

# Supporting Stakeholder Coordination and Structure Modernization for Improved Urban Water and Wastewater Services

中华人民共和国财政部  
Ministry of Finance People's Republic of China

## TABLE OF CONTENTS

Executive Summary . . . . .	1
Introduction . . . . .	2
Contextual Conditions . . . . .	3
Tracing the Implementation Process . . . . .	6
Lessons from the Case Study . . . . .	12
Annex 1: Project Components . . . . .	14
Annex 2: National Policies on Water Sectors . . . . .	15
Annex 3: Stakeholder Table for Water Tariff Reform . . . . .	16
Annex 4: List of Interviews . . . . .	17
Annex 5: Chongqing Urban Environment Project: Timeline . . . . .	18

### PROJECT DATA

<b>PARTNER ORGANIZATION:</b> Ministry of Finance, P.R. China	<b>REGION:</b> East Asia and Pacific
<b>ORGANIZATION TYPE:</b> Government	<b>PROJECT DURATION:</b> 2000–2009
<b>DELIVERY CHALLENGE:</b> Stakeholder coordination; fragmented management structure	<b>PROJECT TOTAL COST:</b> US\$450.41 million
<b>DEVELOPMENT CHALLENGE:</b> Inadequacy in urban environmental services	<b>ORGANIZATION COMMITMENT:</b> US\$279.91 million
<b>SECTOR:</b> Water	<b>CONTACTS</b>
<b>COUNTRY:</b> P.R. China	<b>WORLD BANK TASK TEAM LEADERS:</b> Geoffrey Read, Tom Zearley, Paul Kriss, Ji You
	<b>CASE WRITER:</b> Weiyi Wang

## Executive Summary

How did the Chongqing Municipal Government reform its water, wastewater, and solid waste management services to serve six million citizens in the core urban area? What can other municipal governments in developing and middle-income countries learn from Chongqing’s experience in modernizing public utilities?

In 1999, Chongqing Municipal Government initiated the Chongqing Urban Environment Project with the World Bank’s support in response to the deteriorating urban environment in the context of rapid urbanization and industrialization. In a condensed 10-year period, the Chongqing Municipal Government constructed and upgraded sustainable essential water supply, wastewater and solid waste management systems for the main urban area of the municipality to serve a population of more than six million. Removing the point source wastewater and solid waste pollution generated in the Chongqing urban area significantly mitigated environmental damage to the Yangtze River and downstream at the Three Gorges Dam. Moreover, completing these essential sustainable environmental services has been a crucial enabler of the recent dynamic economic growth of the city, to the benefit of the entire municipal population.

This case study traces the design and implementation process of the project, and lays out how the Chongqing Municipal Government met the need for strong

Special thanks are due to task team leaders Geoffrey Read, Tom Zearley and Ji You, and the Project Management Office Dr. Linjun Zhou, who contributed crucial feedback and insights throughout the process. Many individuals contributed to the case study, starting with the interviewees who provided context, details, and insights. The following individuals contributed additional assistance and special acknowledgments are due for their in-depth reviews and editorial support: Jacob Bathanti, Oliver Haas, Claudio Santibanez, Maria del Camino Hurtado, and Sruti Bandyopadhyay.

stakeholder coordination and improved management structure of the urban environmental services, eventually leading to an integrated urban environment management system that provides better access to water and to wastewater treatment services for citizens. The response by a competent and coordinated municipal government and strong support from the national level led to success.

The case study features key events of the project that explain how results were achieved, including debate on the need to update the drainage master plan for the main city, water governance reform, water tariff reform, and public-private partnership practices. It explains how the intertwined interventions in infrastructures and institutions were made possible through aligning interests of various stakeholders and how these interventions contributed to the modernization of Chongqing Municipality's water sector.

## Introduction

On November 2, 2015, French president Francois Hollande visited the Tangjiatuo Wastewater Treatment Plant in Chongqing as part of his official trip to China. Operating since 2009, this Sino-French joint venture treats wastewater from around a million inhabitants, adopting cutting edge technology that renders the plant partly self-sufficient with regards to energy consumption.

The aforementioned Tangjiatuo Wastewater Treatment Plant is part of the urban water infrastructure that made possible the dramatic transformation of Chongqing's urban landscape and improved the life of millions of Chongqing citizens. With a US\$ 170 million loan from the World Bank and US\$ 279.91 million counterpart fund from the Chinese Government, the Chongqing Urban Environment Project (CUEP) expanded the municipal water supply to reach 30 million people, established a wastewater collection and treatment system, and modernized the management and operation of the urban water and solid waste management sectors. As a result, Chongqing's urban water environments were improved considerably. Water quality of the Yangtze River and Jialing River improved progressively from 1998 to 2008.<sup>1</sup> The safety and reliability of Chongqing Municipality's drinking water sources also improved significantly.

In comparison with other major cities in the world, what Chongqing accomplished was remarkable. For instance in Philadelphia, a similar endeavor took over 50

years to create an adequate wastewater treatment system after the city published its first master plan for the sewage and sewage treatment system in 1914;<sup>2</sup> the work of using green infrastructure to reduce sewerage overflows in rainfall events is still underway.<sup>3</sup>

This case study describes how the Chongqing Municipal Government overcame the challenges during the implementation process of the project to achieve the results, which are summarized in this introduction.

## The Development Challenge: Inadequate Urban Environment Services

The 1990s witnessed an industrial boom and a growing urban population in Chongqing. The heavily-subsidized water company could hardly afford to expand production capacity to meet the increasing demand. The city was ranked in the lowest three major cities in China for tap-water quality between 1993 and 2003.<sup>4</sup> The main city of Chongqing had long become the largest source of water pollution in the upper Yangtze River. With only one wastewater treatment facility in operation for the six million urban inhabitants, approximately 93 percent of domestic wastewater was discharged untreated into the Yangtze River and Jialing River every day. The construction of the Three Gorges Dam, beginning in 1997, would exacerbate the existing pollution problems. Although the dam would provide benefits by generating much-needed power to boost the country's industrialization, it would also slow the speed of river water flow allowing pollutants to collect and stagnate. Chongqing's water quality was at stake.

The deteriorating water environment was an issue of concern for Chongqing's citizens. In a paper published in *Environment and Development Economics* journal in 2001, the environmental cost of water pollution in Chongqing was equal to 1.2 percent of Chongqing's gross domestic

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- 1 Wastewater treated in Chongqing reached 776,000 m<sup>3</sup>/d (from 70,000 m<sup>3</sup>/d before the project), with the treatment ratio reported to be close to about 90% of the municipal wastewater. Through collection and treatment of municipal wastewater, the deteriorating water quality was reversed from Class III to Class II in the Yangtze River, and Class V to Class II in the Jialing and Wu Rivers.
  - 2 Kramek, N., & Loh, L. (2007). The History of Philadelphia's Water Supply and Sanitation System. Lessons in Sustainability of Developing Urban Water Systems. *Master of Environmental Studies, Philadelphia, University of Pennsylvania, Philadelphia Global Water Initiative, junio*.
  - 3 Philadelphia Water Department, "Amended Green Cities, Clean Waters: The City of Philadelphia's Program for Combined Sewer Overflow Control" (2011), available at [http://www.phillywatersheds.org/doc/GCCW\\_AmendedJune2011\\_LOWRES-web.pdf](http://www.phillywatersheds.org/doc/GCCW_AmendedJune2011_LOWRES-web.pdf).
  - 4 From a speech of the Mayor of Chongqing Municipality Mr. Qifan Huang at Annual High-level Forum on China Development in 2013. Retrieved from <http://finance.sina.com.cn/meetingvideo/topic/20130325/3162211215.shtml>.

