



# Blue Books

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**China**  
**Utility**

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## Falling up!

Water pricing must meet true costs



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Civic Exchange is collaborating with ADM Capital Foundation on the Asia Water Project, a new information portal on China's water issues targeting the investment and business community. Please visit [www.asiawaterproject.org](http://www.asiawaterproject.org).



### Guo Peiyuan



Dr Guo Peiyuan is the co-founder and general manager of SynTao, a Beijing-based consulting firm on corporate social responsibility (CSR). He is an environmental engineer by training and obtained his PhD in management from Tsinghua University's School of Public Policy and Management. He has worked for several international bodies such as the United Nations and the World Trade Organisation. His area of research includes CSR, corporate sustainability and sustainable finance. Guo has advised a number of large Chinese corporations on CSR strategy, reporting and training, and helped global responsible investors on corporate engagement.

Guo's associates, Anna-Sterre Nette and An Jiali, also contributed to this report.



## Foreword

**Water is the cheapest commodity in the world**

Water is cheap, whether in developed countries or emerging economies. Name one other commodity you can get a tonne delivered to your home for a dollar or two - or even half of that if you're in China or Hong Kong. However, with severe shortages emerging due to inefficient usage, climatic and demographic changes, natural disasters and pollution, it is doubtful that water supply should remain forever a low-cost, government-subsidised service.

**Water stress is most prevalent in Asia**

Nowhere is water stress more prevalent than in Asia. This is mainly due to booming demand from growing populations and agricultural and industrial activities, as the region's developing countries race to boost their GDP. Leaders of the pack, China and India suffer the greatest strain: underground aquifers are overpumped; they are heavily reliant on irrigation; and melting of the glaciers that feed Asia's major rivers continues to accelerate.

**Tariffs in China already up 250% in 15 years**

Our January 2010 *Thirsty Asia 2* report highlighted how China has hiked the tariffs it levies on domestic water users by more than 250% in the past 15 years. Alongside the US\$65bn South-North Diversion Project under construction, which will direct some of the resource from the south to water-stressed Beijing, the policy moves during this period reflect the Chinese government's determination to improve water management.

**The shift from supply to demand management**

Dr Christine Loh of Hong Kong public-policy thinktank Civic Exchange and Dr Guo Peiyuan of Beijing-based consulting firm SynTao have been following China's water crisis closely. They have been keeping track of the availability and pricing of the resource as well as the evolution of related policies and regulations, including the opening up of the water sector to private companies in the 1990s. In this report, they highlight a very important shift in thinking of central and provincial governments - from supply to demand-side management through pricing control.

**Water impacts every part of life**

The price of water must rise to sustain its provision (utilities are losing money), encourage efficient use and expose the true cost of pollution. For business owners, this means higher costs, which they have to cope with by improving their efficiency. For society, the implications extend beyond higher utility fees to social stability and harmony, as water shortages strain farming, which in turn hurt food production and put pressure on food prices. Clearly, water impacts every aspect of life, politics and the economy in China, so investors should continue to watch this space closely.



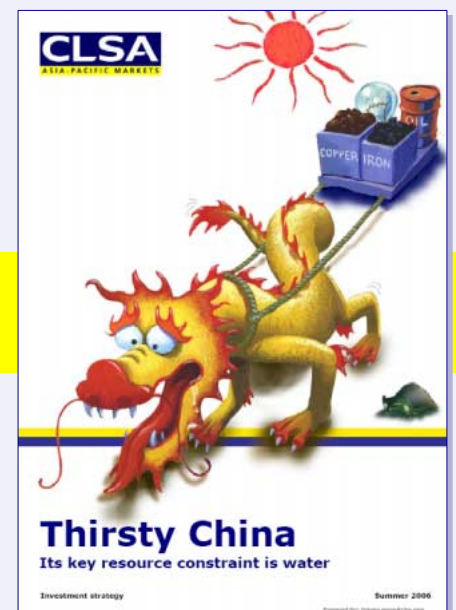
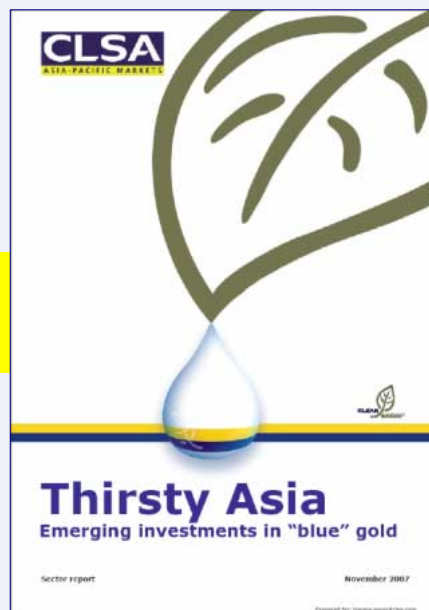
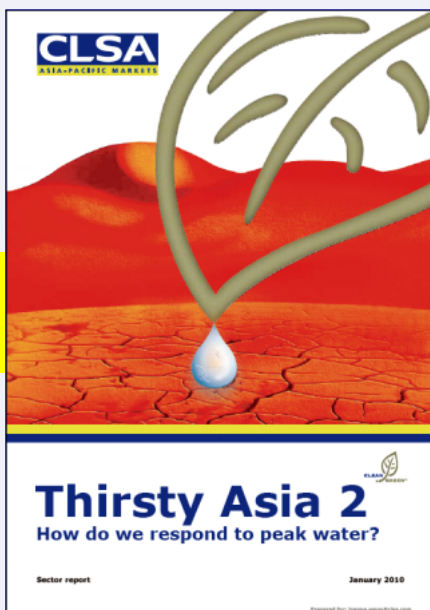
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## The search for water continues





## Falling up!

**Water is overallocated, inefficiently used and badly polluted in China**

China is facing an enormous water crisis: geographic, climatic and demographic changes mean that demand has gushed up to overtake supply, while the resource is overallocated, inefficiently used and badly polluted. The government knows this only too well and has introduced a series of reforms since the 1980s. In the past decade, however, its focus has shifted from supply to demand-side management, putting pricing at the heart of its water policy.

**Price of water remains too low to reflect the true cost of provision**

Despite many rounds of tariff hikes over the past 20 years, the price of water in China remains too low to reflect the true cost of provision. To ease public resistance to rate increases, utilities must make their cost structures transparent - users already expect to pay more, they just need to know where their money goes. Access and affordability for the poor will also determine the popularity of a policy.

**China opened the water market to private companies in the 1990s**

In light of the huge need for water and wastewater infrastructure, and to fund their operation and maintenance, China opened its water market to private domestic and international companies in the 1990s. It was a steep learning curve for the authorities and the investors. Investments were made in an environment where laws, regulations, accounting methods, financing norms, information transparency and accountability were in transition. They still are and today local firms are the major water investors in China.

**Some authorities lost control of pricing, quality after selling water assets**

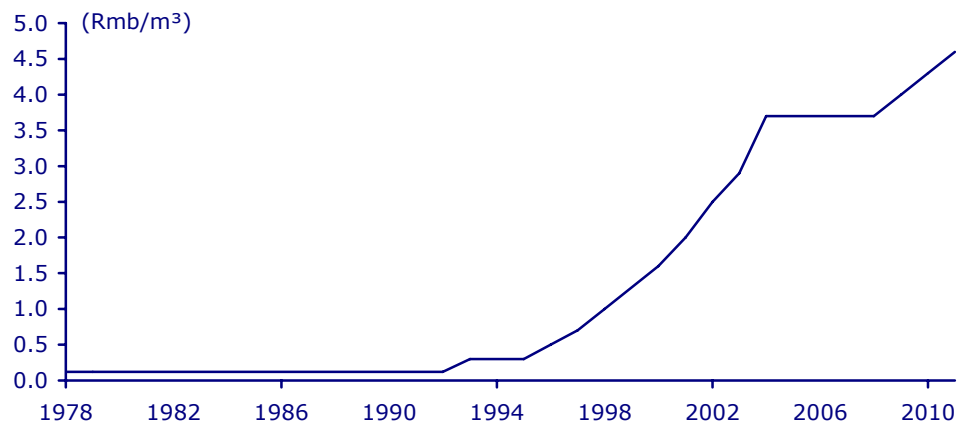
Water supply is a national-security issue and there have been cases where local authorities have lost control of pricing and quality after selling off their assets. Hence, private-sector participants, especially foreign firms, will find it increasingly difficult to acquire equity stakes in water projects. But for those with solid experience in water supply, wastewater and sludge treatment, and water-services consulting and facility design, there should be plenty of management contracts up for grabs. In particular, China's 12<sup>th</sup> Five-Year Plan (2011-15) has budgeted US\$454bn for environmental control measures.

**Large tariff hikes unlikely in major cities in 2010 . . .**

Substantial tariff increases are unlikely in major cities this year after recent hikes, but in second-tier cities in the richer parts of China there is still room for upward adjustment. Major water-consuming businesses will need to improve their efficiency, as the cost of the resource will continue to surge. Investors should ask for companies' water audits and footprint assessments as related risks become more obvious.

**. . . as they have already seen large increases in recent years**

### Beijing is a bellwether in water-tariff hikes - Rate for household users



Source: SynTao



## Evolution of water pricing in China

### Some basic facts

Before we look into water pricing, we need to understand some basic facts about the resource. First, the Earth is a closed system, meaning it rarely loses or gains extra matter. The water that existed millions of years ago is the water we have today. Most of it is in the oceans. Only 3% is freshwater, of which 75% is in the form of glaciers and ice caps. Water has always been the most valuable resource on our planet because all ecosystems and every aspect of human activity depend on it. In principle, it is self-generating and cannot run out. However, that doesn't mean there is enough clean water for the world's six billion people when and where they need it.

Humans have altered the hydrologic cycle of water moving from ocean to cloud, onto the ground and then back to the ocean. Many aquifers, from which groundwater can be extracted, are tapped at a rate exceeding their natural regenerating capacity and many lakes, rivers and streams are badly polluted. Meanwhile, the land is losing its capability to retain the resource as vegetation has been cleared and soil depleted, leading to declining availability of clean freshwater.

Figure 1

### China's major rivers



Source: CLSA Asia-Pacific Markets

### Peak water

"Peak water" refers to the critical point where humans overtax the planet's natural ability to absorb consequences of our use of the resource. Analogous to "peak oil", it is reached when the rate of water demand exceeds that of supply replenishment. Thus, it is not about the depletion of freshwater but the peaking and subsequent decline in production.

**Water is the Earth's most valuable resource**

**Humans altered the water cycle, making freshwater harder to come by**

**Yangtze, Yellow, Huai and Tarim Rivers are heavily polluted**

**China has hit peak water**

China is a prime example of the problem: the resource is overallocated, inefficiently used and badly polluted, yet many people lack access to safe drinking water. The impacts are obvious: rivers and lakes are in very bad shape; groundwater aquifers are rapidly depleting; uncounted species of aquatic life are close to extinction; and human and ecosystem health are in jeopardy.

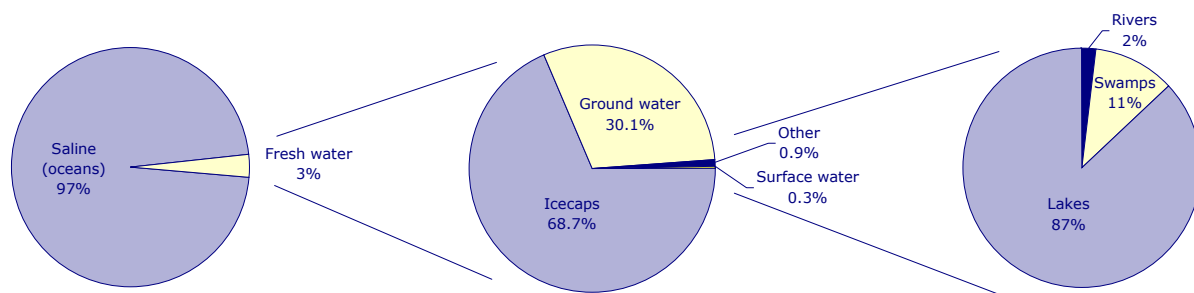
**Water is an ambient commodity**

**Water is a public good but clean water is a public need**

Another fundamental point about the resource is that it is an ambient commodity - it does not belong to any single place or authority. While water is a public good, clean water is not. Most freshwater in nature is unsuitable for drinking. Moreover, pollution is prevalent due to agricultural development (livestock, pesticides and fertilisers); industrial production (chemical, organic and thermal); and human activities (food, detergents, etc). Thus, it must be processed for safe consumption. Treatments of raw water and wastewater, particularly highly polluted one, are costly. Meanwhile, water isn't always where we need it - it has to be delivered. Clean water is certainly a public need but someone has to pay to make it available.

Figure 2

**The world has lots of water but only 1% is on the surface and fresh**



Source: US Geological Survey

**Water pricing is highly dysfunctional, partly due to its political nature**

**Dysfunctional pricing systems**

Most of the problems associated with clean-water access have to do with the fact that water price doesn't reflect the true cost of obtaining the resource. Although many parts of the world are enduring serious water stress, pricing - especially that for the municipal sector - is highly dysfunctional, partly because water is a very political issue. According to *Global Water Intelligence* author Christopher Gasson, 'It is like someone talking up the attractions of their marriageable daughter to a suitor, without mentioning that as well as being beautiful, she is a deranged lunatic. The long-term growth prospects of the water sector are blighted by the fact that water, in general, is sold for far less than it costs to treat and deliver'<sup>1</sup>.

**Transparency and accountability need to be addressed**

**Water service is a natural monopoly**

Government policy and public investments are crucial whether the industry is open to private companies or not. But there is a widespread fear among non-governmental organisations (NGOs) globally that because water supply is a natural monopoly, privatising its provision will not necessarily lead to better services. Instead, it may give commercial interests the chance to squeeze maximum profit from the public. Citizen groups also worry that once long-term contracts are signed between governments and private companies, it would be difficult to hold any party accountable. In short, affordability, accountability and transparency in contract-awarding and tariff-setting all need to be addressed.

**Pricing can reduce demand and lift efficiency**

**Role of water tariffs**

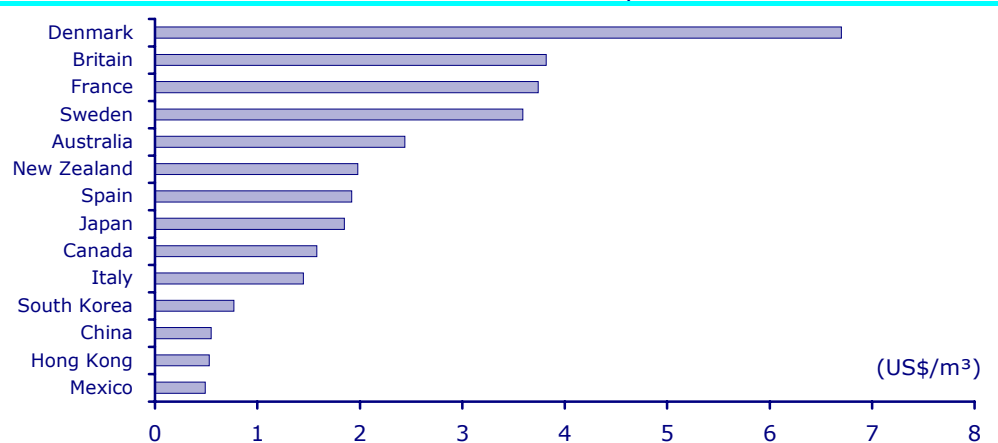
How water is managed impacts almost all aspects of society and the economy, in particular food production, water supply and sanitation, energy, industry, ecosystem and public health. There are currently many issues relating to good water management, ranging from the soundness of policies and laws, effectiveness of implementation and consistency of enforcement to proper use of pricing to reflect the scarcity of the resource. The most important aspect of water pricing is that it can be an effective means to reduce demand and improve efficiency of use.

Pricing is a demand-side management tool. Many cities and countries fail to reflect the true cost of water supply and wastewater treatment (includes sewage) in their tariffs. Indeed, people all over the world are paying too little for the resource. In China, urban households pay only about 1% of total family income for water and sewage services, which is low. The equivalent world average is 2-5%, which is not high either, but China's average is way below the global norm.<sup>2</sup>

**People all over the world pay too little for water**

Figure 3

**Price of water and sanitation services to households, 2007-08**



Source: OECD

**Low water productivity**

**Extreme wasteful water use**

China's water productivity (amount of water used for production, or water-use efficiency) is low. According to the World Bank, at US\$3.60/m<sup>3</sup>, the country's water productivity is lower than middle-income countries' US\$4.80/m<sup>3</sup> average. For comparison, high-income countries can achieve as much as US\$35.80/m<sup>3</sup>.<sup>3</sup>

**Consumes 5-10 times more water for same industrial goods produced**

A number of other metrics provide a general picture of the extent of China's water-wastefulness. First, Harvest Fund Management estimated in 2006 that China consumed 241m<sup>3</sup> of water for every Rmb10,000 worth of industrial goods produced, which was five to 10 times more than in developed economies.<sup>4</sup> Second, reclaimed water accounted for about 40% of the total amount industries in China use, versus 75-85% in developed economies.<sup>5</sup> Of the industries, the worst offender of water wastage in China is agriculture.

