



# Report and Recommendation of the President to the Board of Directors

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Project Number: 38594  
October 2009

Proposed Loan  
People's Republic of China: Guiyang Integrated Water  
Resources Management (Sector) Project

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 30 September 2009)

Currency Unit	–	yuan (CNY)
CNY1.00	=	\$0.146
\$1.00	=	CNY6.83

## ABBREVIATIONS

ADB	–	Asian Development Bank
EA	–	executing agency
EARF	–	environmental assessment and review framework
EIA	–	environmental impact assessment
EIR	–	environmental impact report
EIRR	–	economic internal rate of return
EMDF	–	ethnic minorities development framework
EMDP	–	ethnic minorities development plan
EMP	–	environmental management plan
EPB	–	Environmental Protection Bureau
FAR	–	feasibility assessment report
FIRR	–	financial internal rate of return
FSR	–	feasibility study report
GAP	–	gender action plan
GFB	–	Guiyang Finance Bureau
GMG	–	Guiyang municipal government
GPFD	–	Guizhou Provincial Finance Department
IA	–	implementing agency
ICB	–	international competitive bidding
IEE	–	initial environmental examination
IWRM	–	integrated water resources management
LIBOR	–	London interbank offered rate
MLR	–	Ministry of Land Resources
NCB	–	national competitive bidding
NGO	–	nongovernment organization
O&M	–	operation and maintenance
PES	–	payment for environmental service
PIO	–	project implementing office
PLG	–	project leading group
PMO	–	project management office
PPMS	–	project performance management system
PRC	–	People's Republic of China
QCBS	–	quality and cost-based selection
RF	–	resettlement framework
SEIA	–	summary environmental impact assessment
SIEE	–	summary initial environmental examination
SOE	–	statement of expenditures
TA	–	technical assistance
WRB	–	Water Resources Bureau
WRS	–	water resources system
WSC	–	water supply company
WUA	–	water users association
WUG	–	water users group

## WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
km <sup>2</sup>	–	square kilometer
m <sup>2</sup>	–	square meter
m <sup>3</sup>	–	cubic meter
m <sup>3</sup> /day	–	cubic meters per day
m <sup>3</sup> /s	–	cubic meters per second
mu	–	a Chinese land measure approximately equal to 0.06667 ha, or 15 mu to 1 ha

## NOTES

- (i) The fiscal year (FY) of the Government and its agencies ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

<b>Vice-President</b>	C. Lawrence Greenwood, Jr., Operations 2
<b>Director General</b>	K. Gerhaeusser, East Asia Department (EARD)
<b>Director</b>	K. Kannan, Agriculture, Environment, and Natural Resources Division, EARD
<b>Team leader</b>	Q. Zhang, Senior Water Resources Engineer, EARD
<b>Team members</b>	S. Ferguson, Principal Social Development Specialist (Safeguards), EARD
	Y. Kobayashi, Water Resources Management Specialist, EARD
	T. Lin, Natural Resources Economist, EARD
	L. Medina, Project Officer, EARD
	X. Peng, Lead Professional (Counsel), Office of the General Counsel
	F. Radstake, Environment Specialist, EARD
	M. Vorpahl, Social Development Specialist, EARD
	Y. Zhou, Water Resources Management Specialist, EARD

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## LOAN AND PROJECT SUMMARY

<b>Borrower</b>	People's Republic of China
<b>Classification</b>	Targeting classification: General intervention Sector (subsector): Agriculture and natural resources (water-based natural resources management) Themes (subthemes): <b>Economic growth</b> (promoting economic efficiency and enabling business environment), environmental sustainability (natural resources conservation), capacity development (institutional development) Climate change: Climate change adaptation Location impact: Rural (medium) and urban (medium)
<b>Environmental Assessment</b>	Category A. An environmental impact assessment (EIA) was undertaken for this sector lending project. The summary EIA for three core subprojects was circulated to the Board of Directors of the Asian Development Bank (ADB) on 19 August 2006 and uploaded to the ADB website on 21 August 2006. The environmental assessment and review framework is in Supplementary Appendix H. The summary EIA is in Supplementary Appendix N. The summary initial environmental examination for three other core subprojects is in Supplementary Appendix O.
<b>Project Description</b>	The proposed Project supports the policies and plans of the Government of the People's Republic of China (PRC) and Guiyang municipal government (GMG) for introducing integrated water resources management (IWRM) in Guiyang Municipality. The Project will finance a slice of the Guiyang Integrated Water Resources Master Plan (2006–2020, the Master Plan), a medium-term investment plan for Guiyang Municipality. While the Master Plan is mainly focused on structural interventions and covers the whole range of water sector investments, including wastewater treatment and flood management, the Project will focus its activities on five segments of the Master Plan: (i) urban water supply, (ii) rural water supply and irrigation, (iii) irrigation system rehabilitation, (iv) soil and water conservation, and (v) small water storage structures. The Project will also address nonstructural interventions including institutional strengthening and capacity development, stakeholder participation, water tariff adjustments, integrated information management system, hydrological monitoring center, and other demand-management measures. The Project will be implemented over a 6-year period, 2010–2016. The Project will follow the sector investment approach and finance six core subprojects that have already been prepared, as well as an undetermined number of noncore subprojects that will be prepared and approved during project implementation.
<b>Rationale</b>	Guiyang Municipality lies in the mountainous watershed that separates the Yangtze River Basin to the north from the Pearl River Basin to the south. While there are adequate natural water

resources in Guiyang Municipality, significant problems relate to the following:

- (i) The difficulties in capturing sufficient quantities of water and its distribution to users. Much of the water drains into rivers as quick surface flows through numerous short creeks and streams that run deep in valleys, or through fast-flowing deep aquifers (groundwater rivers) through the limestone layers (karst areas).
- (ii) The poor condition of urban water supply infrastructure and Guiyang Municipality's rapidly increasing urban population. This combination has seriously stretched the existing water supply capacity, resulting in reduced water pressure and water rationing in dry periods.
- (iii) The shortage of water for potable use and irrigation in the surrounding rural area, constraining the improvement of rural resident incomes and living standards. Only about half of the households in rural areas of Guiyang Municipality have piped water supply and about 420,000 rural residents face potable water shortages.
- (iv) The fragmented management in the Guiyang Municipality water sector. There is vertical fragmentation with different responsibilities between provincial, municipal, and district/county levels; and there is horizontal fragmentation with responsibilities for water sector management split between different functional departments of each level of government.

GMG has given a commitment to develop solutions based on IWRM. GMG has also formulated the Master Plan, which covers all aspects of infrastructure needs while recognizing some of the deficiencies of current water sector management, including fragmented institutional arrangements and inadequate attention to water demand management. Investments under the Master Plan will focus predominantly on supply side interventions, but there is a need for parallel efforts in institutional reform and demand management, which will be addressed by the Project.

### **Impact and Outcome**

The Project will support an area and time slice of the Master Plan, the achievement of which will contribute to sustainable and inclusive socioeconomic growth in Guiyang Municipality with corresponding reductions in poverty, especially in rural areas where the problem is endemic. The outcome of the Project will be that water supply and demand in Guiyang Municipality are balanced in a sustainable manner.

### **Project Investment Plan**

The investment cost of the Project is estimated at \$439.2 million, including taxes and duties of \$14.1 million.

### **Financing Plan**

A loan of \$150 million from the ordinary capital resources of ADB will be provided under ADB's London interbank offered rate (LIBOR)-based lending facility. The loan will have a 26-year term, including a grace period of 6 years, an interest rate determined in

accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.15% per annum, and such other terms and conditions set forth in the draft loan and project agreements.

<b>Source</b>	<b>Total</b> (\$ million)	<b>%</b>
Asian Development Bank	150.0	34.2
Guiyang Municipal Government	258.0	58.7
Guiyang Municipal Commercial Bank	20.0	4.5
Beneficiaries	11.2	2.6
<b>Total</b>	<b>439.2</b>	<b>100.0</b>

Source: Asian Development Bank estimates.

<b>Allocation and Relending Terms</b>	The Government will relend the proceeds of the ADB loan to the Guizhou provincial government, which will onlend to GMG on the same terms and conditions as the ADB loan. Loan proceeds for subprojects will be disbursed by the Guiyang finance bureau to local-level finance bureaus. GMG will bear the interest and foreign exchange rate variation risks, and be responsible for repayment of the loan.
<b>Period of Utilization</b>	Until 31 October 2016
<b>Estimated Project Completion Date</b>	30 April 2016
<b>Executing Agency</b>	Guiyang Municipal Government
<b>Implementation Arrangements</b>	The project management office (PMO), under the overall direction and guidance of the project leading group headed by the vice mayor of Guiyang Municipality, will coordinate project implementation work through the various design institutes and implementing agencies responsible for day-to-day implementation arrangements. The PMO will be responsible for directing project preparation activities, monitoring resettlement, managing environmental impacts, monitoring project progress and project impacts, and assisting participating districts and counties in implementing their subprojects. The PMO is comprised of staff primarily from Guiyang Municipal Water Resources Bureau, as well as representatives of the Guiyang Finance Bureau, the Development and Reform Commission, the Resettlement Office, and other line agencies of GMG.
<b>Procurement</b>	ADB-financed goods and services will be procured in accordance with ADB's <i>Procurement Guidelines</i> (2007, as amended from time to time). Major contracts for equipment and materials valued at \$1 million equivalent or more will be awarded through ADB's international competitive bidding (ICB) procedures. Smaller packages for equipment and materials valued at less than \$1 million equivalent will be procured following national competitive bidding (NCB) procedures in accordance with the

1999 PRC's Tendering and Bidding Law, subject to modifications agreed with ADB. Civil works contracts estimated to cost \$10 million equivalent or more will be carried out using ICB procedures, while those costing less than \$10 million equivalent will be carried out using NCB procedures. Shopping will be allowed for goods and contracts valued at \$100,000 equivalent or less and for civil works contracts valued at \$200,000 or less. Small civil works contracts of \$100,000 equivalent or less on subprojects involving small-scale reservoirs, irrigation system rehabilitation, soil and water conservation, and small water storage tanks may be carried out on a force account basis or through community participation, whenever practicable, to ensure sustainability and to achieve the Project's social objectives. International contractors may participate in bidding for contracts using NCB procedures.

### **Consulting Services**

Twenty-four person-months of international and 171 person-months of national consulting services will be required during the first 4 years of project implementation, with expertise in project management, training, procurement, economic and financial analysis, water demand management, community participation, and social and environmental safeguards. The consultants will provide guidance and training for capacity development to ensure that (i) subproject implementing agencies are able to function as effective project management units; (ii) noncore ADB-funded subprojects can be appraised and approved in a timely manner based on the agreed eligibility criteria; (iii) implementation of water demand management activities will promote more efficient use of water among all categories of users; and (iv) social, resettlement, and environmental impacts are monitored and mitigated. Consultants will be recruited through an international firm in accordance with ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time). Detailed design and engineering and construction supervision will be carried out using government counterpart funds by qualified local design institutes recruited by the local implementing agencies.

### **Project Benefits and Beneficiaries**

The Project will provide extensive water resources benefits that will affect about 1.6 million residents or 45% of the total population of Guiyang Municipality. At project completion, expected benefits will include (i) increases in urban water supply of 40 million cubic meters (m<sup>3</sup>) per year; (ii) increases in rural water supply of 94.8 million m<sup>3</sup> per year; (iii) improvement in the existing irrigation area of 10,773 hectares (ha) and an increase in the irrigation area of 18,815 ha; (iv) increased irrigation coverage from 0.3 mu to 0.5 mu per capita; (v) soil conservation treatment to an area of 800 square kilometers (km<sup>2</sup>) of land at risk of erosion; and (vi) provision of 105,100 small water storage tanks in rural areas to collect spring and rainwater for drinking, irrigation, and livestock. It is estimated that about 240,000 rural beneficiaries will be given access to safe drinking water as a result of the Project and about 59,200 farmers will benefit from improved irrigation

services.

### **Risks and Assumptions**

The Project has several potential environmental, institutional, financial, and policy risks related to (i) drought and excessive climate variation, (ii) increased rural to urban migration, (iii) unforeseen physical conditions that could affect construction costs and schedules, and (iv) resistance to water tariff reforms. Important assumptions include the following: (i) the Government's continued policy program for sustainable development, (ii) effective agriculture extension support to farmers, (iii) the Government actively encourages a participatory approach to water resources management, (iv) incentives for effective interagency coordination are introduced, (v) timely financing is identified for other activities in the Master Plan, (vi) community support will be enlisted to help construct and maintain rural water infrastructure, and (vii) mitigation measures to protect water quality will be taken by neighboring administrative jurisdictions.

The Project includes measures to mitigate these risks and verify assumptions that include (i) extensive stakeholder consultation during the design of subprojects; (ii) regular tariff reviews and adjustments by the Government following national guidelines as well as public awareness programs; (iii) regular examination of the GMG budget to assess availability of counterpart funding; (iv) formal commitment from GMG to introduce IWRM-based reforms; and (v) implementation of training, capacity development, and community support programs.

### **Technical Assistance**

The technical assistance (TA) for Strengthening Water Resources Management in Guiyang for IWRM institutional reforms is being undertaken to enable the institutional environment and to assist effective implementation of the Project. The three main initiatives being addressed by the TA are (i) improved coordination and effectiveness of government agencies responsible for water management; (ii) promotion of community participatory approaches to water resources management; and (iii) a strong shift toward demand management, consistent with the current national campaign for a "water saving society." The policy, institutional, and IWRM-based reforms to be implemented in conjunction with the TA and in parallel with the structural interventions under the Project will bring about improvements in (i) subproject design through increased stakeholder involvement, (ii) sustainability of operations and maintenance, (iii) resolution of water conflicts, (iv) interagency and cross-sector cooperation, and (v) increased emphasis on water conservation activities.

## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of China (PRC) for the Guiyang Integrated Water Resources Management (Sector) Project. The design and monitoring framework is in Appendix 1.

## II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

### A. Performance Indicators and Analysis

2. The PRC has been experiencing water shortages for several decades. Total naturally available water flows from all surface and underground sources in this country are about 2,812 billion cubic meters (m<sup>3</sup>) per annum, placing the PRC sixth behind Brazil, Russian Federation, Canada, Indonesia, and the United States.<sup>1</sup> On a per capita basis, the naturally available water flow (2,206 m<sup>3</sup>/person), accounting for about 28% of the world's average, is one of the lowest levels in the world.<sup>2</sup> Therefore, as population and wealth increase, it is inevitable that increasingly serious water management problems will be encountered in the PRC. The PRC's annual per capita water availability has dropped by about 23% in the last 20 years, and the country is expected to become the most water-stressed in east and northeast Asia by 2010.

3. Adding to the complications, the availability of water resources varies significantly across regions and seasons. This represents a major development challenge, as the demand for water is ever increasing with rapid economic development and urbanization. In rural areas, well-developed and maintained infrastructure, including irrigation facilities, is a precondition for reasonable living standards, and is critical for poverty alleviation. Thus, effective water resource allocation and management is necessary to maximize the benefits of water usage.

4. The Guizhou Province is one of the poorest provinces in the PRC, with the second lowest rural income, and has the lowest level of urban income of any province. The capital of the province, Guiyang Municipality, is its political, economic, and cultural center; and a major transportation hub of the southwest PRC. In 2008, Guiyang Municipality has an estimated population of 3.6 million, of which about 2.4 million reside in the main urban area, with the remaining 1.2 million in suburban or rural areas. About 574,000 people (16% of the total population) are ethnic minorities who mainly reside in the rural areas. The income disparity between the rural and urban population is high, and about 25% of the rural population lives on an income of less than CNY1,200 (\$176) per capita per year. Like many other areas in the PRC, Guiyang Municipality is undergoing rapid urbanization with the urban population increasing at over 3% per annum, a trend that is likely to continue.

5. Guiyang Municipality is one of the PRC's major producers of nonferrous metals and tobacco, and major industries include machinery, steel making, food processing, and chemicals. The total gross domestic product of Guiyang Municipality in 2008 was equivalent to about CNY81.1 billion, of which the tertiary (service) sector accounted for about 47%, the secondary (manufacturing) sector about 47%, and the primary (mining and agriculture) sector about 6%. However, the primary sector is much more important in terms of employment, accounting for 34% of recorded employment in Guiyang Municipality.

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<sup>1</sup> Shalizi, Z. 2006. Addressing China's Growing Water Shortages and Associated Social and Environmental Consequences. *World Bank Policy Research Working Paper 3895*. Washington, DC.

<sup>2</sup> Jiao, Y. 2005. *China Water Policy and Practice, Conference on Water and Sustainable Development: Towards Innovative Solutions*. New Delhi.

6. As the economic hub of the province, Guiyang Municipality has a rapidly increasing population and industrial development, and hence increasing demand for water. Servicing this population and related municipal and industrial water demands is causing a severe strain on the existing water supply facilities. Urbanization in Guiyang Municipality means increased water demand for household, commercial, and industrial use. The water quality in local rivers and water sources is also a growing concern because of the rapid urbanization and industrialization.

## **B. Analysis of Key Problems and Opportunities**

7. Both urban and rural areas of Guiyang Municipality are on the mountainous ridge of the watershed boundary between the Yangtze River basin to the north and the Pearl River basin to the south. Annual average precipitation is quite high but large evaporative losses and uneven distribution present particular challenges for capturing and storing water, much of which drains into rivers as quick surface flows through numerous short creeks and streams that run deep in valleys, or through fast-flowing deep aquifers (groundwater rivers) through the limestone layers (karst areas).

8. The Guiyang Municipality urban water supply infrastructure is in poor condition and its rapidly increasing urban population has seriously stretched the existing water supply capacity, resulting in reduced water pressure, and water rationing in dry periods. It is projected that the annual water shortage will reach about 420 million m<sup>3</sup> in 2010 and about 642 million m<sup>3</sup> in 2020. Rapid urbanization is generating increased volumes of wastewater, much of which is being left untreated.

9. In the surrounding rural area, shortage of water for potable use and irrigation is perceived as a critical constraint to improving rural incomes and living standards. Only about half of the households in the rural areas of Guiyang Municipality have piped water supply and about 420,000 rural households face potable water shortages. In the absence of public water supply systems, the majority of the rural population relies on local springs and streams, although some have small storage structures near their homes for domestic and livestock use. Most of the rural water is needed for agricultural purposes. However, the steep mountainous terrain makes it very difficult for farmers to obtain surface or groundwater for irrigation, particularly at higher elevations. Seasonal variation in water availability is high. Farmers have difficulties growing crops during the dry months from February to April, and the short growing season prevents them from further diversifying their cropping systems. This situation is expected to be further complicated by climate change impacts.<sup>3</sup> The irrigation coverage in Guiyang Municipality is much lower than the national average, and many existing structures have been damaged and abandoned. Water use efficiencies in larger irrigation schemes are estimated to be no more than 40%. Meanwhile, sustainable watershed management is urgently needed to prevent soil erosion and pollution, and to protect water sources.

10. Currently, the Guiyang Municipality water sector management is not well integrated. There is vertical fragmentation with different responsibilities between provincial, municipal, and district/county levels; and there is also horizontal fragmentation, with responsibilities for water sector management split between different government departments. Specific water management issues include (i) absence of a formal process of stakeholder consultation and involvement; (ii) despite being closely integrated in physical terms, suburban districts continue

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<sup>3</sup> Climate change has three big implications for water use: (i) it changes the way plants grow; (ii) it increases problems of water management, and larger floods overwhelm existing controls; and (iii) some regions are swinging more violently between flood and drought. This is one big reason why dams have been making a comeback.

to have their own water supply companies; (iii) local townships, villages, and individual households are charged with managing their own water supplies, thereby losing potential benefits from physical and management integration; and (iv) lack of coordination between water departments, agriculture departments, and local water users, resulting in poor irrigation water delivery systems and optimization of cropping patterns.

11. In recent years, the Government has recognized the urgency to improve the comprehensive management of water resources, apply approaches consistent with integrated water resources management (IWRM) methodologies, and shift emphasis toward managing demand, including the use of economic mechanisms. A crucial milestone along this path was reached on 1 October 2002 when the revised Water Law was made effective, and its added emphasis to water resources planning, protection of water resources, economical use of water, resolution of disputes concerning water, and enforcement of water use regulations, all of which are common water resources management concerns.

12. Adopting the principles of IWRM will become more important as water demand and competition increase. Under the 2002 Water Law, the responsibilities of the river basin commissions<sup>4</sup> and local water bureaus with respect to integrated water resources planning have been strengthened. The 2002 Water Law also stipulates full cost recovery for urban water services. In 2004, the China Council for International Cooperation on the Environment and Development completed an important policy recommendation entitled *Promoting Integrated River Basin Management and Restoring China's Living Rivers*.<sup>5</sup> Since then, the challenges associated with its adoption have been discussed in various forums, including the Second Yangtze Forum in April 2007 and the Third International Yellow River Forum on Sustainable Water Resources Management and Delta Ecosystem Maintenance in October 2007.

13. A recent comprehensive review of progress in adopting the IWRM approach in the PRC concluded that there has been considerable progress, but there is still a long way to go.<sup>6</sup> The report set out detailed recommendations for medium- and long-term actions in five main areas—legal and institutional reform, policy integration, IWRM master planning, public participation, and science and technology support—making it clear that sustainable IWRM is a long-term process that takes many years to achieve.

14. The Guiyang municipal government (GMG) recognizes this shift toward IWRM, and has given a commitment to develop solutions based on IWRM, including the establishment of an interagency project leading group (PLG). GMG has also formulated the Guiyang Integrated Water Resources Master Plan (2006–2020, the Master Plan), which covers all aspects of infrastructure needs while recognizing some of the deficiencies of current water sector management arrangements, including fragmented institutional arrangements and inadequate attention to water demand management. Investments under the Master Plan will focus predominantly on supply-side interventions, but there is a need for parallel efforts in institutional

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<sup>4</sup> Seven river basin-based water resources commissions under the jurisdiction of the Ministry of Water Resources were set up in the 1950s for improving water resource planning and coordinating flood control. Most of Guiyang Municipality (95%) lies in the Yangtze river basin under the jurisdiction of the Yangtze River Water Resources Commission, with its headquarters in Wuhan. A small part of Guiyang Municipality (5%) is within the Pearl River catchment under the jurisdiction of the Pearl River Water Resources Commission, with its headquarters in Guangzhou.

