the lines under construction, it could still impact on the decision to build this line.

Once completed though, about 45 billion cubic metres of water will be transferred yearly. 'Although the water diversion

project is immense, it won't solve the underlying problem of water shortage,' Zhang points out. 'The fundamental solution is to save water. The diversion of rivers is just a supplement to this. We have to raise awareness in the general public and educate students in how to make better use of water.'

Conservation |

Farmers also are urged to save water and in some areas around Beijing and in Hebei province, irrigation of land already is no longer allowed. 'Large rice fields have been abandoned to make way for less water consuming crops like wheat or corn or are being transformed into construction areas,' says a local farmer near the Miyun reservoir. And the Chinese government isn't taking any risks. Hundreds of armed forces are now guarding the reservoir around Beijing to prevent people from polluting the water or misusing it. Even local residents are being asked to assist. 'People have asked us to look out for suspicious people and activities here in the mountains,' says Ms Zhao, a resident of a small mountain village near Beijing.

A shortage of water is not the only problem China faces. Heavy pollution makes the challenge to secure clean water even more difficult. 'China's lakes, rivers and underground water wells are polluted,' says Ding Aizhong, a professor at Beijing Normal University who specializes in water pollution. 'The quality of the water in the past twenty years has worsened.' Project Director Zhang acknowledges this problem. 'It's our main cause of concern for this project,' he says. 'There is very severe pollution in the middle and eastern lines.' The World Bank estimates that three-fourths of China's rivers are polluted, and more than 700 million people drink contaminated water.

The Chinese government is putting laws into place that can help prevent further deterioration, such as the requirement for factories to install wastewater treatment equipment. 'The amount of wastewater treated now lies at 60% in the areas where the water is to be diverted. It used to be only 20%,' according to Professor Ding.

Hydropower giant

The South to North Water Diversion Project is one of the biggest engineering projects in the world. The water that will be diverted from the south of China to the northern regions will also generate energy along the way. There will be 67 pumping stations built in the eastern line with a total installed capacity of 678 MW. Sixteen existing pumping stations with the installed capacity of 149 MW will also be used. Still, these hydropowerstations only account for a small percentage in the total hydropower capacity of China.

In 2007, the installed capacity of hydropower generation reached 145,000 MW (145 GW) in China, making it the largest producer of hydropower in the world, far ahead of Canada, Brazil and the United States. China produced 397 TWh of hydropower in 2005. This is expected to rise to 1,005 TWh in 2030. Even so, hydropower's share in total generation will fall from 16% to 12%, according to figures from the International Energy Agency.

To become less dependent on coal, which accounts for 78% of China's energy usage, the country wants 15% of its energy consumption to come from renewable sources by 2020. This amount currently stands at 7.5%.

China's economic hydropower resources are located mainly on the Yangtze, Lancang, Hongshui and Wujiang rivers. Further hydropower development will be undertaken in the coming years. The huge Three Gorges Dam on the Yangtze River in Hubei province will have a total installed capacity of 18.2 GW upon its completion in 2009, making it by far the largest hydro generating facility in the world. Construction has also recently started on two other very large hydropower plants: the Xiluodu project, which is located along the Jinsha River in south-western China and will have a total capacity of 12.6 GW; and the Xiangjiaba project, which is in Sichuan province and will have a capacity of 6 GW. Both projects are scheduled for completion in 2015. Small-scale hydropower plants are widely used across the country. About one-third of China's counties rely on small-scale hydropower as their main source of power.



‘But the real effects of these installations can only be seen in the long term,’ he warns. Still, he’s optimistic. ‘China is in a way no different from western countries. European rivers like the Rhine and the Thames were also heavily polluted. We can learn a lot from how the Europeans tackled the water pollution problems.’

According to project manager Zhang, 426 projects have been started to tackle the pollution problem. ‘We’ve closed down factories and created more than 100 wastewater processing companies. We already invested 14 billion yuan in technologies and projects that should help to reduce pollution.’

Apart from new wastewater treatment technologies, the Chinese government also tries to make people more aware of the scarcity of water by raising its price. Water in China has been underpriced for years. Chinese people pay only a fraction of what people in other countries pay and the charging of water actually only began in 1985. Very few companies and farmers therefore were pressed to invest in waste treatment or recycling or even be concerned about irrigation activities.

Water prices have risen very slowly over the past 20 years. ‘In Beijing, for example, the price now is 4 yuan per cubic meter where it used to be 1 yuan,’ Project Director Zhang says. ‘Finally we must develop new technologies that can help people save water in daily use.’

Local Fisherman Liu Guangxiang has already noticed that water meters have been recently installed in his village. ‘We’re not being charged yet, but maybe in the future we will be.’

Consequences |

Zhang Junfeng of the Green Earth Volunteers is worried about the long term effects water shortage will have in China. They could be devastating. ‘From the west to the east China should be

the relocation of more than one million people with still more to come. Worldwide attention focused not only on the environmental impact but also on the social consequences of the relocation of hundreds of thousands of local peasants. Misuse of compensation money destined for peasants by local authorities also led to widespread criticism.

‘Relocation for the construction of the South to North Water Diversion project

‘We can learn a lot from how the Europeans tackled their water pollution problems’

something like this: desert, grassland, bushes and a network of forests. The west is especially vulnerable, since there is less green coverage,’ says Zhang. ‘With this pressing situation, people have to dig deeper wells underground. This changes the ecological system. A big problem is that any negative effects are difficult to recover from.’

There are also some concerns about the social effects of the water diversion project. ‘The project affects more than 100 counties in seven provinces and municipalities and requires the relocation of up to 400,000 people,’ says Zhang Jiyao. It will be China’s second largest resettlement scheme after the Three Gorges Project, which required

is still a huge challenge,’ says Zhang. ‘But we shall ensure that good arrangements are made for the lives and work of the resettled people, and we will provide better living conditions for all those people affected.’

It might just be the biggest challenge China faces with the South to North Water Diversion project. Still recovering from the horrible aftermath of an 8.0-magnitude earthquake, China now knows that if it doesn’t succeed in ensuring enough clean water for everyone within its borders, it risks creating social unrest. Exactly thirty years after opening up its economy to the rest of the world, that’s something the proud host of the Olympic Games desperately wants to avoid. ■