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

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. Urbanization is a key driver of strong economic growth in the People’s Republic of China (PRC). Since the PRC initiated economic reforms in 1978, rapid urbanization has accompanied significant economic progress. The urban population has grown from about 160 million in 1975 to 780 million in 2016, and now accounts for more than 56% of the total population. Urban development has generated well-being for a growing middle class, and lifted millions out of poverty. However, this rapid growth places great pressure on the PRC to build sustainable, environment-friendly, and livable urban areas.

2. The rapid economic development and urbanization in the Yangtze River Economic Belt (YREB) was driven by industrialization. The expansion of resource-intensive industries (e.g., chemicals, thermal power, steel, petrochemicals) resulted in depletion and degradation of natural resources. In 2014, the water quality of 23% of the total measured sections of the Yangtze River was Class IV and below, with major pollutants such as nitrogen, total phosphorus, and chemical and biological oxygen demands. The major sources of pollution in the Yangtze River are households, industry, and agriculture. The YREB—including the project area of Ziyang Municipality (Ziyang)—is a key growth engine for the PRC. Ziyang was selected by the central government to demonstrate inclusive green development.

3. Ziyang is one of the 21 prefecture-level cities of Sichuan Province in the YREB, located within the Chengdu–Chongqing city cluster in the upper reaches of the Yangtze River. It consists of 1 district and 2 counties, and has a total population of 3.6 million people (19% urban) and a land area of 5,747 square kilometers (km²). The PRC envisions the economic development to take place around 15 city clusters in the YREB. In 2016, Ziyang’s gross domestic product was CNY127 billion. The Ziyang Municipal Government (ZMG) attracted important automobile manufacturing industries and established one of the largest technical and vocational education and training (TVET) schools in the PRC. However, this development model resulted in environmental degradation from wastewater discharges, solid waste, and air emissions. The ZMG thus aims to promote inclusive green development, and encourage businesses to relocate to the

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2 This summary is based on the detailed sector assessments done by the project team during project preparation.
3 Government of the PRC. 2002. *Environmental Quality Standards for Surface Water (GB3838-2002)*. Beijing. The applicable standard and/or target for surface water quality is Class III and above. GB3838-2002 also cited that water quality up to Class III standard is suitable for drinking.
4 The project will concentrate on the Sichuan Ziyang High Technology Development Zone.
5 The YREB covers nine provinces and two specially administered municipalities, accounts for more than 40% of the PRC’s population, has 20% of the total wetland area, and already contributes about 45% of the PRC’s economic output.
6 Chongqing Municipality headed the PRC’s economic growth in 2015, with its gross domestic product surging by 11%; while the national figure contracted to 6.9%. Chengdu City also posted nearly 8% gross domestic product growth.
8 In this context, green development refers to areas developed in a manner that is socially responsible; and environmentally and economically sustainable.
Sichuan Ziyang High Technology Development Zone, which focuses on light and service industries.\(^9\)

4. **Ziyang’s urban development planning and management.** Typically, cities in the PRC focus their urban planning on promoting economic development and creating a city with good living conditions. The government is now promoting a new urban development model, one based on industrial upgrade and transformation: integrated or synchronized city development and industrialization where people will have easy access to their clean and high-technology-based jobs. Thus, urban planning needs to focus not only on the economy but also on people, natural resources, the ecological environment, and the whole of the local society (e.g., with respect to inclusiveness). A performance monitoring and evaluation system is necessary to (i) track the progress of planning and implementation, and (ii) provide information on future planning.

5. **Ziyang’s water resources and environmental management.** Ziyang lies in Sichuan Province’s hilly areas and has the lowest annual volume of rainfall and runoff in the province. In Ziyang, the per capita quantity of water resources is 503 cubic meters (m\(^3\)); this compares with 1,800 m\(^3\) in the province, and 2,100 m\(^3\) nationwide.\(^10\) Precipitation is unevenly distributed and peaks from June to September (62%–73% of annual precipitation). Ziyang loses large volumes of water during floods in summer. The flood protection design standard is for a 2% probability storm event (i.e., occurring once in 50 years); but the embankment is incomplete, and sections were designed for 5% probability (i.e., once in 20 years).