**Policymakers are aware of the situation**

**Accepted wisdom**

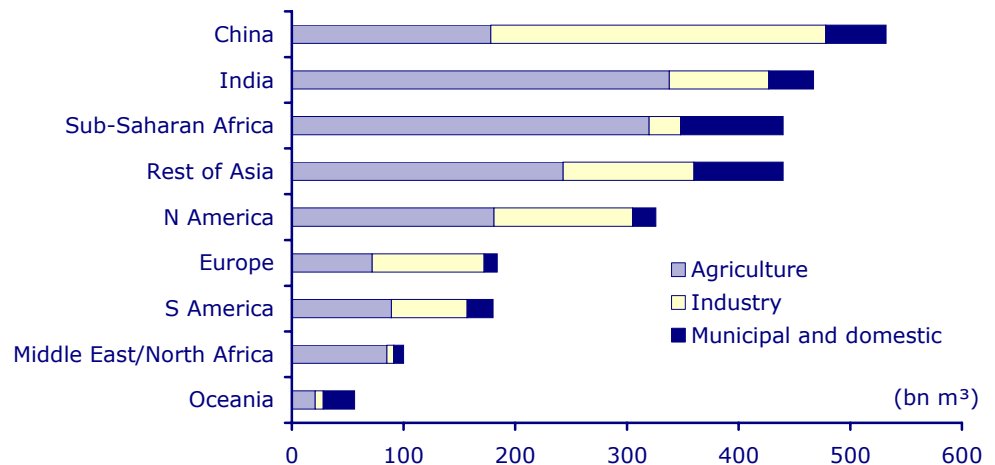
Chinese policymakers are well aware that water shortage hinders the country's development and even threatens its survival. As such, water-pricing policy is now at the top of the government's agenda. By allowing water price to reflect the true cost of provision, Beijing can:

- ❑ Give users the right signals about water demand and supply;
- ❑ Regulate users' water-use behaviour to improve efficiency;
- ❑ Reflect the scarcity of the resource; and
- ❑ Expose the true environmental cost of overuse and water pollution.

**Most growth in demand is for growing food**

Figure 4

**Increase in annual demand for water 2005 to 2030**



Source: McKinsey's 2030 Water Resources Global Water Supply and Demand Model

**Water works get less funding than transport infrastructure**

China has become much more water-conscious in its policymaking, especially in urban areas, although shortages have yet to be effectively solved. However, water facilities remain the poor sister to transport infrastructure in terms of government spending. For example, of China's US\$130bn economic stimulus package in 2009, 38% (US\$49bn) went into infrastructure, mostly roads, railways, airports and irrigation. Water works, classified under rural development, only got 9% (US\$12bn).<sup>6</sup>

This report focuses on the role of pricing in China's water reform in urban areas. Though also a pressing issue, water management in rural vicinities is beyond the ambit of this study and thus we will only make passing comments for the sake of completeness.

**Industry players expect the water sector to grow at least as fast as GDP**

**China's water business**

The thirst for water is driving the growth of private domestic and international companies in the water-management, supply as well as sludge and wastewater-treatment businesses in the cities. Industry players expect the sector to grow at least as fast as GDP.<sup>7</sup> However, private investors have to work within a large developing country where decision-making can be inconsistent, legal framework incomplete, local financial markets underdeveloped, and accounting methods in transition. The risks are especially considerable for foreign investors.

**China started rapid industrialisation and urbanisation in the 1980s**

**China's four phases of water-pricing development**

China began its rapid industrialisation and urbanisation in the 1980s and at the same time started transforming from a centrally planned to a more market-oriented economy. Water utilities in the cities, formerly all stated-owned, became corporatised during that period and Beijing eventually opened the urban sector to private domestic and foreign investors, starting with a trial case in 1992.

**Sought solution in the market**

This decision reflected the government’s belief that the solution to China’s water shortage could come from the market, which is able to more effectively promote water conservation and efficiency as well as to generate funds for additional investment in water infrastructure. Many water supply and piping systems constructed in the 1950s were deteriorating, exacerbated by poor operation and inadequate maintenance. A huge amount of capital was needed to construct, renovate, operate and maintain water and wastewater infrastructure and facilities.

Below we look briefly at how China’s water pricing has evolved against its overall reform over the years and its attempt to gradually build a new water-governance system with new policies, norms, laws, regulations, practices and management. There are four phases to the story.<sup>8</sup>

**Water was free of charge up until 1965**

**Phase 1: 1949-79**

After the establishment of the People’s Republic of China in 1949, the government provided water free of charge up until 1965, when it put the first legal framework for tariffs in place. The Tentative Administrative Method on Collecting and Managing Water Charges for Hydraulic Engineering introduced a fee for raw water to cover a part of the costs of constructing and maintaining water facilities.<sup>9</sup> This early attempt to price the resource was unsuccessful due to the Cultural Revolution (1966-76) and its ideological bent against economic principles. Even water metering was considered “politically incorrect”. In 1979, on the cusp of reform, water meters were uncommon, and water rates very low.

Figure 5

**Yalong River, which flows into Yangtze**



Source: Green River

As for wastewater treatment, up until the 1960s, only a few cities had plants that provided primary processing, such as removing the solids. By 1978, there were 35 sewage-treatment plants in China, all operated by the state.

**Creation of a water-governance system**

**Phase 2: 1980-94**

China embarked on an economic reform during this period, resulting in a turning point in its water development, including the creation of a governance system. Booming urban water-infrastructure investments to meet the rising demand of industrial and urban residential users characterised these 15 years. This phase also saw the rapid enactment of laws, regulations and administrative rules to promote the country’s reform. Though it was a new experience, it was not always systematic or well thought-out. A large number of laws, decisions, orders and administrative regulations and rules were created or made under a variety of ad hoc policy orientations.

**Government set water tariffs through the 1980s**

The government set the water tariffs throughout the 1980s, while state-owned suppliers had no role in the process. In a major reform initiative in 1991, the responsibility of providing water and wastewater treatment shifted from central to local authorities, which established water companies through merging regional entities. These new bodies still received government

subsidies but were tasked to operate with a more commercial mindset. They became separate accounting units (assuming responsibility for their own profit and loss), although tariffs were still monitored by local governments.

**New set of laws and rules between 1984 and 1994 to support water reform**

To support the reform, Beijing promulgated a new set of laws and rules between 1984 and 1994. The Administrative Method on Accounting, Collecting and Managing Raw Water Charges of Hydraulic Facilities proposed to charge a fee for water that covered operation, maintenance, depreciation and other costs. The Ordinance on Price Management set the political tone of the reform in 1987 - the government would provide water as a key public service but would keep tariffs low. The first Water Law was also passed in 1988 to regulate water resources. The Notice on Promoting Urban Water Conservation introduced a quota system for water usage. Users exceeding the quota had to pay double the charge. The Stipulation on Urban Water Conservation required relevant departments to set quotas for water usage, and the resource would be charged on actual consumption. The Urban Water Supply Regulations, promulgated by the State Council in 1994, provided that urban household tariffs should be set in accordance with the principle of cost recovery and low profits. It also empowered local governments to design tariff-setting plans and procedures.

**First wave of tariff increases took place in mid-1980s**

The first wave of tariff increases took place in the mid-1980s, accompanied by installation of household water meters and by the end of the decade, about 80% of China's cities had had increased water charges. By 1990, households were paying Rmb0.15-0.30/m<sup>3</sup> and industrial users Rmb0.20-0.50/m<sup>3</sup> - both of which were still far below the actual cost of water provision.

**First case of foreign investments in China's water projects**

This phase would be incomplete without the mention of the first trial of opening up the water market to foreign participation. In 1992, the Suez Group entered into a joint venture with Hong Kong's NWS to form Sino French Water to undertake a project in Zhongshan, Guangdong province, to manage and distribute water.<sup>10</sup>

**Focused on dealing with water pollution**

**Phase 3: 1995-2007**

Between 1995 and 2007, the Chinese government mainly focused on dealing with water pollution, thus building wastewater-treatment infrastructure was a major priority. The period had three key characteristics: experimentation with policies and strategies in water governance; institutionalisation of wastewater treatment; and opening up of the water sector to private and even foreign investment, although the major investors today are domestic companies.

## Domestic and foreign water investors in China<sup>11</sup>

Foreign firms participating in China's water projects must fulfil a complex set of joint-venture requirements that are designed to limit their control of the mainland's water assets while maximising technology transfer to local partners.

Global water companies, such as Veolia Water, Suez Lyonnaise des Eaux, Berlin Wasser and Thames Water, had gained footholds in China despite many problems with contracts. Some of these had to be renegotiated or cancelled as the guaranteed rates of return had led to the local governments losing large sums of money because water tariffs remained low.

As of 2009, Veolia Water, the largest foreign water investor in China, has ventured into 21 projects in about 20 provinces, with most of them in Tier-1 cities. The company holds about a 50% stake in joint ventures with Chinese partners that run for 25-30 years.

Domestic firms are now the major water investors in China. Beijing Capital focuses on urban water supply and sewage disposal and has more than 30 projects. Other major players include Capital Environmental Protection, Shenzhen Water and General Water of China, which were formerly owned or are still majority-owned by the state.

**Price Law in 1997**

The groundbreaking Price Law passed in 1997 gave the market the power to set prices but the authorities retained the right to intervene. This applied to the setting of water tariffs as well. The following year, the landmark Urban Water Supply Price Management was promulgated. It provided the regulatory framework for a new system to rationalise the resource together with the related infrastructure as public economic goods. A water fee was proposed to protect supply and improve efficiency. Ancillary to these major pieces of legislation were policies and rules for water provision and conservation that reinforced the notion of charging for water and wastewater treatment, such as the Administrative Methods on Urban Water Supply Pricing. Furthermore, the Code of Conduct for Governments to Set Prices (Trial), passed in 2001, defined the responsibilities of the authorities in price-setting.

**New Water Law promotes unified water management**

In October 2002, a new Water Law came into effect. Compared with the one in 1988, this version spelt out a national strategy on managing the resource. It promoted unified water management and efficiency, and stressed the importance of balancing supply, population, economic development, environmental protection and legal responsibilities - a new norm-setting attempt. In 2002, 36 major cities were paying, on average, Rmb1.26/m<sup>3</sup> for water, about an eightfold increase from 1988's Rmb0.14/m<sup>3</sup>. Beijing saw an even greater increase from Rmb0.12/m<sup>3</sup> to Rmb2.50/m<sup>3</sup> during the same period.

China had 63.1bn m<sup>3</sup> of wastewater in 2002, 61.5% industrial and 38.5% domestic. The amount of municipal wastewater treated was only 13.5bn m<sup>3</sup>, at a treatment rate of 39.9%, compared to 15% in 1990. In counties, towns and rural areas, the rates were lower. By 2005, the US Department of Commerce estimated the treatment rate of city municipal wastewater in China had rose to 45% and that in cities with population greater than 500,000 was up to about 60%.<sup>12</sup> China Investment Consulting Net, however, calculated the 2005 rate at 52%, with 792 wastewater-treatment plants.<sup>13</sup> By 2006, 56% of urban domestic wastewater was treated, which remained a low rate and 200 cities still had no treatment facilities at all.<sup>14</sup> Today, all cities in China are required to have wastewater-treatment facilities.

**The consequence of pollution is obvious**

Figure 6

**Fishkill on Miaohu Lake**



Source: Imagine China

**Role of the government in further marketisation**

Meanwhile, the revised Catalogue for the Guidance of Foreign Investment Industries, published in March 2002, included the construction and management of urban water plants for the first time. Most importantly, in 2003, the 16<sup>th</sup> Central Committee of the Chinese Communist Party decided to allow private domestic and foreign companies to invest in the country's water market. This reaffirmed the recognition of the massive need to invest in urban water infrastructure and management at the highest political level. From that point on, urban water supply became a commercialised service. By 2007, China had many water utilities and wastewater-treatment companies operating under a variety of structures. These include: corporatised state-owned utilities; companies operating under concession, management, lease or greenfield contracts; joint ventures; and, in some rare situations, privatised assets. Joint ventures were the most widespread (51%) form, and greenfield contracts were most prevalent for wastewater-treatment projects.<sup>15</sup>

Figure 7

**Major foreign-invested water projects in China, 1992-2009**

Location (company)	Year	Project	Duration (years)	Population served
Tianjin (Sino French Water)	2009	Renovation and operation of drinking-water facility	30	1.5 million
Xian (Veolia)	2008	Xian negotiated with Veolia for two years but decided not to sell any equity or enter into joint venture.		
Haikou (Veolia)	2007	Management of water production and distribution	30	800,000
Changshu (Sino French Water)	2006	Management of water production and distribution	30	1.8 million
Lanzhou (Veolia)	2006	Management of water production and distribution	30	1.9 million
Liuzhou (Veolia)	2006	Management of water production and distribution	30	1 million
Changzhou (Veolia)	2005	Management of water production and distribution	30	1.2 million
Kunming (Veolia)	2005	Management of water production and distribution	30	2.5 million
Urumqi (Veolia)	2005	Renovation and operation of wastewater facility	23	1.14 million
Hohhot (Veolia)	2004	Renovation and operation of drinking-water facility	30	1 million
Sanya (Sino French Water)	2004	Management of water production and distribution	30	280,000
Shenzhen (Veolia)	2004	Management of water production and distribution, and wastewater facility	50	7.61 million
Qingdao (Veolia)	2003	Construction and management of new wastewater-treatment plant	25	820,000
Chongqing (Sino French Water)	2002	Joint venture between Sino French Water (60%) and Chongqing Water Group (40%)	50	1 million
Qingdao (Sino French Water)	2002	Management of water production and distribution	25	2.5 million
Shanghai (Veolia)	2002	Management of water production and distribution in Pudong	50	2.6 million
Zhuhai (Veolia)	2002	Built and operate two new wastewater-treatment plants	30	330,000
Zhengzhou (Sino French Water)	2001	Created the new water company	30	na
Chengdu (Veolia)	1998	BOT, drinking-water facility	18	2.66 million
Tianjin (Veolia)	1997	Renovation and operation of water production and drinking-water facility	20	1.85 million
Shanghai (Thames)	1996	BOT, Dachang Water Plant (contract bought out from Thames in 2004)	20	na
Shenyang (Hong Kong Huijin China)	1996	BOT, development of new water plant but project bought back in 1999	20	na
Zhongshan (Sino French Water)	1992	Management of water production and distribution	35	170,000

Source: Civic Exchange<sup>16</sup>

**An innovation - public hearings**

Also put in place in 2003 was a novel initiative - Methods on Organising Public Hearings for Governments to Set Prices. It provides for the legalising, institutionalising and holding of public hearings for commodity-price setting. The snag here is that public hearings are still in an early stage of development in China and they have not yet won the trust of the people. We will discuss public hearings on tariff adjustment in greater depth in Section 4.

**New policy in 2004  
labelled water as a  
commercial good**

A new policy promulgated in 2004, Administrative Method on Raw Water Price of Hydraulic Facilities replaced a similar one passed in 1985 to allow higher water charges. It labelled water as a commercial good, thus it is subject to a commercial price. In 2006, the Ordinance of Water Permits and Water Resource Fee Management enabled local authorities to set and keep local water tariffs. They can use retained funds for water development, conservation, protection and management. The National Development and Reform Commission (NDRC) also issued a supervisory regulation on water pricing that year, urging to base tariffs on the cost of supply, including costs of accessing groundwater, pipe construction and sewage treatment. The government would cover the capital investment, while users should cover the operation, maintenance and disposal expenditure.

**Beijing will focus  
on four aspects**

**Phase 4: 2007 onwards**

Beijing will focus on four aspects going forward: the role of the government within a socialist market economy; tariff hikes; dealing with water-pollution control; and pushing for environmental information reporting and disclosure as a means to improve corporate performance. There is an ongoing debate on what the role of government should be and what structures are appropriate as the country continues reforming its water and wastewater sector. We will go into greater detail in Section 4.

**Public reaction to tariff  
hikes has been negative**

The current phase of reform is also about raising water tariffs but this is a challenging task. China made a determined effort in 2009 to hike charges as many domestic water suppliers were operating at a loss. While many cities have or will increase tariffs by Rmb0.30-0.60/m<sup>3</sup>, public reaction has been negative. We will talk more about this in Section 4.

**Release of environmental  
information improves  
transparency . . .**

Transparency is essential to good governance. In terms of water management, information on water resource, policies, relevant institutions and price adjustments transparency should be made available to the public. Since 2004, Beijing has issued various policies and laws to promote information disclosure but China still has a long way to go.

**. . . which helps gain  
trust of the people**

The government also believes naming and shaming would encourage/force agencies and the corporate sector to improve their environmental performance. The State Council's Government Open Information Regulations and the Ministry of Environmental Protection's (MEP) Environmental Information Disclosure Measures went into effect on 1 May 2008. By requiring environmental-protection agencies to release a wide range of information and by allowing the civil society access to these data, Beijing has enabled NGOs and the media to track water quality and pollution in China.

**Note the long-term  
impact of China's  
disclosure laws**

For example, the Institute of Public & Environmental Affairs (IPE) in Beijing has developed a Pollution Information Transparency Index, which has become an influential information source.<sup>17</sup> The Shanghai Stock Exchange echoed the new open-information law by issuing a notice in 2008 to listed companies, requiring them to devise social-responsibility plans and release information on environmental violations.<sup>18</sup> IPE, together with Civic Exchange in Hong Kong, have called upon Hong Kong Exchanges & Clearing in March 2010 to follow Shanghai Stock Exchange's footsteps since many Hong Kong-listed companies operate in the mainland. The Hong Kong stock exchange is formulating a new Corporate Social Responsibility Code, and it would be interesting to see if the city takes a leadership role to seriously push for environmental reporting and disclosure.<sup>19</sup>



## Challenges and fixes

**The sixth-largest water resource in the world**

China has total water resources of 2,840bn m<sup>3</sup>, ranking it sixth in the world. A third of it is groundwater, where 70% of the nation's drinking water and 40% of water for agricultural uses come from.<sup>20</sup> However, only 2,156m<sup>3</sup> was available for each person in 2007, which was about a quarter of the global average (8,550m<sup>3</sup>).<sup>21</sup> Compare China with Canada and the picture becomes clear: the countries are about the same size and have a similar amount of water resources, but China has 40 times more people. In other words, the mainland's large population has strained its water capacity.