product, if the equation is limited to the resource cost, that is, real resources spent or production possibilities foregone because of water pollution.<sup>5</sup> Water pollution also brought threats to human health. In the Jialing River region in 2000, the incidence rates of intestinal infectious diseases such as hepatitis A and dysentery were 50 percent higher than the national average.<sup>6</sup>

In consequence, **the development challenge faced by the Chongqing Municipal Government was the increasing levels of water pollution, which were overwhelming existing capacity and affecting the quality of urban water services<sup>7</sup> provided, to the detriment of economic growth and the citizens' well-being.**

### **The Delivery Challenges: Need for Strong Stakeholder Coordination and Improved Management Structure of the Urban Environmental Services**

In the late 1990s, in response to the need for improved urban water services to sustain the economic growth for an expanding urban population, the Chongqing Municipal Government initiated the Chongqing Urban Environment Project (CUEP) as the first phase of a long-term urban environment improvement program. In the project, a broad range of stakeholders at different levels were involved, including, the Project Management various bureaus and agencies within the Chongqing Municipal Government, the Chongqing citizens as beneficiaries, the Chongqing Water Group, and the private investors in the negotiation for PPP operations.

The need for strong coordination among different stakeholders appeared as a delivery challenge to address throughout the preparation and implementation phases. This is manifested, for instance, in the debate among different agencies within the government on the need to update the drainage master plan for the main city and the highly contested water tariff reform.

Another featured delivery challenge appearing throughout the project implementation was the need for improved management structure of the urban environment services. The World Bank and the Chongqing Municipal Government reached consensus at the inception of the project that to achieve an integrated sustainable urban environment management system, investing solely in “hardware” (specifically urban water and wastewater infrastructure) would be inadequate;

institutional reforms would need to be introduced as an integral part of the project to complement and reinforce the core physical infrastructure component of the project. The old management structure of the urban water services separated the water supply and wastewater treatment responsibility, and was not able to meet the challenge of financing the new urban environmental infrastructure.

The lessons and experience in addressing these questions could benefit other urban water-related projects facing similar circumstances, especially since these projects usually include components of both infrastructure and institutional reform, and require engagement of different stakeholders within the local context including policy makers (the Chongqing Municipal Government in this case), private sector, and citizens/beneficiaries.

## **Contextual Conditions**

### **An Overview of Chongqing Municipality: Administration, Geography, and Economy**

Chongqing Municipality, previously part of Sichuan Province, was created in 1997 in a government effort to develop China's western regions and to coordinate the resettlement of residents from the reservoir areas of the Three Gorges Dam. Like three other major Chinese cities (Beijing, Shanghai, and Tianjin), Chongqing is in the first tier of China's administrative divisions, equal to a provincial level. The Chongqing Municipal Government enjoys the same degree of independence to make decisions as do Provincial Governments, and it reports directly to the Central Government. Chongqing Municipality comprises a main central urban area, Chongqing City or Chongqing proper, containing nine districts, as well as a much larger surrounding rural area containing 29 smaller districts and towns.<sup>8</sup> The CUEP was designed to

5 Chang Yongguan, Hans Martin Seip and Haakon Vennemo (2001). The environmental cost of water pollution in Chongqing, China. *Environment and Development Economics*, pp 313–333. doi:10.1017/S1355770X01000183.

6 Project Appraisal Document.

7 The definition of the term “urban water services” is cited from the World Bank report *Stepping Up: Improving the Performance of China's Urban Water Utilities*: “it means the provision of water supply, storm water drainage, and wastewater management. Since storm water and wastewater are closely linked through combined drainage systems, the term ‘wastewater’ refers to both services unless otherwise noted.”

8 Administrative Divisions of Chongqing Municipality. Retrieved from <http://en.cq.gov.cn/AboutChongqing/2007/6/12/981919.shtml>.

target Chongqing City and several surrounding districts and towns including Fuling, Wanzhou, Tongliang, Dazu, Changshou, Wulong, Bishan, Beibei and Jiangjin (see Table 1 in Annex 1: Project Components).

Chongqing Municipality is located in the southwest of China. The central urban area is a city of unique features, built on a hilly area and partially surrounded by the Yangtze and Jialing rivers. The Yuzhong District, Nan'an District, Shapingba District and Jiangbei District are located directly on a large slope. Surrounded by mountains, hills and rivers, Chongqing is known as a “mountain city” and a “city on rivers.” Its complex topological and geographical features posed unique challenges for the design of the urban drainage system and the installation of inceptors for wastewater collection during implementation.

Chongqing is one of the world’s largest metropolitan areas, with approximately 30 million people, including six million urban residents. It is a commercial hub for shipping along the Yangtze River, and is located at the upstream limit of the Yangtze Commercial Navigation. It has a diverse industrial base that includes coal, iron, petroleum refining, as well as metallurgical, chemical, and petrochemical operations, and the more recent development of light industry and manufacturing. The Municipality, especially the central urban areas, was growing rapidly in the late 1990s. Annual levels of investment in infrastructure such as power, transport, telecommunications and water supply had been growing at the rate of 30 percent a year or more but investment in pollution control had lagged behind.<sup>9</sup>

## Urban Water Services in Chongqing

### ***Infrastructure: Outdated and Under-Invested***

In 1997 when the CUEP was conceived, two major challenges that had been identified in water supply: limited production of clean water and low water quality. There were 12 water treatment plants providing tap water to the Chongqing main urban area, with six intakes extracting raw water from the Yangtze and six others from Jialing River. These plants had a total capacity of 975,000 m<sup>3</sup>/day serving 2.3 million urban residents, well below the projected water use for the next 10 years since urban residents were expected to increase to 2.9 million in 2010. In addition, there were 49 self-supply waterworks,

with a total capacity of 1.3 million m<sup>3</sup>/day, mainly run and owned by state-owned enterprises, serving industrial purposes. Among all the existing water treatment plants, only three were built and expanded in 1990 and could produce tap water qualified for National Standard Class I (the highest water standard level), while 72 percent of the total municipal water supply produced by the rest of the water plants could barely reach National Standard Class II or III.<sup>10</sup> Furthermore, water became contaminated after treatment, during transmission and distribution, largely due to the outdated distribution infrastructure: 60 percent of the existing 453 kilometer water distribution networks were built before the 1990s, with the oldest dating back to the 1950s and 1960s. As a result, the water that customers received from faucets could hardly meet the national sanitary standards.<sup>11</sup>

Compared to the water supply system, the wastewater treatment system was much less advanced. Most of the population was serviced by septic systems that typically overflowed into the surface-water drainage systems. Centralized wastewater treatment was limited only to the Tangjiaqiao catchment serving a population of approximately 74,000 (50,000 m<sup>3</sup>/day). More than 90 percent of the Municipality’s wastewater was discharged directly into rivers through various channels, including 600 outlets located along the banks of the Yangtze and Jialing Rivers. These outfalls were side by side with the water supply intakes, resulting in increased health risks, growing operating costs and occasional interruptions in the water supply. A wastewater master plan had been prepared proposing 21 small new treatment plants distributed at locations in the city discharging into the Jialing and Yangtze Rivers. The Chongqing Municipal Government recognized these problems, which were some of the factors leading to the establishment of CUEP.