<sup>5</sup> China Council for International Cooperation on the Environment and Development. 2004. *Promoting Integrated River Basin Management and Restoring China's Living Rivers*. Beijing PRC.

<sup>6</sup> Wang Yi, L. Li, X. Wang, X. Yu, and Y. Wang. 2007. *Taking Stock of Integrated River Basin Management in China*. Beijing: Science Press.

reform and demand management, which the Project will address. Further information about the Master Plan is in Appendix 2.

15. The following challenges to the implementation of IWRM in Guiyang Municipality remain to be addressed: (i) lack of experience in involving local stakeholders in the design, implementation, and operation of water projects; (ii) duplication of water quality monitoring and lack of coordination between the Water Resources Bureau (WRB) and the Environmental Protection Bureau, and conflicting responsibilities for urban water management among WRB, Urban Construction Bureau, and Urban Management Bureau; (iii) constraints to the dissemination of information between water management agencies; (iv) lack of awareness and incentives for increased demand management and water conservation activities; (v) poorly integrated institutionalized planning of water resources; (vi) inconsistency in applying economic instruments, including the issuance of water permits, which is not applied at all to rural water use; (vii) insufficient implementation of demand management programs; and (viii) a variety of technical issues, such as conflicting systems of water and environment function zoning. A problem tree analysis is in Supplementary Appendix V.

16. These challenges will be partly addressed with the implementation of the Master Plan and the Project will contribute solutions to achieve greater coordination and optimization of water supply and demand management activities in line with IWRM principles.

17. **External assistance.** To help the Government develop and implement its strategies in managing the water sector, external assistance has been provided mainly by the Asian Development Bank (ADB), the World Bank, and the Japan Bank for International Cooperation. ADB has provided 19 loans totaling more than \$2 billion for water sector projects. ADB has also financed 61 technical assistance (TA) projects for more than \$35 million to address issues relating to water resources management, flood management, soil conservation, water supply, and wastewater management. ADB assistance has resulted in the construction of needed infrastructure and institutional capacity development, more rational pricing of water, introduction of wastewater tariffs, implementation of commercial principles, and private sector participation. These improvements are fundamental to making the water sector financially and operationally sustainable, and in managing water as an economic resource.

18. Two projects currently under implementation in Guiyang Municipality are funded by the Japan Bank for International Cooperation and involve environmental management in the water sector: (i) the Guiyang Environment Model City Project, and (ii) the Guizhou Guiyang Water Environmental Improvement Project targeting wastewater management in Guiyang City. The latter is particularly relevant as it complements the proposed Project with activities designed for wastewater management. External assistance is further described in Appendix 3.

19. **Lessons learned.** ADB's experience in the PRC water sector indicates that projects are generally well planned and implemented, although there is considerable scope to increase the use of participatory approaches in project design and implementation, especially in rural areas. The TA completion report for Strategic Options for the Water Sector<sup>7</sup> highlighted the need for (i) shifting to a more unified and integrated approach, and (ii) shifting from traditional structural measures to preventive and anticipatory nonstructural measures. While urban water tariffs have been increased for full cost recovery, water supplies in rural areas remain heavily subsidized and the financial sustainability of investments is an issue. Willingness-to-pay analysis indicates

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<sup>7</sup> ADB. 2000. *Technical Assistance Completion Report on a Technical Assistance to the People's Republic of China for Strategic Options for the Water Sector*. Manila.

that rural consumers are willing to pay substantially higher water tariffs if service improves. Lessons incorporated in the project design include greater focus on (i) institutional reforms to promote sustainable IWRM, including the establishment of water users associations (WUAs); (ii) the adoption of participatory approaches to improve subproject design and confirm stakeholder support; and (iii) financial and institutional arrangements for sustainable operation and maintenance (O&M).

20. ADB's sector lending approach together with IWRM was introduced in the PRC in 2001, starting with the Yellow River Flood Management Sector Project,<sup>8</sup> and followed by the Songhua River Flood Management Sector Project<sup>9</sup> in 2002, and the Hunan Flood Management Sector Project<sup>10</sup> in 2006. The earlier projects demonstrate the long-term nature of the IWRM process, which requires full government and stakeholder commitment. Whenever there is an IWRM project, the challenging task will be to build integrated institutional capacity for achieving sustainable IWRM objectives.

### III. THE PROPOSED PROJECT

#### A. Sector Investment Approach

21. The Project will adopt a sector investment approach and GMG has complied with the procedural requirements of ADB's policy for sector lending.<sup>11</sup> The Project was prepared in line with the Master Plan to respond to current and impending problems in the management of the water sector including shortages. The Project will finance and help implement a subset of the measures identified in the Master Plan. These include structural measures focusing on urban and rural water supply capacity (supply management), irrigation water use efficiency (demand management), and protection of water resources through the control of soil erosion. Rural interventions, particularly the construction of small water storage tanks for individual households, will target the reduction of poverty among vulnerable groups, including women and ethnic minorities.

22. The policy framework is conducive for implementation of the Master Plan. Relevant development goals and objectives are stated in the 11th Five-Year Economic Development Plan of the PRC, the Guizhou Province, and Guiyang Municipality, as well as in the Ministry of Water Resources' 11th Five-Year Plan for Water Resource Utilization and Management. These plans feature sustainable economic growth targets, projected increases in rural incomes, continued urbanization, initiatives to reduce rural poverty, agriculture and farm reforms, rural development, and poverty alleviation. Improved water resource management and increased efficiency in water usage are seen as key drivers to the achievement of these plans.

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<sup>8</sup> ADB. 2001. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Yellow River Flood Management Sector Project*. Manila (Loan 1835-PRC, for \$150 million, approved on 28 August 2001).

<sup>9</sup> ADB. 2002. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Songhua River Flood Management Sector Project*. Manila (Loan 1919-PRC, for \$150 million, approved on 20 September 2002).

<sup>10</sup> ADB. 2006. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Hunan Flood Management Sector Project*. Manila (Loan 2244-PRC, for \$200 million, approved on 29 June 2006).

<sup>11</sup> ADB. 2003. Sector Lending. *Operations Manual*. OM D3/OP. Manila. In processing a sector loan, the borrowing developing member country submits to ADB an acceptable medium-term or long-term sector/subsector development plan; a statement on sector policies that affect the development of the sector/subsector concerned; and an assessment of the technical and managerial capabilities of the sector institutions to develop, process, and implement projects. Detailed analysis is in appendices 2 and 6.

23. Under the 2002 Water Law, the responsibilities of the river basin commissions and local water bureaus in respect to integrated water resources planning have been strengthened. The Master Plan is an attempt to put the new responsibilities into effect, and GMG has given a clear commitment to IWRM and the reforms needed to make this a practical reality. Measures demonstrating GMG's commitment to IWRM include (i) the establishment of a PLG in 2005, with representation from all relevant water management authorities, to address cross-sectoral water issues; (ii) demand management initiatives being developed under the PRC's "water saving society program"; (iii) the establishment of WUAs for the subprojects involving irrigation, on which the first pilot WUA was formed in Shuitian village for the water users of the irrigation network at Qiankanjing reservoir since November 2008; (iv) participatory approaches that are being undertaken for design and implementation of subprojects; and (v) dialogue with the Guizhou provincial government to introduce integrated management of reservoirs on the Nanming River. Sustainable IWRM is a long-term process and the Project will support the first critical steps to introduce the principles and get it embedded into the Government's planning and implementation procedures.

## **B. Impact and Outcome**

24. The Project will support an area and time slice of the Master Plan, whose achievement will contribute to sustainable and inclusive socioeconomic growth in Guiyang Municipality with corresponding reductions in poverty, especially in rural areas where the problem is endemic. The outcome of the Project will be that water supply and demand in Guiyang Municipality are balanced in a sustainable manner. The Project will contribute to this outcome through nonstructural and structural measures needed to address high-priority investments identified in the Master Plan.

## **C. Outputs**

25. The outputs include (i) improved water quality; (ii) increased supply of water for domestic, industrial, and irrigation purposes; (iii) improved water use efficiency; and (iv) improved institutional and technical capacity to manage water resources. The inputs and activities designed to achieve these outputs include a range of nonstructural and structural measures for improving the management of water resources, and reducing shortages of water for domestic use and irrigation. Nonstructural measures include institutional strengthening and capacity development; stakeholder participation and water tariff adjustments; integrated information management system; hydrologic monitoring center; construction of reservoirs and water supply schemes; and the upgrading of agricultural irrigation systems, soil and water conservation, and rainwater collection and storage structures. These measures will significantly improve water services in Guiyang Municipality.

26. The implementation of a TA for IWRM reform<sup>12</sup> commenced in April 2007. The TA supports the introduction of the IWRM approach and the enhancement of the enabling institutional environment. To date, the TA achieved the following: (i) Qingzhen City, one of the cities in the project area, has successfully institutionalized IWRM in water sector management by establishing a city water authority. All of the water-related management functions became the mandates of this newly-established city water authority, which should significantly improve the city's fragmented water management; (ii) Guiyang Municipality was selected by the Ministry of

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<sup>12</sup> ADB. 2006. *Technical Assistance to the People's Republic of China for Strengthening Water Resources Management in Guiyang*. Manila (TA 4912-PRC). The TA is designed to support the IWRM capacity building and assist in implementation of the lending project. It is expected to be completed by February 2010.

Water Resources as a potential candidate municipality to pilot test the “water-saving society program,” which aims to promote water demand management nationwide; and (iii) the IWRM strategy and action plan (Supplementary Appendix S), based on the findings of the TA interim report, was discussed and agreed with GMG.

27. Five key infrastructure development activities are to be financed with the ADB loan:
- (i) Urban water supply. The establishment of one medium-sized reservoir and two small reservoirs,<sup>13</sup> including the construction of dams, water conveyance tunnels, transmission pipelines, one water treatment plant, and the extension of the municipal water distribution networks.
  - (ii) Rural water supply and irrigation. The construction of up to 43 small reservoirs, including about three for county water supply, 20 for water supply and irrigation at the township level, and 20 for human and livestock water supply and small irrigation systems. Many of these include investments in water conveyance systems, small township water treatment facilities, and irrigation systems.
  - (iii) Irrigation system rehabilitation. Rehabilitation and upgrading of up to nine irrigation systems covering a total area of 195,447 mu (13,030 hectares [ha]), including installation or repair of intake structures, canals, and aqueducts.
  - (iv) Soil and water conservation. Farmland restructuring, conversion of sloping farmland to terrace and tree or grass planting, and fruit tree planting, to protect the upper catchments of the water sources (about 800 square kilometers [km<sup>2</sup>]) from soil and water losses.
  - (v) Small water storage structures. The provision of up to 105,100 small water storage tanks in rural areas to catch spring water for human consumption, and rainwater for irrigation and livestock consumption.

28. Following the sector lending modality, six core subprojects representing the five main types of infrastructure development activities were appraised and confirmed as potentially suitable for ADB financing. Except for the Yudongxia reservoir, which is the only medium-sized reservoir to be supported under the Project, these are meant to serve as representative models for the design and implementation of similar noncore subprojects to be financed under the Project. The six core subprojects are the Yudongxia reservoir and water treatment subproject for urban water supply, the Jinlong and Liaojiuzhai reservoir subprojects for rural water supply and irrigation, the Wudang irrigation rehabilitation subproject, the Huaxi soil and water conservation subproject, and the Xifeng County small water storage tanks subproject. The main features of these six core subprojects are presented in Table 1.

**Table 1: Core Subprojects**

Segment/Subproject Name	Location	Features	Estimated Cost (CNY million)
A. Urban Water Supply	Wudang District	71.5 m high concrete double curvature arch dam; 18.6 million m <sup>3</sup> reservoir storage capacity; 100,000 m <sup>3</sup> /day water treatment capacity	256.43
1. Yudongxia reservoir			163.72
2. Yudongxia water treatment plant			
B. Rural Water Supply and Irrigation	Xiuwen	52.3 m high concrete faced rockfill	67.7

<sup>13</sup> Ministry of Water Resources. 2000. *Standard for Classification and Flood Control of Water Resources and Hydroelectric Project*. Beijing (SL252–2000). A reservoir with a capacity of more than 10 to 100 million m<sup>3</sup> is classified a medium-sized reservoir, and a reservoir with a capacity of 0.1 to 10 million m<sup>3</sup> is classified a small reservoir.

Segment/Subproject Name	Location	Features	Estimated Cost (CNY million)
1. Jinlong reservoir 2. Liaojiuzhai reservoir	County Xifeng County	dam; 4.2 million m <sup>3</sup> reservoir storage capacity. 14.5 m high geomembrane anti-leakage earth dam; 0.2 million m <sup>3</sup> reservoir storage capacity.	5.43
C. Irrigation System Rehabilitation 1. Wudang irrigation system	Wudang District	1,847.4 ha rehabilitation area; 450.8 ha new irrigation area; WUA establishment.	7.3
D. Soil and Water Conservation 1. Huaxi soil and water conservation	Huaxi District	15 km <sup>2</sup> soil erosion control area in the upper and middle Nanming River catchment area.	5.3
E. Small Water Storage Structures 1. Xifeng County small water storage	Xifeng County	250 tanks, 91 covered tanks for water supply, 159 uncovered tanks for livestock and irrigation; ranging in size from 15 m <sup>3</sup> to 100 m <sup>3</sup> .	2.2

ha = hectare, m<sup>3</sup> = cubic meter.

Source: Guizhou Hydraulic and Hydropower Design Institute.

29. The Project and the TA for Strengthening Water Resources Management in Guiyang (footnote 12) will strengthen water resources management in Guiyang Municipality by creating an enabling environment for IWRM, addressing institutional and capacity weaknesses, and improving skills in administering and implementing the Project through provision of consulting services and various training programs. The Project will (i) support institutional reform for implementing IWRM; (ii) improve coordination and awareness among relevant agencies; (iii) establish up to 46 WUAs<sup>14</sup> for subprojects that include irrigation development or rehabilitation activities; (iv) improve mechanisms for stakeholder participation in water management, project preparation, and implementation; (v) facilitate water tariff adjustments; and (vi) enhance staff skills in water management and project administration.

30. The Project is fully consistent with ADB's water policy.<sup>15</sup> ADB is now moving from *Water for All* and IWRM to the concept of water security, for which ADB will help DMCs address five key dimensions: (i) satisfy household water security in all communities; (ii) support productive economies in agriculture and industry; (iii) develop vibrant, livable cities and towns; (iv) restore healthy rivers and ecosystems; and (v) build resilient communities that can adapt to climate change. Generally, these dimensions have been incorporated in the project design.

#### D. Special Features

31. **Integrated water resources management.** The Project is the first large IWRM project being considered for investment at the city/municipality level in the PRC. GMG recognizes the need for shifting toward IWRM, and has given a commitment to develop solutions based on IWRM principles. The IWRM strategy and action plan, based on the findings of TA for Strengthening Water Resources Management in Guiyang, was discussed and agreed with GMG. The key TA activities under implementation include the following: (i) establishing an effective

<sup>14</sup> One pilot WUA has been formed and operated in Shuitian village for the water users of the irrigation network at the Qiankanjing reservoir since November 2008. The implementation follows the action plan for the WUAs development prepared during project preparatory technical assistance. The WUA consists of elected representatives from each village.

<sup>15</sup> ADB. 2001. *Water for All: The Water Policy for ADB*. Manila.

water sector management structure, (ii) shifting the current supply management to demand management, (iii) promoting participation in water resources management, (iv) improving information management and sharing, and (v) building the capacity to manage the water in Guiyang Municipality. The plan will be implemented in conjunction with the Project from 2010 to 2016.

**32. Practical environmental categorization approach for reservoir subprojects.**

Reservoir projects are usually categorized for environmental sensitivity based on physical criteria such as dam height, reservoir storage volume, or generation capacity.<sup>16</sup> These criteria can be indiscriminate and therefore assign resources to environmental assessment efforts inefficiently. Unless an alternative approach to categorization is introduced, this would be the case for the Project, which will construct more than 40 small reservoirs with heights over 15 meters (m) on the mountainous watershed, even though they will possess relatively low-capacity reservoirs. While ADB does not hold fixed rules regarding physical criteria and environmental categorization, the Government using its own physical criteria by reservoir capacity will categorize only one of them a category A subproject that requires full environmental impact assessment (EIA) preparation. The Project introduces a practical categorization approach for reservoir subprojects based on their environmental effects (i.e., impacts of downstream flows, groundwater, protected areas, etc.) rather than their physical characteristics, particularly dam height and reservoir volume. The benefits of following this approach to environmental categorization of reservoir subprojects are (i) terms of reference for environmental assessments that are better tailored to the needs of each subproject, (ii) closer alignment of procedures for environmental categorization of reservoir subprojects, (iii) strengthened cooperation between responsible authorities and transparency of procedures, and (iv) more efficient application of scarce resources through optimization of efforts required to conduct environmental categorization of reservoir subprojects. The detailed categorization criteria and screening process are in Appendix 8.

**33. Payment for environmental service mechanism in water supply reservoir subprojects.**

The Project also includes the introduction of payment for environmental service (PES) scheme to encourage pollution reduction in the environmental protection zone of water supply reservoir subprojects, particularly the Yudongxia subproject. The concept of PES will pay close attention to (i) balancing the demand side—their affordability and willingness to pay—and the supply side—costs of maintaining a certain level of water quality and opportunity costs (such as forgone development benefits), (ii) ensuring financial sustainability by minimizing the Government's subsidies, and (iii) introducing result-based compensation. First, a scheme will be established to provide direct payments from water tariff collection in GMG or the operating entity for compensating the upstream Government for (i) restricted development and land use (i.e., opportunity costs); or (ii) actual water quality improvements of the inflow to the reservoir. Second, it would be necessary to establish more direct payments or financial support to those stakeholders that engage more actively in environmental improvement activities. The most likely options for introducing such PES mechanisms would be the extension of the pollution reduction activities in the communities in the near vicinity of the reservoir area, e.g., the introduction of organic farming, promotion of biogas digesters, and interception of sanitation wastewater.

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<sup>16</sup> There is a difference between international financing institution practices and the PRC country system. International financing institution pay more attention to dam safety by emphasizing dam height, while the PRC country system focuses more on dam capacity because dam safety is addressed separately in this system.

## E. Project Investment Plan

34. The Project investment cost is estimated at \$439.2 million equivalent, including taxes and duties of \$14.1 million equivalent.<sup>17</sup> Detailed cost estimates and assumptions are in Appendix 4. Total project costs by component are summarized in Table 2.

**Table 2: Project Investment Plan**

Item	Amount <sup>a</sup> (\$ million)
<b>A. Base Cost<sup>b</sup></b>	
1. Urban Water Supply	
a. Core subprojects	58.1
b. Noncore subprojects	9.5
2. County, Township, and Irrigation Water Supply	
a. Core subprojects	10.8
b. Noncore subprojects	158.1
3. Irrigation System Rehabilitation	
a. Core subproject	1.1
b. Noncore subprojects	43.3
4. Soil and Water Conservation	
a. Core subproject	0.7
b. Noncore subprojects	40.7
5. Small Water Storage Structures	
a. Core subproject	0.3
b. Noncore subprojects	55.8
6. Project Management and Capacity Development	
a. Municipal Level Project Management	4.1
b. Integrated Water Resources and Management, and Capacity Building	11.6
<b>Subtotal (A)</b>	<b>394.1</b>
<b>B. Contingencies<sup>c</sup></b>	<b>27.9</b>
<b>C. Financing Charges During Implementation<sup>d</sup></b>	<b>17.2</b>
<b>Total<sup>e</sup></b>	<b>439.2</b>

<sup>a</sup> Includes taxes and duties of \$14.1 million.

<sup>b</sup> In 2009 prices. Base costs include the cost of environmental protection measures.

<sup>c</sup> Physical contingencies computed at 5% for all costs other than beneficiary contributions. Price contingencies computed by year and expenditure type based on domestic and foreign price escalation factors prescribed by the Asian Development Bank. Price contingencies are not included for beneficiary contributions.

<sup>d</sup> Interest during implementation computed at the 5-year forward London interbank offered rate plus a spread of 0.2% for 6 years for the Asian Development Bank loan and 5.97% for the local bank loan.

<sup>e</sup> Numbers may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

## F. Financing Plan

35. The Government has requested a loan of \$150 million from ADB's ordinary capital resources to help finance the Project. The loan will have a 26-year term, including a grace period of 6 years, an interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per annum, and such other terms and conditions set forth in the draft loan and project agreements. The Government has provided ADB with (i) the reasons for its decision to borrow under ADB's

<sup>17</sup> The taxes and duties, specifically for categories to be financed 100% from counterpart resources.

LIBOR-based lending facility on the basis of these terms and conditions; and (ii) an undertaking that these choices were its own independent decision, and not made in reliance on any communication or advice from ADB.

36. The financing plan is in Table 3. The balance of costs will be financed by GMG, domestic borrowing, and beneficiary labor contributions.<sup>18</sup> GMG will finance land acquisition and resettlement costs, and the financial charges on the ADB loan. The Guiyang Municipal Commercial Bank will provide loan financing of \$20 million equivalent with a 15-year term including a 3-year grace period and interest rate set in accordance with the PRC's current lending rate. A facility will be arranged by GMG to capitalize the financial charges on the commercial bank loan. The Government will relend the proceeds of the ADB loan to the Guizhou provincial government which will onlend the proceeds of the loan to GMG under the same terms and conditions as the original loan. As the end borrower, GMG will bear any interest and foreign exchange variation risks, and be responsible for repayment of the loan. Appendix 5 illustrates the flow of funds and onlending and repayment arrangements.

**Table 3: Financing Plan**

Source	Total (\$ million)	%
Asian Development Bank	150.0	34.2
Guiyang Municipal Government	258.0	58.7
Guiyang Municipal Commercial Bank	20.0	4.5
Beneficiaries	11.2	2.6
<b>Total</b>	<b>439.2</b>	<b>100.0</b>

Source: Asian Development Bank estimates.