Figure 8

**Water is scarce in China due to its vast population**

**Water per capita by province, 2007**



Source: National Bureau of Statistics, Civic Exchange, CLSA Asia-Pacific Markets

**The north is much more water-challenged than the south**

### Availability, rainfall and population mismatch

In China, water availability, rainfall and population distribution do not match. More than 45% of people live in the north, accounting for 25% of national grain production and half of the national produce, but the region only has 19% of China's water resource and gets about a fifth as much rain as the rest of the country. Surface and groundwater there have been badly polluted.

Figure 9

**Water-resource distributions - North versus south**

National value	Five northern major watersheds	Four southern major watersheds
Water resource (%)	19	81
Population (%)	46.5	53.5
Per capita (m <sup>3</sup> )	1,127	3,381
GDP (%)	45.2	54.8
Cultivated land (%)	65.3	34.8

Source: Ministry of Commerce, PRC<sup>22</sup>

Moreover, water tables have been falling for decades as a result of excessive pumping for agricultural, industrial and municipal uses. At the present rates of water consumption, groundwater in northern China may deplete in the next

decade.<sup>23</sup> The exhaustion of the resource also contributes to the drying up of lakes as well as land subsidence (Beijing, Tianjin, Taiyuan and Shanghai have recorded several meters), which impair the storage capacity of aquifers and exacerbates the impact of droughts and desertification.<sup>24</sup>

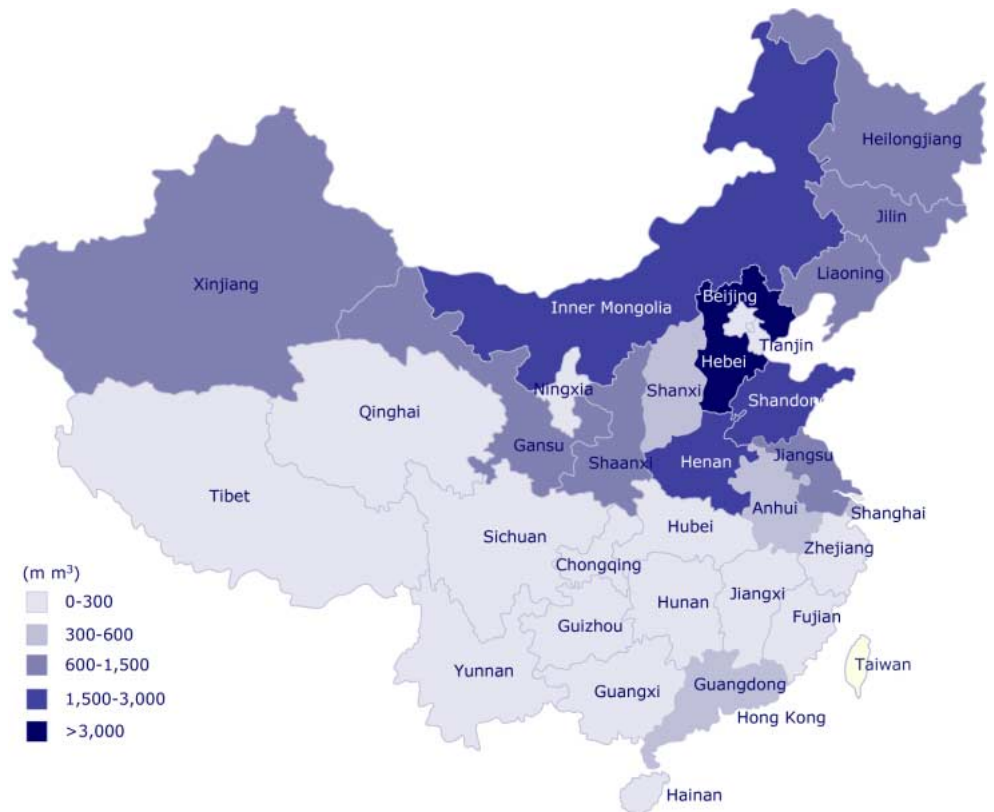
**Southern region is better water-resourced**

Much of the rain during the summer monsoon falls on the southern part of China, and the region has 80% of the country's water resource. The significant imbalance gave rise to the ambitious but highly controversial South-North Water Diversion Project, which was designed to channel water from the Yangtze River along three routes to the north, including the cities of Beijing and Tianjin, and Hebei and Henan provinces. The Rmb500bn plan is to divert 5% of the flow from the Yangtze River every year through the building of canals, pipes and pumping stations along the three routes in eastern, central and western China.

**Groundwater most depleted in the north**

Figure 10

**Groundwater depletion by province**



Source: World Bank, Ministry of Water Resources, CLSA Asia-Pacific Markets

**Two of three routes to divert water to the north should be ready in 2014**

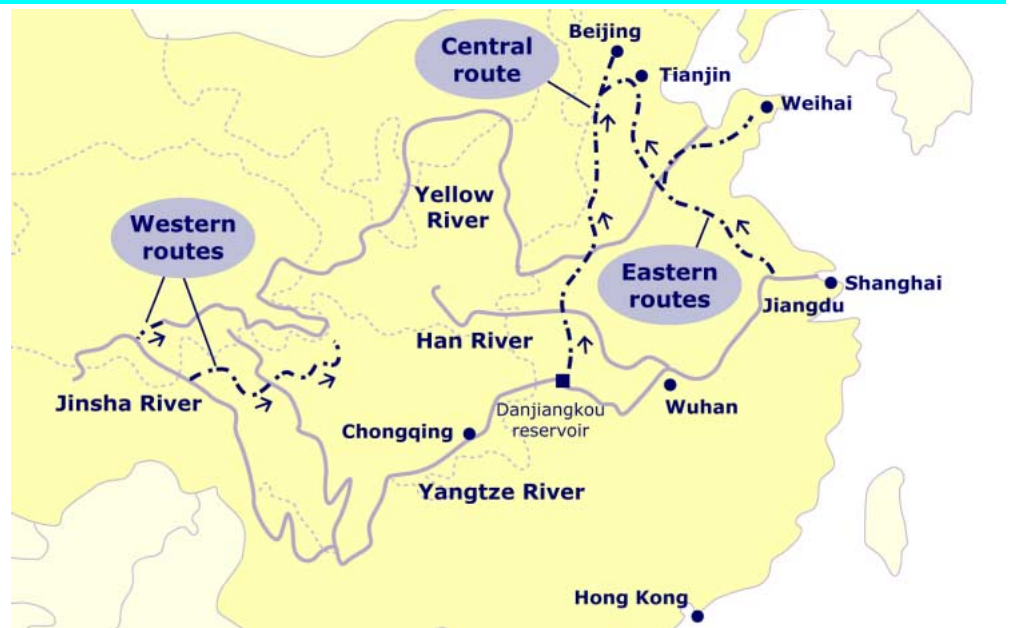
Work on the eastern route began in 2002 and the central route in 2004. There have been many delays, but the timetable is for completion of these two routes by 2014. In light of the droughts this year, there are now calls for delaying and reconsidering the western route of the project which requires cutting through mountains in Sichuan and Qinghai.<sup>25</sup>

However, storage infrastructure has been neglected. Of China's 87,000 reservoirs, the government reckons 43% are in poor condition. The situation is worse in the more remote rural areas.<sup>26</sup>

Three routes for diverting water the water-stressed northern region

Figure 11

South-to-North Water Diversion Project



Source: South-to-North Water Diversion, www.nsb.gov.cn, CLSA Asia-Pacific Markets

The drought this year is a 'once-in-a-century' disaster

Geography and climate

Due to its geography and climate, China suffers frequent droughts, floods, mudflows and typhoons that can lead to heavy economic loss. Between 1949 and 2009, the country endured 17 severe droughts and 50 extraordinary floods.<sup>27</sup> Authorities describe the current droughts in the southwest as a 'once-in-a-century' occurrence.

Figure 12

Signs of water scarcity

Symptoms	China
Declining dry-season river flow	✓
Groundwater depletion	✓
Extensive water pollution	✓
Inequitable allocation of water resource	✓
Poor enforcement of permitted water withdrawal	✓

Source: Civic Exchange

Droughts in 2010 . . .

In 2010, the country faces serious droughts in many parts of the country, particularly in the southwest. Persistent dryness in some parts of northern China is also worrying because it may affect grain production.

Southwest China suffered most, with 50-60m people affected

The Pearl River and its tributaries make up the main river system in south China. It rises in Yunnan and feeds Guangxi and Guangdong provinces, and is vital to the wellbeing of 100 million people. But since 2009, Yunnan, Guizhou, Sichuan and Guangxi provinces as well as the city of Chongqing have received only 40-50% the annual average rainfall. The drought in the southwest region is constraining the source of the Pearl River in Qujing, Yunnan. On 22 March 2010, Zeng Lingyan, the administrative director of the Pearl River Source Natural Reserve, said the water that used to gush out from a granite cave at the foot of a hill like a 'thundering waterfall' is now running with a width of 'a finger' after several months of severe droughts.<sup>28</sup>

**Yunnan usually has a lot of water and a drought of this magnitude is rare**

Water supplies have been depleted, with Guizhou and Yunnan particularly hard hit.<sup>29</sup> Yunnan is one of China's best-water-resourced province and a drought of this magnitude is rare. Meanwhile, Gansu province in the northwest is also impacted. By end-March 2010, droughts have affected 50-60 million people across the country, leaving 24.25 million of them and 15.8 million livestock short of drinking water. About 7.7 million hectares of farmland had been affected and more than a million hectares are likely to yield no harvest.<sup>30</sup>

**Impact on harvest could hurt food supplies**

The droughts also disturb the water flows to Guangdong, lowering water levels at reservoirs and affecting hydroelectric power generation, resulting in a once-a-week blackout in the Pearl River Delta. As such, power supply to Dongguan factories is being suspended once a week starting 1 April 2010.<sup>31</sup>

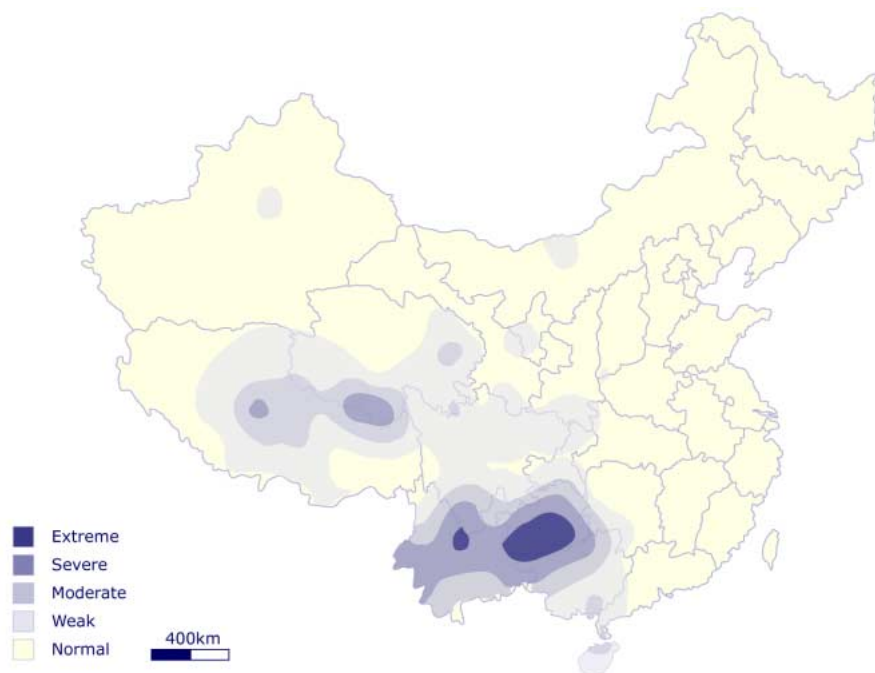
The implications are widespread for drinking water, irrigation and industrial activity such as power generation. Some of the worst affected areas, where early-spring harvest such as corn and wheat are non-existent, have run out of food. And there are reports that sugarcane fields in Guangxi have been ruined. If there is no rain in May, major spring crops such as rice will also be at risk. But even if it rains, there are not enough water buffalos to till the land as many had been sold since the start of the droughts.

Authorities have sent water trucks and food to affected areas, and are trying to hold down food prices. Wells are being drilled. More than 260,000 soldiers have been doing relief work, and while cloud seedings have slightly eased the situation in some places temporarily, they have not been a great success due to a lack of moisture in the sky.<sup>32</sup> Much still depends on the adequacy of rainfall in May.

**Worst affected areas this year**

Figure 13

**Areas affected by droughts in 2010**



Source: Beijing Climate Centre, CLSA Asia-Pacific Markets

Some 11m hectares of land watered by extreme measures

Figure 14

Irrigation in eastern Anhui



Source: Xinhua

Figure 15

Y-7 ready for cloud seeding



In 2009, Beijing declared an emergency: 'rarely seen in history'

**. . . and recent years**

Dry years tend to come in succession. There have been droughts of varying severity in many parts of China for some years. Poor water infrastructure has only exacerbated the situation.

In February 2009, Beijing declared a state of emergency in eight northern and central drought-stricken provinces (Hebei, Shanxi, Anhui, Jiangsu, Henan, Shandong, Shaanxi and Gansu), saying the condition was 'rarely seen in history'.<sup>33</sup> In the summer of 2009, droughts hit northeast China, including Jilin and Inner Mongolia, and even the central provinces of Hubei and Hunan.<sup>34</sup> As noted above, northern China is the country's main grain-producing region, so persistent dryness into 2010 has caused official concern.<sup>35</sup> With dryness emerging in Hebei, Shanxi, Gansu and Ningxia, officials are anxious about having to cope with simultaneous droughts in the southwest and the north.<sup>36</sup>

In 2008, parts of Yangtze River saw its lowest water level in 142 years

In 2008, state media reported that China was combating its worst drought in a decade, with parts of the Yangtze River seeing its lowest level of water in 142 years. Millions of Chinese people suffered water shortages and dozens of ships had run aground in the river since October 2007. Water levels in other rivers and reservoirs were also at record lows. Officials cited an earlier-than-expected dry season as the reason for the drought.<sup>37</sup>

In 2007, torrential summer rains and storms caused devastating floods and landslides in Jiangsu, Anhui, Henan, Hubei, Sichuan and Shaanxi provinces and the city Chongqing. On 16-17 July, Chongqing reportedly received 227mm (9 inches) of rain in 24 hours.<sup>38</sup> Despite this episode, groundwater supplies had not been replenished by the time drought arrived two years later.

In 2004-05, south China suffered the worst drought in 50 years

From October 2004 to January 2005, south China suffered what was described as the worst drought in 50 years. The drought was most serious in Guangdong province, but parts of Guangxi, Hunan, Jiangxi, Fujian, Yunnan and Hainan were also affected.<sup>39</sup>

**Top of the water-reform agenda  
Matching supply with huge demand**

By 2009, 46.6% of China's total population was classified as urban, and the ratio will continue to rise.<sup>40</sup> Supplying clean water and treating wastewater remain a constant challenge although the country's progress in this area is the largest and fastest-growing in the world - the numbers are staggering.

**Some real progress**

No one can accuse China for being a slouch. In 2000, 250 million urban residents could access water and domestic consumption was at 1.32bn m<sup>3</sup>. By 2007, the population served had increased by 100 million to 350 million urban residents with total domestic consumption at 16.4bn m<sup>3</sup>.<sup>41</sup> From 1998 to 2007, the number of water-supply plants expanded by 27%, from 1,450 to 1,852. Between 2002 and 2007, water-production capacity surged from 122m m<sup>3</sup> per day to 154m m<sup>3</sup>, with 194,000km of water pipes, up from 336,000 km.<sup>42</sup>

In 2000, 31m m<sup>3</sup> of wastewater was treated daily, at an urban ratio of 34%. By 2007, these figures had increased to 62m m<sup>3</sup> and 63%.<sup>43</sup> The volume of annual discharge of industrial wastewater and sewage in cities and townships rose from 23.9bn m<sup>3</sup> in 1980 to 73.1bn m<sup>3</sup> in 2006.<sup>44</sup>

What China has done to date is no small feat but problems remain:

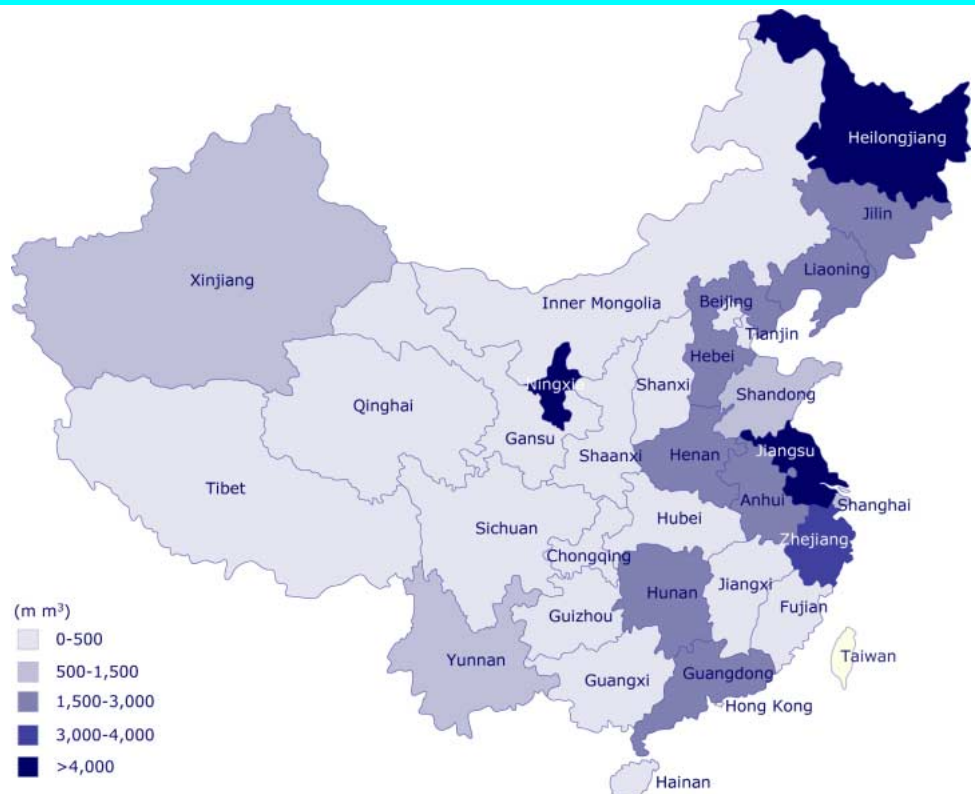
**A turning point in water governance**

- ❑ **Shortage:** Of China's 663 cities, 400 are still short of water, with 110 facing severe shortage. This amounts to 16m m<sup>3</sup> per day, affecting about 40 million people, according to government estimates.<sup>45</sup>
- ❑ **Leakage:** The volume of non-revenue water (water that has been produced but lost before it reaches users) increased from 4.9bn m<sup>3</sup> to 8.7bn m<sup>3</sup> in 2007. The bulk of the loss is due to leakage, which is literally water down the drain in a country where water is scarce.<sup>46</sup>
- ❑ **Poor quality:** Of China's 140,000km rivers, 21.8% is not fit for any use and 41.7% is only fit for industrial purposes.<sup>47</sup> A huge amount of untreated wastewater continues to flow into natural water bodies. China's polluted lakes and rivers are legendary. Beijing estimated in 2004 that water pollution causes economic losses amounting to at least 1.7% of GDP.<sup>48</sup>

**Many polluted areas**

Figure 16

**Polluted water sources by province**



Source: World Bank, Ministry of Water Resources, CLSA Asia-Pacific Markets

**Air and water pollution prevalent**

Figure 17

**On the banks of the mighty Yangtze**



Source: CLSA Asia-Pacific Markets

**What it takes to create a new system**

**New water-management system**

Three aspects of China’s attempt to build a new water-management system appropriate for the modern era are relevant to its water policy:

- Completing the creation of a water-governance mechanism;
- Dealing with a fragmented and hierarchical decision-making system; and
- Meeting major policy challenges across the board.