### ***Institutions: Ill-Equipped to Meet Challenges***

The initial governance structure for water services within the Chongqing Municipal Government was ill-equipped to face the growing challenges. Water supply and drainage (which would later become wastewater

<sup>9</sup> Project Appraisal Document.

<sup>10</sup> Research Report on Water Tariff Adjustment in Chongqing City.

<sup>11</sup> Research Report on Water Tariff Adjustment in Chongqing City.

## Box 1: Governance Structure of the Water Supply and Wastewater Treatment System in Chongqing Municipal Government Before 2000

### Water Supply

The public utility Chongqing Water Company (CWC) was responsible for the supply of tap water to the urban area of the Municipality. The Public Utility Bureau was its “parent bureau” that was responsible for overseeing the utility. The CWC had no autonomy in terms of budget allocation, which was controlled by the provincial Finance Bureau, and its investment decisions needed to be approved by the Development and Reform Commission, while the Price Bureau determined tariff adjustments.

### Wastewater Management

Before the first wastewater treatment plant at Tangjiaqiao was established in 1997, the Municipal Drainage Department under the Municipal Affairs Bureau undertook the role of maintaining the main drains in the city. The combined storm water and sanitary drainage of Chongqing was collected and disposed into the nearest water body, the Yangtze and Jialing Rivers. In 1998, the Municipal Drainage Department was turned into Chongqing Drainage Company (CDC) and made responsible for wastewater treatment. The wastewater treatment fee was collected together with the tap water fee by the Chongqing Water Company.

treatment) were functions managed by two different bureaus (see Box 1) and this administrative segmentation created coordination problems. First, since the parent bureaus of Chongqing Water Company and Drainage Company managed their budgets separately, the Chongqing Water Company had no incentive to collect the wastewater treatment fee for the Drainage Company, and even charged administrative fees to the Drainage Company for collecting the wastewater treatment fee. As a result, the wastewater treatment fee collection rate was much lower than that of the tap water fee, at a level that was insufficient to finance new investments in the urban wastewater treatment system. Secondly, due to the lack of coordination between the two bureaus and utilities, the Chongqing Municipal Government was not able to synthesize reliable data of water supply and wastewater treatment to make long-term investment plans for an integrated urban water management system.

12 [http://www.ce.cn/cysc/ny/dl/201601/20/t20160120\\_8386662.shtml](http://www.ce.cn/cysc/ny/dl/201601/20/t20160120_8386662.shtml).

13 Project Appraisal Document.

14 <http://www.cnd.org/HXWK/author/GAO-Gang/cm9706a-1.gb.html>.

15 Excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.

16 Project Appraisal Document.

### Map of the Location of the Three Gorges Dam and the Most Important Cities Along the Yangtze River



Source: Wikipedia, Three Gorges Dam.

## Tracing the Implementation Process

In 1997, as the construction began on the Three Gorges Dam, the national and municipal governments made addressing deteriorating water quality in the Jialing and Yangtze Rivers a priority. With the goal of providing a sound environmental basis for the long-term sustainable economic growth of the municipality and to safeguard public health and the environment, Chongqing Municipal Government (CMG) initiated the Chongqing Urban Environment Project.

The CMG was committed to the implementation of CUEP from the onset. A “Leading Group” headed by a Deputy Mayor was formed in 1998 to provide guidance and policy direction. The Group designated the Chongqing Planning Commission (the later National Development and Reform Commission) as the agency responsible for managing the project. The Commission organized and staffed a Chongqing Municipal Project Management Office (PMO) to prepare and execute the project. The PMO played a crucial role in aligning various stakeholders throughout the design and implementation process.

### Rethinking Design (1997–1999)

The construction of a wastewater collection and treatment system for the main urban area was one of the main components of CUEP. Through existing drainages

and planned receptors, the wastewater from different districts would be collected and channeled to wastewater treatment plants for centralized treatment. A drainage master plan needed to be approved by both CMG and the World Bank team as a pre-requisite.

The initial drainage master plan proposed by the Chongqing Municipal Government took into account the technical feasibility of the new treatment plants and channels, and consisted of the construction of 21 small-scale wastewater treatment plants scattered throughout the urban area, based on the location of natural water catchments. This master plan had been formulated jointly by the Chongqing Urban Planning Bureau, Chongqing Construction Bureau and Chongqing University of Architecture and Civil Engineering (the current Chongqing University) and was approved by the State Council of People’s Republic of China in 1993.

Since the formulation of the initial drainage plan took place almost four years prior to the design of the CUEP, the World Bank team recommended that the drainage master plan for the urban area of Chongqing be updated. The first challenge that the project encountered in the preparation phase was to reach consensus on drainage master plan within the Chongqing Municipal Government.

Agencies within the Chongqing Municipal Government had divergent opinions towards the drainage master plan. While the Urban Planning Bureau and Construction

Bureau was in favor of the initial 21-plant plan, the Finance Bureau and Chongqing Reform and Development Commission where the Project Management Unit (PMO) was located, supported the World Bank team's suggestion to find an alternative solution. The major concern for the Finance Bureau and the Chongqing Reform and Development Commission regarding the original plan was its substantial construction costs as well as a large budget for land requisition and settlement.

*“Wastewater treatment plants in a city resemble toilets in a house where you flush waste away. Imagine building 21 wastewater plants in Chongqing... it is like having a toilet in each room of a house. Would you do that in your own house?”* Linjun Zhou, the PMO Director, was among the first group of government officials who endorsed the replacement of the original drainage master plan. *“The opportunity costs would be immeasurable. The value of the land that would have been occupied by the scattered wastewater treatment plants has skyrocketed. Those areas now are the busiest Central Business Districts, shopping malls and residential complexes,”* Zhou added in the interview.

Reaching consensus on the final drainage master plan among different government agencies was a lengthy process lasting almost two years from 1997 to 1999. The PMO led the re-assessment process by adopting an **inclusive approach to engaging all the major stakeholders** within the Municipal Government in the discussion regardless of their initial standpoints on the drainage master plan. *“We invited representatives from the Urban Planning Bureau, Construction Bureau and Chongqing University of Architecture and Civil Engineering (who designed the initial plan) to be fully engaged in the research. Particularly, we suggested that the Urban Planning Bureau led the discussion while the PMO organized and coordinated debates. Excluding them from the process of developing an alternative plan would have caused immense conflicts inside the organization, and replacing the original plan would have become more controversial.”*

Furthermore, in-depth research on the City's drainage plan was commissioned by the PMO and conducted by domestic and international consulting firms, and was critical in formulating a clear cost-benefit analysis for comparison between different drainage plan options for the municipal decision makers. The Chongqing Municipal Government received additional support from the Governments of France, Japan, Australia, Denmark, Italy, and Switzerland in the form of grants and technical

assistance to conduct the research. The joint research by 12 domestic consulting firms and relevant agencies together with seven international consulting companies lasted for two years from 1997 to 1999, and produced nine alternatives to optimize network configuration for the wastewater interceptors along both the Yangtze and the Jialing rivers, which were benchmarked in terms of investment and operational costs, potential pollution sources, land acquisition, resettlement of population, and impact on urban landscape.<sup>17</sup> The research product, a comprehensive economic analysis of the alternatives for the drainage master plan, identified the least-cost solution. All of the relevant agencies within the Municipal Government were able to agree on this option as the best way forward.