## **G. Implementation Arrangements**

### **1. Project Management**

37. GMG will be the Executing Agency (EA) responsible for overall project planning, management, and implementation. The PLG, headed by a vice mayor, has been established to oversee preparation and implementation of the Project. The PLG comprises representatives from the Municipal Financial Bureau, Development and Reform Commission, Construction Bureau, WRB, Environmental Protection Bureau, Land Resources Bureau, Poverty Reduction Office, Resettlement Office, and Bureau of Ethnic Minority and Religious Affairs of GMG.

38. Under the PLG, the project management office (PMO) has been established to coordinate project implementation work through the various design institutes and implementing agencies (IAs)<sup>19</sup> responsible for day-to-day implementation arrangements. The PMO is responsible for supervising project preparation activities, monitoring resettlement, managing environmental impacts, monitoring project progress and project impacts, and assisting participating districts and counties in implementing their subprojects. The PMO is staffed primarily from Guiyang Municipal WRB, but also with representatives of the Guiyang Finance Bureau, Development and Reform Commission, Resettlement Office, Environmental Protection

<sup>18</sup> Beneficiary labor contributions will cover those activities that the farmers will undertake under the soil and water conservation and small water storage structures.

<sup>19</sup> These IAs include the governments of Huaxi district, Wudang district, Baiyun district, Nanming district, Xiaohe district, Jinyang new district, Xiuwen county, Xifeng county, Kaiyang county, and Qingzhen city. The Guiyang Zhushui Water Resources Development Company under municipal government will serve as the PIO for the Yudongxia reservoir subproject.

Bureau, and Land Resources Bureau of GMG. The PMO will also recruit project implementation consultants, a dam construction advisory panel, and other institutions and experts to assist the PMO in project implementation, monitoring, and evaluation. The PMO has considerable capacity for project implementation, but this will be the first time it will assume responsibility for an ADB-funded project.

39. Each local county and district-level government involved in the Project has set up a PLG and a project implementing office (PIO) to coordinate subproject preparation and implementation within its jurisdiction. There will be 10 PLGs and PIOs (6 district, 3 county, and 1 city), and corresponding IAs (usually local level WRBs) for each county. These county and district governments also have experience in managing domestic projects but with less experience in the administration of projects funded by international financial institutions. The county/district WRBs will serve as IAs for their respective subprojects. The project management arrangements are in Supplementary Appendix W.

40. As the capacity of the institutions at lower management levels is considered weak, capacity strengthening measures were identified (Appendix 6), and strengthening activities will be undertaken early during project implementation. The Project's capacity strengthening activities are designed to take into account weaknesses identified by both the institutional capacity analysis and the financial management assessments. Currently, capacity strengthening is being undertaken under the TA for strengthening water resources management in Guiyang.

41. During project preparation, financial management assessments were conducted, covering implementation arrangements, sustainability, and fiduciary risks and mitigation strategy. Based on these financial management assessments, each IA, PIO, and local finance bureau will be assisted in establishing a sound and solid financial management system at the beginning of project implementation, which will be in line with the *Guidelines on the Financial Governance and Management of Investment Projects Financed by ADB*.<sup>20</sup> A customized financial management manual has been prepared, which incorporates both domestic regulations and ADB policies and requirements to guide the financial management operations of all IAs. On this basis, along with the provision that the capacity strengthening is implemented early during implementation, the Project's financial management arrangements are considered satisfactory.

## **2. Subproject Preparation and Appraisal**

42. During project preparation, in addition to the appraisal of six core subprojects, a list of candidate noncore subprojects was selected as potentially suitable for ADB financing and for subsequent appraisal by the EA (Appendix 7). The participating local governments and IAs will, with the assistance of local design institutes and consultants, prepare a feasibility study for each of the noncore subprojects and submit the completed study to the PMO. The feasibility study report will include an environmental assessment (in a form stipulated by the environmental assessment and review framework [EARF]); resettlement plan (if required); ethnic minorities development plan (EMDP) if required; rationale, scope and activities, technical description and analysis, cost estimates and financing plan, implementation arrangements, and financial, economic, and institutional analysis, including financial management assessment and social dimensions.

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<sup>20</sup> ADB. 2002. *Guidelines on the Financial Governance and Management of Investment Projects Financed by ADB*. Manila.

43. Based on the completed feasibility study report and in consultation with the Guiyang Development and Reform Commission, the PMO will appraise the subprojects in accordance with the eligibility criteria agreed upon by the Government and ADB (Appendix 8). All subprojects must satisfy these criteria. The result of the appraisal will be summarized in a feasibility assessment report (FAR), following the format of the FARs prepared for the core subprojects. Prior ADB approval of FARs is required for (i) the first subproject in each type of intervention except for small water storage structures; and (ii) the following specified subprojects: (a) Gejiazhai reservoir, (b) Liangchahe reservoir, (c) Xiguan reservoir, (d) Xiuwen irrigation system rehabilitation, and (e) Wudang soil and water conservation subproject. These are the largest noncore subprojects with the greatest potential impact, which require closer scrutiny. The remaining FARs will be sent to ADB for information.

### 3. Implementation Period

44. The Project will be implemented over 6 years from 2010 to 2016. The preparation of safeguard documents and public disclosure for core subprojects has already started. Actual construction of these subprojects is expected to commence in the first year of project implementation and all core subprojects except the Yudongxia reservoir subproject are expected to be completed within the first 2 years. Given the size and complexity of the Yudongxia subproject, it is expected that 3 years will be required for its completion. Noncore subprojects will be implemented in about four batches after commencement of the core subprojects,<sup>21</sup> but it is anticipated that construction for many of these will also commence during the first 3 years of project implementation. The project implementation schedule is in Appendix 9. ADB's successful experience with similar projects in the PRC and the basic level of technology and modest scale of the individual subprojects indicate that this schedule is realistic and achievable.

### 4. Procurement

45. ADB-financed civil works, equipment, materials, and goods and services will be procured in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time). Major contracts for equipment and materials valued at \$1 million equivalent or more will be awarded through ADB's international competitive bidding procedure. Smaller packages for equipment and materials valued at less than \$1 million equivalent will be procured following the national competitive bidding procedure in accordance with the PRC's Tendering and Bidding Law (1999), subject to modifications agreed upon with ADB. Civil works contracts estimated to cost \$10 million equivalent or more will be carried out using international competitive bidding, while those costing less than \$10 million equivalent will be carried out using national competitive bidding. Shopping will be allowed for goods contracts valued at \$100,000 equivalent or less, and for civil works contracts valued at \$200,000 or less. Small civil works contracts valued at \$100,000 equivalent or less—for subprojects involving small-scale reservoirs, irrigation system rehabilitation, soil and water conservation, and small water storage tanks—may be carried out on a force account basis or through community participation, whenever practicable, to ensure sustainability and to achieve the Project's social objectives.<sup>22</sup> The procedures, specifications, and contract packaging should facilitate such participation, provided it is efficient to (i) involve

<sup>21</sup> Each noncore subproject is expected to be completed in 1–2 years.

<sup>22</sup> In the case of the small subprojects, it is only when community participation would not be practical that force account would be considered as a last resort, particularly when the works are scattered in remote locations for which no local contractors express interest, and when no nongovernment organizations or community-based organizations can participate. If force account is to be used for the small subprojects, prior ADB approval is required.

local communities and/or nongovernment organizations (NGOs), (ii) use more local knowledge and materials, and (iii) employ labor-intensive and other appropriate technologies. The relevant sections of ADB's *Anticorruption Policy* (1998, as amended to date) will be included in all procurement documents and contracts. The procurement plan is in Appendix 10.

## 5. Advance Contracting and Retroactive Financing

46. GMG has requested advance contracting and retroactive financing to enable early commencement of civil works and recruitment of project implementation consultants. The Government has been advised that retroactive financing could only apply up to 20% of the ADB loan amount with respect to expenditures incurred not earlier than 12 months before the signing of the loan agreement. During the appraisal mission, it was identified that about \$3.53 million equivalent would be required for retroactive financing in connection with the following items: (i) civil works for the Yudongxia reservoir/dam construction (\$0.98 million), (ii) civil works for Jinlong small reservoir/dam construction (\$0.62 million), (iii) civil works for small water storage tanks (\$1.18 million), (iv) civil works for irrigation system rehabilitation subprojects and rural water supply subprojects (\$0.07 million), (v) civil works for soil and water conservation subprojects (\$0.28 million), and (vi) capacity development and training (\$0.40 million). Supplementary Appendix U provides details of retroactive financing requirements. All contracts for advance action will be undertaken in accordance with ADB's *Procurement Guidelines and Guidelines on the Use of Consultants* (2007, as amended from time to time). The Government has also been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the Project.

## 6. Consulting Services

47. The Project will support a total of 24 person-months of international consulting services and 171 person-months of national consulting services during the first 4 years of project implementation to support the PMO, local PIOs, and IAs in project implementation and capacity development.<sup>23</sup> The consultants will strengthen their project implementation capabilities to ensure that (i) the subproject IAs are able to function as effective project management units; (ii) noncore subprojects utilizing ADB loan finance can be appraised and approved in a timely manner, based on agreed evaluation criteria; (iii) the implementation of water demand management activities will promote more efficient use of water among all categories of users; and (iv) social, resettlement, and environmental impacts are monitored and mitigated. Capacity development for IAs will be achieved through consultant inputs under the Project and TA for Strengthening Water Resources Management in Guiyang, hands-on training on project facilities, training in the PRC, and international training financed by the loan. This type of capacity development is not new to the PRC, so national experts have the knowledge to provide cost-effective support. However, the overall capacity development program is large and diverse, and international consultants will provide general direction to the program's content. An international consulting firm will be recruited in accordance with ADB's *Guidelines on the Use of Consultants* using the quality and cost-based selection method (80:20) with full technical proposals to carry out the international and national consulting services. Detailed design, and engineering and construction supervision, financed with the Government's counterpart funds, will be carried out by qualified local design institutes recruited by the local IAs.

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<sup>23</sup> Twenty person-months of national consulting services are being used to support the following activities during the second phase of the TA for strengthening water resources management in Guiyang: (i) development of an information management system, (ii) demand management initiatives, and (iii) training for capacity building of IAs involved in the Project.

## 7. Anticorruption Policy

48. ADB's *Anticorruption Policy* was explained and discussed with the Government and GMG. Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the Project. To support these efforts, relevant provisions of ADB's *Anticorruption Policy* are included in the loan regulations and the bidding documents for the Project. In particular, all contracts financed by ADB in connection with the Project shall include provisions specifying the right of ADB to audit and examine the records and accounts of the EA and all contractors, suppliers, consultants, and other service providers as they relate to the Project. The Project will also include strengthening of the financial management systems of IAs such as the Guiyang Zhushui Water Resources Development Company for the Yudongxia reservoir subproject. Each IA will keep accounts in accordance with commercial accounting principles, and be subject to an independent external audit by suitably qualified auditors. Accounting will be in accordance with relevant PRC accounting standards, which are largely in accordance with internationally accepted accounting standards.

## 8. Disbursement Arrangements

49. The proceeds of the loan will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2007, as amended from time to time). Direct payment, reimbursement, and commitment procedures may be used to withdraw funds from the loan account. To expedite the flow of funds and simplify document processing, the statement of expenditures (SOE) procedure may be used to reimburse eligible expenditures for any individual payment not exceeding \$200,000. Payments exceeding this ceiling will be reimbursed based on the full documentation process.

50. A project imprest account<sup>24</sup> will be set up by the Guizhou Provincial Finance Department (GPF) in a commercial bank acceptable to ADB after loan effectiveness. The initial amount to be deposited into the imprest account shall not exceed the equivalent of 10% of the total loan amount, or the estimated expenditures to be financed from imprest account for the first 6 months of implementation, whichever is lower. GPF will be responsible for management, monitoring, maintenance, and reconciliation of the imprest account. SOE will be used only at GPF level to request withdrawals from ADB or otherwise clarify the use of SOE by IAs. Disbursements from the imprest account will be supported by appropriate withdrawal applications and related documentations. Such documentations will demonstrate, among other things, that the goods/services (i) were produced in and procured from ADB members, and (ii) are eligible for ADB financing.

51. To ensure that adequate loan proceeds are available on a timely basis, Guiyang Finance Bureau (GFB) will maintain close coordination with GPF. Measures to be taken to accelerate internal review and verification for withdrawal applications include the following: (i) GPF will have at least two authorized representatives to sign withdrawal applications; (ii) GFB, the county/district financial bureaus, the PMO, and county/district PIOs will establish written procedures with specified time frames for review and verification of withdrawal applications submitted by subprojects; and (iii) GPF, GFB, and the local financial bureaus will release project funds immediately after receiving them to avoid delay in implementation.

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<sup>24</sup> Bank charges will be financed from the loan resources.

## **9. Accounting, Auditing, and Reporting**

52. The PMO, on behalf of GMG, will prepare consolidated quarterly progress reports indicating progress made, problems encountered during the review period, steps taken or proposed to remedy the problems, the proposed program of activities, and progress expected for the following quarter. The PMO will ensure that these reports are submitted to ADB in a timely manner. Within 3 months of the Project's physical completion, the PMO will submit to ADB a completion report that describes (i) institutional strengthening and water sector policy reform; (ii) implementation of the structural investment program; (iii) other project implementation matters; (iv) actual costs incurred in relation to cost estimates, benefits, and beneficiary consultations; and (v) other information requested by ADB.

53. The PMO and each IA will maintain records and accounts that identify the goods and services financed from the loan proceeds, financing resources received, expenditures incurred for the Project, and use of local funds. The accounts will be established and maintained in accordance with sound accounting principles and internationally accepted accounting standards. The annual project accounts of GMG and the IAs will be audited by auditors acceptable to ADB. Audit coverage will include a special audit of project accounts, including separate opinions on (i) utilization of funds deposited in the Project's imprest account; (ii) the use of the SOE procedure, including whether the amount claimed is duly supported and verified; (iii) whether the EA is operating the imprest account in accordance with ADB procedures; (iv) procurements undertaken through community participation and force account; and (v) compliance with financial covenants specified in the loan and project agreements. The audit reports, management letter, and related financial statements will be submitted to ADB not later than 6 months after the end of the fiscal year to which they relate, or the project closing date if earlier. ADB has informed the Government of its policy on the submission of audit reports, which covers failure to submit audited project accounts and financial statements by the due date. A formal warning will be issued for audited accounts more than 6 months overdue, and disbursements will be suspended for audited accounts that are 12 months overdue.

## **10. Project Performance Monitoring and Evaluation**

54. The major project performance monitoring indicators include project progress, results of capacity development, water resources management performance and related service levels, the social impact of the Project, user satisfaction with water availability, quality and price, and relevant economic and health data to monitor project impacts. An outline of the project performance monitoring system (PPMS) is in Supplementary Appendix X.

55. At the beginning of project implementation, the PMO, in consultation with the IAs and with the assistance of consultants, will develop comprehensive PPMS procedures to generate data systematically on inputs and outputs of project activities; and the socioeconomic, health, and environmental indicators to measure project impacts. The PMO will refine the PPMS framework, confirm achievable targets, firm up monitoring and recording arrangements, and establish systems and procedures no later than 6 months after project inception.

56. Under the PPMS framework, baseline and progress data will be reported at the requisite time intervals by the IAs to the PMO, including semiannual reporting on the environmental management plan. The PMO will be responsible for analyzing and consolidating the data through its management information system. The PPMS will be designed to permit adequate flexibility to adopt remedial action regarding project design, schedules, activities, and development impacts. The PMO, with assistance from the consultants, will monitor and assess

activities, and report to ADB on a quarterly basis on the physical implementation and financial aspects of the Project to ensure that impacts are monitored and reported in line with ADB requirements. Key issues and progress on social and environmental safeguard aspects will be briefly included in the project quarterly progress report, and the external monitoring and evaluation on the resettlement and environmental ambient quality changes will be reported on a semiannual basis.

57. Project management arrangements will need to be further refined to take into consideration lessons on involving NGOs in project activities, in particular in assessing their institutional capacity and experience of interacting with government agencies and communities. Their work will be closely monitored by the monitoring and evaluation specialist within the PMO. Where NGOs will be working with resettled communities, the impact of their involvement will also be captured in the monitoring of the resettlement process. In the contracts to be negotiated with the NGO, their reporting requirements to ADB on the community mobilization work will be specified. Project implementation consultant inputs will also be closely monitored and tied to specific outputs.

## **11. Project Review**

58. It is envisaged that ADB review missions will be undertaken twice per year, for the first 2 years and once a year thereafter. ADB and the Government will undertake a midterm review 3 years after the start of project implementation. This review will reassess in detail the likelihood of achieving the Project's impact, outcome, and outputs; and include a detailed evaluation of the scope, implementation arrangements, resettlement, achievement of scheduled targets, and progress with capacity development measures. Feedback from the PPMS activities will be analyzed.

## **IV. PROJECT BENEFITS, IMPACTS, ASSUMPTIONS, AND RISKS**

### **A. Water Resources Benefits**

59. The Project will provide extensive water resources benefits that will affect about 1.6 million residents of Guiyang Municipality, or about 45% of the total population. At project completion, the expected benefits include (i) an increase in urban water supply of about 40 million m<sup>3</sup> per year; (ii) an increase in rural water supply of about 94.8 million m<sup>3</sup> per year; (iii) improvement in the existing irrigated area of about 10,773 ha and an increase in the irrigated area by about 18,815 ha; (iv) increased irrigation coverage from 0.3 mu to 0.5 mu per capita; (v) soil conservation treatment to an area of about 800 km<sup>2</sup> of land at risk of erosion; and (vi) provision of 105,100 small water storage tanks in rural areas to catch and store spring and rainwater for drinking, irrigation, and livestock. It is estimated that about 240,000 rural beneficiaries will have access to safe drinking water, and about 59,200 farmers will benefit from improved irrigation services.

60. Surface water quality will be improved with sewerage interception and wastewater treatment, industrial wastewater discharge control, nonpoint source pollution control, reservoir catchment pollution protection, and soil conservation. Most of these pollution control measures will be paid by the wastewater dischargers. For activities involving reservoir catchment and water protection, control and improvement costs will be included in each subproject design.

61. The policy, institutional, and IWRM-based reforms to be implemented in parallel with the structural interventions will bring about improvements in (i) subproject design through increased

stakeholder involvement, (ii) sustainability of O&M, (iii) resolution of water conflicts, (iv) interagency and cross-sector cooperation, and (v) increased emphasis on water conservation activities.

## **B. Environmental Impacts and Benefits**

62. The Project's environmental impact and benefits are evaluated in general terms and cumulatively for the Master Plan as a whole. The environmental assessments of individual core subprojects provide a more detailed assessment of environmental benefits and impacts at the subproject level. A summary environmental impact assessment (SEIA) covering the core subprojects was categorized as environmental category A and a summary initial environmental examination (SIEE) covering the remaining three core subprojects were prepared in accordance with the PRC's environmental assessment technical guidelines and ADB's *Environment Policy*.<sup>25</sup> The soil and water conservation activities of the Project provide the most obvious and direct environmental benefits. For the other activities, especially the construction of reservoirs, there is a trade-off between development and livelihood benefits, and adverse environmental impacts, which will occur while under construction and during operation of the subproject facilities. However, each subproject environmental assessment concludes that the overall balance is favorable, and that the adverse environmental impacts are manageable with appropriate mitigation measures that have been identified and incorporated in the subprojects' environmental management plan (EMP). The environmental assessment of noncore subprojects to be prepared and implemented under the Project will be undertaken in accordance with the provisions of the EARF that have been agreed with the EA. The summary environmental assessment framework is in Appendix 11.

## **C. Social Dimensions**

### **1. Poverty Reduction and Social Benefits**

63. Guizhou Province is one of the poorest provinces in the PRC, with the second lowest rural income and the lowest level of urban income of any province. In 2008, about 4.6% of the municipality's urban population lived under the municipality's absolute poverty line for urban areas and about 3.9% of the rural population lived under the absolute poverty line for rural areas, and received conditional support from the Government. The rural population living at less than CNY1,200 per person per year was estimated at 25%.<sup>26</sup> The Project covers 71 towns and townships out of the total 77 towns and townships in Guiyang Municipality, including 18 "poverty" towns and townships designated by Guizhou Province, five of which are designated class A "poverty" towns and townships with an average annual income of less than CNY785 per person. The Project has specific provisions to target women and ethnic minorities, considered particularly vulnerable. In Guiyang Municipality, about 430,000 people, primarily in rural areas, lack satisfactory domestic water supplies, with the burden of water collection falling mainly on women. The Project will provide rural households with opportunities to improve their agricultural

<sup>25</sup> The environmental impact assessment and initial environmental examination reports for individual subprojects used methodologies and standards consistent with relevant guidelines established by the Ministry of Environmental Protection, in compliance with applicable laws and regulations. The individual environmental impact assessment and initial environmental examination reports have been prepared in accordance with the PRC domestic procedures. ADB reviewed the SEIA and posted it on the ADB website on 21 August 2006.

<sup>26</sup> The national line for absolute poverty in the PRC has been set at CNY1,196 for 2009, which means that 25% of the rural population is now considered absolutely poor and entitled to special support by the Government. This poverty line corresponds to the former international poverty line of \$1 per day, while the new international poverty line of \$1.25 per day—adopted by ADB—corresponds roughly to CNY1,600.

income by increasing the surface of irrigated land, allowing them to change from low-yield crops and subsistence farming to higher-value crops. The Project will also reduce non-income poverty by providing reliable domestic water supply to households. The summary poverty reduction and social strategy is in Appendix 12.

64. Labor opportunities will be provided to local communities. The PMO and IAs will ensure that contractors hire local labor, in particular ethnic minorities and women, for skilled and unskilled work as much as possible.