It is fair to say that China is probably going as fast as any developing economy in the area of water reform but the scarcity crisis is not letting up. A key indicator to watch is Beijing’s policy priority and financial resources it will budget for management of the resource in its upcoming 12<sup>th</sup> Five-Year Plan (2011-15), which we will discuss more in Section 4.

**Need to define roles of the government, markets and society**

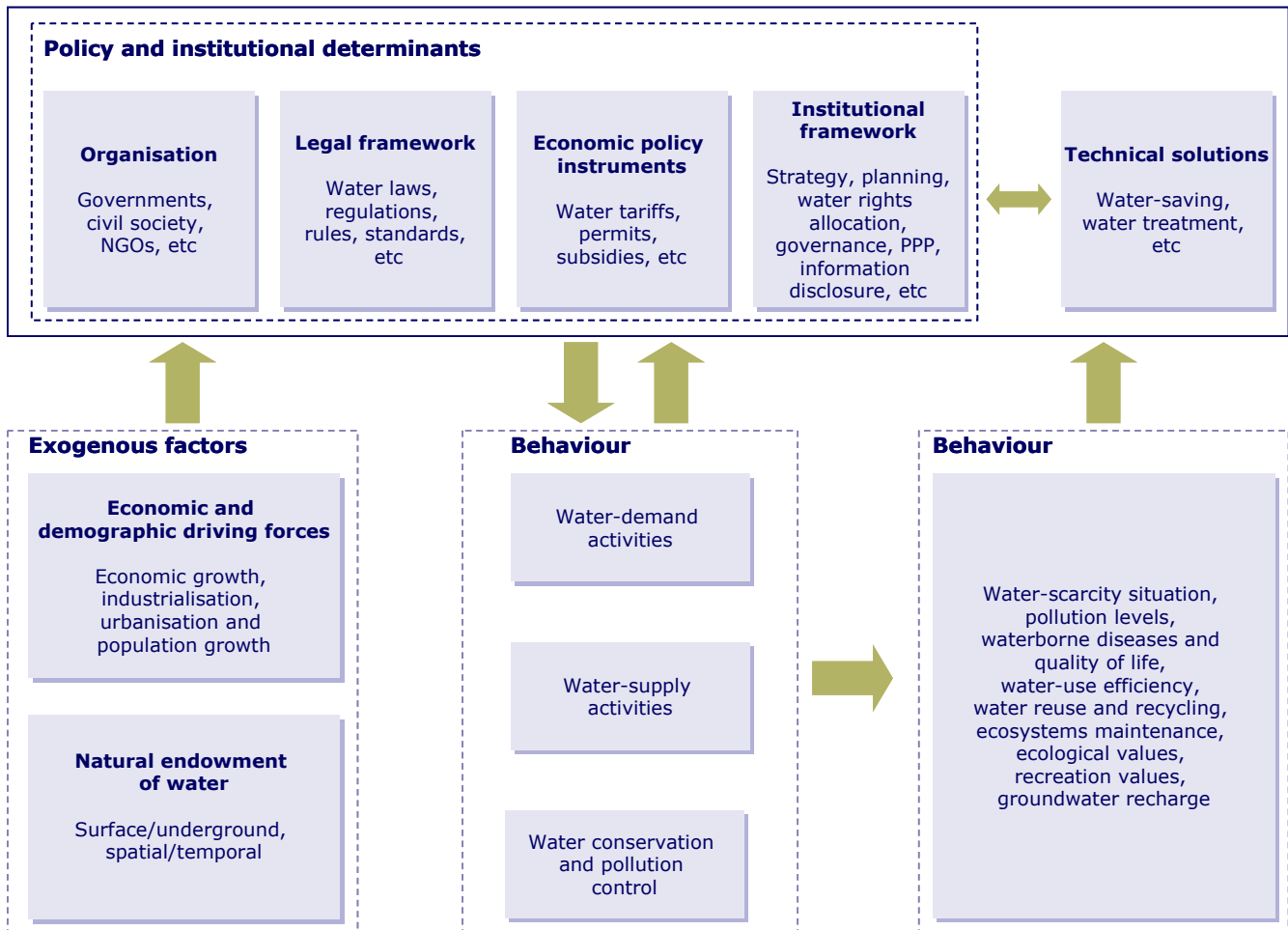
What the process entailed to date is that the government has had to clarify, through various policies, the new roles of and relationships between government, markets and society. The building of a socialist market economy, starting in the 1980s, has gradually decentralised decision-making from the central to more local levels, realigning these parties’ roles.

**New legal framework to boost water governance**

In building a new water-governance system, China has already gone through a number of important milestones. An effective governance system is only possible if it is built on a sound legal foundation, which requires a new framework and different institutional arrangements to be put in place. We will not delve into too much detail about China’s legal system in this report but note that the process is far from complete and the country still has a long way to go.

Figure 18

**Water governance takes broad effort**



Source: World Bank<sup>49</sup>

**Chinese law are strong on stating principles but weak on execution**

China’s current legal system was built in the 1980s. In other words, its water-governance system took shape within a still-evolving legal and regulatory structure and system. Its many imperfections have much to do with this ongoing process. Many pieces of Chinese law are strong on stating principles but weak on execution. This is the case with laws relevant to water-resource management as well. They often lack mechanisms and procedures for enforcement, such as supervision, monitoring, reporting, evaluation and penalties for non-compliance. Moreover, many parts of the legislation remain incomplete or ambiguous, which weaken their overall effectiveness.

**Policy and legal development**

**Decision-making process**

**Fragmented system**

In Chinese mythology, dragons rule water, particularly waterfalls, rivers and seas. In today’s China, there are many “dragons” ruling water too, by directing decision-making about the use of the resource. Figure 19 shows these central-level decision-makers. It is obvious that China’s water-management system is fragmented, both vertically and horizontally.

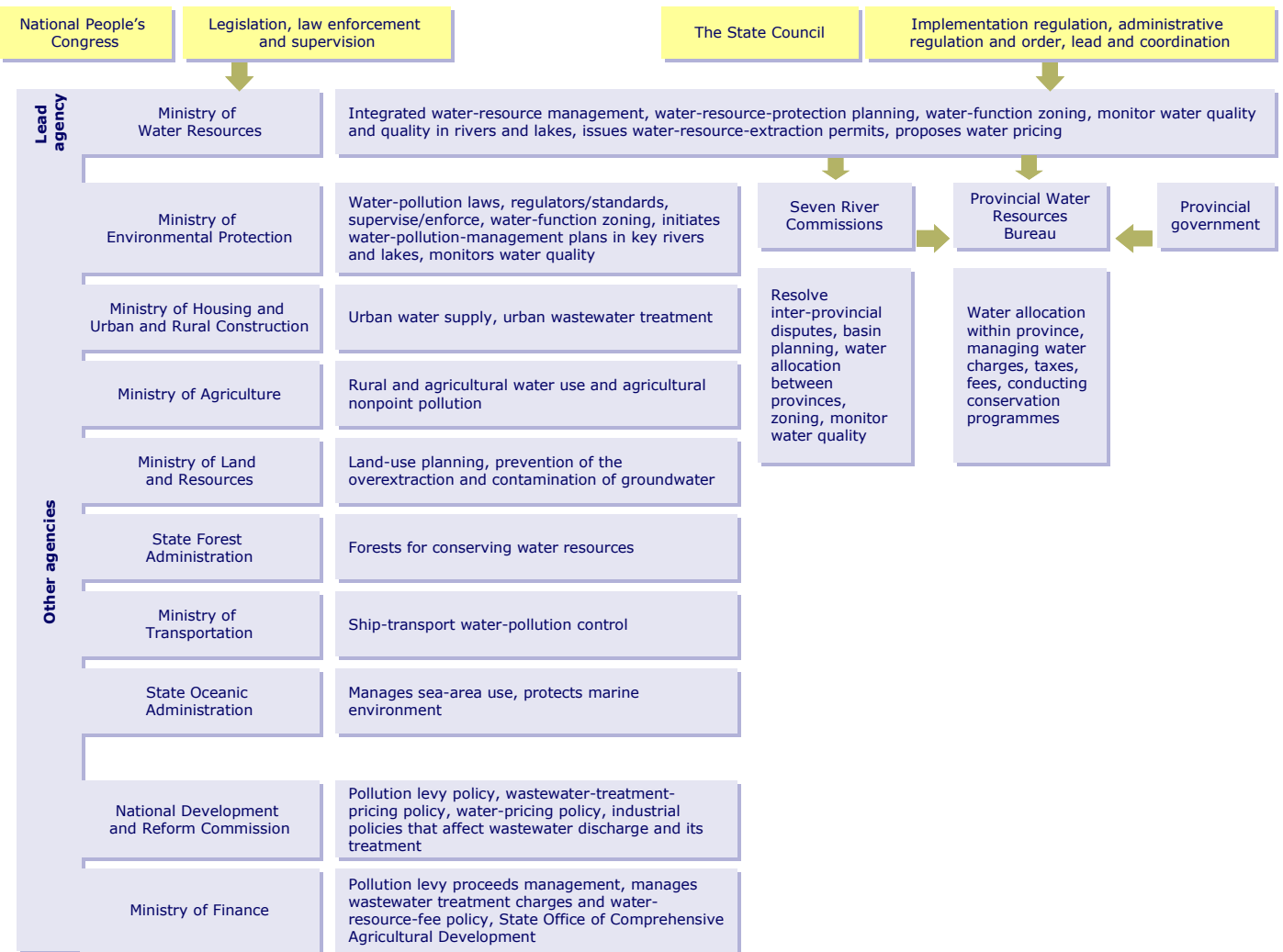
Among these “dragons”, the Ministry of Water Resources (MWR) is the main high-level policy body. Its main role is to manage water-resource allocation. Once water is transferred to the urban water-supply system, responsibility

**Water decision-making - a four-tiered hierarchical structure**

falls upon the Ministry of Housing and Urban-Rural Development (Mohurd, previously called the Ministry of Construction). However, the setting of water tariffs is overseen by the NDRC. The MEP deals with pollution matters. And there are other central-government-level bodies dealing with various other water matters. Beyond them are their local equivalents, which present the last layer of a four-tiered hierarchical structure.

Figure 19

**Ministries and authorities involved in water management**



Source: Civic Exchange, SynTao<sup>50</sup>

Vertically, the structure is mainly built on the administrative boundaries of different levels of government - and each level of government has its own focus and priorities. This doesn't make dealing with water basins easy since rivers cross the boundaries of many provinces, and even into other countries. Horizontally, at every level, several institutions are involved with various points of overlap and even conflict.

**Conflict of interests between government bodies**

Too many cooks often spoil the broth. In summer 2007, Lake Tai (third-largest in China) in the Yangtze River Delta turned fluorescent green from toxic cyanobacteria, commonly referred to as "pond scum". Not only was the stench

**Interdepartmental conflicts are common**

**Algae attack at Lake Tai**



Source: China Environmental Law

**World Bank sees two options**

**There has been some integration at local levels**

**Demand-side management is key**

of decay terrible, the people in Wuxi were left without drinking water for days. The cause was longstanding pollution from various sources, including chemical factories and even aquatic farms. An example of interdepartmental conflict arose between the environmental-protection and agricultural agencies. It was difficult for the former to close down the aquatic farms because the agricultural agencies defended them as important to the local economy.<sup>51</sup>

Solving this kind of institutional problems requires drastic restructuring of governmental organisations, which is never easy in any country. The World Bank sees two options and time will tell how this will evolve. The first option, also the World Bank’s preferred choice, is to establish a new state water-resource commission as a coordinating and steering body on related matters across China’s highest level of government. This body should be chaired by the premier or a vice-premier so that it has political clout, and commission members should be made up of the heads of all water-related ministries and agencies at the central level. Its mission would be to direct the development of a national water strategy, consider long-term water plans, and coordinate the various bodies to avoid conflicts and promote consistency. The second option involves the ministry level. It would merge major water-related duties and put them under different agencies and then create a new super-ministry to manage water matters.<sup>52</sup>

The fragmented structure repeats itself at the local levels in provinces, municipalities and counties. The MWR has worked on integration at the local levels since the 1990s with a degree of success. By May 2006, a total of 1,413 integrated water authorities had been established at the county level.<sup>53</sup> At the municipal level, such as in Beijing, Chengdu and Shenzhen, they each have its own water authority.

In some areas where water pollution is severe, local governments may set up a separate entity to deal with the problem. For example, the Lake Dian Management Bureau was formed in 2002 in Kunming, Yunnan, as a higher body to clean up pollution.<sup>54</sup> Nevertheless, it remains an ongoing battle as half of the rivers that run into the lake remains outside the bureau’s control.<sup>55</sup>

**Policy focus has shifted**

Up until relatively recently, China’s policy focus had been on supply rather than demand. That means much effort was directed towards building reservoirs, digging wells to extract groundwater and creating canals to transfer the resource. This thinking has shifted. China’s goal is to become a ‘water-efficient’ and ‘water-saving’ society.

Nevertheless, the most significant policy failures to date all have something to do with failure in demand-side management. Chinese governing tradition focuses on using administrative means rather than market tools, thus shifting to using price signals to change behaviour is a relatively new approach. Further reform in demand-side management in China requires the following:

- **Improve water rights administration.** China’s water is owned by the state. The administration of water rights refers to government decisions about water allocation, withdrawal and rights transfer. Modern science can provide information on water-balance analyses (water flowing in and out) at the river-basin level as well as groundwater use, telling decision-makers the amount of water it can authorise. The Minister of Water Resources said on 22 March 2010 that China would implement water-quantity control and quota system in the near future.<sup>56</sup> However, it is

unlikely that all water users will be covered, which is the case today with farmers. Indicators of China's attempts to move forward on water-rights allocation should appear in the 12<sup>th</sup> Five-Year Plan.

- ❑ **Shift from administrative to market pricing.** Water prices today are mostly still determined politically through administrative commands rather than by the market. Thus, it does not reflect the scarcity value of water, as is the case in most places around the world.
- ❑ **Invest more in pollution control.** Although urban sewage treatment is supposed to reach 70% this year, according to the 11<sup>th</sup> Five-Year Plan (2006-10), continuing investment and personnel-capacity building will remain critical. When compared to investment in transport infrastructure, the amount going to sewage treatment is relatively small. Beyond building hardware, China has to ensure there are sufficient funds to run the sewage facilities since wastewater-treatment plants in smaller cities and towns often do not function or function well.
- ❑ **Make pollution matter.** As in most developing economies, penalties for pollution are low. Businesses see them as a cost of doing business. Thus, enforcing pollution control and raising the cost of pollution is essential to changing behaviour. There is also a political cost for the government in not pushing ahead with tight enforcement and high penalties. Pollution and its impact on people result in social unrest, and protests due to environmental and public-health problems are on the rise. For example, the phenomenon of "cancer villages" has much to do with water contamination from industrial pollution.<sup>57</sup>

**Wastewater-treatment plants in smaller cities often do not function well**

**Penalties for pollution not high enough**



**A Price Administration Office in every municipality and county**

## Who pays what

As noted in Section 1, the central government used to set a single water price for the whole country and this changed after 1994, when Beijing gave provincial authorities the power to set the rates based on the principle of earning 'low profit from domestic users and reasonable profit from business users'. Beginning in 1998, the process was further decentralised to municipal and county levels. There is now a Price Administration Office in every municipality and county dealing with the setting of all kinds of prices. In the case of water, the work is done by a Water Administrative Office. Still, the composition of tariffs is complex. Generally, urban users are at the forefront of China's water-price reform but farmers still pay very little.

Meanwhile, the central-level NDRC and its local-level equivalents are in charge of pricing policy, such as what should be included in the cost of water supply. In some cities, such as Guangzhou, Jinan and Suzhou, there is a municipal price bureau that deals with pricing policy under the supervision of the local NDRC.