The final chosen layout was a seven-plant plan, involving the construction of two large wastewater treatment plants downstream of the urban area on either bank of the Yangtze River, the Tangjiatuo and Jiguanshi Wastewater Treatment Plants. The selected configuration consisted of four trunk wastewater collector systems, along the four banks of the Yangtze and the Jialing. Compared to the initial 21-plant plan, the chosen layout saved, in total, RMB 2.7 billion (nearly 30 percent of the estimated 21-plant cost), including cutting down annual operational costs by RMB 84 million, acquiring 21 hectares of urban land equivalent to RMB 600 million, as well as reducing the number of households resettled by 2,240 households, saving resettlement costs of RMB 670 million.<sup>18</sup>

Both World Bank specialists and the Chongqing Municipal Government recognized the reformulated design of the drainage master plan as one of the cornerstones of the project. The implementation of the drainage master plan constituted the most important infrastructure intervention of the Chongqing Urban Environment Project.

## Adjustment to the Project Components to Utilize Loan Savings

As the construction work started, the project team soon realized that there would be large loan savings for a number of reasons. Since the Central Government considered environmental infrastructure of Chongqing

17 Economic Analysis of Drainage Master Plan for Chongqing City.

18 Economic Analysis of Drainage Master Plan for Chongqing City.

as instrumental in mitigating the negative environment issues affecting the Three Gorges reservoir areas, it made available large amounts of national bond funds to Chongqing for water supply and wastewater projects, while demanding these project be completed prior to the construction of the Three Gorges Dam. To meet the pressing deadline, the Chongqing Municipal Government used the immediately disposable domestic counterpart funds to finance some contracts before the World Bank loan became available. Furthermore, the actual costs were also much lower than the estimates at project appraisal, partly due to fierce competition by contractors, which significantly lowered bid prices.<sup>19</sup>

To tackle the issue of potential loss due to large loan savings, estimated at the time, of about US\$72 million (36% of total loan amount), the World Bank team and the Chongqing Municipal Government jointly worked out a plan to utilize these loan savings, with the goal to enhance the achievement of project objectives and expand the target beneficiaries. Eight new components in seven county towns were added in 2005, following project restructuring at the mid-term review (see Annex 1).

Shifting the project focus from the most-developed urban areas to the less-developed small towns around the city, the project team encountered new implementation bottlenecks—existing weak capacity in the small towns, which led to implementation delays and subsequently extension of the loan closing date. World Bank deployed additional resources for supervision and capacity building among local project implementing agencies in the small towns. Through these efforts, it was possible to complete implementation of the loan-savings subcomponents with a three-month extension over the planned two-year implementation period.<sup>20</sup>

These adjustments to the project components significantly increased the direct beneficiaries of CUEP from 3 million to about 6.61 million, representing a 220% increase in the number of beneficiaries estimated at appraisal. More than 3 million residents in the seven county towns now enjoy cleaner drinking water and water environment (e.g. rivers) as well as better flood control because of the new components of the project.

## Upstream Actions to Address an Inefficient Institutional Framework

Under China's centrally planned economy, particularly prior to 1978, performance of urban water utilities was

measured in terms of achievement of physical targets, such as kilometers of pipelines or treatment plant capacity.<sup>21</sup> For a long time, the Government focused mainly on developing the infrastructure and did not pay as much attention to the management structure or the service quality of the water sector.

During initial discussions with the World Bank team during the preparation phase of CUEP, the Chongqing Municipal Government proposed a plan mainly focused on expanding and upgrading the infrastructure for water supply and wastewater treatment. *"In that time, the Chongqing Municipal Government's urban planning philosophies and practices were quite conventional, mostly focusing on infrastructure, while the approaches advocated by the World Bank recommended a holistic plan to reduce waste disposal by changing consumer incentives, factoring in the economic and financial feasibility and environment impact of the project, among others,"* explained Ji You, the latest World Bank Task Team Leader for the Chongqing Urban Environment Project, *"This Project was the World Bank's first involvement in urban environmental services sector in Chongqing. It took time for the Municipal leadership to accept new ideas... We provided many trainings and workshops to the government officials to change their perceptions."*

The CMG's reluctance to invest in the institutional reform aspect gradually shifted to a more open attitude. One important factor was that the Central Government embarked on water sector reform to achieve the nation's environmental and public health objectives from the late 1990s. The State Council, National Development and Reform Commission, Ministry of Construction, State Environmental Protection Agency, and other national government agencies issued a variety of directives on water pricing, utility regulation, wastewater treatment, private sector participation, and other reform priorities (Table 1).<sup>22</sup> This policy guidance contributed to creating the conditions for the Chongqing Municipal Government to take bolder steps in reforming water sector management with support from the World Bank.

<sup>19</sup> Implementation Completion Report.

<sup>20</sup> Implementation Completion Report.

<sup>21</sup> World Bank report *Stepping Up: Improving the Performance of China's Urban Water Utilities*.

<sup>22</sup> World Bank report *Stepping Up: Improving the Performance of China's Urban Water Utilities*.

## **Streamlining Governance of Municipal Utilities**

The first effort to integrate water supply and wastewater treatment functions within the local government took place in 1999. The former Municipal Affairs Bureau (in charge of drainage management) and Public Utility Bureau (in charge of water supply) were consolidated into a new agency inside CMG; the Chongqing Municipal Administration Commission was responsible, among other priorities, for both water supply and wastewater. The institutional boundary between these two segments of the water sector was dissolved, making it possible for the Municipal Government to strategize water supply and wastewater treatment as an integral sector of the municipality in the long term.

More actions were taken within the water utilities. First, Chongqing Water Company and Chongqing Drainage Company were detached from their parent bureaus, established as state-owned limited liability companies at the project start, forming the Chongqing Water Group Co. Ltd (CWGC) in 1999. Fuling Drainage Company (FDC), the utility serving Fuling District of Chongqing Municipality was also incorporated into the CWGC as its subsidiary company. The water supply and wastewater management for the first time were streamlined within one integrated entity: CWGC. The CWGC became an autonomous state-owned enterprise with the responsibility for water supply and wastewater treatment. The autonomy of CWGC was manifested in two aspects: first, the Chongqing Water Company became fully responsible for its own financial management, and it was no longer dependent on the budget allocation from the Municipal Finance Bureau. Second, the Chongqing Drainage Company was transformed from a government-affiliated agency to a commercialized service provider. CDC and FDC function as cost centers under CWGC, responsible for implementing wastewater projects, and operating and maintaining the assets constructed. The CWGC appoints the management and staff of the CDC and FDC. The Finance Bureaus continue to collect wastewater revenues, provide budgets to the CWGC to distribute to Water Companies; and Finance Bureaus assume the responsibility for debt service. WCs thus function as service providers reimbursed for the quantity of wastewater treated.

The restructuring of water utilities reduced the transaction costs within the urban water sector, and laid a solid foundation for further marketization.