6. The Tuo River flows through Ziyang for about 84 kilometers (km) before entering the Yangtze River, and it floods annually.\(^11\) For 10 km of the Ziyang stretch, water quality sampling and analysis resulted in on-site classification of Class V, mainly because of untreated domestic wastewater. Ziyang must therefore use the Laoying Reservoir as a water source, which is 18 km from the municipality. The water quality in the Heishuisi Reservoir in Ziyang exceeds the Class V standard for surface water. The traditional response to managing stormwater runoff has been to convey the stormwater away from the urban area using gray infrastructure, i.e., concrete culverts and drainage channels. The PRC’s concept of building a sponge city—which enables natural conservation, infiltration, and purification of stormwater—was adopted as a key policy in 2013; and ministries began pilot programs in 2015.\(^12\) The hills in the urban center of Ziyang have suffered significant environmental damage. Improper excavation for roads, buildings, and earth mining has resulted in earth mounds with bare and steep slopes that are vulnerable to soil erosion from wind and water. Results of the second national general investigation through remote sensing estimated the total annual volume of soil erosion in Ziyang at 17.2 million tons, equivalent to 3,330 km\(^2\) of cultivated land with a depth of 40 centimeters.\(^13\) For open land, the remedy is to increase the ground cover through vegetation.

7. **Ziyang’s technical and vocational education and training.** Ziyang developed vocational education during its Twelfth Five-Year Development Plan, 2011–2015, but the system has not provided the skills needed for the municipality’s social and economic development.\(^14\) The

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\(^9\) In general, an industry that uses light inputs and engages light processing is considered light industry. Light industry may also be defined as the industry that produces consumer goods.


\(^11\) From 2014 to 2017, flood disasters occurred every year with an annual direct economic loss of CNY153 million.


PRC’s Thirteenth Five-Year Plan, 2016–2020, offers opportunities but also seriously challenges TVET development in Ziyang.\textsuperscript{15} To meet these challenges and serve its development, which created great demand for middle and high-end technical personnel, Ziyang needs to cultivate a large number of technical and vocational skills that match the labor market’s requirements.\textsuperscript{16} Analyses of Ziyang’s TVET system indicate that its curriculum is not sufficiently based on labor market needs, resulting in a skills mismatch; and that it does not produce enough adequately trained candidates for jobs in the light and service industries.\textsuperscript{17} As cited in Ziyang’s Twelfth Five-Year Development Plan, 2011–2015, the TVET program was developed rapidly; but could not meet the needs of green development and social and economic diversification (footnote 16). In sum, the TVET program requires urgent restructuring to help solve the labor shortages in the municipality.\textsuperscript{18}

8. \textbf{Ziyang’s economic sector development and job creation.} Ziyang’s comparative advantages lie in its location and the existing industry. The municipality is well positioned within the Chengdu–Chongqing city cluster, with proximity to Chengdu City’s international airport; a high-speed passenger train system; and major east–west highways and railroads. It has seven industrial parks with suitable logistical support. However, Ziyang had to compete with other cities for the same type of industries and overcome obstacles such as an insufficient industrial agglomeration and a less desirable living environment. The Sichuan Provincial Government designated the Sichuan Ziyang High Technology Development Zone as the demonstration site for Ziyang’s green development and economic diversification. To promote service-oriented businesses, the ZMG has simplified business registration. To make the Sichuan Ziyang High Technology Development Zone successful, critical project outputs will need to include staff, facilities, and equipment for (i) a research and development center for light industries; (ii) a center for inspection and testing of products, materials, and equipment for national certification; and (iii) education and training of specialized staff for the light and service industries.

2. \textbf{Government’s Sector Strategy}

9. \textbf{Urban planning and management.} Recent PRC policies are promoting a shift from development oriented on gross domestic product growth to development centered on high quality. The PRC’s Thirteenth Five-Year Plan, 2016–2020 and the National New-Type Urbanization Plan (NUP), 2014–2020 emphasize continued urbanization along with industrialization, development of information and communication technology, and agricultural modernization (footnote 15).\textsuperscript{19} These ambitions call for institutional and fiscal reform, and private sector participation.