## **2. Gender and Development**

65. The Project will promote the inclusion of women during subproject design in WUA membership and leadership, and in other project activities that are important for their participation. To achieve this, targets are set for the participation of women and the benefits they will derive from the Project. Quotas of at least 30% are set aside for women in (i) project-financed training activities, (ii) job opportunities created by the Project, and (iii) participation in public consultation processes for the planning of noncore subprojects. To enhance women's participation in project leadership, the All-China Women's Federation is included in the PLG at the PMO (municipal) and IA (district and county) levels, and at the village level a quota is set for at least 30% for women's participation in WUAs. In the small-scale water tank subcomponent, a quota of at least 30% will target poor women and households headed by women. In addition, the Project's emphasis on active participation in community-managed infrastructure will present women with new opportunities and challenges that will further change the traditional division of gender roles in local communities and require targeted training and skills transfer interventions. The Project will also provide gender-awareness training to project management staff to promote women's participation in key areas. The monitoring of gender-disaggregated data and gender-specific indicators is part of monitoring and evaluation of project impacts. The gender action plan (GAP) is in Appendix 13.

## **3. Land Acquisition and Resettlement**

66. Resettlement impacts were assessed in detail for the six core subprojects, and the selected noncore subprojects were screened for potential impacts, of which 48 subprojects may involve land acquisition and resettlement. For the entire Project, it is estimated that about 6,300 persons will be affected by land loss; and about 12,800 mu of land will be acquired for the Project, of which about 5,900 mu (46%) is cultivated land. The houses of about 1,200 persons will have to be relocated. For the core subprojects, the resettlement impacts are relatively small except for the Yudongxia reservoir subproject. The Guiyang PMO has prepared and ADB has approved the resettlement plan for the Yudongxia subproject and three resettlement plans for the Jinlong, Liaojiuzhai, and Wudang subprojects. No resettlement plans are required for the other two core subprojects, as these do not involve land acquisition or involuntary resettlement. Based on satisfactory resettlement experience in Guizhou Province, the EA and local governments were assessed to have the capacity to manage resettlement impacts properly. The IAs will fund the resettlement costs according to the standards set out in the resettlement plans, based on national policies and local regulations. Entitlements will be provided to affected persons before demolition and ground leveling commence, and before any loss of land. A resettlement information booklet was distributed to those affected through village offices, and the resettlement plans for the four core subprojects were made available at the village offices. The summary resettlement plan and framework is in Appendix 14.

67. Compensation for land acquisition, residential housing, and nonresidential housing will be paid to all users regardless of whether titled or not. For land acquisition, compensation includes land compensation, resettlement subsidy, and compensation for young crops. The land compensation will be paid to the affected village and/or affected persons and the resettlement subsidy and other compensation for individual asset loss will be paid to the affected persons. For small businesses and housing demolition, compensation will be paid directly to owners in cash according to the appraised value of the land and fixed property assets. Income losses resulting from reduced production/sales and wages caused by the Project will be assessed and compensated to affected persons in cash.

68. For subsequent noncore subprojects, resettlement plans will be prepared based on the detailed engineering designs and resettlement impact surveys. A resettlement framework providing procedural guidelines for the EA and IAs to follow has been agreed upon between GMG and ADB. The PMO, assisted by the IAs, will be responsible for monitoring resettlement plan implementation and submitting progress reports to ADB. A regular reporting system will be established to ensure that key resettlement activities are implemented on schedule. The PMO will also engage a domestic institute to conduct independent monitoring and evaluation of resettlement implementation and report progress semi-annually, to evaluate results through annual survey updates and reports for 2 years after completion of resettlement. Monitoring and evaluation reports will be submitted to Guiyang PMO and ADB for review and follow up action, if required.

#### **4. Ethnic Minorities**

69. EMDPs have been prepared for four of the core subprojects. About 200 ethnic minority persons in each of these four subprojects will have their livelihoods affected by the Project, although the overall impact of the Project will be beneficial to the ethnic minority communities as a result of improved water supplies and consequential livelihood benefits. Ethnic minority villages will be specifically targeted for the provision of small water storage tanks, and special provisions will be made in resettlement plans, where construction activity has a serious impact on ethnic minority communities. An ethnic minorities development framework (EMDF) for the subsequent noncore subprojects has also been prepared. The PMO, assisted by the IAs, will be responsible for preparing the EMDPs for the noncore subprojects, as required, and monitoring the implementation of all EMDPs. The summary EMDF is in Supplementary Appendix Y.

#### **D. Policy and Institutional Benefits**

70. The capacity development activities under the Project and the continued policy dialogue with the municipal government during its implementation, as well as under the TA 4912-PRC, will support institutional and IWRM reforms that will facilitate the achievement of the overall development goal for the Project. The Project will not only improve water services but also facilitate the introduction of IWRM. It will help implement a subset of the measures identified in the Master Plan that are mainly structural but clearly linked to identified water management problems and overall economic development goals of GMG. Nonstructural measures will be supported under both the Project and TA, and mainly comprise capacity development activities to promote the use of IWRM; support the introduction of related institutional reforms; and establish participatory approaches for the design and management of water projects, water allocations, and water sector planning.

## E. Economic Analysis

71. The economic analysis covers both the Project as a whole and the core subprojects. For the Project, the analysis covers the economic rationale for government involvement, goals of the sector development plan, and the design of the sector development plan. The rationale is sound, based on the sector analysis that has been performed in a manner consistent with ADB requirements.<sup>27</sup> A summary of the sector economic analysis is in Appendix 15.

72. Least-cost analysis based largely on technical evaluations and investment cost comparisons has been performed and is considered acceptable since the alternatives that are considered involve familiar technologies and provide similar levels of benefit. Economic analyses were undertaken to determine subprojects' economic internal rates of return (EIRRs) in accordance with ADB guidelines.<sup>28</sup> Alternative cropping patterns were modeled for both rain-fed and irrigated systems based on crop production data obtained from a survey of 300 rural households distributed across the irrigation subproject areas. All of the core subprojects, except the Liaojiuzhai reservoir subproject, have EIRR values equal to or greater than 12%. For the Liaojiuzhai reservoir subproject, the EIRR equals 10% and it is believed that there are adequate, non-quantifiable benefits of at least 2% that allow the subproject's EIRR to surpass the 12% threshold. For economic viability, subproject selection criteria (Appendix 8) for noncore subprojects were devised to ensure that those with lower prospects of economic viability are excluded from consideration for financing under the Project.

## F. Financial Analysis

73. The financial evaluation of the core subprojects was undertaken in real terms using constant 2009 prices. Financial projections were made at the subproject level involving urban water supply, rural domestic water supply, and irrigation. The project cost estimates and financial projections in nominal terms after tax were converted to real terms by adjusting for foreign and domestic inflation and currency fluctuation. The estimated financial internal rates of return exceed the after-tax weighted average cost of capital for the revenue-generating subprojects, and sensitivity and risk analyses indicate that the financial internal rates of return are robust under adverse conditions.

74. Financial projections were prepared for the Guiyang Zhushui Water Resources Development Company, Guiyang water supply company (WSC), Wudang WSC, Xiuwen County WSC, Jinlong reservoir subproject, Liaojiuzhai reservoir subproject, and the Wudang irrigation rehabilitation subproject in accordance with the *Guidelines on the Financial Governance and Management of Investment Projects Financed by ADB* (footnote 20). The projected financial statements indicate that revenues will be sufficient to finance O&M costs and debt service coverage, and provide reasonable rates of return in all cases except the Jinlong reservoir and the Liaojiuzhai reservoir subprojects. Based on the financial projections, these entities generally meet the accepted target values with respect to the minimum debt-service coverage ratio of 1:4, a maximum debt–equity ratio of 70:30, and a minimum current ratio of 1:0. All subprojects except Liaojiuzhai and Jinlong are therefore considered financially acceptable and sustainable. The Liaojiuzhai reservoir subproject will require a small ongoing subsidy to be financially sustainable. The Jinlong reservoir subproject, while financially viable, will experience some

<sup>27</sup> ADB. 2005. Assessing Aid for a Sector Development Plan: Economic Analysis for a Sector Loan. *ERD Technical Note 14*. Manila.

<sup>28</sup> ADB. 1997. *Guidelines for the Economic Analysis of Projects*, Manila; and ADB. 1999. *Handbook for the Economic Analysis of Water Supply Projects*. Manila.

short-term difficulty with regard to cash flow and will need financial assistance to be sustainable. To address the problem, GMG has provided written assurances to provide financial subsidies in the short term and raise the water tariff in the medium term. Discussion on the tariff issue is summarized in Appendix 15.

75. The assessment of willingness to pay based on households for urban and rural domestic water supplies and of net income from improved crop production indicates that beneficiaries would accept proposed tariff increases. Willingness to pay is estimated at about CNY4 per m<sup>3</sup> for domestic use. Expenditure shares are calculated before accounting for the water bill waiver for registered poor households, and in all cases, with-project water supply costs constitute less than 5% of household expenditure.

## **G. Risks**

76. The Project has several potential environmental, institutional, financial, and policy risks related to (i) drought and excessive climate variation, (ii) rural to urban migration exceeding forecasts, (iii) unforeseen physical conditions that could affect construction costs and schedules, and (iv) resistance to water tariff reforms. Important assumptions include the following: (i) the Government's program for sustainable development is continued; (ii) effective agriculture extension support is provided to farmers; (iii) a participatory approach to water resources management is continued to be adopted; (iv) incentives for effective interagency coordination are introduced; (v) financing is identified for other activities in the Master Plan; (vi) community support, including through the establishment of WUAs, can be enlisted to help construct and maintain rural water infrastructure; and (vii) mitigation measures to protect water quality are undertaken by neighboring administrative jurisdictions.

77. The Project includes measures to mitigate these risks and verify assumptions that include (i) extensive stakeholder consultation during the design of subprojects; (ii) regular tariff reviews and adjustments by the Government following national guidelines as well as public awareness programs; (iii) an examination of the GMG budget to assess availability of counterpart funding; (iv) formal commitment from GMG to introduce IWRM-based reforms; and (v) implementation of training, capacity development, and community support programs. ADB review missions will monitor compliance with the financial and operational covenants to ensure financial sustainability of the water utility companies. Experienced national and international consultants will provide advice and support to mitigate specific construction and other implementation risks.

## **H. Overall Assessment**

78. The Project is critical to keeping Guiyang Municipality's water supply and demand in balance to facilitate continued and sustainable economic growth, which is the overall development goal of GMG. Analysis during project preparation suggests that the economic viability of the subprojects that augment urban and rural household water supplies are easy to demonstrate, but the economic justification of the subprojects providing mainly irrigation water has a more marginal economic justification. In overall terms, collective project benefits outweigh costs in both financial and social terms. The implementation of resettlement plans in accordance with PRC and ADB policies will protect persons adversely affected by the Project, and the application of PRC and ADB environmental safeguards will minimize adverse environmental impacts.

## V. ASSURANCES

### A. Specific Assurances

79. In addition to the standard assurances, the Government and GMG have given the following specific assurances, which have been incorporated in the draft legal documents:

#### 1. Integrated Water Resources Management

- (i) GMG will ensure that the principles of IWRM under the Master Plan and developed under the TA for Strengthening Water Resources Management in Guiyang are carried out under the Project. In particular, GMG will ensure that the IWRM strategic action plan agreed between GMG and ADB (Supplementary Appendix S) is implemented in a timely manner. Key activities to be implemented will include (a) establishment of an effective water sector management structure, (b) shift from the current supply management to demand management, (c) greater public participation in water resources management, (d) improvement in information management and sharing among relevant agencies, and (e) capacity building in water management in Guiyang Municipality.
- (ii) GMG will ensure that the subproject selection criteria and implementation procedures (including prior ADB approval requirements) agreed upon with ADB are followed, including environmental and social safeguard requirements under the EARF, EMP, resettlement framework, and EMDF.
- (iii) Within 3 months of the loan effectiveness date, GMG will appoint a dam safety panel of eminent national engineers, which will review the detailed design of proposed subprojects involving the construction of dams, oversee dam construction, and confirm to ADB that the design and construction of the dams meet international safety standards.
- (iv) GMG will itself cause the finance and price bureaus of each local county participating in the Project, to undertake annual reviews of water tariffs, and to establish tariffs based on financial and economic objectives (including the financial sustainability of water services, and the use of price as a water demand management tool where appropriate), subject to compliance with laws and regulations in the PRC. In the event the tariff is not set at a level allowing for financial viability and sustainability of a subproject, GMG will ensure that the county governments will provide the necessary subsidy. For urban water supply, tariffs will be established, and if necessary, adjusted to ensure full repayment of O&M, interest charges, the greater of depreciation or debt repayment, and a reasonable profit margin.
- (v) GMG will ensure that each local county government (through its poverty bureau): (a) reviews the impact of increased water and wastewater tariffs on the poor, and in urban areas; and (b) maintains the provision of the water tariff waiver under minimum living standard scheme to protect the basic living standard of the poor.
- (vi) GMG will ensure that WUAs are established in a timely manner for all reservoir and irrigation core and noncore subprojects.

#### 2. Social Safeguards

- (i) GMG, through the relevant local governments and IAs, will ensure that (a) all land and rights-of-way required by the Project are made available in a timely manner; (b) the resettlement framework and resettlement plans are implemented

promptly in accordance with their terms, all applicable PRC laws and regulations, and ADB's *Involuntary Resettlement Policy* (1995); (c) all affected persons are given adequate opportunity to participate in resettlement planning and implementation; (d) counterpart funds are provided on a timely basis for land acquisition and resettlement activities; (e) any financial obligations in excess of the resettlement plan budget estimates are met; and (f) compensation and resettlement assistance are given to the affected persons prior to dispossession and displacement to ensure that those affected will be at least as well off as they would have been in the absence of the Project.

- (ii) GMG, through the local level PIOs, will ensure that (a) the resettlement plans prepared for the core subprojects are updated based on detailed designs, disclosed to the affected persons and resubmitted to ADB for concurrence prior to commencement of civil works; (b) resettlement plans for noncore subprojects are prepared in accordance with the resettlement framework based on detailed design, disclosed to affected persons, and submitted to ADB for approval prior to commencement of civil works; and (c) ADB is advised of any significant material changes in project scope or other causes and this is reflected in an updated resettlement plan to be submitted to ADB for its approval. With respect to any updated resettlement plans, GMG will disclose such updated resettlement plans to affected persons prior to ADB approval.
- (iii) GMG, through the Guiyang PMO, will ensure that (a) adequate staff and resources are committed to resettlement monitoring and supervision, and ADB is provided with quarterly reports on implementation, and a resettlement completion report for all the reservoir subprojects; (b) an independent agency acceptable to ADB is engaged to monitor and report progress semiannually, and to evaluate results through annual survey updates and reports for 2 years after completion of resettlement; (c) external monitoring reports are submitted to ADB and the Guiyang PMO for review and comments; and (d) a summary of the final resettlement audit for the Yudongxia reservoir subproject is provided to ADB.
- (iv) GMG will ensure that the GAP is implemented in a timely manner over the entire project period, and that adequate resources are allocated for this purpose. Implementation of the GAP will be closely monitored, and progress will be reported in the quarterly progress reports submitted to ADB.

### **3. Environment Management**

- (i) For those water supply dam subprojects, particularly the Yudongxia dam, GMG will ensure an appropriate classification of environmental protection zone and determine and stipulate related regulations for preserving water quality of the respective reservoir. Such regulations may include land use zoning and control of chemical fertilizers/pesticides use, wastewater discharge, and aquaculture development in the environmental protection zone area. To ensure the preservation of the income and livelihood of local communities that may be affected by such regulations, GMG will ensure that a PES mechanism to maintain the agreed level of water quality by providing sufficient compensation to upstream government and affected communities is established and implemented.
- (ii) GMG will cause each local government and the IAs to construct, operate, maintain, and monitor the project facilities in strict conformity with (a) all applicable laws and regulations, including national and local regulations and standards for environmental protection, health, labor, and occupational safety; and (b) ADB's *Environment Policy* and the environmental mitigation and

monitoring measures detailed in the approved EIAs, initial environment examinations, SEIA, SIEE, and EMP for the Project.

#### **4. Others**

- (i) The PMO, in consultation with the IAs, will prepare and submit to ADB for review and concurrence, a training plan for informing (e.g., on IWRM principles such as water sharing) and empowering local communities to be implemented under the Project.
- (ii) GMG will ensure that proper financial management systems are established and implemented by the IAs in accordance with domestic regulations, ADB's *Guidelines for the Financial Management and Analysis of Projects*, and the customized financial management manual prepared for the Project, and incorporating domestic regulations and ADB policies and requirements.

### **VI. RECOMMENDATION**

80. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of \$150,000,000 to the People's Republic of China for the Guiyang Integrated Water Resources Management (Sector) Project from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; a term of 26 years, including a grace period of 6 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan and Project Agreements presented to the Board.

Haruhiko Kuroda  
President

7 October 2009

### DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p><b>Impact</b> Sustainable and inclusive socioeconomic growth in Guiyang Municipality</p>	<p>Gross value of agricultural production increases from CNY3.8 billion in 2006 to CNY6.1 billion by 2020</p> <p>Rural poverty incidence in Guiyang Municipality is reduced to 20% by 2020 compared with 2004 poverty incidence of 28.7%<sup>a</sup></p> <p>Urban poverty incidence in Guiyang Municipality is reduced to 3.0% by 2020 compared with 2004 poverty incidence of 4.3%</p>	<p>Guiyang Municipality government statistics</p>	<p><b>Assumptions</b> Government continues to promote sustainable development</p> <p>Farmers have access to adequate rural financing and marketing infrastructure</p> <p><b>Risks</b> Drought and excessive climate variation Rural to urban migration of people exceeds forecasts</p>
<p><b>Outcome</b> Water supply and demand in Guiyang Municipality are balanced in a sustainable manner</p>	<p>Total available water resources increase from 0.9 billion m<sup>3</sup> per year to 1.4 billion m<sup>3</sup> per year by 2016</p> <p>94% of surface water quality targets met by 2016</p> <p>No adverse cumulative environment impacts reported as a result of project activities</p>	<p>WRB statistics Guiyang Municipality government statistics EPB monitoring data TA 4912-PRC completion report Project completion report EPB monitoring data</p>	<p><b>Assumptions</b> Government encourages a participatory approach to water resources management</p> <p>Incentives for effective interagency coordination are introduced</p> <p>Financing is identified for the other activities under the Master Plan</p> <p><b>Risk</b> Resistance to tariff reforms</p>
<p><b>Outputs</b></p> <p>1. Improved water quality</p> <p>2. Increased supply of water for domestic, industrial, and irrigation purposes</p> <p>3. Improved water use efficiency</p> <p>4. Improved institutional and technical capacity to manage water resources</p>	<p>By the end of the project implementation (2016):</p> <p>Percentage of rural households in the project area with access to drinking water (at national drinking water standards) increases from 71.5% to 90.0% (by 240,000 beneficiaries)</p> <p>Total reservoir capacity increases from 184.0 million m<sup>3</sup> to 366.6 million m<sup>3</sup></p> <p>Area of irrigated land increases from 557,600 mu to 839,825 mu</p> <p>Irrigation efficiency increases from 45%–50% to 65%–70%</p> <p>Non-revenue water reduced from 30% to 20%</p> <p>WUAs established and operational in all irrigation districts by 2013. About 30% target for women's membership and leadership.</p> <p>Effective coordination mechanism for water resources management</p>	<p>WRB statistics</p> <p>Internal and external monitoring and evaluation reports of EMPs, RPs, GAP, and EMDPs</p> <p>Water saving office data</p> <p>Water supply company data</p> <p>Project progress reports</p>	<p><b>Assumptions</b> Community support can be enlisted to help construct and maintain rural water infrastructure</p> <p>Pollution control measures to be paid by the wastewater generators</p> <p>The EMPs, RPs, and EMDPs are adequately carried out</p> <p><b>Risk</b> Unforeseen ground and construction conditions</p>

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
	established by 2016  Hydrological monitoring center and integrated information management system established by 2013  PMO fully staffed and equipped by the beginning of project implementation (2010)		
<b>Activities with Milestones</b> 1. Establish project management and monitoring systems and carry out institutional strengthening and capacity development (contributes to achieving outputs 1, 2, 3, and 4). a. Establish and equip municipal and local PMOs on a rolling basis according to subproject phasing. b. Establish WUAs (where applicable). c. Train key government staff at municipal, county, and district levels to plan, design, implement and monitor structural and nonstructural IWRM works according to the PRC regulations and ADB safeguards (on a rolling basis according to subproject phasing). d. Supervise and monitor subproject implementation by municipal and local project management offices. e. Strengthen municipal project management capacity (technical, financial, administration, and implementation) for annual work planning and the successful implementation and monitoring and evaluation of the Project according to project performance management system principles (throughout project implementation). f. Establish an integrated information management system for water sector management. g. Establish a municipal hydrological monitoring center. Milestones: PMOs for all noncore subprojects have been established in 2009. Capacity development milestones to be defined in inception report of loan consultants.  2. Construct one medium-sized and two small reservoirs for urban water supply (contributes to achieving output 2). 3. Construct up to 43 small reservoirs for rural water supply and irrigation (contributes to achieving output 2). 4. Rehabilitate and upgrade up to nine irrigation schemes (contributes to achieving outputs 2, 3, and 4). 5. Carry out soil and water conservation up to 800 km <sup>2</sup> (contributes to achieving outputs 1 and 2). 6. Construct up to 105,100 small water storage tanks (contributes to achieving output 2). Milestones for activities 2–6, to be carried out on a rolling basis in accordance with the project implementation schedule (Appendix 9), include: a. Prepare FSRs for each selected subproject. b. Prepare environmental impact report/environment impact assessment and EMP for each noncore subproject in accordance with PRC laws and regulations and ADB environmental safeguard policies. c. Prepare required social safeguard documents as needed (RP and/or EMDP). d. Prepare detailed engineering designs for each selected subproject. e. Acquire land where needed to accommodate civil works, temporarily or permanently relocate affected persons, and provide compensation and other social and economic rehabilitation measures for affected persons in accordance with PRC laws and regulations and ADB resettlement and ethnic minorities safeguard policies. f. Construct water resources infrastructure. g. Monitor and evaluate implementation of EMPs, RPs, GAP, and EMDPs.			<b>Inputs (\$ million)</b>  ADB sector loan: 150.0  Guiyang Municipal Government: 258.0  Guiyang Municipal Commercial Bank: 20.0  Beneficiaries: 11.2  <b>Total Cost: 439.2</b>

ADB = Asian Development Bank, TA = advisory technical assistance, EMDP = ethnic minority development plan, EMP = environment management plan, EPB = Environment Protection Bureau, FSR = feasibility study report, GAP = gender action plan, IWRM = integrated water resources management, m<sup>3</sup> = cubic meter, PMO = project management office, PRC = People's Republic of China, RP = resettlement plan, WRB = Water Resource Bureau, WUA = water users association.