## **Tariff Reform to Ensure Financial Viability**

The newly established CWGC found itself on rocky footing. It inherited the accumulated debts from the predecessor water utilities, amounting to RMB 1.3 billion. Also, the new investment in water infrastructure enlarged the budget deficit. It was projected in 2001 that for the following 10 years the additional investment in water infrastructure would amount to RMB 5 billion, (around USD 722 million with the exchange rate in 2001) equivalent to RMB 500 million (around USD 72.2 million with the exchange rate in 2001) per year. It was unrealistic to count on the Municipal Government for funding, as this figure far exceeded the CMG's budget for all the construction projects in Chongqing Municipality. On the other hand, water tariffs, including both tap water and wastewater treatment tariffs, were too low to cover real costs and heavily subsidized consumption at 1.34 yuan/ton. It was evident to the CMG that tariff reform was unarguably the only solution to CWGC's ongoing debt stock and new debts that would occur with future investments in infrastructure.<sup>23</sup>

Before the new water tariff was adopted, the Municipal Price Bureau held public hearings for representatives of the Chongqing citizens, before the Municipal Development and Reform Commission reported the adjustment to the National Development and Reform Commission.

The first public hearing on Water Tariff Reform in 1999 encountered strong opposition from Chongqing citizens. Many wondered why they should pay bills for a state-owned enterprise that provided such low quality service. One government official alleged that a Willingness-to-Pay survey carried out by the Statistics Bureau, which showed that more than 90 percent of respondents agreed to the increase, was not based on an accurate sample. *"... they (the government speakers at the public hearing) emphasized the need for funds to cover the deficit of the Chongqing Water Group as a major reason tariff increase. But this did not persuade the citizens to agree on water price increase..."* The Director of the PMO, Linjun Zhou, was quite candid about the backlash against the tariff reform at the first public hearing.

Realizing that citizens needed a convincing justification for the tariff reform, the CMG authorized the PMO to conduct another Willingness-to-Pay research in the same year. The survey questionnaire was carefully re-designed

<sup>23</sup> Linjun Zhou, Review of the Chongqing Water Tariff Study and Reform.

## Box 2: Some Key Findings from the Second Willingness-to-Pay Survey<sup>a</sup>

### Beneficiaries of low water tariffs were not always as intended

The study revealed that heavy water users and high-income groups were the main beneficiaries under the existing heavily-subsidized tariff arrangement. The amount of water consumed by a resident was highly correlated with his or her economic status. In other words, wealthy families were more likely to consume greater amounts of water than poor families. Research showed that residents with family income of over 10,000 yuan/month enjoyed a subsidy of 22 yuan/month, while residents whose family income was closer to 500 yuan/month received a mere subsidy of 3 to 4 yuan per month.

### Low “metered” water expense and high “un-metered” water expense

Another finding from the study was that consumers were paying much more for water consumption than what was calculated by the household meter. For example, if a family of three consumed six tons of water a month, according to the water meter their monthly water charge was 7.20yuan (1.20yuan/ton). However, besides the cost of tap water, the family would also need to spend extra money on barrelled drinking water, or install a family-use water purifier. If three to four barrels of water were used the average monthly cost would be around 30 to 40 yuan; if the filters of a water purifier were replaced every year, then the total costs would amount to around 80 yuan, which reflected an average monthly expense of six yuan. The low quality of water brought extra costs to citizens. Although customers were not willing to pay increased water price for the tap water, they were paying voluntarily for clean water provided by bottled water manufacturers and water purifier manufacturers.

### Social costs and other problems resulting from low water tariff

These problems included: waste of water resources, pollution of the environment, additional costs for pollution control, health losses, severe financial deficit and inferior service of the water provider, as well as a public fiscal burden.

<sup>a</sup> Reform of Water Tariff in Chongqing: A Case Study Review. World Bank Analytical and Advisory Assistance (AAA) Program. China: Addressing Water Scarcity. Study Summary Note Series. Retrieved from [http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/Chongqing\\_Water\\_Tariff\\_EN.pdf](http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/Chongqing_Water_Tariff_EN.pdf).

to include questions about citizen’s expenses on water beyond the metered tap water. The findings from the Survey (Box 2) revealed that the current low water tariff benefited a small group of high-income residents with higher water consumption, and that the citizens had the willingness and financial capacity to pay for high-quality drinking water. It was further pointed out on the survey that with the low water tariff, the government would not be able to upgrade the water distribution networks, expand the water supply capacity, and attract investment from the private sector to further improve the efficiency of the water sector. The water policy research provided solid evidence of low service quality, high indirect costs and inefficiency caused by underpricing water.

The Chongqing Municipal Government responded to the concern about the additional financial burden for low-income families by the tariff reform. Subsidies were provided to targeted vulnerable groups to compensate for the rise in the tariff. The minimum monthly living standard guarantee allowance was raised from CNY169 per person to CNY185; the monthly unemployment pension was raised from CNY201 to CNY210; and monthly allowance for laid-off state-owned enterprise employees was also raised from CNY205 to CNY210. The CMG switched from an approach of subsidizing the price for all to subsidizing targeted groups on tap water.

Additionally, in response to citizens’ demand for high quality water, the CMG showed its resolution to substantially improve service quality, and reduce the “unmetered” expenses accordingly. A “Clean Water Campaign” took place in Chongqing between 2003 and 2008 to upgrade the distribution networks and water treatment facilities, with another loan from the Japanese government. The message from the CMG was clear: increased water tariffs would be used to invest in the water infrastructure for all citizens to benefit them in the long term.

Finally, water tariff reform took a gradual approach to ameliorate strong social reaction. There were six separate tariff adjustments between 2001 and 2009 (see Table 2). The average tap water rate was raised from 1.71 yuan/m<sup>3</sup> in 2001 to 3.06 yuan/m<sup>3</sup> in 2009, while wastewater treatment fee was raised from 0.25 yuan/m<sup>3</sup> to 1.00 yuan/m<sup>3</sup> for residents, and to 1.3 yuan/m<sup>3</sup> for non-residents. By the loan closure in 2009, the Project Appraisal Document projected tariff for wastewater treatment, 1.00 yuan/m<sup>3</sup>, was implemented to achieve substantial cost recovery for wastewater services.<sup>24</sup>

According to the Chongqing Water Company’s statistics, the amount of water consumption in the urban districts was reduced by 3 to 5 percent shortly after the

<sup>24</sup> Implementation Completion Report.

**Table 2: Tariff Reform in Chongqing City 2001–2009**

	Average tariff	Water Price by Category				
		Industrial	Commercial	Construction	Residential	Sanitation
2001.6	1.71	1.50	2.25	1.85	1.25	Missing
2002.3	2.46	2.25	3.00	2.60	2.00	Missing
2004.5	2.52	2.31	3.06	2.66	2.06	Missing
2005.1	2.52	2.31	3.06	2.66	2.06	Missing
2006.8	2.56	2.35	3.10	2.70	2.10	Missing
2009.12	3.06	3.25	3.25	3.25	2.50	Missing

tariff increase, which indicates that consumer behavior had been influenced to reduce wasteful consumption. Understanding better the real needs of citizens—clean water and quality service—and responding to those needs were key to get buy-in.

### **Promoting Private Participation to Improve Utility Performance**

Tariff reform paved the way for foreign capital to enter the water sector in Chongqing. Increased user fees indicated consistent profits within the water sector, which became attractive to private investors. With the support of the World Bank team and two grants from the Public Private Infrastructure Advisory Facility (PPIAF), CMG received advice on options for establishing public private participation (PPP) in infrastructure provision, which resulted in several PPP operations.