**Water tariffs vary from city to city depending on cost of access**

Water tariffs vary from city to city. For instance, Beijing has the highest tariff in the whole country at Rmb4/m<sup>3</sup>, which is nearly seven times higher than in Lhasa, Tibet (Rmb0.6/m<sup>3</sup>).<sup>58</sup> The large variation is due to the cost of accessing water in different localities. Generally speaking, tariffs are higher in the dry north and lower in the more-water-abundant south.

**Principles in increasing tariffs**

### Tariff-hike procedures and rationale

The law provides that authorities need to follow set principles in adjusting tariffs. Their proposals have to be justified by the following:

- To develop water supply so as to meet the needs of economic development and domestic users;
- To provide incentives for water conservation;
- To ensure water is affordable to the people; and
- To regulate the market and control the cost of water companies.<sup>59</sup>

**The issue is about proving costs**

A key issue in price adjustment is what constitutes costs. NDRC regulations provide accounting standards for water utilities. They set caps to categories of costs to prevent overspending and inflating expenditure. Independent auditing are also required by government assessors. The procedures that a utility has to follow in applying for a price adjustment reflect these principles.

First, a water utility has to send an adjustment request to the local responsible body (usually to increase the water price) on the ground that:

- Its revenue does not cover its costs (ie, breakeven);
- It continues to lose money even with government subsidies; and/or
- It needs reasonable compensation for investment to boost its capacities.<sup>60</sup>

**Inability to break even is the most frequently cited reason for hike request**

Inability to cover costs with revenue is the most frequent reason utilities cite. For example, it was reported in 2008 that 16 water companies in Henan province requested price increases every year because their operations could not reach breakeven.<sup>61</sup>

To accompany the request for price adjustment, a utility needs to provide various supporting documents. The Guangzhou Municipal Price Bureau, for example, published in 2008 that the following documents are necessary:

**Supporting documents include audit done by government cost-assessor**

- ❑ A formal written request for price adjustment by the utility;
- ❑ A detailed report on costs of the operation done by a government cost-assessing body (this is the most important document since the majority of the price-adjustment requests relate to increased costs);
- ❑ A statement from the Water Administrative Office of the local government giving in principle consent to the adjustment; and
- ❑ Other supporting documents related to costs and relevant matters.<sup>62</sup>

## Case study - Lanzhou Veolia Water<sup>63</sup>

In 2005, Lanzhou's state-owned water utility began its reform. The company was burdened by Rmb1.1bn of loans, Rmb619m of debt as well as running monthly losses. Its facility was in poor shape and capacity could not meet demand. The local government decided to sell a part of its stake in the utility and called a tender in 2006. Beijing Capital placed a Rmb280m bid, Sino French Water Rmb450m and Veolia Water Rmb1.71bn.

In 2007, Veolia Water was awarded a 30-year concession with Lanzhou Water Supply and acquired 45% of the utility. The city has a population of 3.2 million, and the new joint venture, named Lanzhou Veolia Water, manages several water-treatment plants. However, considerable controversy arose from this deal.

Despite several hikes in water price in Lanzhou since 2005, Lanzhou Veolia Water further increased tariffs after it took over the operation. Reports suggest from December 2005 to early 2009, when the utility applied for yet another price adjustment, water price increased from Rmb0.9/m<sup>3</sup> to Rmb1.45/m<sup>3</sup>. The application in 2009 asked for a raise from Rmb1.45/m<sup>3</sup> to Rmb2.16/m<sup>3</sup>. The company said it lost money as costs had increased to Rmb1.95/m<sup>3</sup> because of rising labour and other costs in the previous two years, including expenditures on purification equipment as well as monitoring and distribution.

The provincial NDRC accepted there was a cause to consider an adjustment.<sup>64</sup> To verify costs, authorities asked the Gansu provincial price

bureau to review the supporting documents submitted by Lanzhou Veolia Water. The utility's records showed in 2008, it supplied 210m m<sup>3</sup> of water for sales revenue of Rmb288m, while costs incurred were Rmb346m. However, the price bureau estimated the company's cost at Rmb342, or Rmb1.72/m<sup>3</sup>, although it did not use an independent assessor to go through the figures.

Public reaction to yet another round of price increases was negative. To put this in perspective, an official from one community in the Chengguan district surveyed 10% of Lanzhou's 2,400 households and 95% of them objected to the rate adjustment. In July 2009, a public hearing was held but only two participants present disagreed with the proposal. This reflected the representativeness of those who were invited to participate in the hearing in light of widespread public opposition and justified most people's distrust in the system.

In October 2009, the Lanzhou government announced a hike in the tariff for domestic users, from Rmb1.45/m<sup>3</sup> to Rmb1.75/m<sup>3</sup>, due to high operation cost. While the utility did not get what they asked for, an increase was permitted despite public objections.

This is a good example why most people are cynical about these public hearings. In any event, government officials always grant price increases.

We will talk more about the public's distrust of the system in Section 4.

Lanzhou . . .



. . . and its water plant in 1950s



Modern water facilities



Source: www.lanzhou.cn

**Public hearings but government makes final decision**

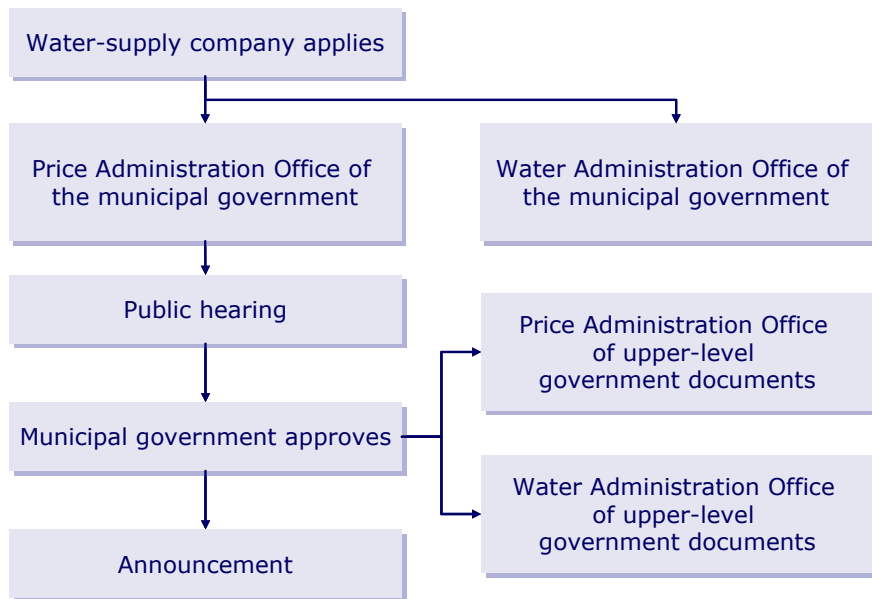
**Local price bureau decides if there is enough ground for adjustment**

**Public hearing for approval**

Upon review of the application, if the local price bureau decides there is enough ground for price adjustment, it then has to organise a public hearing. For example, Guangzhou’s price bureau has to respond to an applicant within 30 working days of receiving the application and then makes another decision to hold a public hearing within 20 working days. The hearing should then be held in three months<sup>65</sup>, with government officials presenting the proposal to the public.

Figure 20

**Process of water-price adjustment**



Source: SynTao

**Authorities choose hearing attendees**

The rules for holding public hearings were set by the NDRC in 2008. Five categories of people, essentially chosen by the authorities, can attend them:

- Consumers, which should make up two-fifths of the audience;<sup>66</sup>
- Corporate participants;
- Other stakeholders
- Experts and scholars; and
- Government agencies, NGOs and others.

Public hearing is not a decision-making process<sup>67</sup> but merely for officials to collect public views and take them into account while they make a decision.

**Water classifications**

The water supplied by water utilities, particularly in urban areas, is classified according to the type of user: domestic, public (municipal), industrial, commercial and special with various sub-classes. A basic framework is applied throughout China although local differences do occur.<sup>68</sup> However, the policy trend is toward simplification, as per the NDRC’s Notification on Urban Water Price Management issued on 6 July 2009.<sup>69</sup>

**Classifications according to type of users**

Figure 21

**Typical classifications of urban water uses**

Classes	Subclasses	User types
Domestic		Household
Public (Municipal)	Government	Government agencies and affiliated organisations
	School	Schools
	Military	Military
	Hospital	Not-for-profit hospitals
	Community	Municipal, parks, public hygiene, etc
Industrial	Industry production	<input type="checkbox"/> Industries, transport, postal and telecommunications
		<input type="checkbox"/> Government agencies, military and schools that use water for production purposes
	Commerce	<input type="checkbox"/> Shopping malls, etc <input type="checkbox"/> Government agencies, military and schools that use water for commercial purposes
Commercial	Culture	Cinemas, theatres, photo studios, swimming pools
	Hospital	For-profit hospitals
	Construction	Construction
	Finance	Banks, securities houses, insurance companies
	Services	Hotels, restaurants, laundries
Special		KTV, bars, tea houses, spas, foot-massage parlours, hair salons, gyms, car-wash services, etc

Source: SynTao

**Four types of fees make up water tariffs**

**In practice, local governments keep WRF for development**

**Hard to analyse and deconstruct water price**

**Four types of water fees**

In general, water tariffs in China consist of four types of fees:

- Hydraulic-facility fee (HFF):** This is the price of hydraulic engineering, and is based on the cost of the raw-water infrastructure built by the government. HFF is also referred to, in some literature, as 'water-engineering fee' or 'water-development fee'.
- Water-resource fee (WRF):** This is set according to the degree of water scarcity, thus the fee is higher in water-scarce areas. WRF is supposed to go to local and central governments as part of general revenue but in practice most of it is retained by local governments for water-resource development, conservation, protection and management. For example, part of Beijing's WRF goes to fund the South-North Water Diversion Project. In some places, a part of the fee is used in forestry as part of ecological compensation in river basins.
- Water-supply fee (WSF):** WSF covers utilities' capital and operation/maintenance costs as well as relevant expenses, taxes and profit.
- Wastewater-treatment fee (WWTF):** This is based on the actual water consumed and set to cover operation and maintenance costs for treatment. Wastewater treatment is usually handled by a separate company from the water supplying utility.

It is hard to analyse and deconstruct water price. The Administrative Method on Urban Water Supply Pricing provides that urban rates should be made up of costs of production, operation, tax and profit. Among these, production costs are the most complicated, as it includes WRF, electricity expenses, raw-material expenses, depreciation, salaries and quality-testing costs, etc. Operation costs include the cost of sales, management and financing. Tax is paid to central and local governments.

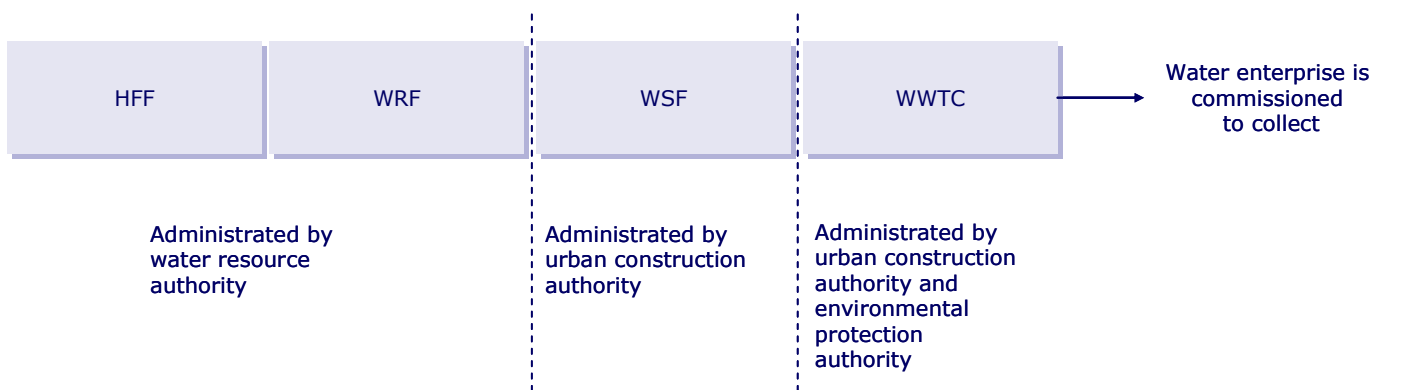
As for profit margin, the law defines it should range from 8% to 10%. If a water company is mainly government-owned, then the ratio should not be more than 6%, and if privately-owned, then not more than 12%.

**Which fee is rising tells you who bears the increase**

Figure 22 shows which authority administers which fee and which body gets the proceeds. The water utility acts as the collector of all the fees making up the water tariff. It keeps the WSF and transfers the rest to the appropriate government bodies and wastewater-treatment companies.

Figure 22

**Water-tariff structure in China**



Source: Zhong Lijin <sup>70</sup>

**Increase does not always come from utilities**

The chart above shows that a water-tariff increase does not necessarily mean the water utility has raised its price. One needs to look at which fee or fees have been adjusted. For example, in September 2009, the rise in Beijing was attributable to an increase in the WRF and the WWTF, while in Shanghai, Tianjin, Shenyang and Nanjing, the hikes were attributable mainly to the WSF. In the case of Shenyang, 80% of the rise came from the WSF. Figure 23 shows the breakdown of increases in 2009 in five cities.

Figure 23

**Breakdown of water-tariff increases in five cities, 2009**

(Rmb/m <sup>3</sup> )	Beijing	Shanghai	Tianjin	Shenyang	Nanjing
Month adjustment	Sep	Jun	Apr	Jul	Apr
WRF	0.42	0.00	0.00	0.00	0.00
HFF	0.00	0.00	0.38 <sup>2</sup>	0.00	0.00
WSF	0.00	0.60	0.12	0.40	0.10
WWTF	0.48	0.40	0	0.10	0.20
Total increases	0.90	0.96 <sup>1</sup>	0.50	0.50	0.30

<sup>1</sup> Consumers pay only 90% of the WWTF. <sup>2</sup> Pay for South-North Diversion Project. Source: SynTao

**Beijing - highest water tariffs in China**

**Urban tariffs by user**

**Different types of uses and charges**

Figures 24-27 show the price of water by user in 31 cities in China. Domestic users pay the least, while special users pay the most. Industrial and commercial users pay about the same.

**Domestic:** Prices range from Rmb1.5/m<sup>3</sup> to Rmb4.0/m<sup>3</sup> with Beijing, Tianjin, Changchun, Jinan and Kunming paying the highest rates, while Lhasa, Nanchang, Hefei and Xining paying the lowest. On average, WWTF represents about 30% of the tariff, but in Lhasa, households don't have to pay this fee.

**Public (municipal):** Water for public uses cost more than for domestic use. For example, in Tianjin, the water price for public use is Rmb6.7/m<sup>3</sup> whereas that for domestic use is Rmb3.9/m<sup>3</sup>.

**Commercial users in Changchun endure exceptionally high fees**

**Industrial:** Industrial users pay slightly more than public users, although in some places like Tianjin and Changchun, the two groups pay the same rates.

**Commercial:** The prices for industrial and commercial uses are similar. Changchun is unique among Chinese cities as its commercial water price is exceptionally high.

**Special:** Users in this category are the larger water consumers among commercial businesses, such as car washes, bath houses/spas and tea houses. The policy is to charge them more for water. In Beijing, special users paid Rmb61.68/m<sup>3</sup> prior 22 December 2009 but now pay Rmb81.68/m<sup>3</sup>. Car-washers in Beijing raised their service price from Rmb40 to Rmb45 when the new charges kicked in last year. The price in the capital more than doubles that in Tianjin for the same category of use. Figure 28 shows the large price differentials between special users and other categories of water consumers.