<sup>a</sup> The targets of poverty incidence reduction included here came from discussions and consultations with local governments, and they represent the general social and economic objectives that the municipality aims to achieve by 2020.

## SECTOR ANALYSIS AND POLICY DIALOGUE

### A. Macroeconomic Context

1. Guizhou Province is one of the poorest provinces in the People's Republic of China (PRC), with the second lowest rural income, and the lowest level of urban income of any province. The capital of the province, Guiyang Municipality, is its political, economic, cultural, technical, and service center, and a major transportation hub of southwest PRC. In 2008, Guiyang Municipality has an estimated population of about 3.6 million, of which about 2.4 million reside in the main urban area, with the remaining 1.2 million in suburban or rural areas. About 574,000 people (16% of the total population) are ethnic minorities who mainly reside in the rural areas. The income disparity between the rural and urban population is high and about 25% of the rural population lives on an income of less than CNY1,200 (\$176) per capita per year. Like many other areas in the PRC, Guiyang Municipality is undergoing rapid urbanization with the urban population increasing at over 3% per annum, while the rural population is decreasing at an annual rate of 1.6%—a trend that is likely to continue.

2. Guiyang Municipality is one of the PRC's major producers of nonferrous metals and tobacco; and major industries include machinery, steel making, food processing, and chemicals. The total gross domestic product of Guiyang Municipality in 2008 was equivalent to about CNY81.1 billion, of which the tertiary (service) sector accounted for 46.69%, the secondary (manufacturing) sector for about 47%, and the primary (mining and agriculture) sector for about 6%. However, the primary sector is much more important in terms of employment, accounting for 34% of recorded employment in Guiyang Municipality.

### B. Water Resources System in Guiyang Municipality

3. In the context of integrated water resources management (IWRM), the water resources system (WRS) comprises (i) the natural resources system—the natural resources and related infrastructure; (ii) the socioeconomic system—the water-using and water-related human activities; and (iii) the administrative and institutional system—the system of administration, legislation, and regulation, including the authorities responsible for the management of the WRS and the implementation of laws and regulations.<sup>1</sup> Major problems and constraints in the context of IWRM in Guiyang Municipality, and the cause–effect relationship are provided in a problem tree in Supplementary Appendix V.

4. **Natural resources system of WRS in Guiyang Municipality.** Both urban and rural areas of Guiyang Municipality are on the mountainous ridge of the watershed boundary between the Yangtze River basin to the north, which drains about 95% of the area, and the Pearl River basin to the south. Annual average precipitation is quite high at 1,096 millimeters, but large evaporative losses and uneven distribution present particular challenges for capturing and storing water. The total annual renewable freshwater supply is estimated at 8.8 billion cubic meters (m<sup>3</sup>), almost half of which evaporates because of the poor vegetative cover and rocky terrain of the catchment areas. The remaining water drains into rivers (4.5 billion m<sup>3</sup> or 51% of

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<sup>1</sup> This definition of WRS covers the aspects that are essential for natural resources management: demand, supply, and control of the resources. The natural resources system refers to the supply side of the system (resource base) and the socioeconomic system to the demand side. The control of both sides is provided by the administrative and institutional system (AIS). The external natural boundaries of the natural resources system usually consist of the water that divides the catchment area, boundaries of the groundwater aquifer(s) belonging to this catchment area and the point where the river or canal discharges into the sea. The geographical boundaries of the socioeconomic system and the AIS vary depending on what part of the socioeconomic system is considered essential for managing and assessing the impacts of the WRS.

total precipitation) as quick surface flows through numerous short creeks and streams that run deep in valleys, or through fast-flowing deep aquifers (groundwater rivers) through the limestone layers (karst areas). Local surface and underground water resources average 1,300 m<sup>3</sup> per capita. This compares poorly with the PRC average of 1,700 m<sup>3</sup> per capita. To illustrate these challenges: (i) 85% falls from May to September; (ii) only 4.5% falls from December to February; (iii) annual fluctuations with a 100% difference (i.e., a 1:2 ratio) between a low rainfall year and a high rainfall year; and (iv) northern Guiyang Municipality only receives 60% of the amount of rain that falls in the south.

5. **Socioeconomic system of WRS in Guiyang Municipality.** As the economic hub of the province, Guiyang Municipality has a rapidly increasing population and industrial development, and hence increasing demand for water. Servicing this population and related municipal and industrial water demands is putting a severe strain on the existing water supply facilities. Urbanization in Guiyang Municipality means increased water demand for household, commercial, and industrial use. Water quality in local rivers and water sources is also a growing concern.

6. The Guiyang Municipality urban water supply infrastructure is old and in poor condition, water pressures are declining, and the supply is rationed in dry periods. Industrial recycling fails to meet the PRC targets of 75% and nonrevenue water is believed to be high, probably over 30% on average. Increased urbanization is generating increased volumes of wastewater and currently only about 10% is treated.

7. In rural areas of Guiyang Municipality, only 50% of homes have piped water supply. In the absence of public water supply systems, the majority of the rural population relies on local springs and streams, although some have small storage structures near their homes for domestic and livestock use. About 420,000 rural residents face potable water shortages. Most rural water is needed for agricultural purposes (domestic requirements only account for about 10%). However, the steep mountainous terrain makes it very difficult for farmers to obtain river water or groundwater for irrigation, particularly at higher elevations.

8. About 10% of Guiyang Municipality land area is arable, only 24% of this land has potential access to irrigation, and only 50% of cultivated land is irrigated. Consequently, irrigation coverage is currently only 0.3 mu per capita, lower than the national average of 0.8 mu per capita. It is estimated that production from the 50% of the cultivated area that is irrigated supplies 70% of production. Surface irrigation systems account for 99% of the irrigation area. Up to 40% of these structures have been abandoned, and 28.8 kilometers of canals are damaged. Water conveyance efficiency in larger irrigation schemes is estimated to average 40% and on-farm application efficiency about 90%, implying scheme level efficiencies of no more than 40%. With rehabilitation, conveyance efficiencies of 74% and on-farm application efficiencies of 95% are expected (scheme level 70%). Nonpoint source pollution from agriculture and rural point source pollution from livestock rearing are significant threats to water quality. Soil erosion is estimated to affect about 2,600 square kilometers of Guiyang Municipality, and watershed management is urgently needed to conserve soil and protect water sources.

9. **Administrative and institutional system of WRS in Guiyang Municipality.** In recent years, the PRC has recognized the need to improve the comprehensive management of water resources, applying approaches consistent with IWRM methodologies, and to shift the emphasis more toward managing demand, including the use of economic mechanisms. A crucial milestone along this path was reached on 1 October 2002, when the revised Water Law was made effective, and in which added emphasis is given to such issues as water resources planning, protection of water resources, the economical use of water, the resolution of disputes

concerning water, and the enforcement of water use regulations—all of which are common water resources management concerns.

10. The case for solutions based on the principles of IWRM becomes stronger as water demands increase and potentially compete with one another. Under the 2002 Water Law, the responsibilities of the river basin commissions<sup>2</sup> and local water bureaus in respect to integrated water resources planning have been strengthened. The 2002 Water Law also stipulates full cost recovery for urban water services. In 2004, the China Council for International Cooperation on the Environment and Development completed an important policy recommendation entitled *Promoting Integrated River Basin Management and Restoring China's Living Rivers*.<sup>3</sup> Since then, the challenges associated with its adoption have been discussed in a wide variety of forums, including the Second Yangtze Forum in April 2007 and the Third International Yellow River Forum on Sustainable Water Resources Management and Delta Ecosystem Maintenance in October 2007.

11. A recent comprehensive review of progress in adopting the IWRM approach in the PRC<sup>4</sup> concluded that there has been considerable progress but there is still a long way to go. The report set out detailed recommendations for medium- and long-term action in five main areas—legal and organizational reform, policy integration, IWRM master planning, public participation, and science and technology support—making it clear that sustainable IWRM is a long-term process that takes many years to achieve.

12. As in other provinces and municipalities, Guiyang Municipality level bureaus are subordinate to their relevant central line ministries and agencies. For example, the Guiyang Water Resources Bureau is subordinate to the Ministry of Water Resources, but exercises a coordinating role over water resources management with particular responsibilities for water resource planning, water allocations, water conservation, flood control, and rural water supplies at the local level. At the municipal level, the Urban Construction and Urban Management Bureaus (under the Ministry of Housing and Urban/Rural Construction) are responsible for the management of urban water supply, drainage, and wastewater treatment. The provincial and municipal environmental protection bureaus play important regulatory and enforcement roles in environmental protection and pollution control. The provincial and municipal Development and Reform Commission, operating as the local subordinates of the National Development and Reform Commission, are involved in the approval process of investment projects and in most cases are delegated authority for administering the PRC's Pricing Law (1997). Other ministries and government offices at the provincial, municipal, and lower levels (notably agriculture, finance, health, civil affairs, land, trade and industry, and forestry) are also involved in water sector issues.

13. As indicated above, the current management of the Guiyang water sector is not well integrated. There is vertical fragmentation with different responsibilities between provincial, municipal, and district and county levels, and horizontal fragmentation with responsibilities for water sector management split between different functional departments of each level of

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<sup>2</sup> Seven river basin-based water resources commissions under the jurisdiction of the Ministry of Water Resources were set up in the 1950s for improving water resource planning and coordinating flood control. Most of Guiyang Municipality lies in the Yangtze river basin under the jurisdiction of the Yangtze River Water Resources Commission, with its headquarters in Wuhan. A small part of Guiyang is within the Pearl River catchment under the jurisdiction of the Pearl River Water Resources Commission, with its headquarters in Guangzhou.

<sup>3</sup> China Council for International Cooperation on the Environment and Development. 2004. *Promoting Integrated River Basin Management and Restoring China's Living Rivers*. Beijing PRC.

<sup>4</sup> Wang Yi, L. Li, X. Wang, X. Yu, and Y. Wang. 2007. *Taking Stock of Integrated River Basin Management in China*. Beijing: Science Press.

government (mainly water resources, urban management, and agriculture). Both types of fragmentation lead to problems in water resources management, but generally, horizontal fragmentation presents more difficult problems to deal with. This is because the system of functional supervision within the Government of the PRC allows issues caused by vertical fragmentation to be resolved more easily—although this does not always happen in practice. Problems of horizontal fragmentation have the following major institutional and technical implications: (i) overlap of monitoring functions and lack of data sharing, (ii) inadequate comprehensive water resources planning that includes other sectors, (iii) pollution control planning that is largely unrelated to water resources, and (iv) lack of integration of function zoning with harmonization of quantity and discharge permitting.

### C. Integrated Water Resource Management in Guiyang Municipality

14. Guiyang municipal government (GMG) recognizes this movement toward IWRM, and has given a commitment to develop solutions based on IWRM. As a first step, it has prepared the Guiyang Integrated Water Resources Master Plan (the Master Plan).

15. **Master Plan.** There is a good potential for further water resource development to overcome shortages in both rural and urban areas. The primary objective of the Master Plan is to ensure an increase in available water resources in line with Guiyang Municipality's development needs. The Master Plan provides a comprehensive review of water needs in different sectors, including urban and rural domestic water, industrial water, hydropower, irrigation, environmental and ecological water needs, wastewater treatment and reuse, water savings, and flood control. Analysis of soil and water conservation needs is also included. The Master Plan presents an economically-sound strategy to pursue Guiyang Municipality's water resources development, and covers all forms of water use, both urban and rural, including initiatives to (i) develop new resources, (ii) improve irrigation facilities, (iii) manage demand and conserve water, (iv) exercise pollution control and protect existing water resources, (v) reform institutions, and (vi) introduce market-based measures to save water.

16. As well as enhancing total available water resources, the Master Plan has specific targets to (i) extend rural water supplies to un-serviced areas, (ii) increase irrigation coverage, and (iii) treat areas subject to soil erosion. However, while the Master Plan contains a large listing of structural interventions, the level of attention given to resolving institutional constraints, and developing nonstructural interventions and practices in keeping with IWRM principles is less well developed. This situation is understandable given the traditional emphasis to supply side water resources planning in the PRC, and the relatively recent attention given to demand side solutions. However, the Master Plan correctly identifies the priorities, which are to provide water to un-serviced or under-provided areas, and recognizes that these priorities require predominantly structural solutions, albeit with greater stakeholder involvement in their design and implementation.

17. GMG has established a project leading group to address cross-sectoral water issues. It seeks to develop initiatives under the PRC "water saving society program" and is in dialogue with the Guizhou provincial government to introduce integrated management of reservoirs on Nanming River. These initiatives will further the development of institutional capacity needed for IWRM, as well as fulfillment of the sector lending criteria of the Asian Development Bank (ADB).<sup>5</sup>

<sup>5</sup> According to ADB guidelines for sector lending, criteria for applying the sector loan modality are as follows: (i) the borrowing entity has a sector development plan to meet the priority development needs of the sector; (ii) the borrowing entity has the institutional capacity to implement the sector development plan; and (iii) if so required, the policies applicable to the sector can be improved.

18. Besides the policies mentioned above, a favorable set of government policies to support implementation of the Master Plan already exists in Guiyang Municipality, but increased efforts must be made to ensure they are fully implemented. These policies include:

- (i) establishment of water user groups and increased responsibilities conferred on individual households and local communities (including asset ownership), rather than the Government;
- (ii) greater attention in national planning to rural development and livelihood improvement;
- (iii) public services to be corporative and not provided directly by the Government;
- (iv) the Government role should become that of an enabler and regulator of services;
- (v) separation of government and the management of enterprises;
- (vi) utility services to be financed from user charges, with tariffs set in accordance with full cost recovery principles; and
- (vii) competition and private sector participation to be encouraged for both investment in infrastructure construction, and for operation and maintenance.

#### **D. Policy Dialogue and Integrated Water Resources Management Strategic Action Plan in Guiyang Municipality**

19. The ADB-supported Project will help GMG to implement the Master Plan and to promote the implementation of improved water sector management based on IWRM principles. ADB will finance a slice of the Master Plan, specifically in respect of five priority structural areas related to (i) alleviating shortfalls in urban water supplies resulting from increased urbanization; (ii) improving rural water supplies for irrigation and domestic use, via small reservoirs; (iii) tanks to serve individual households; (iv) rehabilitation and construction of new irrigation infrastructure; and (v) soil conservation and water source protection measures.

20. Technical assistance (TA) for IWRM<sup>6</sup> reform commenced in April 2007 to introduce the IWRM approach and enhance the enabling institutional environment. Since TA implementation, the following progress has been made: (i) Qingzhen City, as one of the cities in the project area, has successfully institutionalized IWRM in water sector management by establishing the city water authority—all of the water-related management functions become the mandates of this newly established city water authority, and the fragmented water management in this city will be significantly improved; (ii) Guiyang Municipality was selected by the Ministry of Water Resources as a potential candidate municipality to pilot the water-saving society program, which aims to promote water demand management nationwide; and (iii) the IWRM strategic action plan (Supplementary Appendix S), based on the findings of the TA interim report, was discussed and agreed with GMG.

21. GMG will ensure that the IWRM strategic action plan is implemented in a timely manner. Key activities to be implemented in the strategic action plan include the following: (i) establish an effective water sector management structure, (ii) shift the current supply management to demand management, (iii) promote participation in water resources management, (iv) improve information management and sharing, and (v) build the capacity to manage water in Guiyang Municipality. The plan will be implemented in conjunction with the Project from 2010 to 2016.

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<sup>6</sup> ADB. 2006. *Technical Assistance to the People's Republic of China for Strengthening Water Resources Management in Guiyang*. Manila.

## EXTERNAL ASSISTANCE

Donor	Project Title	Year	Amount (\$ million)
World Bank	Fourth Rural Water Supply and Sanitation Project—Anhui, Fujian, Guizhou, and Hainan Provinces <sup>a</sup>	1999	4.1
	Yangtze and Pearl River Watershed Rehabilitation <sup>b</sup>	2007	100.0
Japan Bank for International Cooperation	Guiyang Water Supply Project <sup>c</sup>	1998	42.0
	Environment Model Cities—Chongqing, Dalian, and Guiyang <sup>d</sup>	2000	284.9
	Guiyang Water Environmental Improvement Project <sup>e</sup>	2005	110.1

<sup>a</sup> This World Bank-funded project is to provide access to safe and convenient water to 3.1 million poor rural people in four provinces, including Guizhou rural water supply and sanitation system for nine counties, which includes Kaiyang, Xifeng, and Xiuwen counties:

- (i) Nine small water treatment plants with a total capacity of 6,050 cubic meter (m<sup>3</sup>)/day for 57 villages domestic water supply, 210 household composting latrines for villagers, and three village school composting latrines in Kaiyang county in an amount of \$1.5 million; and
- (ii) Rooftop rainwater collectors and hand pumps in rural areas where rainfall is plentiful, but access to surface water is difficult.

<sup>b</sup> The Project includes components for soil and water conservation, and livelihood improvement, including the construction of sediment retention structures and the terracing of slope land, with planting of appropriate crops including fruit trees and other perennial crops, as well as construction of small tanks for household water supply. The Project will be implemented in 37 counties of eight prefectures in four provinces, including some of the western counties of Guizhou Province.

<sup>c</sup> The loan amount is 55 billion Yen for the Xijiao Water Treatment Plant of Guiyang Municipal Water Supply Company.

<sup>d</sup> The loan amount is 30.7 billion Yen (14.4 billion Yen for Guiyang), and it covered the energy and air quality sectors.

<sup>e</sup> The loan amount is 12.1 billion Yen, and it is to reduce water pollution by improving sewage treatment facilities, and associated wastewater collection systems at seven locations. The Loan is funding wastewater collection and treatment facilities at seven locations within the Guiyang Municipality.

Sources: Japan Bank for International Cooperation and World Bank.

Numerous international agency-funded projects have supported Guizhou and Guiyang economic development in the past, but there are only a few supporting development of the water sector. The Asian Development Bank has assisted Guizhou Province in the past with two projects: (i) Chongqing–Guizhou Roads Development Project,<sup>1</sup> and (ii) Guizhou Shuibai Railway Project.<sup>2</sup> The proposed Project will be the third Asian Development Bank-funded project in Guizhou, but it will be the first one relating to water sector development.

<sup>1</sup> ADB. 2000. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Chongqing–Guizhou Roads Development Project*. Manila (Loan 1784-PRC, for \$200 million, approved on 21 November).

<sup>2</sup> ADB. 1998. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Guizhou Shuibai Railway Project*. Manila (Loan 1626-PRC, for \$140 million, approved on 18 August).

## DETAILED COST ESTIMATES

**Table A4.1: Detailed Cost Estimates by Expenditure Category<sup>a</sup>**

Item	Local	Foreign	Total	Foreign Exchange %	Total Base Costs %
		(\$ Million)			
<b>A. Investment Costs<sup>b</sup></b>					
1. Civil Works					
Structures and Buildings	119.4	119.4	238.8	50.0	<b>61.0</b>
2. Other Civil Works	1.6	1.6	3.2	50.0	<b>1.0</b>
3. Equipment and Materials					
Equipment	5.1	20.4	25.5	80.0	6.0
Office Materials and Supplies	0.1	0.5	0.6	80.0	0.0
<b>Subtotal (Equipment and Materials)</b>	<b>5.2</b>	<b>20.9</b>	<b>26.1</b>	<b>80.0</b>	<b>7.0</b>
4. Land Acquisition and Resettlement					
Compensation	55.8	0.0	55.8	0.0	<b>14.0</b>
5. Environment Protection	19.9	0.0	19.9	0.0	<b>5.0</b>
6. Implementation Consulting Services					
International Consultants	0.0	0.7	0.7	100.0	0.0
National Consultants	1.8	0.0	1.8	0.0	0.0
<b>Subtotal (Implementation Consulting Services)</b>	<b>1.8</b>	<b>0.7</b>	<b>2.5</b>	<b>28.0</b>	<b>1.0</b>
7. Staff Costs					
Staff	1.0	0.0	1.0	0.0	0.0
8. Research, Investigation, and Design	20.9	0.0	20.9	0.0	<b>5.0</b>
9. Training and Capacity Building	1.4	0.5	1.9	25.0	0.0
10. Project Management	12.7	0.0	12.7	0.0	<b>3.0</b>
11. Beneficiary Labor <sup>c</sup>	11.2	0.0	11.2	0.0	<b>3.0</b>
<b>Total Baseline Costs</b>	<b>251.1</b>	<b>143.0</b>	<b>394.1</b>	<b>36.0</b>	<b>100.0</b>
Physical Contingencies <sup>d</sup>	11.8	7.0	18.8	37.0	5.0
Price Contingencies <sup>d</sup>	5.5	3.6	9.1	4.0	2.0
<b>Total Project Costs</b>	<b>268.4</b>	<b>153.7</b>	<b>422.0</b>	<b>36.0</b>	<b>107.0</b>
Interest During Implementation <sup>e</sup>	16.6	0.0	16.6	0.0	4.0
Commitment Charges	0.5	0.0	0.5	0.0	0.0
<b>Total Costs to be Financed</b>	<b>285.6</b>	<b>153.7</b>	<b>439.2</b>	<b>35.0</b>	<b>111.4</b>

Note: Figures may not add up to totals because of rounding.

<sup>a</sup> In 2009 prices.

<sup>b</sup> Includes taxes and duties of \$14.1 million.

<sup>c</sup> Will cover activities that the farmers will undertake under the soil and water conservation and small water storage structures.