In early 2002, the CMG decided to introduce foreign capital to the urban water distribution market as part of the marketization reform of water sector guided by the Central Government. The negotiation was initiated between the CMG, Chongqing Water Group, and Sino-French Water Supply Company.<sup>25</sup> In November 2002, a joint venture, Chongqing Sino-French Water Supply Company Limited was officially established by Sino-French Water and Chongqing Water Group, with each group holding 50 percent equity. The newly established Chongqing Sino-French Water Supply Company Limited was granted a period of 25-year concession as the sole service provider for drinking water supply and network management for Jiangbei, Yubei and the new development zone in the Northern part of Chongqing, under the condition that it would provide adequate, quality, and continuous service to clients who are willing to pay. It was the first PPP project in the public water sector in China, and envisioned an

integrated system of water supply plants and distribution networks. It reduced the overall costs and increased the efficiency of water supply through improved management and coordination of the plant and distribution networks and better customer service.

In the interview, Cheng Ji, the General Manager of Chongqing Sino-French Water Supply Company Limited recalled that the commitment from the CMG was crucial bringing the deal to fruition. *“In 2002, when we first visited the newly established development zone in the northern part of Chongqing, an area where the Government intended to grant concession for water supply, I was quite skeptical about the prospect of the deal. That area was in suburbs, the infrastructure was rudimentary, and the roads were unpaved, muddy and bumpy. We were not sure about the water demand of this area. However, the Mayor Mr. Huang Qifan assured us that this area had been included in the Municipal Government’s development plan, and it would soon become the new commercial center of the Municipality in the next few years. We believed him and signed the deal. In the past 13 years, thousands of factories, firms and residents moved in this area. Our daily capacity for water supply increased from 275,000 m<sup>3</sup> to 940,000 m<sup>3</sup>. By 2018, this figure will become 1.2 million m<sup>3</sup>.”*

For private investors in the water sector, the biggest challenge was the possibility of government policy shifts in contract terms and tariff setting. The leadership of CMG was aware of the investors’ concerns and reassured the Sino-French Water Company with credible commitment, particularly through offering two vital terms. First, the

<sup>25</sup> Sino-French Water Development Company Limited (also known as Sino-French Water) is a joint venture between the world’s leading water treatment and waste management firm SUEZ Environnement, based in Paris, France, and NWS Holdings Limited, based in Hong Kong SAR, China.

Joint Venture (JV) was granted a 50-year concession. Since the ceiling for the concession contract period was 30 years as regulated by the Central Government, the contract would be implemented in two phases, each phase lasting for 25 years. In the first 25 years, if the service provided by the JV was superior or equivalent to other service providers of its kind in Chongqing City, the concession contract would be extended automatically for another 25 years at the end of the first phase. Second, during the concession period, the CMG would guarantee that the Joint Venture be the only service provider in the designated areas. Small-scale water plants of the state-owned enterprises in the areas would be gradually closed down in the following years. In this way, the Joint Venture would be able to reduce costs through increased scale. This PPP arrangement encouraged the JV to improve and expand its service, and ultimately benefited the residents in Chongqing Municipality.

With new capital from the Sino-French Water Company, Liangtuo Water Plant was expanded, and water supply networks in Yubei District and the northern district as well as the system of Jiangbei Water Plant were upgraded. This public-private partnership, as an institutional innovation in Chongqing's water sector, brought abundant funding for infrastructure improvement. In addition, the technological and technical spillover from SUEZ also benefited Chongqing Water Group, which saw considerable improvements in its technical standards, personnel training and cooperative management.

In 2006, the cooperation between Sino French Water and Chongqing Water Group expanded into wastewater treatment. When Tangjiatuo Wastewater Treatment Plant was completed as one subcomponent of the CUEP, another joint venture, Chongqing Sino French-Tangjiatuo Wastewater Treatment Company was formed and was awarded a contract to manage the new wastewater treatment plant. Operating since 2009, the plant treats wastewater from around a million inhabitants. It uses INNODRY 2E technology developed by SUEZ, which enables the facility to treat all the sludge produced, by dehydrating it and converting it into alternative fuel, for use within the plant itself, thus rendering it partly self-sufficient with regards to energy consumption.<sup>26</sup> Compared to the traditional method of sludge disposal on land, which is not only costly in terms of transporting and stocking, but also bears the risk of environmental

contamination, the new technology produces dried sludge with reduced volume, which at the same time, is hygienic, biologically stable, dust-free, and able to be used as an alternative fuel. The Tangjiatuo Wastewater Treatment Plant has become an exemplar of a circular economy in the field of water management in China, which yields no waste and pollution.

## Lessons from the Case Study

### Sustained Leading Environment Engagement Vital to Success of the Project

The sustained competence of principal stakeholder, the Chongqing Municipal Government, was vital to the success of the project. Through the Planning Commission and PMO, the Chongqing Municipal Government enabled decisions to be made building confidence as the decision making and analysis of options and policy alternatives proceeded. This was supported by similar competence and confidence shown by the Central Government's logical approach to development planning and approvals.

### Agility of the Government and World Bank in Project Implementation

The mid-term adjustment of the project demonstrated clearly the agility of the Chongqing Municipal Government and the World Bank during implementation to adapt the project objectives and design to effectively achieve the project objectives and target an expanded group of beneficiaries. In response to the issue of sizable project loan savings, the Government and the World Bank added new components to address critical environmental infrastructure deficiencies in small towns of the Chongqing municipality. This successful pilot initiative lead the way for the Bank and Chongqing to identify and prepare a full-fledged project (Chongqing Small Cities Infrastructure Project), which was one of several follow-up operations supported by the Bank.

<sup>26</sup> Press Release from SUEZ Environment SAS. Retrieved from [http://www.suez-environnement.fr/wp-content/uploads/2015/11/Press-Release-Chongqing\\_VA.pdf](http://www.suez-environnement.fr/wp-content/uploads/2015/11/Press-Release-Chongqing_VA.pdf).

## Using High-quality Analytical Research to Inform Decision making

The high quality analytical studies informed and rationalized the decision making process within the Chongqing Municipal Government. In the preparation phase, the Government ensured that analysis of both the technical and economic aspects of the master drainage plan alternatives was performed using the best available national and international experts. The rigorous analytical work proved critical in changing the minds of decision-makers. The thorough economic analysis and comparison of different alternatives for the wastewater collection and treatment master plan in Chongqing provided solid evidence for decision-making and to drive consensus. This approach was also applied in the tariff reform. Being exposed to the water-use data and its social analysis, the citizens had a better understanding of the social costs of the heavily-subsidized water, and turned to support the Municipal Government's tariff reform.

It is worth noting that the World Bank task team played an important role in securing funding for such analytical work. The World Bank task team mobilized over US\$3 million grant funds from various donor countries to enable the various full analyses to be undertaken, together with resources from the Municipality.

## Using Inclusive and Participatory Approaches to Align Interests Among Different Stakeholders

The PMO at the Chongqing Municipal Government undertook a vital coordination role for project implementation, especially when disputes arose among different stakeholders. An inclusive approach that allowed for open and honest discussion among different stakeholders proved to be crucial in forming consensus. The Chongqing PMO adopted this approach when mediating the debates at critical junctures of the project. In the debate on the Chongqing Drainage Master Plan, Municipal Construction Bureau, Municipal Finance Bureau, and Development and Reform Commission, their different opinions on the design of the drainage plan were discussed and weighed in the meetings. Furthermore, policy makers should be aware that in highly contested

tariff reform, citizen consultation is critical and it can become a long process. In the Chongqing case, it was a patient process with multiple rounds of the survey, with multiple consultations among citizens. The citizens' needs were carefully assessed and addressed.