City	Province
Beijing	(municipality)
Changchun	Jilin
Changsha	Hunan
Chengdu	Sichuan
Chongqing	(municipality)
Guangzhou	Guangdong
Guiyang	Guizhou
Haikou	Hainan
Hangzhou	Zhejiang
Harbin	Heilongjiang
Hefei	Anhui
Hohhot	Inner Mongolia
Jinan	Shandong
Kunming	Yunnan
Lanzhou	Gansu
Lhasa	Tibet
Nanchang	Jiangxi
Nanjing	Jiangsu
Nanning	Guangxi
Shanghai	(municipality)
Shenyang	Liaoning
Shijiazhuang	Hebei
Taiyuan	Shanxi
Tianjin	(municipality)
Urumqi	Xinjiang
Wuhan	Hubei
Xiamen	Fujian
Xian	Shaanxi
Xining	Qinghai
Yinchuan	Ningxia
Zhengzhou	Henan

Figure 24

**Water charges for domestic users**

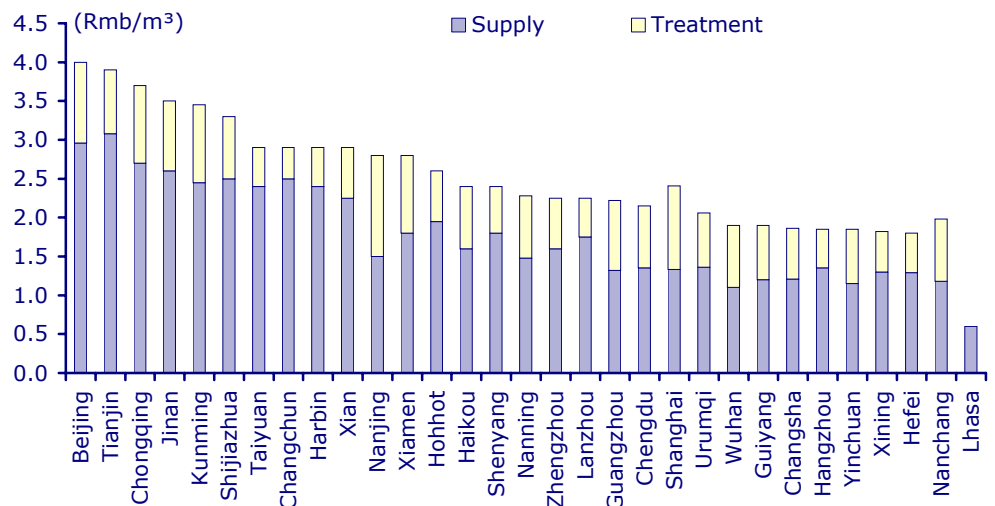
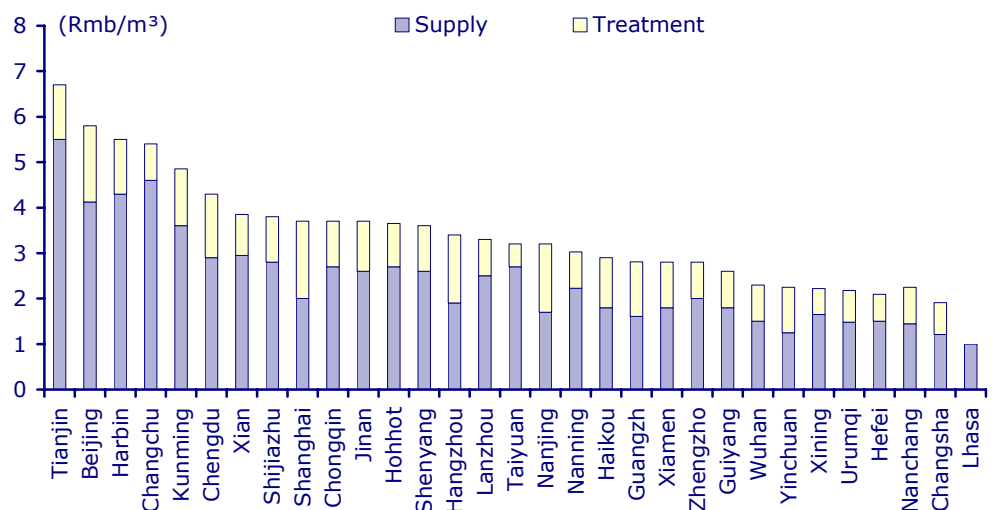


Figure 25

**Water charges for public (municipal) users**

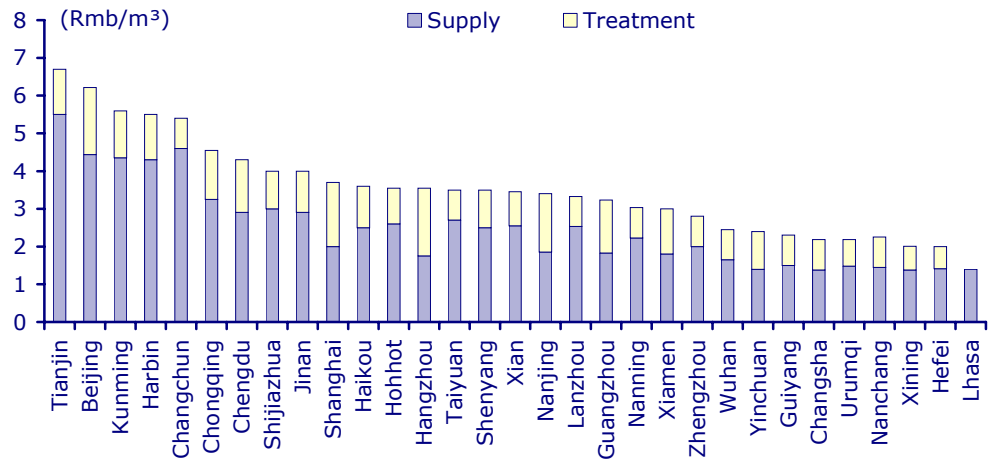


Source: SynTao

**Industrial users pay slightly more than municipal users**

Figure 26

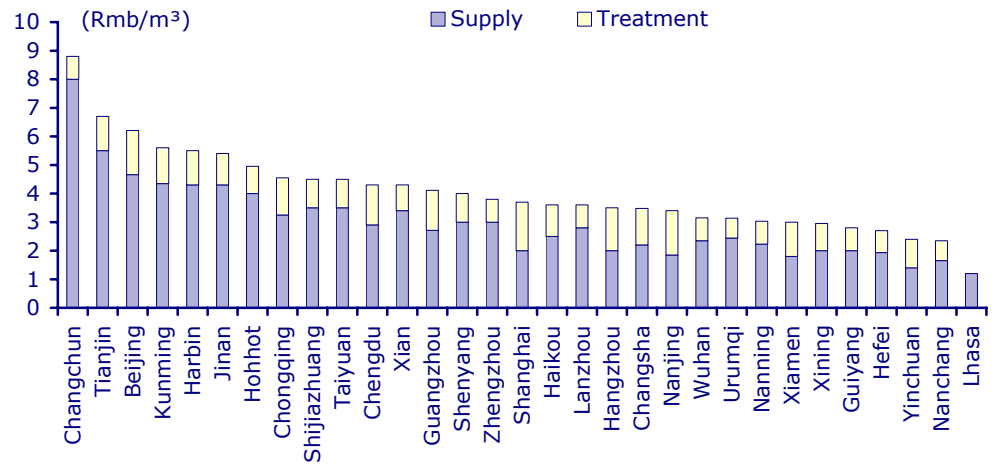
**Water charges for industrial users**



**Similar to those for industrial users**

Figure 27

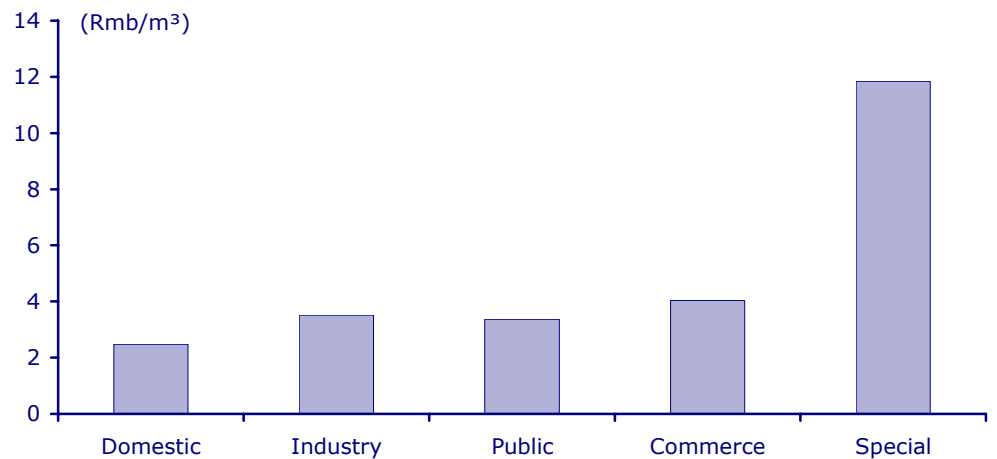
**Water charges for commercial users**



**Special users such as tea houses and spas pay the most**

Figure 28

**Water charges for special users compared to other users**



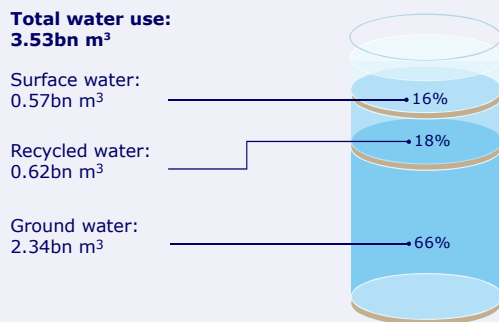
Source: SynTao

## The case of Beijing<sup>71</sup>

Beijing, as China's capital, is the bellwether for what will happen in the rest of the country. The city is severely short of water: per-capita water resource is less than 300m<sup>3</sup>, which is less than one-eighth of the national average. Meanwhile, its population keeps soaring. Reservoirs and groundwater supply the city's needs. Its water is mostly for agriculture, industry and domestic uses.

In light of China's rapid economic development, availability of water has created a bottleneck for Beijing's further advancement. In 2010, the city's water demand is likely to be around 5,700bn m<sup>3</sup>, while surface and groundwater can only supply, on average, around 4,000bn m<sup>3</sup>, hence a sizable deficit. Groundwater has already been largely depleted.

### Beijing's water consumption, 2008

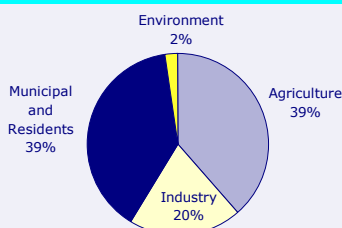


Source: Beijing Water Bureau, CLSA Asia-Pacific Markets

Continuous huge extraction of groundwater leads to the removal of subsurface support and loss of surface elevation. Beijing's groundwater level decreased nearly 11 metres between 1998 and 2007, and the consequential land subsidence is a risk to the geological stability of the area.

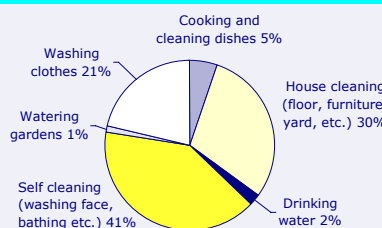
Since the 1990s, the government has launched many campaigns to promote water conservation and efficiency, including putting meters in every household and promoting water-saving products and methods, such as low-flow taps and water-saving toilets. A major policy is also to increase the price of water in order to change the behaviour of users. Research in 2002 showed if water accounted for 2% of household expenditure, people started to show concern about consumption, but behaviour change needed to reach 5%.

### Beijing - Split of water usage



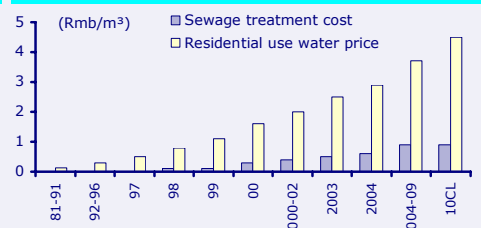
Source: CLSA Asia-Pacific Markets

### Beijing - Split of household use



Source: CLSA Asia-Pacific Markets

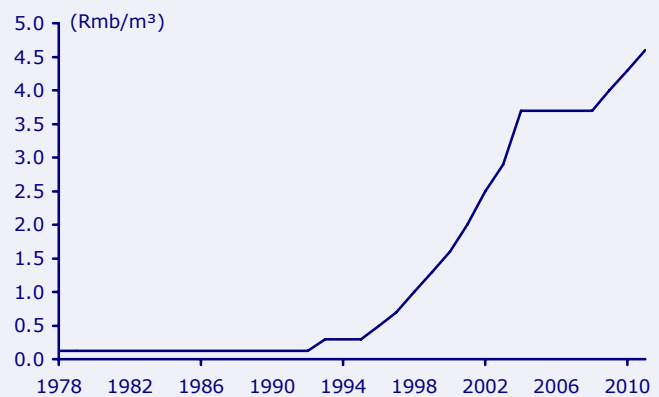
### Beijing - Residential water tariffs



Source: Government, CLSA Asia-Pacific Markets

Beijing started to charge a very nominal fee for residential water use in 1952. The price was fixed at Rmb0.12/m<sup>3</sup> in 1967 and that continued till 1991. Since then, the water price has been adjusted frequently. For example, between 1994 and 2004, the price was raised nine times. Since 1997, the rate has been subject to adjustment almost annually. The city introduced the WRF in 1997 and the WWTF in 2002.

### Beijing's water price for household users



Source: SynTao

By 2006, the capital's domestic water price reached Rmb3.7/m<sup>3</sup> under a three-tier price structure for tap-water supply, water resource and sewage treatment. A public-opinion survey that took place prior to the announcement of yet another price increase in 2009 showed 47.01% of respondents agreed that there should be an increase, against 38.71% who disagreed, and 14.29% who expressed no opinion. The vast majority (89.35%) believed price hikes would help promote water conservation, 31.95% thought water price should increase because the price of other commodities had gone up, and 12.99% even perceived the rate then was too low.<sup>72</sup>

Today, Beijing's domestic water tariff has reached Rmb4/m<sup>3</sup>. If the government were to recover the full cost of water supply after the South-North Water Diversion Project commences operation, charges of water would have to rise to about Rmb7/m<sup>3</sup>. Thus, the authorities have a lot of public education and awareness-building to do.

**Northern and eastern cities pay more**

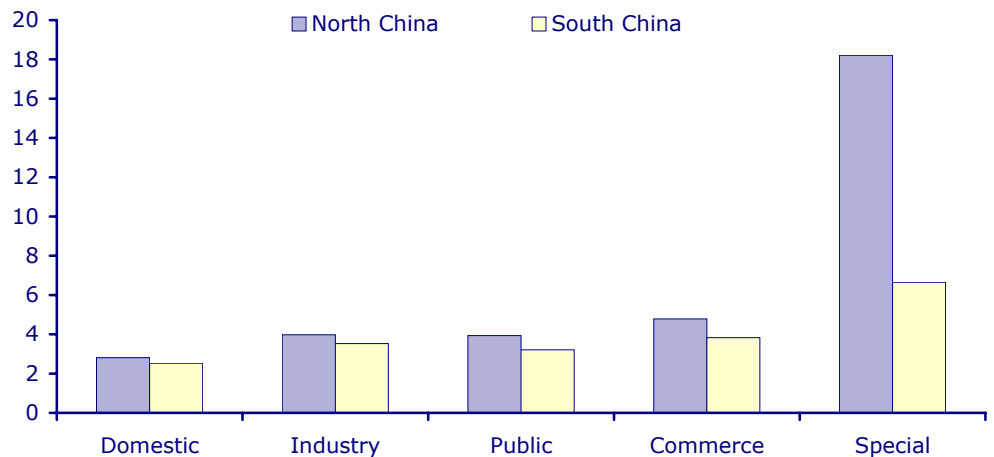
**Urban tariffs by region**

On average, people and businesses in north China pay more than those in south China, reflecting the natural water distribution in the country. However, users in the eastern region pay more than those in the west as a result of cities in the east - especially those along the coast - being a lot wealthier. Residents in more developed and affluent areas have much higher purchasing power and can, therefore, afford to pay more. Water utilities there also have higher costs, which partly explain the necessity for higher tariffs.

Figure 29

**Water prices compared**

**Water prices in northern and southern China**



Source: SynTao

**Increasing block prices becoming more prevalent**

**Block pricing encouraged**

Tiered pricing (also known as block tariffs or ladder prices), is a progressive way of billing users, heavier users pay more. The idea behind this is to encourage those who consume large amounts of water to be more water-efficient and at the same time ensure light users (usually the poorer people in the community) will have access to certain amount of water at an affordable price.

**Block rates work in Ningbo, Zhejiang . . .**

There are several cities using block tariffs in China. Ningbo in Zhejiang province adopted the practice in 2006. In the case of a typical family with three people, the domestic water price is Rmb2.75/m<sup>3</sup> for the first 17m<sup>3</sup> of, Rmb4.43/m<sup>3</sup> for the next tranche of 18-30m<sup>3</sup> and Rmb5.9/m<sup>3</sup> for use above 30m<sup>3</sup>. A quota of 5m<sup>3</sup> is given to each additional person in a household of three. This scheme is considered a great success because it saved 30,000m<sup>3</sup> of water daily for the city.<sup>73</sup>

**. . . but not in Zhengzhou, Henan**

However, things did not work out in Zhengzhou in Henan province. The local government announced in 2005 that it would adopt block tariffs in 2007. In order to implement such a scheme, all households had to have water meters. The government planned to install meters for 500,000 families at a cost of Rmb750 each. The local water utility was supposed to cover this cost by raising the WSF. However, the price was not raised as planned for a variety of reasons, including inflation, and this put the utility in financial trouble. Finally, in 2008, it ran out of money and the whole plan was suspended although another attempt is likely to be made to revive the plan in the future.<sup>74</sup>

The trend is for wider implementation of block tariffs. Beijing announced it will adopt a pilot scheme from 4Q10; Chongqing also has plans within this year; and Hainan authorities are also encouraging local areas to adopt block pricing.

**Agricultural use**

**Poor irrigation systems and water infrastructure are prevalent**

Agriculture uses about 62% of China’s water. According to the MWR, more than half of the country’s farmland - 63.0 million out of 122 million hectares - lacks irrigation systems and counts on good weather for harvests. For the rest, which has access to irrigation, more than 50% of the water is wasted before it reaches the crops. In other words, water-use efficiency is very poor. As such, improving water efficiency in agriculture can make the biggest savings in overall water use.<sup>75</sup>

**Water for agricultural uses still greatly underpriced**

Among water users in China, farmers are the most privileged because they pay the least despite the sector taking up the largest annual quantity. It is a matter of policy that the price of water for agricultural use is low because the government wants to ensure small-scale subsistence farmers can keep costs down. Farmers do not have to pay the WRF and the WWTF. In places where water costs are high, the government will even subsidise farmers. In most rural areas, water price is around Rmb0.1/m<sup>3</sup>. Shanxi province has the highest water price for agriculture at about Rmb0.507/ m<sup>3</sup> because water has to come from the Yellow River, which is then used in less-accessible highland farms, but with government subsidies, farmers are only paying about 25% of the cost.<sup>76</sup> For comparison, the WSF for domestic water use in Taiyuan, the capital of Shanxi province, is Rmb2.9/m<sup>3</sup>.