<sup>d</sup> Contingencies will be financed by the Government. Physical contingencies were computed at 5% of base costs. Price contingencies were computed using foreign escalation factors of 1.9% for 2009, 1.0% for 2010, 0.0% for 2011, 0.3% for 2012 and 0.5 thereafter, and a local escalation factor of 0.8% for 2009, 1.0% for 2010, 1.5% for 2011, and 2.0% thereafter.

<sup>e</sup> Includes interest during construction computed at the 5-year forward London interbank offered rate, with a spread of 0.2%, and a commitment charge of 0.15% for the Asian Development Bank loan and 5.97% for 3 years for the commercial bank loan.

Source: Asian Development Bank estimates.

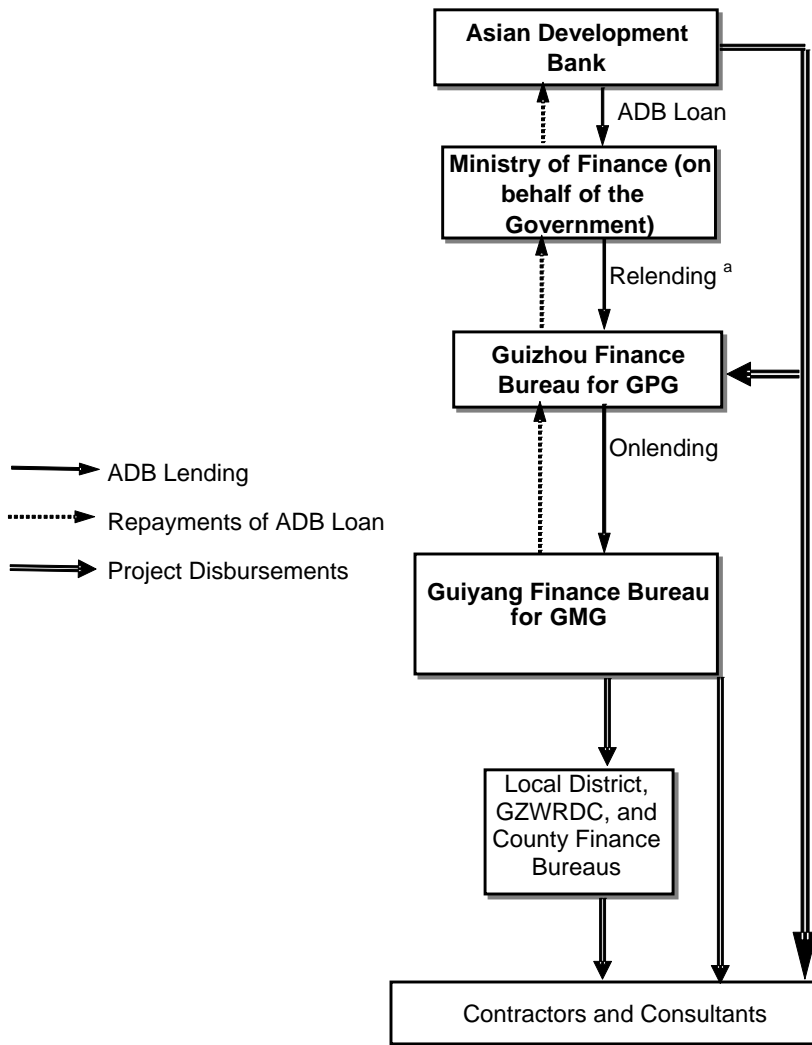
**Table A4.2: Detailed Cost Estimate by Expenditure Category and Financier**  
(\$ million)

Item	Asian Development Bank								Total		Foreign Exchange	Local (excluding taxes)	Duties and Taxes
	Bank		Commercial Bank		Beneficiaries		The Government		Amount	%			
	Amount	%	Amount	%	Amount	%	Amount	%					
<b>A. Investment Costs</b>													
<b>1. Civil Works</b>													
Structures and buildings	123.8	51.9	11.6	4.9	0.0	0.0	103.4	43.3	238.8	54.4	119.4	110.1	9.3
2. Other Civil Works	0.0	0.0	0.1	1.6	0.0	0.0	3.1	98.4	3.2	0.7	1.6	1.5	0.1
<b>3. Equipment and Materials</b>													
Equipment	22.0	86.4	0.0	0.0	0.0	0.0	3.5	13.6	25.5	5.8	20.4	0.8	4.3
Office Materials and Supplies	0.5	86.4	0.0	0.0	0.0	0.0	0.1	13.6	0.6	0.1	0.5	0.0	0.1
<b>Subtotal Equipment and Materials</b>	<b>22.5</b>	<b>86.4</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>3.5</b>	<b>13.6</b>	<b>26.1</b>	<b>5.9</b>	<b>20.9</b>	<b>0.8</b>	<b>4.4</b>
4. Land Acquisition and Resettlement Compensation	0.0	0.0	8.3	14.9	0.0	0.0	47.5	85.1	55.8	12.7	0.0	55.8	0.0
5. Environment Protection	0.0	0.0	0.0	0.0	0.0	0.0	19.9	100.0	19.9	4.5	0.0	19.9	0.0
<b>6. Implementation Consulting Services</b>													
International Consultants	0.7	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2	0.7	0.0	0.0
National Consultants	1.8	100.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.4	0.0	1.8	0.0
<b>Subtotal Implementation Consulting Services</b>	<b>2.5</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>2.5</b>	<b>0.6</b>	<b>0.7</b>	<b>1.8</b>	<b>0.0</b>
<b>7. Staff Costs</b>													
8. Research, Investigation, Design	0.0	0.0	0.0	0.0	0.0	0.0	20.9	100.0	20.9	4.8	0.0	20.9	0.0
9. Training and Capacity Building	1.1	60.0	0.0	0.0	0.0	0.0	0.8	40.0	1.9	0.4	0.5	1.2	0.2
10. Project Management	0.0	0.0	0.0	0.0	0.0	0.0	12.7	100.0	12.7	2.9	0.0	12.7	0.0
11. Beneficiary Labor	0.0	0.0	0.0	0.0	11.2	100.0	0.0	0.0	11.2	2.6	0.0	11.2	0.0
<b>Total Project Costs</b>	<b>150.0</b>	<b>38.1</b>	<b>20.0</b>	<b>5.1</b>	<b>11.2</b>	<b>2.9</b>	<b>212.9</b>	<b>54.0</b>	<b>394.1</b>	<b>89.7</b>	<b>143.0</b>	<b>237.0</b>	<b>14.1</b>
Contingencies							27.9	100.0	27.9	6.4			
Interest During Implementation	0.0	0.0	0.0	0.0	0.0	0.0	16.6	89.5	16.6	3.8	16.6	0.0	0.0
Commitment Charges	0.0	0.0	0.0	0.0	0.0	0.0	0.5	100.0	0.5	0.1	0.5	0.0	0.0
<b>Total</b>	<b>150.0</b>	<b>34.2</b>	<b>20.0</b>	<b>4.5</b>	<b>11.2</b>	<b>2.6</b>	<b>258.0</b>	<b>58.7</b>	<b>439.2</b>	<b>100.0</b>	<b>143.0</b>	<b>237.0</b>	<b>14.1</b>

Note: Figures may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

### FLOW OF FUNDS AND LENDING ARRANGEMENTS



<sup>a</sup> ADB funds will be onlent on the same terms and conditions as those received by MOF.

ADB = Asian Development Bank, GMG = Guiyang municipal government, GPG = Guizhou provincial government, GZWRDC = Guiyang Zhushui Water Resources Development Company.

Source: Asian Development Bank.

## **INSTITUTIONAL AND CAPACITY ANALYSIS**

1. The objective of this analysis is to provide an assessment of the technical, financial, and managerial capabilities of Guiyang municipal government (GMG) and the relevant implementing agencies (IAs) to develop, process, and implement the proposed Project. In particular, adequate institutional capacity is needed to (i) ensure that subprojects are successfully prepared and implemented, and (ii) facilitate effective and sustainable operation and maintenance of the project facilities. This section provides a summary of existing capacity, current weaknesses, and how these will be overcome during project implementation.

### **A. Analysis of Technical, Financial, and Managerial Capacity**

2. **Capacity of the Executing Agency.** GMG has experience in implementing major international financial institutions funded projects, but has not previously been involved with Asian Development Bank projects. The project management office, with a core staff from the Water Resources Bureau, is well experienced in the execution of water sector projects of the types included in the Project, and has performed well during the project preparatory phase. GMG has already identified a series of subprojects to be implemented under the proposed Project and preparations of these are well advanced.

3. **Implementing Agency Capacity.** IAs have been assigned the responsibility for project preparation and implementation of individual subprojects by the relevant local governments. Most IAs are located at the district/county level of the Government, with actual infrastructure provision often at the township or village level. This characteristic of the Project has two significant implications. First, the Project includes a very large number of subprojects, and second, the majority of participating agencies have limited or no previous involvement with foreign-funded infrastructure projects, and certainly no substantive experience of Asian Development Bank requirements.

4. It is recognized that county level project management and professional skills capacity are significantly less than the level of capacity found in municipal and provincial level cities. A partial counterbalance to this lack of capacity is the fact that most of the subprojects are small-scale, and use well-proven approaches and technology, with which the IAs are already familiar. However, the need for significant capacity building during loan implementation is acknowledged.

### **B. Capacity Building Measures and Support to the Implementing Agencies**

5. Although technical capacity at the county level is weak, there is a strong presence of engineering institutes and construction supervision companies in the People's Republic of China (including Guiyang) with good technical capacity able to undertake project design, and safeguard owner interests in construction. These institutes and companies are licensed under accreditation systems designed and supervised by the Ministry of Water Resources for water conservancy projects and by the Ministry of Housing and Urban and Rural Construction for urban water supply projects. Environmental institutes and laboratories were able to prepare environmental impact assessments and monitor compliance, operating under a similar accreditation system under the auspices of the Ministry of Environmental Protection. Except for the small-scale water supply subprojects, IAs will make extensive use of bought-in expertise to design and construct the project facilities, and pass on significant responsibilities to these expert agencies.

6. Table A6 provides more detailed analysis of the capacity needed for the main project preparations and implementation activities, and of the support that will be provided to overcome existing gaps and weaknesses in capacity.

Table A6: Capacity Analysis of Executing Agency and Implementing Agencies

Project Stage (Phase)	Required Tasks	Responsible Agency	Required Capacity	Existing Capacity of Responsible Agency	Required Support for Responsible Agency
<b>A. Design</b>	Stakeholder participation and consultations	IA supported by Engineering Design Institute	Participatory approaches become institutionalized	Limited experience gained during PPTA by EA and core IAs	Ongoing support of national consultants
	Engineering FSR preparation	IA who will engage qualified Engineering Design Institute	Familiarity with PRC and ADB requirements	Design Institute have strong capacity based on PRC requirements, but less familiarity with ADB needs	During the PPTA, some transfer of knowledge on ADB needs was provided. Ongoing support of national consultants is desirable.
	Finance	IA who will engage a qualified Engineering Design Institute and/or qualified Accounting Institute	Ability to compute project FIRR IA analysis. Financial Management and affordability assessments.	FIRR is calculated as part of standard PRC procedures. Other aspects are not routinely carried out under PRC procedures.	During the PPTA, some transfer of knowledge on ADB needs was provided. Ongoing support of national consultants is desirable.
	Economics Benefit-cost analysis	IA who will engage a qualified Engineering Design Institute	Equivalent of Master's in Economics and experience in project analysis	Primarily focused on PRC procedures and not on the broader assessment required by ADB	During the PPTA, some transfer of knowledge on ADB needs was provided. Ongoing support of international and national consultants is necessary.
	Environment EIA preparation IEE preparation	IA who will engage a qualified institute licensed by Ministry of Environmental Protection	Familiarity with PRC requirements	Already adequate	None needed
	Resettlement RP preparation	IA who will make appropriate arrangements	Familiarity with PRC laws and ADB guidelines	Very limited, as formal RPs are not required under PRC regulations	Ongoing support of national consultants is required
	Ethnic minorities EMDP preparation	IA who will make appropriate arrangements	Familiarity with PRC laws and ADB guidelines	Very limited, as formal EMDPs are not required under PRC regulations	Ongoing support of national consultants is required
<b>B. Evaluation</b>	Engineering	PMO supported by an independent expert review institute	Familiarity with PRC and ADB Requirements	Full familiarity with PRC requirements. PMO has been involved in designing the evaluation criteria.	None needed
	Finance	PMO supported by an independent expert review institute	As for design phase	As for design phase	Support of national consultants is necessary

<b>Project Stage (Phase)</b>	<b>Required Tasks</b>	<b>Responsible Agency</b>	<b>Required Capacity</b>	<b>Existing Capacity of Responsible Agency</b>	<b>Required Support for Responsible Agency</b>
	Economics Benefit–cost analysis	PMO supported by an independent expert review institute	Equivalent of Master's in economics and experience in project analysis	As for design phase	Initial coaching by consultants, with follow-up support as required
	Environment EIA review IEE review	PMO/Guizhou EPB	Familiarity with PRC and ADB requirements	Full capacity to review both EIAs and IEEs based on PRC regulations	Consulting support to prepare SEIAs will be required
	Resettlement RP review	PMO supported by an independent expert reviewer	Familiarity with PRC laws and ADB guidelines Ability to interpret and apply the resettlement framework	Good awareness and familiarity with undertaking land acquisition and resettlement under PRC but not ADB procedures	Ongoing support of consultants is necessary
	Ethnic Minorities EMDP review	PMO supported by an independent expert review institute	Familiarity with PRC laws and ADB guidelines Ability to interpret and apply the ethnic minorities framework (supplementary appendix Y)	Good awareness and PRC ethnic minorities protection arrangements, but not ADB procedures	Ongoing support of consultants is necessary
<b>C. Construction</b>	Project Management Project coordination Disbursements PPMS Progress reporting Advice and support to IAs	PMO (with disbursements under the control of Guiyang Municipal Finance Bureau)	Familiarity of ADB requirements gained through previous ADB project implementation	Already largely exists, except for specifics of ADB requirements	Consulting services to provide assistance to set up reporting systems and the PPMS
	Land acquisition and resettlement	IAs	Familiarity with PRC laws and the approved RP	Good knowledge of PRC procedures, limited experience of monitoring and reporting	Loan consulting services to help set up internal monitoring and reporting procedures
	Detailed design	Qualified Engineering Design Institute	Familiarity with relevant PRC design standards	Already exists	None required
	Procurement <sup>a</sup>	Tendering company	Familiarity with PRC bidding law and ADB procurement guidelines	Already exists	None required
	Physical construction	Qualified contractors	Previous relevant experience	Already exists	None required

Project Stage (Phase)	Required Tasks	Responsible Agency	Required Capacity	Existing Capacity of Responsible Agency	Required Support for Responsible Agency
	Construction quality assurance	Construction Supervision Company	Must possess relevant PRC license	Already exists	Expert panel to be used for medium-sized dam construction
	Environmental monitoring	Local EPB and its designated environmental monitoring institute	PRC environmental monitoring certification	EPB capacity already exists, but IAs lack experience for internal monitoring and reporting	Loan consulting services to help set up internal monitoring and reporting procedures
	Resettlement monitoring	Independent monitoring agency	Familiarity with PRC laws and the approved RP	Already adequate	None—assuming suitably qualified institute is appointed
	Project audit	Qualified audit agency	Familiarity with ADB and PRC audit requirements	Already exists	None needed
<b>D. Management</b>	WTP and other asset commissioning	IAs	Previous experience	Already exists except for WTPs	Support of Construction Supervision Company
	WTP operations	IAs	Previous experience and technical skills	None at present	Training and knowledge transfer from other WTP
	WTP maintenance	IAs	Previous experience and technical skills	None at present	Training (including suppliers)
	Financial Management Financial reporting and control Effective income collection	IAs	Only limited involvement by IAs Income collection to be at least 90%	IAs' capacity okay for limited needs Collection rates in rural areas are a concern	Development of WUA to become involved in local O&M, including fee collection from users
	Environmental monitoring	As construction phase	As construction phase	As construction phase	To be dealt with during construction

ADB = Asian Development Bank, EA = executing agency, EIA = environmental impact assessment, EMDP = ethnic minorities development plan, EPB = Environmental Protection Bureau, FIRR = financial internal rate of return, FSR = feasibility study report, IA = implementing agency, IEE = initial environmental examination, O&M = operation and maintenance, PMO = project management office, PPMS = project performance management system, PPTA = project preparatory technical assistance, PRC = People's Republic of China, RP = resettlement plan, SEIA = summary environmental impact assessment, WUA = water users association, WTP = wastewater treatment plant.

<sup>a</sup> Procurement Capacity:

- (i) Public procurement in the PRC has to be carried out in accordance with the PRC bidding law, which stipulates the use of competitive procedures. The PMO is well familiar with these requirements and their practical application.
- (ii) Two training courses in ADB project implementation procedures (including procurement) were provided to the PMO and Guiyang Finance Bureau staff in 2005 and 2008. This training will be repeated and include an update to cover the latest ADB guidelines, and an extension to local county level IAs/PMOs.
- (iii) It is a normal practice for qualified design institutes to prepare technical specifications for all engineering related contracts, including for goods and equipment.
- (iv) For larger contracts, it is a normal practice to engage a professional tendering company to manage the procurement process on the project owners' behalf. The services normally include pre-qualification (where needed), preparation of commercial bidding documents, advice/supervision of contract evaluation, advice/supervision of contract negotiations, and in final contract preparation.

Source: Asian Development Bank.

## CANDIDATE SUBPROJECTS

Table A7.1: Reservoir Subprojects

No.	Segment/Project Name	District/ County/City	Storage Capacity (mm <sup>3</sup> )	Water Supply (1,000 m <sup>3</sup> /y)	LA (ha)	AP Nos.	Cost <sup>a</sup> (CNY million)
<b>A.</b>	<b>Urban Water Supply</b>		<b>20.85</b>	<b>40,022</b>	<b>180.30</b>	<b>267</b>	<b>489.48</b>
1.	Yudongxia Reservoir	Wudang	18.60	32,900	138.30	267	420.15
2.	Wenggang Reservoir	Huaxi	1.44	4,362	20.90		39.85
3.	Xiaolongtan Reservoir	Huaxi	0.81	2,760	21.10		29.48
<b>B.</b>	<b>Rural Water Supply and Irrigation</b>		<b>65.23</b>	<b>71,588</b>	<b>536.22</b>	<b>652</b>	<b>1,190.66</b>
<b>1.</b>	<b>County Water Supply</b>		<b>14.26</b>	<b>12,653</b>	<b>78.60</b>	<b>6</b>	<b>166.01</b>
a.	Jinlong Reservoir	Xiuwen	4.18	3,240	19.00		67.67
b.	Jiancaogou Reservoir	Xifeng	1.40	3,106	6.40	6	47.83
c.	Bai'an River Reservoir	Kaiyang	8.68	6,307	53.20		50.51
<b>2.</b>	<b>Township Water Supply</b>		<b>40.98</b>	<b>58,935</b>	<b>318.02</b>	<b>590</b>	<b>770.83</b>
a.	Limu Reservoir	Huaxi	3.14	3,830	18.60		58.62
b.	Jinjiaqing Reservoir	Wudang	1.01	380	16.70		27.10
c.	Baizhitian Reservoir	Wudang	0.85	340	7.70		19.43
d.	Chuandong Reservoir	Wudang	0.57	1,020	6.40		19.56
e.	Beilongzhai Reservoir	Qingzhen	0.76	263	8.20	25	27.09
f.	Hexi Reservoir	Qingzhen	1.35	1,086	10.70		43.80
g.	Gejiazhai Reservoir	Qingzhen	8.97	12,680	67.73	45	101.08
h.	Xiguan Reservoir	Qingzhen	4.83	8,610	51.90	418	105.13
i.	Machanghe Reservoir	Qingzhen	1.90	530	11.30		28.39
j.	Zhongqilin Reservoir	Qingzhen	1.14	738	5.30		48.49
k.	Shili Industrial Corridor	Xiuwen	1.14	2,810			25.60
l.	Liangchahe Reservoir	Xifeng	9.94	20,700	60.00	42	130.09
m.	Zhongba Reservoir	Xifeng	0.99	1,600	13.20	60	26.75
n.	Majiaqing Reservoir	Xifeng	0.19	183	4.13		7.25
o.	Gaodong Reservoir	Xifeng	0.47	803	3.90		30.74
p.	Maozhulin Reservoir	Kaiyang	1.09	121	11.70		23.90
q.	Shamulin Reservoir	Kaiyang	1.54	1,825	9.70		15.91
r.	Jianshang Reservoir	Kaiyang	0.22	752	3.70		6.96
s.	Zhanjiawan Reservoir	Kaiyang	0.53	465	5.00		11.75
t.	Yunwan Reservoir	Kaiyang	0.35	199	2.07		13.19
<b>3.</b>	<b>Irrigation, Human and Livestock Water Supply</b>		<b>9.99</b>		<b>139.60</b>	<b>56</b>	<b>253.82</b>
a.	Yunguan Reservoir	Nanming	0.21		3.10		10.52
b.	Pingshan Reservoir	Baiyun	0.20		2.73		9.25
c.	Guanyinshan Reservoir	Huaxi	0.21		6.30		10.15
d.	Daping Reservoir	Huaxi	0.67		5.07		12.93
e.	Longqing Reservoir	Wudang	0.63		9.20		13.71
f.	Daqing Reservoir	Wudang	0.52		4.90		10.10
g.	Xintao Reservoir	Wudang	0.36		4.30		12.35
h.	Damaixi Reservoir	Qingzhen	2.93		48.50	28	40.76
i.	Ciguchong Reservoir	Qingzhen	0.30		13.90		17.41
j.	Baixi Reservoir	Xiuwen	1.23		13.70	28	28.42
k.	Liubaishui Reservoir	Xiuwen	0.41		1.70		3.99
l.	Heying Reservoir	Xiuwen	0.46		2.30		9.34
m.	Hualang Reservoir	Xiuwen	0.47		6.70		17.72
n.	Chagou Reservoir	Xiuwen	0.35		4.90		9.28
o.	Dayan Reservoir	Xiuwen	0.19		3.90		11.54
p.	Lingjiawan Reservoir	Xiuwen	0.27		2.60		16.31
q.	Xinmin Reservoir	Xiuwen	0.13		2.30		4.95
r.	Qinggou Reservoir	Xiuwen	0.17		1.20		7.05
s.	Liaojiuzhai Reservoir	Xifeng	0.18		2.10		5.43
t.	Xiaoshangou Reservoir	Kaiyang	0.10		0.20		2.61

AP = affected person, ha = hectare, LA = land acquisition, mm<sup>3</sup> = million cubic meter.

