SECTOR ASSESSMENT (SUMMARY): WATER AND OTHER URBAN INFRASTRUCTURE AND SERVICES

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. The urbanization ratio in the People’s Republic of China (PRC) increased from 19.4% in 1978 to 53.7% in 2013, and the urban population rose to nearly 700 million in 2013. Such rapid urbanization brought along high economic growth and transformation throughout the PRC, but the magnitude of economic development and expansion also significantly eroded the quality of municipal services and the environment. It is important to improve the capacity of local government agencies to undertake urban planning and environmental management initiatives to ensure the sustainability of cities. Severe challenges remain: (i) regional imbalances, (ii) urban–rural disparities, and (iii) a growing urban–rural income gap (in 2014 at a factor of 2.8).

2. Urbanization and industrialization have caused massive environmental damage, which increasingly limits the options for sustainable urbanization in the PRC. Water scarcity and pollution have worsened, with approximately 43% of surface water rated class IV or worse (unsuitable for human use). Long-term water shortage is a challenge for 30 of the 32 cities with more than 1 million residents. Inefficient land-use models, oversupply of industrial land, and smaller than average households have caused massive loss of green land. Since 1978, the urban population has tripled while urban areas increased in size more than five times. Much-needed cross-sector integration for environmental protection is difficult because of government departmentalization.

3. Achievements in the provision of urban infrastructure were very significant between 2000 and 2012—urban water supply increased from 63.9% to 97.2%. Still, the demand for urban infrastructure and services will remain high, especially in the less-developed western region such as Qinghai Province (Qinghai) and in small and medium-sized cities. Further expansion of urban infrastructure and services into rural towns and villages, and better integration to generate mutual benefits among these territories are much needed.

4. Opportunities. Qinghai is one of the less-developed western regions targeted by the PRC’s national preferential policies under the National Strategy for Development of the West (NSDW). Located mostly on the Qinghai–Tibetan plateau, Qinghai made the decision to promote urbanization within a northern corridor linking its capital, Xining, to Lanzhou, the capital of neighboring Gansu province. In doing so, vast sections of the province’s fragile mountainous terrain remain undeveloped, protecting the headwaters of several of the PRC’s most important rivers. Haidong, the second-largest city in Qinghai with a total land area of 13,200 square kilometers (km$^2$), lies within this corridor.

5. A city of 1.7 million residents, Haidong straddles Huangshui River, an important tributary of the Yellow River. Urban development in Haidong is concentrated within the narrow river valley,

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1 According to PRC government figures, the urban population was about 749 million in 2014.
2 From 2000 to 2011, the urban built-up area increased by 76.4% while urban population increased by 50.5% and land-use change from farmland to urban land increased from 66,000 km$^2$ to 89,000 km$^2$.
3 The strategy aims to support faster economic development of the western regions to allow them to catch up with rapid advances in the country’s eastern provinces. It covers six provinces (including Qinghai), five autonomous regions, and one municipality of provincial status directly administered by the central government.
4 Qinghai is the source of the Mekong, Yangtze, and Yellow (Lancangjiang) rivers.
confined between steep mountains. Buildable land is limited and the valley has been subject to a high rate of conversion from farmland to urban land. This is putting pressure on an already fragile landscape that is prone to flash flooding and soil erosion. It also strains municipal services such as water supply and solid waste disposal. In 2014, Haidong had a poor population of 293,601, accounting for 39.9% of the provincial poor population. The project will promote sustainable social and environmental development of urban and rural areas of Haidong, and will contribute to poverty reduction by improving river flood control capacity, domestic water quality, and water resource utilization, as well as protecting the environment of the Huangshui River watershed.

2. Government’s Sector Strategy

6. Urban development. In 2014, the national government released a new framework for urbanization in the PRC, the National New-type Urbanization Plan (2014–2020). It proposes a new people-centric and environment-oriented urbanization model, and sets a target to enable cities in western PRC to become driving forces for regional development. The plan focuses on key issues such as urban sustainability and integration of urban and rural development while addressing critical quality-of-life issues for urban residents. The plan recognizes sustainability and coordination between urbanization and environmental protection as key aspects of urban development. Supporting this, in 2014, the government issued an implementation plan for establishing an “ecological civilization,” identifying Qinghai as one of the 55 pilot areas.