## Balancing the 'Hardware' and 'Software' of Reforms

One important lesson for future infrastructure projects in China is the significance of investing in both physical facilities and institutional reform. The practitioners and policy makers usually find interventions in institutions, or software, are more challenging, and their result is variable and largely depends on the persistence of the involved institution as well as its effort in implementing these programs. Chongqing Urban Environment Project is an exemplar for urban infrastructure project in China, indicating a policy shift from a major focus on physical investment to a synergy between infrastructural upgrades and institutional reforms.

First of all, strong government commitment is crucial for the success of institutional reform, as in the Chongqing case. Additionally, an integrated and gradual approach is recommended for institutional reform. Chongqing's reform of the water sector was multi-faceted and implemented in steps. The institutional changes included four aspects: agency adjustment within the municipal government, establishment of new financially autonomous water utilities, tariff reform, and the introduction of private investors in the water sector. Each of the four components was an integral part of the institutional reform of Chongqing's water sector. Also, sequence matters. The institutional reform began with the agency adjustment within the municipal government, following by the establishment of new financially autonomous water utilities. This contributed to the installation of market mechanisms in the water sector, and increased the financial viability of the water utility, and thus paved the way to attract private investors in the water sector. Likewise, practitioners should keep in mind that change does not happen overnight. It takes time for stakeholders in the affected institutions to accept new ideas and new structure. One example from the CUEP is tariff reform, which took place as six adjustments over a nine-year course.

## Annex 1: Project Components

Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Chongqing City Solid Waste	48.70	38.72	80%
Chongqing City Wastewater	309.30	270.55	87%
Fuling City Wastewater	22.00	11.25	51%
Wanzhou City Water Supply	15.60	5.49	35%
Nanbin/Shizhu Water Supply	5.00	1.20	24%
Environmental Water Quality and Monitoring	5.30	9.36*	177%
Urban Management Information	3.20	2.59	81%
Environmental Rehabilitation and Reconstruction	4.00	7.58*	190%
Institutional Strengthening and Training	10.20	12.46*	122%
<b>Subtotal Original Components-Actual</b>		<b>359.20</b>	<b>70%</b>
Tongliang Wastewater and River Embankment Improvement	—	13.64	—
Dazu Wastewater Management and River Embankment Improvement	—	1.93	—
Changshou Wastewater Management and River Embankment Improvement	—	12.42	—
Wulong River Embankment Improvement	—	37.43	—
Bishan Wastewater Management and River Embankment Improvement	—	10.52	—
Bishan Water Supply	—	6.60	—
Beibei Water Supply	—	4.15	—
Jiangjin Water Supply	—	4.52	—
<b>Subtotal Additional Subcomponents-Actual</b>		<b>91.21</b>	
Total Baseline Cost	423.30	—	
Physical contingencies	39.00		
Price Contingencies	44.50		
<b>Total Project Costs</b>	<b>506.80</b>	<b>450.41</b>	<b>89%</b>
Interest during construction	27.10		
Front-end fee	2.00		
<b>Total Financing Required</b>	<b>535.90</b>		

## Annex 2: National Policies on Water Sectors

Year	Policy Statement
1999	NDRC, MOC, and SEPA issued a notice to “Improve Wastewater Collection Capability and Establish Sound Collection and Treatment Practices” (Notice 1992). The notice called on cities to establish wastewater companies, collect wastewater fees as part of the water supply bill, and start constructing wastewater treatment plants.
2000	State Council “Circular on Strengthening Urban Water Supply, Water Saving, and Water Pollution Prevention and Control.” This historic circular has set the agenda for the period 2000–10 and calls for China to (a) improve water supply planning and promote water conservation; (b) enforce the existing “Law on Water Pollution Prevention and Control” and aim to achieve at least a 60 percent urban wastewater treatment rate by 2010; (c) promote market-oriented tariff reforms to help attract private capital; and (d) improve sector governance and regulation.
2002	<p>Ministry of Construction Circular No. 272 (2002): Quickening the Process of General Adoption of Market Principles for the Municipal Public Utilities Sector;</p> <p>Ministry of Construction Circular “Circular on Accelerating the Marketization of Urban Utilities” encourages domestic and foreign investment in urban public utilities through a variety of ownership arrangements such as sole ownership, joint venture, or partnerships.</p> <p>The “Circular on Accelerating the Commercialization of Urban Wastewater and Solid Waste Treatment” (MOC, NDRC, and SEPA, September 2002) provides specific references to wastewater treatment plants and promotes arrangements such as build-operate transfer (BOT), joint ventures with municipal utilities, and transfer-own transfer (TOT).</p>
2004	<p>“Decision on Reforming the Investment System (2004).” This decision allows and promotes nongovernment entities to invest in new areas of the economy, including municipal public utilities. It also provides more flexibility and encourages enterprises to raise capital through debt and equity markets. It also relaxes the government’s review process for new investments.</p> <p>MOC Decree No. 126 (2004): Management Measures for Concession of Urban Public Utilities. It laid the basic ground rules for competitive and transparent awards of public utility concessions</p> <p>In 2005 SEPA issued Circular No. 110, which provides guidance on the application of discharge standards for municipal wastewater treatment plants.</p>
2005	MOC Opinion 154 (2005): Strengthening the Monitoring of Municipal Public Utilities. It emphasized the supervisory role of the municipal and provincial governments, the need to improve laws and regulations, and capacity building for utility regulation. The opinion also noted the need to moderate the reform pace in order to balance efficiency and equity.

## Annex 3: Stakeholder Table for Water Tariff Reform

Stakeholders		Description and Roles
Government	Chongqing Municipal Government	Leading force in the water utility reform, key roles include making regulations and policies in water utility and granting concessionary rights to water supply and wastewater treatment to service provider
	Price Control Bureau	Pricing of water supply and wastewater treatment after consultation with the service providers and the public
	Municipal Affairs Management Committee	Former Municipal Affairs Bureau and Public Utility Bureau combined. A new role after the reform is to monitor wastewater treatment volume at wastewater treatment plants
	Environmental Sanitation Bureau	Monitors water quality before and after wastewater is treated
	Finance Bureau	Purchases wastewater treatment service from private sector with a subsidized price based on volume monitored by Municipal Affairs Management Committee
Service Provider	Chongqing Water Group	Publicly listed state-owned enterprise, granted with concession, major provider of water supply and treatment with concession in designated areas;
	Chongqing Water Company	Water supply company, subsidiary of Chongqing Water Group; charge water tariff from the public directly
	Chongqing Wastewater Treatment Company	Subsidiary of Chongqing Water Group; service provider of wastewater treatment for the Municipal Government; wastewater treatment fees heavily subsidized by Government
	Small-scale Water Supply Plants	Usually attached to SOEs, supplied the SOEs for industrial production as well as their employees for household use. Their water plants and pipe networks were initially designed for industrial purpose, thus the water quality was lower than the Chongqing Water Company, and the water price was much lower; these are gradually disappearing, either bought by CWG or Sino-French Waster Development, or closed down
	Chongqing Sino French Water Supply Company	Joint venture of Chongqing Water Group and Sino French Water Development Company; the first concession project following the opening up of China's distribution networks to foreign involvement; the sole drinking water supplier and network manager for Jiangbei, Yubei and the new developed zone in the Northern part of Chongqing
	Chongqing Sino French Tangjiatuo Wastewater Treatment Plant	Joint venture of Chongqing Water Group and the Sino French Water Development; management contract; wastewater treatment service heavily subsidized by the Municipal Government
Civil Society	Customers	Includes both resident and non-resident water users; they participate in price consultation organized by the Price Control Bureau