<sup>a</sup> Based on project feasibility study reports and not the final subproject design.

Source: Asian Development Bank.

**Table A7.2: Irrigation System Rehabilitation Subprojects**

No.	Segment/Project Name	District/ County/ City	New Irrigation Area (ha)	Rehabilitation Area (ha)	No. of APs	Cost <sup>a</sup> (CYN million)
<b>Irrigation System Rehabilitation</b>			<b>2,022.81</b>	<b>11,003.05</b>	<b>276</b>	<b>319.46</b>
1.	Shatian Irrigation System	Baiyun	130.00	262.00	1	14.03
2.	Yanshan–Maijia Irrigation System	Baiyun		232.70	5	8.29
3.	Huaxi Irrigation System	Huaxi	33.30	606.70	9	18.94
4.	Wudang Midsize Irrigation System	Wudang	450.80	1,847.41	47	61.50
5.	Qingzhen Midsize Irrigation System	Qingzhen		3,078.50	15	56.80
6.	Xiuwen Midsize Irrigation System	Xiuwen	1,024.81	1,891.14	157	78.20
7.	Xifeng Midsize Irrigation System	Xifeng		635.90	19	15.50
8.	Wengjing	Kaiyang	333.30	1,897.50	19	52.00
9.	Yangchang	Kaiyang	50.60	551.20	4	14.20

AP = affected person, ha = hectare.

<sup>a</sup> Based on project feasibility study reports and not the final subproject design.

Source: Asian Development Bank.

**Table A7.3: Soil and Water Conservation Subprojects<sup>a</sup>**

No.	Segment/ Project Name	Soil Erosion Control Area (km <sup>2</sup> )	Cost (CNY million)	District/ County/ City	Soil Erosion Control Area (km <sup>2</sup> )	Cost <sup>b</sup> (CNY million)	Remark
<b>Soil and Water Conservation</b>		<b>800</b>	<b>268</b>		<b>800</b>	<b>268</b>	
1.	Upstream and Midstream of Nanming River Catchment	470	163	Huaxi Xiaohe Nanming Wudang	165 145 80 80	57 50 28 28	Focus on Songbaishan Huaxi, Aha, Chenliang River, Yuliang River, and Yudongxia reservoirs.
2.	Maotiao River Catchment	150	47	Qingzhen Wudang	120 30	37 10	Primary for Hongfeng Lake and Baihua Lake reservoirs
3.	Water Resource Areas of Three Northern Counties	180	58	Xiuwen Kaiyang Xifeng	63 56 61	20 19 19	Water resources for major townships

km<sup>2</sup> = square kilometer.

<sup>a</sup> Eight subprojects are proposed.

<sup>b</sup> Based on project feasibility study reports and not the final subproject design.

Source: Asian Development Bank.

**Table A7.4: Small Water Storage Structures Subprojects<sup>a</sup>**

No.	District/ County/City	Segment/ Project Name	Storage Capacity (1,000 m <sup>3</sup> )	New Irrigation Area (ha)	Benefited Population	Benefited Livestock	No. of Tanks	Cost <sup>b</sup> (CNY million)
<b>Small Water Storage</b>			<b>3,429</b>	<b>9,136.80</b>	<b>96,902</b>	<b>132,447</b>	<b>105,099</b>	<b>384.5</b>
1.	Huaxi	irrigation						
2.	Wudang	drinking	284	940.00			9,400	31.2
		irrigation	80		10,450	11,840	2,750	9.7
3.	Qingzhen	drinking	550	2,442.10			21,670	60.4
		irrigation	196		24,580	30,603	6,530	23.8
4.	Xiuwen	drinking	381	1,346.70			13,831	41.9
		irrigation	280		32,240	48,546	8,769	34.0
5.	Xifeng	drinking	122	408.00			2,760	13.4
		irrigation	36		4,632	5,458	1,200	4.4
6.	Kaiyang	drinking	1,287	4,000.00			29,704	140.1
		irrigation	213		25,000	36,000	8,485	25.6

ha = hectare, km<sup>2</sup> = square kilometer, LA = land acquisition, m<sup>3</sup> = cubic meter.

<sup>a</sup> Actual subproject scope will be based on the number of tanks needed by the village or a group of villages.

<sup>b</sup> Based on project feasibility study reports and not the final subproject design.

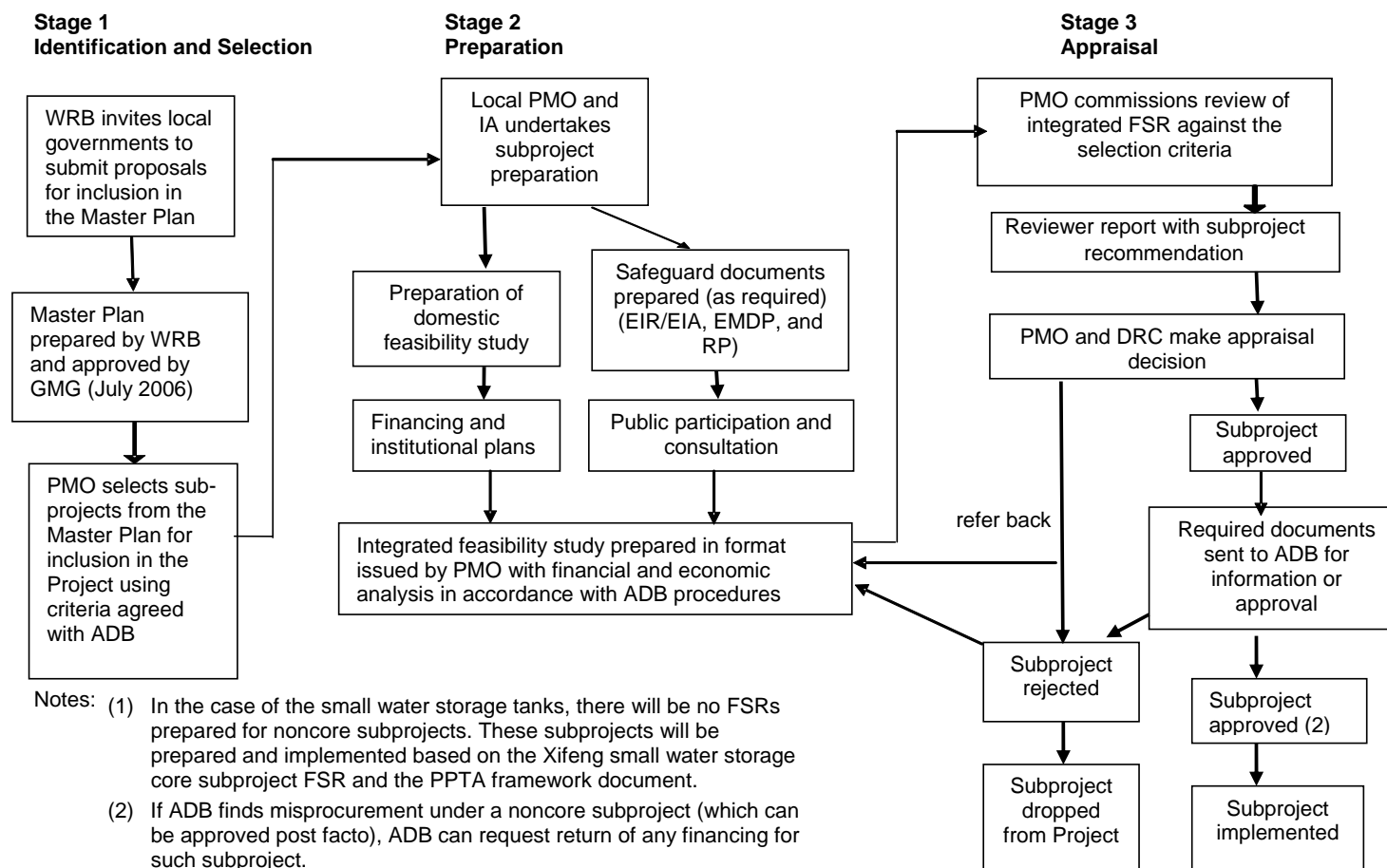
Source: Asian Development Bank.

### SUBPROJECT SELECTION CRITERIA AND PROCESS DIAGRAM

Item	Urban Water Supply, Rural Water Supply, and Irrigation	Irrigation System Rehabilitation	Soil and Water Conservation	Small Water Storage Structures
General	The subproject is included in the Master Plan and is consistent with the principles of integrated water resources management. There is evidence of community mobilization/empowerment to ensure effective design, implementation, and O&M of the subproject.			
Institutional	Demonstrated commitment to establish WUAs		Local government gives assurance on future O&M Agriculture support arrangement put in place where needed	Beneficiaries commit to provide cash or in-kind contributions (except where social exclusion support provisions apply)
	Water purchase agreement with WSC for urban supplies	Not applicable		
	Agriculture extension support arrangement put in place			
Economic viability	The subproject is shown to be economically viable using standard ADB economic methodology. This includes being shown to be a least-cost solution and that the subprojects' economic internal rate of return is greater than 10%.			Not needed—assumed based on core subproject appraisal
Tariffs and user charges	Charges for water use cover system O&M costs in all cases, and agreement is reached with local government to provide subsidy in cases where the tariff cannot be increased to cover costs.		Not applicable	
	Charges for urban water use meet full cost recovery, and agreement is reached with local government to provide subsidy in cases where the tariff cannot be increased to cover costs, and tariff concessions given for urban poor.	Not applicable		
Financial	Financial management capacity of IA and local finance bureau established			Not applicable
	Urban WSC is financially sustainable	IA and/or township government commits to fund O&M fully IA commits to fund WUA and agriculture extension support for 5 years		IA commits to fund cost of social exclusion
Technical	Domestic feasibility study prepared and approved Detailed design will be in accordance with relevant Ministry of Water Resources design standards and guidelines Construction supervision in accordance with Ministry of Water Resources standards and guidelines			Design and construction in accordance with local best practice
Social development and social safeguards	IA commits to follow the gender action plan in implementing the subproject Participatory approaches and consultations are part of subproject design, implementation, and O&M			
	EMDP prepared and approved by local government based on the EMDF where this is required			Implementation arrangements are in accordance with subproject FSR and framework documents. Village committee signs assurance that no socially disadvantaged household will be excluded.
Resettlement	RP prepared and approved where this is required based on ADB's <i>Involuntary Resettlement Policy</i> (1995) and resettlement framework guidelines			Not applicable
Environment	(i) All subprojects shall avoid areas with defined or known environmental sensitivities. (ii) Subprojects requiring environmental assessment must follow the procedures outlined in this report. (iii) Reservoir, small water storage, and irrigation subprojects shall avoid apparent pollution sources to minimize the risk of water contamination, and ensure safety of water supply. (iv) Subprojects shall be selected to maximize environmental benefits, and minimize adverse environmental impacts.			Not applicable

ADB = Asian Development Bank, EMDF = Ethnic Minorities Development Framework, EMDP = Ethnic Minorities Development Plan, FSR = feasibility study report, IA = implementing agency, O&M = operation and maintenance, RP = resettlement plan, WSC = water supply company, WUA = water users association.  
Source: Asian Development Bank.

**Figure A8: Process for Subproject Identification, Selection, Preparation, and Appraisal**





ADB = Asian Development Bank, DRC = Development and Reform Commission, EIA = environmental impact assessment, EIR = environmental impact report, EMDP = ethnic minorities development plan, FSR = feasibility study report, GMG = Guiyang municipal government, IA = implementing agency, PMO = project management office, PPTA = project preparatory technical assistance, RP = resettlement plan, WRB = Water Resources Bureau.

Source: Asian Development Bank.

### PROJECT IMPLEMENTATION SCHEDULE

Activity	2010	2011	2012	2013	2014	2015	2016
<b>Guiyang Integrated Water Resources Management</b>	[External Task Bar]						
<b>Yudongxia Water Supply Subproject</b>	[External Task Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning					[Progress Bar]		
<b>Jinlong Reservoir Subproject</b>	[External Task Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning				[Progress Bar]			
<b>Liaojuzhai Reservoir Subproject</b>	[External Task Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Acceptance and Commissioning				[Progress Bar]			
<b>Wudang Irrigation Rehabilitation Subproject</b>	[External Task Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning					[Progress Bar]		
<b>Huanxi Soil and Water Conservation Subproject</b>	[External Task Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Acceptance and Commissioning				[Progress Bar]			
<b>Xifeng Small Water Storage Tanks</b>	[External Task Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Commissioning				[Progress Bar]			
<b>First Batch Noncore Subprojects</b>	[External Task Bar]						
ADB and Domestic Review and Approval	[Progress Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning				[Progress Bar]			
<b>Second Batch Noncore Subprojects</b>	[External Task Bar]						
ADB and Domestic Review and Approval	[Progress Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning					[Progress Bar]		
<b>Third Batch Noncore Subprojects</b>	[External Task Bar]						
ADB and Domestic Review and Approval	[Progress Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning					[Progress Bar]		
<b>Fourth Batch Noncore Subprojects</b>	[External Task Bar]						
ADB and Domestic Review and Approval	[Progress Bar]						
Land Acquisition and Resettlement	[Progress Bar]						
Design and Bidding	[Progress Bar]						
Civil Works Construction	[Progress Bar]						
Equipment Procurement and Installation			[Progress Bar]				
Acceptance and Commissioning					[Progress Bar]		

Legend:  
 External Tasks  
 Progress

ADB = Asian Development Bank.  
 Source: Asian Development Bank.

## PROCUREMENT PLAN

<b>Project Name:</b> Guiyang Integrated Water Resources Management (Sector) Project <b>Loan Amount:</b> \$150 million <b>Date of this Procurement Plan:</b> 28 September 2009	<b>Loan</b>  <b>Executing Agency:</b> Guiyang Municipal Government
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### A. Process Thresholds, Review, and 18-Month Procurement Plan

#### 1. Project Procurement Thresholds

1. Except as the Asian Development Bank (ADB) may otherwise agree, the following process thresholds shall apply to procurement of goods and works.

<b>Procurement of Goods and Services</b>	
<b>Procurement Method</b>	<b>To be used above/below (\$)</b>
ICB Works	>= \$10,000,000
ICB Goods	>= \$1,000,000
NCB Works	< \$10,000,000 > \$200,000
NCB Goods	< \$1,000,000 > \$100,000
Shopping Works	<= \$200,000
Shopping Goods	<= \$100,000
<b>Exceptional Methods:</b>	Small civil works packages of \$100,000 equivalent or less, in subprojects involving (i) small water storage tanks, (ii) water and soil conservation, (iii) irrigation system rehabilitation, and (iv) small-scale reservoirs, may be carried on through CP in procurement and/or on a FA basis. The FA is proposed as these works are small and scattered in remote locations for which qualified construction firms are unlikely to bid at reasonable prices. The CP is a desirable method in these small subprojects to ensure sustainability and ownership of farmers and to achieve the Project's social benefits since CP can (i) call for the participation of local communities, and (ii) employ labor-intensive and other appropriate technologies.
CP and/or FA	The CP should be applied first so that it is only when CP would not be practical that FA would be considered as a last resort, particularly when the works are scattered in remote locations for which no local contractors express interest, and when no NGOs or community-based organizations can participate. ADB must be satisfied that the construction facilities are efficient and the executing agency and implementing agencies are capable of undertaking the works quickly and to the required quality, at reasonable cost.

CP = community participation, FA = force account, ICB = international competitive bidding, NCB = national competitive bidding.

#### 2. ADB Prior or Post Review

2. Except as ADB may otherwise agree, the following prior or post review requirements apply to the various procurement and consultant recruitment methods used for the Project.

<b>Procurement Method</b>	<b>Prior or Post</b>	<b>Comments</b>
<b>Procurement of Goods and Works</b>		
ICB Works	Prior	
ICB Goods	Prior	
NCB Works	Post	ADB's prior review and approval is required for the first NCB bidding documents for goods and for works.
NCB Goods	Post	
SP for Works	Post	
SP for Goods	Post	
CP and/or FA	Post	
<b>Recruitment of Consulting Services</b>		
QCBS	Prior	
Consultant Qualification Selection	Prior	

ADB = Asian Development Bank, CP = community participation, FA = force account, ICB = international competitive bidding, NCB = national competitive bidding, NGO = nongovernment organization, QCBS = quality and cost-based selection, SP = shopping.

### 3. Goods and Works Contracts Estimated to Cost More than \$1 Million under the Core Subprojects

3. The following table lists goods and works contracts for which procurement activity is either ongoing or expected to commence within the next 18 months.

Ref Contract	Description	Contract Value (\$'000) <sup>a</sup>	Procurement Method	Expected Date of Advertisement	Prior Review	Comments
<b>1.</b>	<b>Yudongxia Water Supply Subproject</b>					
1.1	Civil works					
1.1.1	Reservoir/Dam construction <sup>b</sup>	8,764.0	NCB	December 2009	yes	Yes, if it is the first NCB civil works
1.1.2	Curtain grouting (reservoir areas)	4,075.1	NCB	December 2009	no	
1.1.3	Sewage interception and collecting system	2,379.6	NCB	February 2010	no	
1.1.4	Water treatment plant construction <sup>c</sup>	3,806.5	NCB	February 2010	no	
1.1.5	Water delivery system	4,238.7	NCB	February 2010	no	
1.2	Goods					
1.2.1	Water treatment plant equipment	4,165.8	ICB	September 2010	yes	
1.2.2	Water delivery system pipes and other goods and their installation	4,766.0	ICB	September 2010	yes	
<b>2.</b>	<b>Jinlong Small-Scale Reservoir Subproject</b>					
2.1	Civil works					
2.1.1	Reservoir/Dam construction <sup>d</sup>	4,632.0	NCB	December 2009	no	
2.1.2	Canals, tunnel, pump station	2,500.0	NCB	December 2010	no	

ICB = international competitive bidding, NCB = national competitive bidding.

<sup>a</sup> \$1 = CNY6.85

<sup>b</sup> Includes dam, spillway, tunnel, buildings, water intake, temporary works, saddle dam, public facilities, dam observation equipment and its installation, electric equipment, river regime automatic forecast system, and survey and technical design.

<sup>c</sup> Includes tanks, buildings, temporary works, survey, and design.

<sup>d</sup> Includes dam, spillway, tunnel, buildings, water intake, temporary works, public facilities, dam observation equipment and its installation, electric equipment, river regime automatic forecast system, and survey and technical design

### 4. Consulting Services Contracts Estimated to Cost More than \$100,000

4. The following table lists consulting services contracts for which procurement activity is either ongoing or expected to commence within the next 18 months.

Ref Contract	Description	Contract Value (\$'000) <sup>a</sup>	Recruitment Method	Advertisement Date	International or National Assignment	Comments
1.	Project Implementation Consultants	2,512.7	QCBS (Quality-Cost 80:20)	March 2010	A team of international and national experts	

QCBS = quality and cost-based selection.

<sup>a</sup> \$1 = CNY6.85

### 5. Goods and Works Contracts Estimated to Cost Less Than \$1 Million and Consulting Services Less Than \$100,000 Under the Core Subprojects

5. The following table groups smaller-value goods, works, and consulting services contracts for which procurement activity is either ongoing or expected to commence within the next 18 months.

Ref Contr act	Description	Contract Value (\$'000) <sup>a</sup>	Procurement Method	Expected Date of Advertisement	Prior Review	Comments
<b>A.</b>	<b>Civil Works, Goods, and Related Services</b>					
<b>1.</b>	<b>Yudongxia Water Supply Subproject</b>					
1.1	Civil works					
1.1.1	Roads and access roads	833.3	NCB	December 2009	no	
1.2	Goods					
1.2.1	Reservoir metal structures <sup>b</sup>	292.0	NCB	March 2010	yes	Yes, if it is the first NCB goods
1.2.2	Reservoir mechanic and electric equipment	654.7	NCB	March 2010	no	
1.2.3	Vehicles	51.0	SP	March 2010	no	
<b>2.</b>	<b>Jinlong Small-Scale Reservoir Subproject</b>					
2.1	Goods—metal works, mechanic and electric equipment	249.0	NCB	March 2010	no	
<b>3.</b>	<b>Liaojiuzhai Small-Scale Reservoir Subproject</b>					
3.1	Civil works					
3.1.1	Reservoir/Dam construction <sup>c</sup>	289.5	NCB	December 2010	no	
3.1.2	Irrigation canals, inverted siphon, pump station	102.6	SP	December 2010	no	
<b>4.</b>	<b>Wudan Irrigation System Rehabilitation</b>					
4.1	Civil works					
4.1.1	Qiankanjing primary canal and Huanghuashao canals	242.6	NCB	March 2010	no	
4.1.2	Dongnong branch canals	47.4	SP	March 2010	no	
4.1.3	Lizi and Huangchenshan branch canals	121.7	SP	March 2010	no	
4.1.4	Wanpeng branch canals	92.1	SP	March 2010	no	
4.1.5	Sanjiangdagou primary and branch canals	111.5	SP	March 2010	no	
4.2	Goods—hydrological forecast equipment	20.0	SP	September 2010	no	
<b>5.</b>	<b>Huaxi Soil and Water Conservation<sup>d</sup></b>					
5.1	Civil works					
5.1.1	Slope water control works	240.5	NCB	April 2010	no	
5.1.2	Terrace works	69.8	SP	April 2010	no	
5.1.3	Trees and vegetation measures	228.4	NCB/SP	April 2010	no	
<b>6.</b>	<b>Xifeng Small Water Storage Tanks</b>					
6.1	Civil works	292.0	CP/FA	December 2009	no	about 250 tanks

CP = community participation, FA = force account, NCB = national competitive bidding, SP = shopping.