7. Flood risk management. The PRC has made a conscious shift from flood control to flood risk management. Recognizing the need for a more integrated approach to tackling floods, the PRC passed the Flood Control Law in 1997, reinforcing that a combination of structural and nonstructural measures would be pursued to manage the problem of flooding in the country. The Ministry of Water Resources initiated a program of action called “32-word policy” that proposed nonstructural measures such as the planting of trees to protect mountainous areas. In 2008, the State Council approved the Flood Control Plan of Yellow River Basin, which targets the establishment of a complete flood prevention system for the river basin by 2025. Proposed key measures involve strengthening flood protection infrastructure, improving the management of water and soil erosion, and enhancing flood risk management capacities.

8. In line with the national and provincial guidelines, Haidong City developed the Haidong City Drainage (Rainfall) Integrated Flood Prevention Plan (2012–2030), emphasizing that the comprehensive flood risk management for Haidong should include both Huangshui River mainstream projects and mountain river projects. The plan also focused on flood plain development such as vegetation restoration and rehabilitation of wetlands at favorable conditions along the rivers, which does not only increase the flood detention areas but also provides waterfront areas for the residents. In addition, the plan increases the extent of water reclamation to better control water usage and quality. This agenda is also demonstrated in the Thirteenth Five-Year Plan on Water Resource Development of Haidong City, which issued further

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directions to complement the current strategies on flood control, early-warning systems, and drought reduction. The plan establishes specific targets to reach by 2020, including integrated management of three major rivers and 2,341 kilometers of new embankments.\(^{11}\)

9. **Water resource management.** The PRC’s Thirteenth Five-Year Plan (2016–2020) has the toughest-ever water resource management program aimed at controlling consumption and preventing pollution.\(^ {12}\) It includes key environmental aspects such as water recycling and water supply safety, and sets stringent targets—e.g., forest coverage rate to reach 23% by 2020.\(^ {13}\) Recently, the national government introduced a national policy requiring integration of “sponge city” practices in urban development.\(^ {14}\) Sponge cities should have “the functions of water absorption, harvesting, infiltration and purification on rainy days, and release and making use of stored water when needed. Sponge city measures include aspects such as the protection of original urban ecosystems, ecological restoration, and low-impact development.

10. **Soil erosion control.** In 2015, the State Council approved the first national soil erosion plan, which has the following key targets: (i) by 2020, 320,000 km\(^2\) of new soil erosion area to be controlled compared with 2015, and the annual soil loss to be reduced by 800 million tons; and (ii) by 2030, 940,000 km\(^2\) of new soil erosion area to be controlled, and annual soil loss to be reduced by 1,500 million tons.\(^ {15}\) Qinghai prioritized the management of small river basins and protection of mountainous areas to combat severe soil erosion in its Integrated Management of Small Watershed Soil and Water Conservation Program.\(^ {16}\) By the end of 2012, about 329 tributary river basins had been rehabilitated—the total area of soil erosion management amounted to 7,794 km\(^2\), and ecological restoration covered about 14,700 km\(^2\).\(^ {17}\)

11. Realizing the importance of such measures for sustainable development, Haidong prepared the Haidong City South–North Mountains Greening Master Plan (2013–2030).\(^ {18}\) The city proposes to vegetate 654,100 mu (436 km\(^2\)) of mountainous area and river corridors within the Huangshui River valley.\(^ {19}\) The plan will be implemented in two phases between 2014 and 2030 at an estimated cost of CNY14.3 billion. The plan also supports Haidong City’s vision to become a “green, livable, and sustainable city” by 2030. By the end of 2015, Haidong City had achieved total forestation across 7,887 mu (5.26 km\(^2\)), and a land preparation area of an additional 12,913 mu (8.6 km\(^2\)).