**No consistent rule on calculation for water fees levied on farmers**

Local governments calculate what farmers should pay and collect fees. There is no consistent rule on fee calculation. Some authorities calculate payment based on the size of farms, while others base it on the amount of water consumed (where there are meters), and some use a mixed approach. Collecting fees is arduous and it is estimated that only 57.4% of the fees from farmers are actually collected.<sup>77</sup>

Another major problem in water-scarce rural areas is that farmers are forced to use wastewater as irrigation, and this has affected 40,000km<sup>2</sup> of farmland. This, in turn, contaminates soils and food with heavy metals.<sup>78</sup>

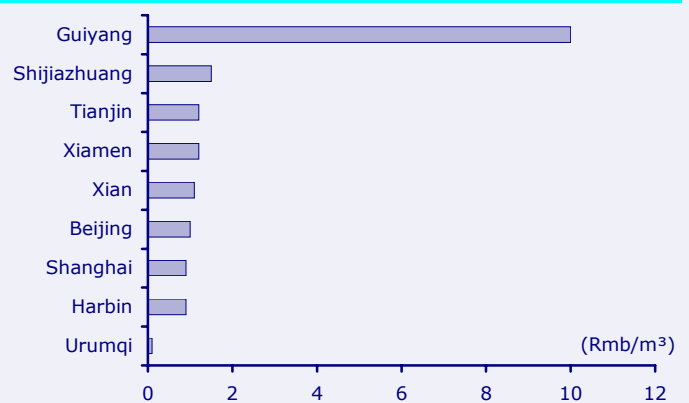
**Reclaimed water**

Reclaimed water is produced from used water. China began its large-scale wastewater reclamation in the early 1990s. Today, most buildings, residential areas, municipal wastewater-treatment plants and industrial enterprises have wastewater-reclamation facilities.

These include grey-water and storm-water collection, which can be reused for toilets, lawn irrigation, cleaning and car washing. Reclamation in the industrial sector is mainly achieved by recycling water used for cooling.

Users of reclaimed water do not pay WRF. For example, in Shijiazhuang, Hebei province, the normal water price for domestic use is Rmb3.30/m<sup>3</sup> but reclaimed water only costs Rmb1.50/m<sup>3</sup>. Beijing’s policy is to encourage the use of reclaimed water as much as possible.

**Price of reclaimed water in nine cities**



Source: SynTao



**Despite public resistance, it is necessary to raise water prices**

## Tariff hikes require public trust

It is difficult to raise water fees in China given a lack of public trust in the system and the potential impact on the poor. The Chinese public still has to be convinced that higher tariffs will lead to better services. Still, the government has to continue raising water prices to tackle the country's water-scarcity problem. We believe increases are less likely in major cities this year but there is scope for further hikes in second-tier cities. Utilities have to make their cost structures transparent in order to set the stage for future price adjustments, or the Chinese public will continue to resist such moves.

**Natural monopolies**

### People are cynical about the system

Cynicism about China's water-management system is not without foundation. Water utilities are natural monopolies and have not been known for providing a sterling service in China. The public often complains about state-owned operators keeping overblown and high-paying staff.<sup>79</sup> A related gripe is over inadequate supervision by higher authorities. Most people do not believe higher tariffs will lead to better water quality and service. Rather, it just means they will be the one bearing the high cost of operational inefficiency and better staff benefits.

**Unqualified operators that only want to make money**

There are also frequent complaints about utilities' lack of competence, particularly privately water providers. Coupled with poor regulations and the lack of transparency in cost structure and decision-making process, the public naturally resist paying more. Furthermore, they believe private operators, now controlling about 10% of China's urban water supplies, want to charge more only to recuperate the high bidding price they paid to get the service contract.

**Severe water leakage - sign of inefficiency**

Wastage is another widespread problem. The vice minister of construction, Qiu Baoxing, noted in 2006 that China's urban water-supply systems were losing some 10bn m<sup>3</sup> water per year at a leakage rate of above 20%.<sup>80</sup>

**A public hearing in Xiamen**



Source: Chinese embassy in UK

### Public hearings are packed with hike supporters

Ordinary folks do not even trust the public-hearing process. They complain about its perfunctory nature and partiality, because attendees generally support tariff increases and hearings mostly end with a hike irrespective of wider public opinion. We have already discussed the case of Lanzhou Veolia Water (page 27). Another example is Luoyang. At the public hearing held in July 2009, 17 out of 18 representatives who attended approved a 40% hike. However, a subsequent online forum pointed to significant disagreement with the result. A following survey indicated people's views did not accord with the hearing.<sup>81</sup> Figure 30 shows tariff-increase proposals invariably succeed. In the case of Foshan, Guangdong, extraordinarily none of the participants at the hearing objected to the application.<sup>82</sup>

**Tariff-hike proposals invariably succeed**

Figure 30

#### Partial results of public hearings on water prices, 2009

Date	City	Proposal % of hike	Agreed % of hike
27 Apr	Shanghai	52	52
06 May	Shenyang	26	26
20 Jul	Lanzhou	20	20
31 Jul	Luoyang	40	40
29 Jul	Ningbo	45	45
21 Oct	Yinchuan	48.60	48.60
25 Nov	Chongqing	35	35
16 Dec	Beijing	24	24

Source: Xinjiang Conservation Fund

**“Packed” hearings not necessarily a good sign**

At a public hearing in Beijing, a large number of civil servants showed up to support the proposal to raise tariff. In a comical twist, some of the “supporters” fell asleep during the hearing, while others were accused of backing the proposal even before reading the supporting materials.<sup>83</sup> There have also been cases where people attended hearing using fake identities. In Harbin in December 2009, a representative listed as a low-income earner was in fact a hotel manager, and another person claiming to be a lawyer used a non-existent identity. The one person who wanted to vote against the proposed tariff increase was not given a chance to speak and showed his frustration by throwing a water bottle at the meeting convenor.<sup>84</sup>

**Positive correlation between high tariffs and water quality is low**

The jury is out regarding whether higher tariffs help to improve water quality and standard of service. Figure 31 summarises a 2008 public-opinion survey conducted in five cities on privatisation and residents’ perception of water-service and sewage-treatment standards. Positive correlation was low - not many people thought water reform has led to service improvement.<sup>85</sup>

Figure 31

Public-opinion survey on water-utility privatisation, 2008						
(% of respondents)	Beijing	Harbin	Chengdu	Lanzhou	Urumqi	Average
No significant change	4	10	15	24	29	17
Increased water tariffs	21	52	31	54	71	46
Improved supply facilities	10	15	14	15	25	16
Less untreated wastewater emitted into watershed	12	8	7	17	8	10
Improved water quality	5	16	13	2	13	10
Deteriorated water quality	7	14	7	2	13	9
Improved service on water supply	6	33	15	17	17	18
Declined service quality on water supply	1	8	1	0	13	5

Source: Xinjiang Conservation Fund

**Numbers are non-existent, questionable or unreliable**

**Poor access to information**

Public distrust could be ameliorated if details of costs are publicised. While the law lays out how tariffs and fees should be charged, utilities and local authorities seldom disclose numbers and breakdowns. Even when numbers are supposedly “audited”, the public does not trust them because there are doubts about whether the audits are professionally and independently carried out in good faith.

**Case studies - Chifeng and Nanzhang**

The cases of Chifeng in Inner Mongolia and Nanzhang in Hubei illustrate how things can go awry if water assets are put in the hands of reckless companies.

In July 2009, a rainstorm flushed raw sewage into a well that was Chifeng’s freshwater source. The city’s water supplier failed to warn the public about potential contamination until several days later. More than 4,500 people fell ill, causing a widespread panic. A subsequent investigation found that the privately owned service provider, Jiulong, had been at fault.

While the company had been operating Chifeng’s water supply since 2003, the investigation revealed that it had no previous experience in managing water and sewage treatment. Its parent company, Jiutian Jianhua

Group, also had no direct track record as it was engaged in property development and building-material business. Jiulong admitted it lacked experience in dealing with circumstances that led to the contamination.<sup>86</sup> Local authorities were also widely criticised for failing to perform its regulatory duty and allowing a plainly unsuitable company to operate the city’s water system.

A similar incident arose in Nanzhang the same year. On 28 May 2009, residents found mud flowing out of their water pipes. The Nanzhang Water Supply was found to be at fault in a subsequent investigation. The company admitted it was ‘basically an investment company’. In other words, it lacked the expertise in running a water utility.<sup>87</sup>

**Clear policy and legal principles on cost recoveries**

The policy and legal principles are clear enough. The Administrative Method on Urban Water Supply Pricing, introduced in 1998, supports recovery of operation and maintenance costs as well as a reasonable profit. The regulation states that tariffs should allow for an 8-10% return on the net value of fixed assets, depending on sources of the funds. The Water Pollution Prevention and Control Law (1996) further allow utilities to recover costs through the WWTF. As we noted above, water bills typically include WRF (supposedly reflects scarcity) and HFF (based on cost of raw-water supply infrastructure) also.<sup>88</sup>

**Ningbo authorities have been skipping the annual audit on water companies**

The case of Ningbo is illustrative. The local audit bureau admitted it had not performed an annual audit on its water-supply company for years. It also acknowledged that it neither participated in the auditing process to determine the costs of supplying water and sewage treatment, nor received cost details used in the public hearing to support the proposal to raise tariffs in 2009.<sup>89</sup>

The case of Shenzhen raises question about competence of those serving in the tariff-setting bodies. The city's audited report for 2010 listed 47 components in deriving water cost. Many of them did not have sufficient numbers that were essential for deliberation and consideration. For example, it stated 16.8% of the tariff will be used to cover labour cost but information such as the number of employees was unavailable.<sup>90</sup>

**Even "audited" results don't always tally**

**Numbers don't always tally**

Water companies say low tariffs make their work difficult, unprofitable and, therefore, unsustainable, suggesting service gaps are a direct result of insufficient funds. However, even "audited" results don't always tally.

For example, Ningbo Water Supply complained that low tariffs threaten its survival. However, the financial report of its Shanghai-listed shareholder, Ningbo Fuda Electric Appliance, showed the water utility enjoyed a gross profit margin of 46.85% in 1Q09. In comparison, Fuda's electric-appliance business only achieves 7.73%, cement 16.14% and real estate 35.03%.<sup>91</sup> It may be that the water side of the business is difficult but local governments often permit water utilities to operate other types of businesses, such as real estate, to make up the difference. However, how much utilities are making from other ventures and the amount of subsidies involved when they propose tariff hikes are usually unknown.

**Chongqing Water's sewage charge is eight times national average**

The case of Chongqing Water, which listed on Shanghai Stock Exchange on 29 March 2010, is noteworthy. Its IPO documents revealed a gross-profit margin of about 16% in 2009 and a sewage-treatment charge of Rmb3.45/m<sup>3</sup>, which is eight times the Rmb0.4/m<sup>3</sup> national average.<sup>92</sup>

**Public hearings are here to stay and the process will improve**

**Public participation is the trend**

Public participation in water management in China remains low as a result of the country's long tradition of government dominance in decision-making. The legal and procedural provisions for public hearings as a key form of participation is still in early stage and many aspects await clarification or consistent execution. Nevertheless, increasing public involvement is a fact of life since public opinion on water-tariff setting is being taken up by the media, NGOs and millions of netizens.

**Six aspects to address public concern**

**Target the low wastewater-treatment fee first**

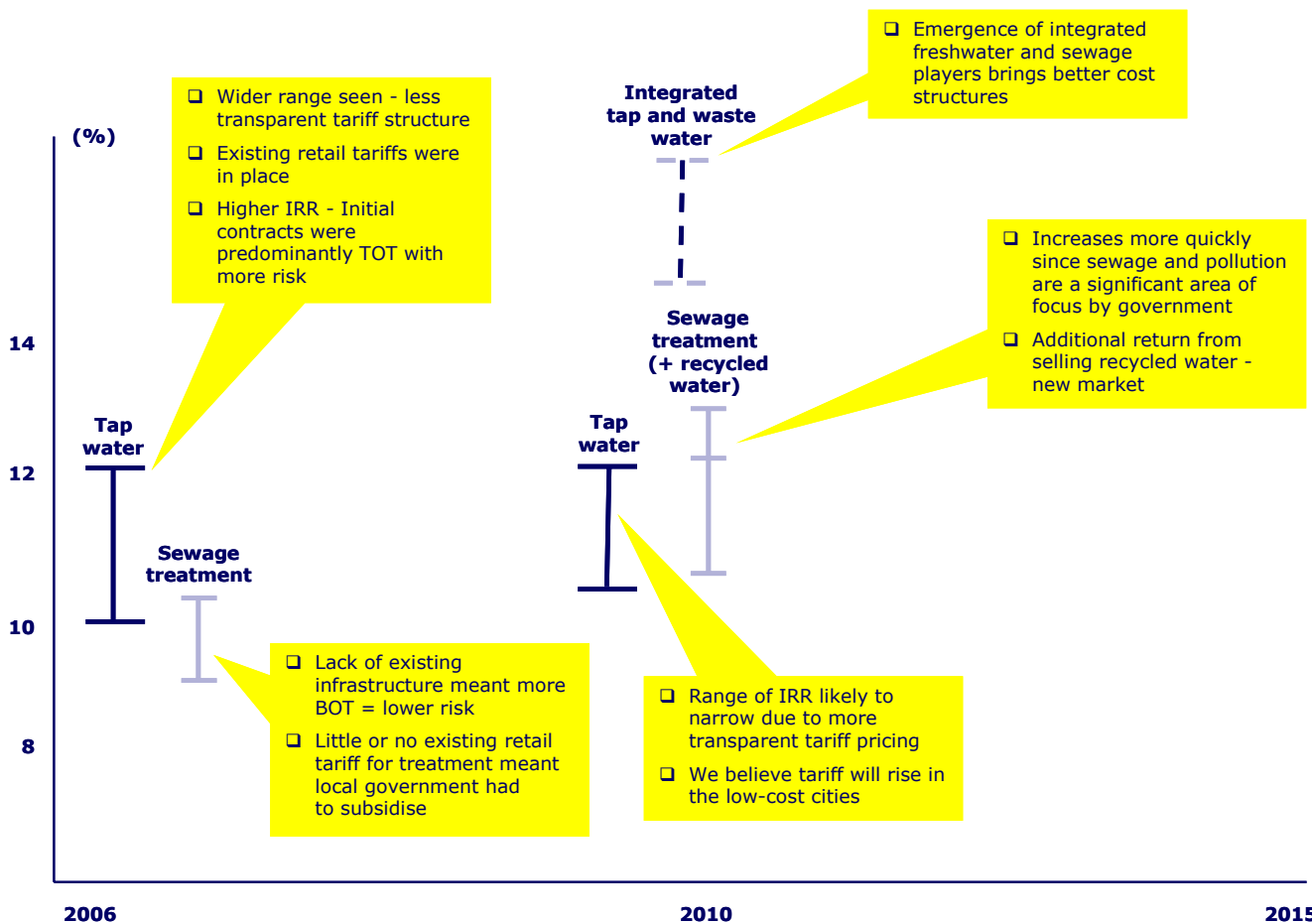
Beijing is aware of the public grievances about tariff hikes. After the spate of price adjustments, and in response to public discontent, the NDRC and the Mohurd issued the Notice of Urban Water Tariff Management in July 2009. Responsible local authorities are directed to focus on six aspects to address public concern:

- ❑ Adjust water tariff gradually to encourage conservation and efficiency. Target the low wastewater-treatment fee first, so to enable funding of treatment and pollution control.
- ❑ Audit water tariff and hold public hearings to ensure transparency of cost calculation. Water suppliers should control staff salaries and reduce leakage.
- ❑ Municipal water uses for landscaping and cleaning should be charged.
- ❑ Simplify the tariff structure, prioritise wastewater charge and encourage water reuse.
- ❑ Ensure low-income residents are protected from tariff increases.
- ❑ Raise public awareness of the need to raise water fees.

In the coming years, the Chinese government is likely to amend its laws and regulations to explicitly encourage public participation in water management. They would cover disclosure of costs and appeals.

Figure 32

**CLSA estimate on internal rate of return for Chinese water projects**



Source: CLSA Asia-Pacific Markets

**Safeguarding right of the poor**

**Safeguarding the right of the poor**

Tariff hikes anywhere in the world face objections on the ground that it will affect the poor. In light of China’s wide income and wealth disparity, this is a sensitive issue. The secret is to get the formula to safeguard the right of the underprivileged.

Research shows that the urban Gini-coefficient in China increased from 0.16 in 1978 to 0.35 in 2005.<sup>93</sup> In 2009, *Journal of Social Sciences* estimated those earning less than US\$1/day in China to be around 20-30m.<sup>94</sup> Using 2008 data, the average water tariff in the country’s 36 major cities was approximately Rmb3.77/m<sup>3</sup>,<sup>95</sup> which represented more than 4% of this group’s daily income. After the tariff hikes last year, the cost for water takes up an even larger portion of their earnings. Yet, the poor are not directly or indirectly represented at public hearings.<sup>96</sup>

**Need to reconcile goal of cost recovery while ensure access of the poor**

Thus, the major challenge in adjusting water fees is how to reconcile the objective of cost recovery while ensuring that poor people have adequate access to clean water. This requires sufficient safeguards, including income-support measures such as bill waivers or reductions, and tariff-related means such as special rates for low-income consumers. The government can also levy a block rate on large consumption (usually by wealthier users), while keeping fees low for smaller users. Local authorities need to identify the right formula for their province, which may require a combination of both methods.

**Time to improve transparency**

**What’s next in China’s water-price reform**

China has to continuing raising water tariffs so to deal with its water-scarcity problem. However, increases are less likely in major cities this year after a few hikes in recent years. In the second-tier cities though, there is still room for adjustment. Overall, this is a good time for utilities to improve transparency of their cost structures so to alleviate public resistance against future increases.