## Annex 4: List of Interviews

Name	Agency	Title	Date/Time
Mr. YOU Ji	The World Bank Group	Task Team Leader	Aug 4, 2015
Ms. SU Hongwei	Government Debt Management Division, Chongqing Finance Bureau	Director	Aug 19, 2015 15:00–18:00
Ms. XU Ping	Government Debt Management Division, Chongqing Finance Bureau	Deputy Director	Aug 19, 2015 15:00–18:00
Ms. JIA Yanhong	Government Debt Management Division, Chongqing Finance Bureau	Title unknown	Aug 19, 2015 15:00–18:00
Dr. ZHOU Linjun	Chongqing PMO	Former PMO Director, Advisor to PMO	Aug 19, 2015 15:00–18:00 Aug 20, 2015 10:30–12:00
Ms. DONG Qi	Chongqing PMO	Former Deputy Director	Aug 19, 2015 15:00–18:00 Aug 20, 2015 10:30–12:00 Aug 20, 2015 15:00–18:00
Mr. CHEN Jin	Chongqing Drainage Company	Former Director	Aug 20, 2015 10:30–12:00
Mr. CHENG Ji	Chongqing Sino French Water Development Company	Deputy General Manager	Aug 20, 2015 10:30–12:00
Mr. HE Zhiya	Chongqing Municipal Government	Former Deputy Secretary	Aug 20, 2015 15:00–18:00

## Annex 5: Chongqing Urban Environment Project: Timeline

Date	Event	Justification for inclusion/ relevance
1997	Concept review	A preliminary consensus was reached between the Bank, major stakeholders, the borrower on project objectives and design and preparation arrangements.
1997–1999	Feasibility study, engineering design for all components, resettlement plan, willingness-to-pay survey and assessment on institutional strengthening and training needs and other supporting studies for CUEP	These studies justified CUEP and prepared operationalized plans for the implementation of CUEP
1997–1999	The review and economic analysis of master plan in Chongqing City	The study compared the original 21-plant drainage master in the Chongqing City to other alternatives, and convinced the CMG to adopt the 7-plant plan. This new design made a significant impact on wastewater management planning through rationalization to achieve economies of scale, moving away from the prevailing more rigid requirements of master planning and treated wastewater discharge standards that characterized domestic planning practices.
1998–2000	Chongqing Drainage Company and Fuling Drainage Company, former Drainage Department affiliated with Municipal Management Bureau, were incorporated into Chongqing Water Group; the Municipal Management Committee was established to manage both water supply and wastewater treatment.	The institutional reform integrated the former fragmented water management system in the CMG. In the meanwhile, CMG was no longer the service provider of water supply and wastewater treatment, but the regulator and the service procurer. Chongqing Water Group, with Chongqing Water Supply Company and Chongqing Drainage Company becoming its subsidiary companies, was able to streamline the upper stream and lower stream of the water industry a whole.
2000	Appraisal	Most risks are identified and mitigated during the project appraisal stage, but the ones associated with weak cost estimations and accumulation of large loan savings were not taking into account and later materialized.
2001	Effectiveness: CUEP was launched.	
2001	Water Pricing Policy Research	Prior to adjusting water tariff, the CMG conducted comprehensive studies to investigate the effect of current water policy on water quality and consuming behaviour. The research indicates that high-income groups were the true beneficiaries of low water tariff; residents were paying a relatively low cost for “inner meter” water consumption, but a high cost for “outer meter” water consumption. The research justified the following tariff reform.
2001	Water Tariff Reform Phase 1: residential tariff was increased from 1.00 yuan/m <sup>3</sup> to 1.25 yuan/m <sup>3</sup> ; industrial tariff from 1.25 yuan/m <sup>3</sup> to 1.5 yuan/m <sup>3</sup> , construction tariff from 1.6 yuan/m <sup>3</sup> to 1.85 yuan/m <sup>3</sup> , and commercial service tariff from 2 yuan/m <sup>3</sup> to 2.25 yuan/m <sup>3</sup> . Wastewater treatment fee increase from 0.25 yuan/m <sup>3</sup> to 0.4 yuan/m <sup>3</sup> .	First phase of the water tariff reform following a gradual approach. Though limited, the tariff reform increased the revenue of Water Supply Company and Wastewater Company, and led up to the next tariff adjustment.
2002	Concession to Chongqing Sino-French Water Supply Company in Jiangbei, Yubei and the new developed zone in the Northern part of Chongqing.	This was the first concession project following the opening up of China’s distribution networks to foreign involvement.

(continued on next page)

(continued)

Date	Event	Justification for inclusion/ relevance
2003	The construction of Chongqing City Wastewater component was accelerated	Chongqing Municipality was urged by the central government to accelerate wastewater treatment in Chongqing to reduce pollution reaching the TGP reservoir. Senior leaders in the CM monitored project implementation through weekly reviews, headed by the Mayor. However, the early completion targets also induced rapid preparation and contract awards, before detailed designs were completed to a technically satisfactory standard, which resulted in numerous contractual problems
2004	Water Tariff Reform Phase 2: water resource fee started to be included in the water tariff. After the adjustment, residential tariff was 2.06 yuan/m <sup>3</sup> ; industrial tariff was 2.31 yuan/m <sup>3</sup> , construction tariff was 2.66 yuan/m <sup>3</sup> , and commercial service tariff was 3.06 yuan/m <sup>3</sup> . Wastewater treatment fee increased from 0.4 yuan/m <sup>3</sup> to 0.6yuan/m <sup>3</sup> for residents; for non-residents, it became 0.9yuan/m <sup>3</sup> .	The adjustment of water tariff was substantial. It provided additional revenue to Chongqing Water Group, and would be utilized to finance the new investments in expanding water supply network and water treatment plants.
2004	Mid-term Review: eight new components in seven county towns were added in 2005, following project restructuring at the mid-term review,	These new components utilized the loan savings, estimated at the time, of about US\$72 million (36 percent of loan amount), and enhanced achievement of the PDO. The project focus shifted from the large cities to small towns near the big cities, but the works remained consistent with the PDO.
2006	The contract for the management of the Tangjiatuo wastewater treatment plant was awarded in 2006, to the Chongqing Sino French Tangjiatuo Wastewater Treatment Company, a company under a joint venture with the Sino French Water Investment Co., Ltd.	A successful PPP operation. First sludge drying unit in Chongqing. Outlet water quality meets National Grade 1 Discharge Standard. One of China's most innovative sewage treatment plants.
2010	Closing	In total, About US\$25.8 million of the loan was cancelled, and the loan closing was extended by a total of 27 months to implement the works added.



## 中华人民共和国财政部

Ministry of Finance People's Republic of China

The Ministry of Finance (MOF) of the Government of the People's Republic of China is the national executive agency of the Central People's Government, which administers macroeconomic policies and the national annual budget. It also handles fiscal policy, economic regulations, and government expenditure for the state. The ministry also records and publishes annual macroeconomic data on China's economy. This includes information such as previous economic growth rates in China, central government debt and borrowing, and many other indicators regarding the Chinese economy.

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