12. **Water supply.** Despite the rapid development of water supply systems in the more urban areas of the PRC (about 98% in cities and 90% in counties), overall rural coverage is 76%. More efforts from the central government will be put toward increasing water supply coverage in rural areas and improving the quality of potable water. In February 2016, six PRC ministries jointly

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17 Data from State Council website: http://www.gov.cn/gzdt/2013-09/16/content_2489145.htm
19 A mu is a Chinese unit of measurement (1 mu = 666.67 m\(^2\)).
issued the Notice on Strengthening Rural Water Supply Safety and Planning Preparation during the Thirteenth Five-Year Period, setting targets for rural water supply rates above 85% and a guarantee rate not lower than 90% for small projects. In addition, they recommended overall improvement of water quality.

13. In the 12th five-year period, Qinghai increased its water supply capacity by 600 million cubic meters (m³) and irrigation areas by 598,000 mu (about 400 km²) in the whole province, benefiting 1.62 million farmers and herdspeople. Since water supply still falls short of full coverage, especially in rural areas, Qinghai initiated the urban–rural water supply improvement program for the 13th five-year period, aiming to increase the water supply capacity by another 600 million m³, and rural water supply coverage to 80% by 2020. The water quality compliance rate and supply guarantee rate should also be significantly increased.

14. To further improve municipal infrastructure, including the water supply situation in Haidong, the city government developed the Qinghai Haidong City Core Areas Municipal Infrastructure Special Plan (2014–2030). The plan includes the following development goals for 2020: (i) systematically plan the water resource structures and realize high-efficiency use of water resources in the basin; (ii) further promote the sustainable development of overall water supply and increase the water quality and guarantee rate to reach 100%; and (iii) complete the water supply pipeline network and service areas to cover 100% of both urban and rural areas.

15. Solid waste management. Development of municipal solid waste management is a major part of improving the PRC’s environmental governance. The Twelfth Five-Year Plan of Environmental Protection set a target that the harmless treatment rate of municipal solid waste should reach 80% by 2015 and all counties should have capacity to treat waste. While the Thirteenth Five-Year Plan on Environmental Protection is yet to be released, the overall principle for solid waste management targets suggests that (i) cities with a treatment rate of 80% by 2013 should reach 95% by 2020, and (ii) all other areas (urban and rural) should reach at least 85% by 2020.

16. The Qinghai Haidong City Core Areas Municipal Infrastructure Special Plan (footnote 23) lacks a detailed section on solid waste treatment. However, it targets the municipal solid waste treatment rate to reach 95% by 2020 and 100% by 2030. For Ledu District, the targets are stricter, requiring a solid waste treatment rate of 100% by the end of 2020, and the number of communities with waste collection to reach 80% of all communities in the district. The Ledu District City Management Thirteenth Five-Year Plan targets specific facilities and infrastructure to meet such goals—e.g., an additional 20,000 collection points, 14 transfer stations, and an integrated treatment park with classification and recycling, kitchen waste treatment, landfill, incinerator and construction waste treatment—for the period of 2015–2020.

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21 http://www.qh.xinhuanet.com/2016-02/05/c_1117997065.htm


3. **ADB Sector Experience and Assistance Program**

17. ADB assistance to the PRC’s urban development has been effective in remedying a range of urban environmental problems, with a positive impact on water resources and pollution control. It focused on promoting sustainable development in small and medium-sized cities in the less-developed central, western, and northwestern regions. Between 1992 and 2015, ADB approved 56 loans totaling $6.65 billion, and 88 technical assistance (TA) projects totaling $60 million to support infrastructure and capacity development related to water supply, wastewater management, solid-waste management, river and lake rehabilitation, flood risk management, and wetland protection.\(^{26}\)

18. The project is aligned with ADB’s (i) Urban Operational Plan, 2012–2020 and Green Cities initiatives, which promote the strengthening of environmental management and support inclusive growth and well-balanced development; (ii) Water Operational Plan, 2011–2020, which encourages integrated management of water resources; (iii) Operational Plan for Integrated Disaster Risk Management, 2014–2020; and (iv) the country partnership strategy for the PRC, 2016–2020, which supports the PRC’s strategic priorities, including in managing climate change and pursuing environmental sustainability.\(^{27}\) Key thematic areas that coincide with the proposed project include strengthening of climate resilience in urban and rural areas, sustainable use of land and natural resources, strengthening of water security, promotion of integrated water resource management, wetland protection, and reforestation.