Moreover, it is worth noting that China’s 12<sup>th</sup> Five-Year Plan (2011-15) will push sustainable development further. The last plan, which ends in December this year, budgeted more than US\$225bn for environmental protection. Chinese experts believe Beijing will allocate US\$454bn to the environment in the 12<sup>th</sup> plan, or 1.5% of China’s projected GDP over the next five years.<sup>97</sup>

Figure 33

CLSA estimate on China’s total spending on environmental protection		
9 <sup>th</sup> Five-Year Plan	1996-2000	US\$43bn
10 <sup>th</sup> Five-Year Plan	2001-05	US\$84bn
11 <sup>th</sup> Five-Year Plan	2006-10	US\$157bn
12 <sup>th</sup> Five-Year Plan	2011-15	Est US\$455bn <sup>1</sup>

<sup>1</sup> 12<sup>th</sup> Five-Year Plan is still being drafted. Source: CLSA Asia-Pacific Markets

**Watch for “green” initiatives in the 12<sup>th</sup> Five-Year Plan**

Thus, “green” growth is a core part of China’s future policy. The government is likely to expand on the new ideas that it is trying out, such as green lending, where commercial banks are asked to screen the environmental performance of borrowers. Bank of China recently signed a memorandum with the Ministry of Environmental Protection (MEP) to increase its support for environmentally friendly developments and cut loans to energy-intensive or polluting projects.<sup>98</sup>

Other new ideas include: green insurance,<sup>99</sup> where insurers cover consequence of pollution accidents; and green securities, where companies wanting to list, or listed companies want to refinance, need to go through

environmental-performance inspection first.<sup>100</sup> The initiatives, all introduced in 2008, were part of the central government's drive to enlist various government agencies to give economic and financial policies a green hue. Other ideas being developed include green tax and even green trade.

The NDRC is actively working on the 12<sup>th</sup> Five-Year Plan, which is scheduled to be formally announced at the end of this year. Once it is out, ministries and provincial governments will follow the broad direction of the national plan to set out goals specific to their provinces.

**Water tariffs have to rise in China**

**Tariffs must rise but unlikely in major cities this year**

Raising the price of water is China's long-term policy goal and this will be restated in the 12<sup>th</sup> Five-Year Plan. Despite regular hikes in recent years, water prices remain low. Even in Beijing, which is paying the highest rate in the country, the resource only accounts for about 1.8% of urban households' total expenditure.<sup>101</sup> Meanwhile, water utilities are losing money as a result of low prices. From January to August 2009, 46% of the 795 water suppliers in China reported losses, totalling Rmb3.69bn. Thus, the financial sustainability of the water business depends on tariff increases.<sup>102</sup>

**Chinese officials refer to price increase often**

The NDRC has said that pricing reform should reflect water scarcity. As noted above, it is exploring the use of green taxes, although these will take time to develop. A green tax on water resources may be determined according to the scarcity of the resource and the cost of pollution control.<sup>103</sup> Regarding the progress of reform, the Minister of Water Resources Chen Lei put it this way: '[China's] water-price reform is incomplete. The pricing scheme does not fit the current situation of water shortage, which makes it difficult to use water price to leverage water saving'. Thus, development over the next five years will focus on further improving water governance, strengthening water-rights administration (ie, allocation) and improving pricing and the water market.<sup>104</sup>

**Increases in major cities will be tough in 2010**

Another factor that may also contribute to higher water price is the government policy to tighten pollution control, which will be a plank of the 12<sup>th</sup> Five-Year Plan. In tandem, water price goes up as wastewater-treatment costs increase to deliver ever-cleaner water.<sup>105</sup>

On the whole, the authorities have done a reasonably good job in raising public awareness of water scarcity. The people of China expect water tariffs to continue to rise. It is just a matter of when, how and by how much. However, tariff increases in major cities will be tough in 2010 because: the public may not accept more adjustments after increases in 2008 and 2009; and even if authorities are determined to push through increases, 10-20% may be the most it can achieve. Otherwise, they will certainly meet widespread public resistance.<sup>106</sup>

**Clean-up process and financial-transparency improvement**

**Transparency problem more urgent**

Again, utilities must make their cost structure transparent before they can target tariff hikes of a more meaningful magnitude. It is a way of improving their image as well as trustworthiness.

Meanwhile, on the municipal level, the case of Beijing - the national bellwether for water-fee increases - shows the authorities' credibility is on the line. In December 2009, the capital's municipal NDRC released financial information of Beijing Drainage Group at a public hearing on price adjustment to justify the proposed increase. The information showed that over the past two years the costs for chemicals had increased by 19%, transport and sludge disposal by

15%, costs relating to pipelines by 15% and management expenses by 12%. However, the numbers and accounting methods were disputed by participants at the meeting, who countered with their own research.<sup>107</sup>

**Data released are questionable**

The example shows that authorities do feel the pressure to release more information, and once that became available, even participants they handpicked questioned the data. The Chinese government is sensitive about imperfect laws and procedures denting official authority, which was why Premier Wen Jiabao emphasised at the National People’s Congress in March 2010 that water-price reform needs to take into account the interests of all concerned.

**Richer second-tier cities are next in line**

**Most likely candidates for tariff hikes**

Tariff increases in the foreseeable future are most likely to fall upon those who can afford it. While this is a sensible way, it is hard to predict the rate of increases and how it may affect the cashflow of businesses that use water as a key input (cost will surge) or utilities and water-treatment companies that offer water services (revenue will increase).

**Heavy users will pay more and block rates will become prevalent**

Richer second-tier cities are most likely to see price adjustments. Tier-1 cities such as Beijing, Shanghai and Guangzhou already incurred tariff hikes in 2009, so further rises are unlikely in the near term. Water consumers in the commercial “special” category will probably suffer much larger increases, while block tariffs will be rolled out. In both cases, heavy water users will have to pay much more.

**Higher WRF and WWTF**

Premier Wen Jiabao noted in the government’s annual work report in 2008 that wastewater-treatment costs should be raised, although few cities have yet to do this. Thus, WWTF is most likely to see some adjustment, along with WRF, which goes to the government.

**Equity stakes may no longer be sold to private companies**

**To sell or not to sell**

China’s water reform to date has enabled private domestic and international companies to take a modest slice of the water market. There have been undoubted improvements but also some issues. For example, some local authorities sold state assets to private companies just to earn a large, one-off payout and absolve themselves from water provision. They paid less attention to water quality and service standard after the sale, while private operators kept asking to raise prices, provoking public resentment. Although there were not many such cases, they gave private involvement in the water sector a bad name

**Protectionist attitude prevails as water is an issue of national security**

Such control and accountability issues gave rise to the discussion as whether private companies, especially those overseas, should be allowed to “monopolise” local water supplies.<sup>108</sup> As water is essential to all social and economic activities, it is considered an issue of national security, where the protectionist attitude has its roots. The argument is that China should not be dependent on foreign companies to operate or expand its water infrastructure, and that it is important to protect the country’s indigenous companies. This attitude is reflected in the National Indigenous Innovation Product Accreditation Programme launched in November 2009, which gives preference to a specific list of accredited enterprises in government procurement and contracting. Accreditation requires a company not only to be a legal entity in China but the products it offers must be sourced from domestically owned intellectual-property rights and not be subject to any foreign restrictions.<sup>109</sup>

Figure 34

**Privatising water - What are the arguments?**

**Is water a free commodity?**

**For**

Water is a resource subject to supply and demand, and so should be treated as an economic good. It may fall freely from the skies, but it has to be collected, managed, processed and supplied through an expensive system of reservoirs, channels, processing plants and pipes. Dirty water and human waste also have to be removed and treated in sanitation systems.

**Against**

Water is a natural resource, it falls from the sky. It is essential to all life. Lack of clean water is the biggest single factor in disease and ill health in the developing world, and without it people cannot grow crops to support themselves. Pollution of water sources or over-extraction has a very damaging environmental impact. For all these reasons water is special and should be seen as a common good, part of the responsibility of governments to their people. Access to clean water is a human right, not something to be traded away or withheld on grounds of cost.

**Is water an economic good?**

**For**

When water is not treated as an economic good, it is wasted. On a domestic level, unmetered access to water means that consumers do not pay according to the quantity they use and so they will use it wastefully. At a national level, subsidised water for farmers and industry encourages wasteful methods and inappropriate crops often with a damaging impact upon the environment. Pricing water according to its true cost promotes more efficient and environmentally-friendly practices, eg, the use of drip-irrigation or dry farming in agriculture.

**Against**

Demand for water increases with population growth, so it does not respond to market signals in the way other resources do. Rich consumers in the developed world also waste water through extravagant use of luxuries such as garden sprinklers, swimming pools, lush golf courses, etc - a problem which will get worse as income inequality increases, both between and within countries. Demand management is needed to prevent waste and to ensure access for all, including the poor, something which pricing water in a purely economic way will not achieve.

**Where does the capex come from?**

**For**

Problems of water supply need to be addressed with huge investment, particularly in the developing world where many people have no access to decent freshwater. Even in the developed world, much water (up to 50% in Canada) is wasted through leaks in pipes and ageing infrastructure. The public sector has failed to provide the money for this investment so private involvement is essential. For this investment to be attractive to the private sector, water companies must be allowed to make a profit through realistic water charges that reflect the costs of supply. Issues of quality, equity and environmental standards can be handled through effective regulation.

**Against**

Large sums are needed to meet global water targets, but the private sector will only provide these in return for a large commercial return, meaning that the true cost of the investment will eventually be much higher than if it were publicly funded. Investment from governments and donors is preferable to privatisation as they can target investment at the most needy, rather than focusing upon the most profitable opportunities. Water supply is also a natural monopoly, so private companies have no competitive pressures to drive up quality and drive down prices.

**Subsidies**

**For**

Treating water as an economic good is better for the poor. Current regimes in developing countries often provide a state subsidy to the rich, with water provided to middle-class areas and wealthy farmers at a fraction of its true cost, while poorer areas have no supply at all. It is misleading to argue that privatising the water supply is bad because it will force the poor to pay for their water. The poor are already paying for their water, either directly to entrepreneurs who carry it in tubs and cans up to the shanty towns or with their time as they spend a large proportion of the family's labour fetching poor quality water from miles away. The poor also pay through ill health caused by dirty water and poor sanitation; this hits their ability to work and study, which keeps them in poverty.

**Against**

Treating water as a purely economic good will be bad for the poor. The rich may take advantage of badly targeted subsidies in some developing countries, but that does not mean that these subsidies are not essential to the poor. How would farmers in much of India cope without state-funded irrigation water? South African experience shows that when their village water supply was charged at even a low price, many women chose to fetch dirty river water from a long distance rather than pay the new cost. The Bolivian disaster of privatising water supply in Cochabamba shows the dangers: the American firm Bechtel doubled water tariffs so that some families paid a third of their income in water rates, mass protests led to riots before the scheme collapsed completely.

Source: CLSA Asia-Pacific Markets

**Xian Water decided in 2009 not to enter into a joint venture with Veolia**

The case of Xian in Shaanxi province provides fruit for thought. Xian Water negotiated with Veolia Water for two years and decided in 2009 not to enter into a joint venture with the French firm. Company head Zhong Shouming thought it inappropriate to sell state assets irrespective of the good price of the deal. Zhong submitted his views to the central authorities in Beijing accordingly. The State Council is still deliberating the issue. Meanwhile, it sent assessment teams to several other cities that were also exploring water joint ventures. There is yet any high-level conclusion but local authorities are now more cautious in their discussion with foreign investors on water projects.<sup>110</sup>

**Kill two birds with one stone by contracting out**

#### **Contract out instead of sell off**

Experts have also suggested that local governments should keep the ownership of water assets. Instead of selling them off, they can contract out water services. This way, the state would retain ownership and control of vital water infrastructure but take advantage of the knowhow and higher management efficiency of the private operators.<sup>111</sup> Some local authorities have already adopted this model, such as those in Hainan province. In accordance with the goals of the 11<sup>th</sup> Five-Year Plan, the state-owned Hainan Provincial Water Conservancy & Power built 16 new wastewater-treatment plants during the plan period. The provincial government bundled the plants into two five-year operating contracts in 2009. Each of the two winners will operate eight plants. This approach is likely to be followed by other provinces.

**Good opportunities for foreign firms in China's water market**

It needs to be stressed that there are good opportunities for foreign firms in China's water market. While local companies are the major investors today, the need for water infrastructure is so great that domestic players alone do not have sufficient capacity and experience to take up all developments. Thus, China remains an important market for international water companies.

**Wastewater business will grow rapidly**

#### **Implications for investors**

##### **Water utilities and wastewater companies**

Water utilities enjoy excellent and stable cashflow even if they are not too profitable, as they are essential to meeting a public need. The water-supply business has a gross-profit margin of about 20% and zero net-profit margin, versus 17% and close to zero for wastewater treatment.<sup>112</sup> Moreover, listed utilities usually outperform the market. In 2008, A-share water suppliers and wastewater-treatment companies enjoy 34% and 52% gross-profit margins. They also perform better than their non-listed peers.<sup>113</sup> For comparison, non-listed water suppliers delivered gross-profit margins of 20%, and 17% for non-listed wastewater-treatment companies, during the same period. Long-term investors such as pension funds should find these companies compelling.

In terms of growth potential, the wastewater-treatment business will grow faster than the water-supply business for two reasons. First, there is little room to expand supply in urban areas as most of the population there is already covered. Second, due to the increasing emphasis on water savings and efficiency, consumption is likely to taper off. However, the wastewater-treatment business is booming as pollution must be dealt with. Donghai Securities forecasts the sector to expand by about 8% per annum over the next three years with GDP growth.<sup>114</sup>

**Only one of the four components in water tariff goes to the utility**

While surging utility charges will benefit water suppliers, bear in mind that only one of the four components in water tariff (WSF) goes to the resource provider. Thus, those offering more services, such as Nanhai Development, may do better. The company does not only produce and supply water but also

deals with sewage treatment, garbage disposal and treatment, supply-project design, installation and technology consultation, sale of related equipment and supplies, etc.

**Lifted national standards for drinking water wastewater treatment**

Since 1 July 2007, the national standard for drinking water has gone up with reference to World Health Organisation guidelines. The standard has 106 criteria, while the old one only had 35. This implies China has to spend more on testing and quality improvement. Meanwhile, the country has also tightened the requirement for disposal of sludge from wastewater-treatment plants in 2009, which likewise calls for greater investments and higher costs.

Overall, the operation of water utilities and wastewater-treatment companies will become more transparent due to public pressure. When information on costs becomes available, the market is likely to reward those that are more efficient and well managed.



Figure 35

China Reality Research's China water survey		
	2007	2009
Tariffs	Annual water price increases (Cagr) will hit 8% year-on-year by 2010, with wastewater treatment fees increasing at a slightly faster pace to account for 34% of the total water price by 2010, up from the 30%.	Compared with 2006 when we last time did the research water prices have gone up by 28% on average, with a Cagr of 8.6%.  Of the 15 cities, 11 plan to raise water prices in 2010, by an average rate of about 10% (industrial 11%, household 10%, sewage 11%).
Wastewater treatment	Local governments in the 13 cities we visited have begun to take serious action against water pollution with targets to increase the number of wastewater-treatment plants by 50% and raise the wastewater-treatment ratio to more than 80% in 2010. But they are in urgent need of external investment to achieve these goals.	The sewage treatment rate has increased more than we expected going up to 92% in industries and 79% in households.
Users	Manufacturers will have to bear higher water charges as Beijing is likely to use water price hikes more frequently in future as part of its campaign to reduce energy-consuming and high-polluting industries.	Only the low income families feel the pressure from the current water prices on their daily life. Urban families still have room to withstand over 50% water tariff hike before they are forced to cut water consumption.

Source: CRR, CLSA Asia-Pacific Markets

**Water-price increases impact the energy sector**

**Non-water sectors**

The price of water impacts many other types of businesses. Investors in water-consuming operations should watch the trend carefully. Again, more water-efficient companies will perform better. For example, the hike of water tariffs levied on commercial users in Beijing in 2004, from Rmb11.20/m<sup>3</sup> to Rmb61.50/m<sup>3</sup>, hurt many spas and bath houses and put some low-end, uncompetitive establishments out of business. When imposed in the capital later this year and in other cities in China, bulk rates will further influence large water-consuming businesses.<sup>115</sup> Heavy-water-use businesses may need to provide value-added services to improve their income stream. In the case of Beijing, the spas and bath houses that survived successive tariff hikes are already providing a range of higher-valued services, such as massages. Investors in companies dependent on the source should ask for water audit and footprint information to assess their water efficiency.

**Indirect impacts**

There are also indirect impacts arising from price increase. For example, a higher WRF may boost cost of hydropower plants and affect its profitability. In July 2009, the NDRC, the MWR and the Ministry of Finance issued a new policy document, Notice on Water Resource Fee Standards for Central-owned and Cross-provincial Hydraulic Projects, which imposes a Rmb0.30-0.80/kWh WRF on hydroelectric power plants. For example, China Yangtze Power had to pay more than Rmb0.10bn every year.<sup>116</sup>

**Water efficiency and wastewater-treatment technology**

Water efficiency is important if water price is high. Tariffs increases provide a greater incentive to improve efficiency. This is already evident in Beijing, where high-water-consuming services (special users) are finding ways to enhance their efficiency in water use. Consequently, the demand for efficiency technologies and management are surging. Appropriate water-treatment technology also has great market potential in the near future, as more water needs to be treated and purified. This can be demonstrated by the high IPO price of Beijing-based water-treatment company Origin Water. On the first day of trading, the stock rose from the offer price of Rmb69 to the high of Rmb152.

**Adapting to climate change is about better water management****Climate change**

This report would be incomplete without mentioning climate change. Water is the primary medium through which climate change influences the Earth's ecosystems and hence people's livelihood and well-being. Water-related impacts appear in the form of more severe and more frequent droughts and floods around the world, and these were identified in China's National Climate Change Programme, published in 2007 by the NDRC. Higher average temperatures and Extreme weather are likely to affect the availability of water from rainfall, soil moisture, glacier and ice melt, and river and groundwater flows. These factors will lead to further deterioration of water quality, as well. The poor are likely to be the most affected by climate change due to its impacts on food prices and weather.

China already has a series of climate-change-mitigation policies in place. How and how fast it deals with its peak water will determine a large part of its success in future management of the resource. Better governance and accountability, and improving integration of land and water policies will be critical. We also need responsive water-management institutions that are able to plan and adjust to water availability and extreme weather events. Countries will also need to pay more attention to adaption to climate change, which will mainly be about better water management.

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