10. \textbf{Water resources and environmental management.} The PRC’s Outline of the Yangtze River Economic Belt Development Plan, 2016–2030\textsuperscript{20} guides the future development path of the YREB toward ecological restoration and green development.\textsuperscript{21} The targets are to (i) improve the


\textsuperscript{16}Sector Assessment for Technical and Vocational Education and Training (accessibile from the list of linked documents in Appendix 2 of the report and recommendation of the President).


\textsuperscript{18}Sichuan Provincial Government. 2013. \textit{Construction of Modern Vocational Education System in Sichuan Province, 2014–2020.} Sichuan. The employee gap was projected at 20,000 persons for Sichuan Province in the next 5 years.


environmental quality of the Yangtze River by 2020, (ii) increase by more than 75% the region’s water resources that meet Class III standard, and (iii) increase forest coverage to 43%. The PRC has made a conscious shift from flood control to flood risk management; and 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. In 2015, the State Council approved the first national soil erosion plan, which has these targets: (i) by 2020, 320,000 km² of new soil erosion area controlled; and the annual soil loss reduced by 800 million tons; and (ii) by 2030, 940,000 km² of new soil erosion area controlled.

11. **Technical and vocational education and training.** The PRC’s Thirteenth Five-Year Plan, 2016–2020, prioritizes developing high-quality human resources, increasing scientific and technological innovations, and accelerating educational reform. The project followed the demonstration features for replication in the PRC’s other provinces and autonomous regions.

12. **Economic and job creation.** The PRC’s NUP highlights that continued urbanization along with industrialization, information and communication technology, and agricultural modernization will be the PRC’s main pillars for economic and social progress. The NUP calls for socially inclusive urban and rural development to reduce income inequality and strengthen social protection. It promotes a more regionally balanced economy and the fostering of coordinated city cluster development.

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

13. The Asian Development Bank (ADB) started lending to the PRC’s urban development activities in 1992. More recently, the focus has been on developing livable, green, and socially inclusive small- and medium-sized cities in the less-developed central, western, and northeastern regions of the PRC. From 1992 to 2017, ADB approved 58 loans amounting to $7.0 billion, and 92 technical assistance (TA) projects totaling $61.4 million. The loans financed infrastructure and capacity development; and the TA projects contributed to knowledge and policies on urban poverty reduction, urbanization strategies, industrial relocation, small-sized city and town development, land use efficiency, urban–rural environmental protection, urban environmental indicators, stormwater management, solid waste management, and public participation.

14. Continued support has been sought by the PRC to strengthen its efforts in the environmental protection and rehabilitation of the Yangtze River based on a strategic framework approach. The PRC requested ADB to assist in demonstrating municipality development that ensures environmental sustainability and social inclusiveness. Experience suggests that project investments and the TA interventions are effective when they (i) are part of well-conceived development plans, and (ii) support broader approaches.

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25 During a country programming mission in 2016, ADB and the Government of the PRC agreed to a strategic framework approach with lending support of $2.0 billion to the YREB over 4 years (2017–2020).
PROBLEM TREE FOR WATER AND OTHER URBAN INFRASTRUCTURE AND SERVICES, AND EDUCATION

Direct effects:

- Economic growth is not reaching its potential.
- Slow transformation toward a green development path
- Increasing pollution and pressure on natural resources
- Worsening living conditions and lack of job creation

Project core problem:

- Slow economic and environmental improvements in the Ziyang Municipality

Causes:

- Outdated and insufficient urban planning and management capacity
  - Urban planning model outdated
  - Weak institutional coordination for strategic planning
  - Weak project implementation and supervision capacity
  - Inadequate information base and technology for the Sichuan Ziyang High Technology Development Zone
  - Weak urban monitoring capacities

- Restricted economic sector development opportunities
  - Cleaner and sustainable businesses reluctant to relocate
  - Limited options for technical and vocational education and training
  - Insufficient number of well-trained candidates for jobs in the light and service industries

- Ineffective and inadequate public environmental infrastructure and ecological system
  - Mitigation of flood risks below national standards
  - Wastewater and agricultural runoff and untreated discharge to rivers
  - Insufficient solid waste management capacity
  - Difficulties in establishing good cooperation with research institutes
  - Inadequate network of specialized testing institutions
  - Inadequate incentives for business development
  - Water conservation opportunities unutilized
  - Inadequate enforcement of earthworks
  - Climate change