19. The project design incorporates lessons from previous ADB-financed projects and policy-oriented studies on integrated water resource management, environmental and ecosystem improvement, wetland management and restoration, reforestation, urban–rural integration, and climate adaptation in the PRC, as reflected in several innovative and special features summarized below:

(i) Incorporation of climate risk and vulnerability assessment modeling data in the design of flood protection infrastructure.

(ii) Preparation of flood risk maps covering flood events from 5-year to 100-year return periods. To reduce disaster risks, the project recommends that during implementation, Haidong City should update land-use policies in the Ping’an and Ledu districts to reflect the findings of the flood risk maps and restrict development in flood-prone areas.

(iii) Establishment of tree coverage on the slopes surrounding Ping’an as part of a landscape approach to reducing soil erosion and improving water quality.

(iv) Use of reclaimed water for mountainside irrigation, which showcases an integrated approach to solving water supply and soil erosion problems.

(v) Establishment of riverside greenbelt and wetland areas as temporary flood storage areas for flood events with more than 20- and/or 30-year return periods.

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\(^{26}\) Inclusive of urban development sector loans and TA projects from ADB’s East Asia Department.

PROBLEM TREE FOR URBAN AND URBAN–RURAL DEVELOPMENT

**CORE PROBLEM**
Flooding of agricultural land, infrastructure, and businesses; low river water quality; separation of residents from riverine and wetland environments; low quality of rural water supply; threat to urban consumption of water and cleanliness of urban environment

**CAUSES**
- Low water supply coverage in rural areas; public health concerns
- Ping’an District receives potable water through a long-distance transmission pipe from Xining; risks related to breakage, threatening stable and constant water supply
- Large demand for irrigating farmland and new forested areas; demand from urban areas expected to increase
- Changes in precipitation and temperature patterns related to climate change
- Knowledge about integrating urban development with water management limited
- Knowledge on how to adapt to climate change limited
- Insufficient data and analysis to inform decision-making at the watershed level
- Weak institutional capacity for sustaining environmental services management
- Insufficient capacity in urban infrastructure planning and management
- Gaps and insecurity related to water supply in rural and urban areas, and to irrigation
- Flood vulnerability within Huangshui River valley
- Low flood control standards in urban/rural sections of the Huangshui River tributaries
- Gaps/deterioration of existing flood protection infrastructure
- Riverbank erosion due to fragile soil conditions
- Loss of natural flood attenuation areas as wetlands and floodplains encroached upon by farms/urban development
- Changes in precipitation and temperature patterns related to climate change
- Knowledge about integrating urban development with water management limited
- Knowledge on how to adapt to climate change limited
- Insufficient data and analysis to inform decision-making at the watershed level
- Weak institutional capacity for sustaining environmental services management
- Insufficient capacity in urban infrastructure planning and management

**EFFECTS**
- Loss of life, property, and economic output due to floods
- Environmental degradation and watershed pollution
- Health and welfare of residents reduced
- Flooding of agricultural land, infrastructure, and businesses; low river water quality; separation of residents from riverine and wetland environments; low quality of rural water supply; threat to urban consumption of water and cleanliness of urban environment
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**Gaps in solid waste disposal**
- Landfill in Ledu reaching capacity; projected urban development will increase demand for waste disposal
- Lack of solid waste management including knowledge and practice of 3R (reduce, reuse, recycle)
- Public health risks due to poor management of landfill facility
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