<sup>a</sup> \$1 = CNY6.85

<sup>b</sup> Includes gates, hoist, and other metal works and their installation.

<sup>c</sup> Includes dam, spillway, tunnel, buildings, water intake, temporary works, gates, public facilities, dam observation equipment and its installation, electric equipment, river regime automatic forecast system, and survey and technical design.

<sup>d</sup> Excluding beneficiary contributions.

## B. Indicative List of Packages Under the Noncore Subprojects

6. The following table groups goods, works, and consulting services contracts for all indicative noncore subprojects, which are subject to be further evaluated by ADB.

No.	Name of Subproject	Location	General Description	Est. Value (CNY'000)	Est. Value (\$'000)	Est. No. of Contracts	Procurement Method	Comments
<b>Reservoir Subprojects</b>								
<b>A. Urban Water Supply</b>								
1.	Wenggang Reservoir	Huaxi	Reservoir/Dam construction	7,380.0	1,077.4	1	NCB	
			Canal systems	11,345.2	1,656.2	1	NCB	
			Metal structures	2,720.0	397.1	1	NCB	
2.	Xiaolongtan Reservoir	Huaxi	Reservoir/Dam including metal structures	5,187.0	757.2	1	NCB	
			Canal systems	5,747.3	839.0	1	NCB	
			Reservoir metal structures	2,439.5	356.1	1	NCB	
<b>B. Rural Water Supply and Irrigation</b>								
<b>B1 County Water Supply</b>								
1.	Jianchaogou Reservoir	Xifeng	Reservoir/Dam	18,210.0	2,658.4	1	NCB	
			Works for treatment plant (including equipment)	11,620.5	1,696.4	1	NCB	
			Reservoir metal structures	1,470.0	214.6	1	NCB	
2.	Bai'an River Reservoir	Kaiyang	Reservoir/Dam	25,395.3	3,707.3	1	NCB	
			Metal structures	2,111.1	308.2	1	NCB	
<b>B2 Township Water Supply</b>								
1.	Limu Reservoir	Huaxi	Reservoir/Dam	20,778.3	3,033.3	1	NCB	
			Pipe system	14,412.0	2,103.9	1 to 2	NCB	
			Reservoir metal structures	1,152.8	168.3	1	NCB	
2.	Jinjiaqing Reservoir	Wudang	Reservoir/Dam	4,799.7	700.7	1	NCB	
			Reservoir metal structures	4,855.2	708.8	1 to 2	NCB	
			Water treatment plant	1,650.0	240.9	1	NCB	
3.	Baizhitian Reservoir	Wudang	Reservoir/Dam	6,362.5	928.8	1	NCB	
			Pipe system	2,161.7	315.6	1	NCB	
4.	Chuangdong Reservoir	Wudang	Reservoir/Dam	5,788.7	845.1	1	NCB	
			Pipe system	2,974.9	434.3	1	NCB	
5.	Beilongzhai Reservoir	Qingzhen	Reservoir/Dam and canal systems	5,953.3	869.1	1	NCB	
6.	Hexi Reservoir	Qingzhen	Reservoir/Dam	7,984.0	1165.5	1	NCB	
			Pipe system	6,163.9	899.8	1 to 2	NCB	
			Metal structures	3,885.5	567.2	1	NCB	
7.	Gejiazhai Reservoir	Qingzhen	Reservoir/Dam	31,750.9	4,635.2	1	NCB	
			Pipe system	5,247.6	766.1	1	NCB	
			Reservoir metal structures	6,085.0	888.3	1	NCB	
8.	Xiguan Reservoir	Qingzhen	Reservoir/Dam	27,803.9	4,058.9	1	NCB	
			Pipe system	13,273.3	1,937.7	1 to 2	NCB	
			Reservoir metal structures	19,375.1	2,828.5	1	ICB	
9.	Machanghe Reservoir	Qingzhen	Reservoir/Dam	6,900.0	1,007.3	1	NCB	
			Pipe system	11,674.9	1,704.4	1 to 2	NCB	
			Reservoir metal structures	1,579.9	230.6	1	NCB	
10.	Zhongqilin Reservoir	Qingzhen	Reservoir/Dam	25,459.6	3,716.7	1	NCB	
			Pipe system	7958.4	1,107.9	1 to 2	NCB	
11.	Shili Industrial Corridor	Xiuwen	Reservoir/Dam and canal	7,535.0	1,100.0	1 to 2	NCB	

No.	Name of Subproject	Location	General Description	Est. Value (CNY'000)	Est. Value (\$'000)	Est. No. of Contracts	Procurement Method	Comments
			systems					
			Water treatment plant	9,065.0	1,323.4	1 to 2	NCB	
12.	Liangchahe Reservoir	Xifeng	Reservoir/Dam	54,411.1	7,943.2	1	NCB	
			Pipe system	1,810.2	264.3	1	NCB	
			Reservoir metal structures	6,742	984.2	1	NCB	
13.	Zhongba Reservoir	Xifeng	Reservoir/Dam	5,934.6	866.4	1	NCB	
			Pipe system	3,576.2	522.1	1	NCB	
14.	Majiaqing Reservoir	Xifeng	Reservoir/Dam	2,784.2	406.5	1	NCB	
15.	Gaodong Reservoir	Xifeng	Reservoir/Dam	20,379.7	2,975.1	1	NCB	
			Pipe system	1,038.6	151.6	1	NCB	
16.	Maozhulin Reservoir	Kaiyang	Reservoir/Dam	8,849.0	1,291.8	1	NCB	
			Pipe system	3,941.8	575.4	1	NCB	
17.	Shamulin Reservoir	Kaiyang	Reservoir/Dam	6,899.7	1,007.3	1	NCB	
			and pipe systems					
18.	Jianshang Reservoir	Kaiyang	Reservoir/Dam and pipe system	3,517.3	513.5	1	NCB	
19.	Zhanjiawan Reservoir	Kaiyang	Reservoir/Dam and pipe system	5,692.7	831.1	1	NCB	
20.	Yunwan Reservoir	Xiuwen	Reservoir/Dam	7,700.2	1,124.1	1	NCB	
			Pipe system	2,075.3	303.0	1	NCB	
B3	Irrigation, Human, and Livestock Water Supply							
1.	Yunguan Reservoir	Nanming	Reservoir/Dam	5,205.1	759.9	1	NCB	
			Pipe system	5,314.9	775.9	1	NCB	
2.	Pingshan Reservoir	Baiyun	Reservoir/Dam	4,582.5	669.0	1	NCB	
			Pipe system					
3.	Guanyinshan Reservoir	Huaxi	Reservoir/Dam	3,460	505.1	1	NCB	
			Metal structures	1,440.0	210.2	1	NCB	
4.	Daping Reservoir	Huaxi	Metal structures	1,749.5	255.4	1	NCB	
			Reservoir/Dam	4,988.2	728.2	1	NCB	
5.	Longqing Reservoir	Wudang	Pipe system	2,230.9	325.7	1	NCB	
			Reservoir/Dam	3,543.6	517.3	1	NCB	
			Metal structures	1,364.1	199.1	1	NCB	
6.	Daqing Reservoir	Wudang	Pipe system	1,355.6	197.9	1	NCB	
			Reservoir/Dam	3,795.1	554.0	1	NCB	
7.	Xintao Reservoir	Wudang	Pipe system and Reservoir/Dam	6,247.0	912.0	1	NCB	
8.	Damaixi Reservoir	Qingzhen	Pipe system and Reservoir/Dam	24,290.0	3,546.0	1	NCB	
9.	Ciguchong Reservoir	Qingzhen	Pipe system	2,546.4	371.7	1	NCB	
			Reservoir/Dam	6,964.6	1,016.7	1	NCB	
10.	Baixi Reservoir	Xiuwen	Pipe system and Reservoir/Dam	8,990.1	1,312.4	1	NCB	
11.	Liubaishui Reservoir	Xiuwen	Pipe system	565.3	82.5	1	NCB/SP	
			Reservoir/Dam	1,422.8	207.7	1	NCB	
12.	Heying Reservoir	Xiuwen	Pipe system and Reservoir/Dam	9,340.0	1,363.5	1	NCB	
13.	Hualang Reservoir	Xiuwen	Pipe system					
			Reservoir/Dam	17,720.0	2,586.9	1	NCB	
14.	Chagou Reservoir	Xiuwen	Pipe system	1,364.4	199.2	1	NCB	
			Reservoir/Dam	2,658.2	388.1	1	NCB	
15.	Dayan Reservoir	Xiuwen	Pipe system	2,429.5	354.7	1	NCB	
			Reservoir/Dam	3,754.6	548.1	1	SP	
16.	Linjiawan Reservoir	Xiuwen	Pipe system	3,305.6	482.6	1	NCB	
			Reservoir/Dam	6,171.5	900.9	1	NCB	
17.	Xinmin Reservoir	Xiuwen	Pipe system and Reservoir/Dam	1,813.1	264.7	1	NCB	
18.	Qinggou Reservoir	Xiuwen	Pipe system and Reservoir/Dam	3,596.2	525.0	1	SP	

No.	Name of Subproject	Location	General Description	Est. Value (CNY'000)	Est. Value (\$'000)	Est. No. of Contracts	Procurement Method	Comments
19.	Xiaoshangou Reservoir	Kaiyang	Pipe system and Reservoir/Dam	1,731.9	252.8	1	NCB	
<b>C. Irrigation System Rehabilitation</b>								
1.	Shatian Irrigation	Baiyun	Civil works	9,570.0	1,397.1	various	NCB/SP/CP/FA	CP/FA may be used for small works of less than \$100,000
2.	Yanshan–Maijia Irrigation System	Baiyun	Civil works	5,130.0	748.9	various	NCB/SP/CP/FA	
3.	Huaxi Irrigation System	Huaxi	Civil works	12,420.0	1,813.1	various	NCB/SP/CP/FA	
4.	Qingzhen Midsize Irrigation System	Qingzhen	Civil works	42,230.0	6,165.0	various	NCB/SP/CP/FA	
5.	Xiuwen Midsize Irrigation System	Xiuwen	Metal structures Civil works	2,410.0 78,190.0	351.8 11,414.6	1 various	SP NCB/SP/CP/FA	
6.	Xifeng Irrigation System	Xifeng	Civil works	9,940.0	1,451.1	various	NCB/SP/CP/FA	
7.	Wengjing Irrigation System	Kaiyang	Civil works	52,010.0	7,592.7	various	NCB/SP/CP/FA	
8.	Yangchang Irrigation System	Kaiyang	Civil works	9,880.0	1,442.3	various	NCB/SP/CP/FA	
9.	Qiankanqing Irrigation System	Wudang	Civil works	4,110.0	600.0	various	NCB/SP/CP/FA	
10.	Wudang Midsize Irrigation System	Wudang	Civil works	32,120.0	4,689.1	various	NCB/SP/CP/FA	
			Metal structures	1,310.0	191.2	1	SP	
<b>D. Soil and Water Conservation</b>								
1.	Upstream and Midstream of Nanming River Catchment		Civil works	159,400.0	23,270.1	various	NCB/SP/CP/FA	CP/FA may be used for small works of less than \$100,000
2.	Maotiao River Catchment	Qingzhen	Civil works	36,710.0	5,359.1	various	NCB/SP/CP/FA	
		Wudang	Civil works	9,730.0	1,420.4	various	NCB/SP/CP/FA	
3.	Water Resource Areas of Three Northern Counties	Xiuwen	Civil works	19,900.0	2,905.1	various	NCB/SP/CP/FA	
		Kaiyang	Civil works	19,540.0	2,852.6	various	NCB/SP/CP/FA	
		Xifeng	Civil works	19,530.0	2,851.1	various	NCB/SP/CP/FA	
<b>E. Small Water Storage Tanks</b>								
1.	Xifeng		Civil works	15,790.0	2,305.1	various	CP/FA/SP	(i) Various small packages each costing \$100,000 or less.
2.	Wudang		Civil works	40,920.0	5,973.7	various	CP/FA/SP	(ii) Materials may be included in civil works packages.
3.	Qingzhen		Civil works	84,240.0	12,297.8	various	CP/FA/SP	
4.	Xiuwen		Civil works	75,870.0	11,075.9	various	CP/FA/SP	
5.	Kaiyang		Civil works	165,740.0	24,195.6	various	CP/FA/SP	
<b>F. Management System</b>								
1.	Civil Works							
1.1	Integrated Management Center			18,000.0	2,627.7	1	National accepted procedures	Non-ADB Financing
2.	Goods							
2.1	Office and Management Equipment			3,500.0	510.9	1 to 2	NCB/SP	
2.2	Water Quality Monitoring Equipment			6,500.0	948.9	1 to 2	NCB/SP	

No.	Name of Subproject	Location	General Description	Est. Value (CNY'000)	Est. Value (\$'000)	Est. No. of Contracts	Procurement Method	Comments
2.3	Information Collection System			24,000.0	3,503.6	3 to 4	ICB/NCB	
2.4	Information Transmission System			3,200.0	467.2	1 to 2	NCB/SP	
2.5	Network System			4,000.0	583.9	1 to 2	NCB/SP	
2.6	Automatic Control System			3,800.0	554.7	1 to 2	NCB/SP	
2.7	Software			3,700.0	540.1	1 to 2	NCB/SP	
2.8	Equipment for 46 Water Users Associations				620.0	7	NCB/SP	
3.	Consulting Services							
3.1	Training and Capacity Building				1,100.0	2 to 3	QCBS	
3.2	Design, Survey, Monitoring, and Engineering Supervision		Use national accepted procedures					Non-ADB financing, about 10% of the total base costs

ADB = Asian Development Bank, CP = community participation, FA = force account, ICB = international competitive bidding, NCB = national competitive bidding, NGO = nongovernment organization, QCBS = quality and cost-based selection, SP = shopping.

Source: Asian Development Bank.

### C. National Competitive Bidding

7. The Borrower's Law of Tendering and Bidding of the People's Republic of China promulgated by Order No. 21 of the President of the People's Republic of China on 30 August 1999, is subject to the following clarifications required for compliance with the guidelines:

- (i) All invitations to prequalify or to bid shall be advertised in the national press, or official gazette, or a free and open access website in the Borrower's country. Such advertisement shall be made in sufficient time for prospective bidders to obtain prequalification or bidding documents and prepare and submit their responses. In any event, a minimum preparation period of 30 days shall be given. The preparation period shall count (a) from the date of advertisement, or (b) when the documents are available for issue, whichever date is later. The advertisement and the prequalification and bidding documents shall specify the deadline for such submission.
- (ii) Qualification requirements of bidders and the method of evaluating the qualification of each bidder shall be specified in detail in the bidding documents, and in the prequalification documents if the bidding is preceded by a prequalification process.
- (iii) If bidding is preceded by a prequalification process, all bidders that meet the qualification criteria set out in the prequalification document shall be allowed to bid and there shall be no limit on the number of prequalified bidders.
- (iv) All bidders shall be required to provide a performance security in an amount sufficient to protect the Borrower/Project Executing Agency in case of breach of contract by the contractor, and the bidding documents shall specify the required form and amount of such performance security.
- (v) Bidders shall be allowed to submit bids by mail or by hand.
- (vi) All bids shall be opened in public; all bidders shall be afforded an opportunity to be present (either in person or through their representatives) at the time of bid opening, but bidders shall not be required to be present at the bid opening.
- (vii) All bid evaluation criteria shall be disclosed in the bidding documents and quantified in monetary terms or expressed in the form of pass/fail requirements.

- (viii) No bid may be rejected solely on the basis that the bid price falls outside any standard contract estimate, or margin or bracket of average bids established by the Borrower/Project Executing Agency.
- (ix) Each contract shall be awarded to the lowest evaluated responsive bidder, that is, the bidder who meets the appropriate standards of capability and resources and whose bid has been determined (a) to be substantially responsive to the bidding documents, and (b) to offer the lowest evaluated cost. The winning bidder shall not be required, as a condition of award, to undertake responsibilities for work not stipulated in the bidding documents or otherwise to modify the bid as originally submitted.
- (x) Each contract financed with the proceeds of the Loan shall provide that the suppliers and contractors shall permit ADB, at its request, to inspect their accounts and records relating to the performance of the contract and to have said accounts and records audited by auditors appointed by ADB.
- (xi) Government-owned enterprises in the Borrower's country may be permitted to bid if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law, and (c) are not a dependent agency of the Borrower/Project Executing Agency.
- (xii) Re-bidding shall not be allowed solely because the number of bids is less than three.

## SUMMARY ENVIRONMENTAL ASSESSMENT FRAMEWORK

### A. Introduction

1. The summary environmental assessment framework summarizes the environmental assessment and review procedures that will be applied under the Guiyang Integrated Water Resources Management Project to ensure that noncore subprojects comply with the requirements of the *Environment Policy* (2002) of the Asian Development Bank (ADB), as well as corresponding requirements of the People's Republic of China (PRC), Guizhou provincial government, and Guiyang municipal government during implementation. The full environmental assessment and review procedures are in Supplementary Appendix H.

### B. Environment Categorization

#### 1. Country Environmental System Categorization<sup>1</sup>

2. Following the PRC regulations, the Project was approved by the Ministry of Environmental Protection<sup>2</sup> on 20 January 2009. As part of the submitted documents, a general and five subprojects environmental assessment reports were submitted. The Yudongxia reservoir core subproject, a medium-sized reservoir<sup>3</sup> with future water storage capacity of 18.6 million cubic meters (m<sup>3</sup>) is classified category A and a full environmental impact assessment (EIA) report has been prepared. Following the Government's environmental categorization criteria, all other subprojects involving construction of smaller reservoirs, irrigation system rehabilitation, and soil conservation subprojects, regardless of their contents and locations, have been classified category B. Environmental impact reports (EIRs) for each category B subproject were prepared. The Guizhou Environmental Protection Bureau (EPB) and/or Guiyang municipality EPB were granted authority by the Ministry of Environmental Protection to review and approve the category B subprojects. For the small water storage structure component of the Project, because of the small scale and insignificant environmental impacts, environment category C is applied.

#### 2. ADB Environment Categorization

3. For ADB's environmental assessment purposes, the Project has been classified category A. The Project will be implemented under a sector loan modality, and six core subprojects have been prepared to ADB standards. Three EIAs for core reservoir subprojects and three initial environmental examinations (IEEs) for the other core subprojects were completed. These have been summarized in one summary environmental impact assessment (SEIA) and one summary initial environmental examination (SIEE), reviewed by ADB environmental specialists, and posted on the ADB website.

4. ADB does not have a formal policy on environmental categorization of dams and reservoir projects, but its historical practice is to assign environmental category A to reservoir projects that involve the construction of a dam higher than 15 meters or a reservoir capacity greater than 3 million m<sup>3</sup>. This follows the International Congress on Large Dams and the World Commission on Dams, and their worldwide categorization of large reservoirs based on technical design and dam safety considerations.

<sup>1</sup> In accordance with the Environmental Protection Categorization Directory of Construction Projects (State Environmental Protection Administration, 1 March 2003), three categories are classified based on degrees of project impacts on the environment: (i) category A: projects with potential for significant adverse environmental impacts, (ii) category B: projects with some lesser adverse environmental impacts, and (iii) category C: projects unlikely to have adverse environmental impacts.

<sup>2</sup> Formerly State Environmental Protection Administration.

<sup>3</sup> The PRC classifies reservoirs into four categories: (i) large-sized reservoir: water storage capacity > 100 million m<sup>3</sup>, (ii) medium-sized reservoir: water storage capacity ranging from 10 million m<sup>3</sup> to 100 million m<sup>3</sup>, (iii) small type I reservoir: water storage capacity from 1 million m<sup>3</sup> to 10 million m<sup>3</sup>, and (iv) small type II reservoir: water storage capacity from 100,000 m<sup>3</sup> to 1 million m<sup>3</sup>. The PRC EIA system classifies large- and medium-sized reservoirs category A projects.

### 3. Alignment of ADB and Country System Environment Categorizations

5. There are differences in environmental categorization of reservoir subprojects between ADB and the PRC country system. ADB pays more attention to the dam safety by emphasizing the dam height while the PRC country system focuses more on reservoir capacity. The dam safety is addressed separately in the PRC system. In conjunction with an independent dam panel's review of technical and dam safety, the Project introduces a practical categorization approach for reservoir subprojects based on their environmental effects (i.e., impacts of downstream flows, groundwater, protected areas, etc.) rather than their physical characteristics, particularly dam height and reservoir volume. These principles were jointly developed by ADB, the Executing Agency, and EPB, and based on the results of focus group meetings with local stakeholders (e.g., farmers' union, women's union, and local government).

6. These principles will be upheld through a transparent and inclusive environmental screening process for each subproject. Every reservoir subproject will, in accordance with ADB's *Environment Policy*, be subject to an environmental screening process by an independent stakeholder panel, in conjunction with an independent dam panel's review of technical and dam safety considerations. The independent stakeholder panel will comprise environmental experts of at least the Water Resources Bureau, EPB, and the Land Resources Bureau. The expert screening will determine whether significant environmental impacts warrant a full EIA. English translations of screening results will be sent to ADB for review and comments prior to finalizing subproject categorization. The environmental screening results will also be used to prepare the terms of reference for the environmental assessment. The detailed description is in Supplementary Appendix H.

## C. Environmental Assessment of Subprojects

### 4. Responsibilities and Procedure for Environmental Assessment

7. With the exception of the small water storage structures component, an EIR or EIA will be prepared for each noncore subproject during project implementation. The EIR or EIA will include an environmental management plan (EMP) with mitigation measures and financial sources as prerequisites for approval. A monitoring and enforcement program will be developed to ensure that none of the project components has any major adverse environmental impacts. Public consultation will be conducted through interviews, meetings, or surveys as part of subproject environmental assessment, based on the PRC public involvement procedures and guidelines. The results will be documented and reflected in the EIR or EIA. A qualified environmental consultant with experience in ADB environmental policy will be recruited to assist the project management office (PMO) to review the EIRs and EIAs prepared for all noncore subprojects by the local certified agency.

8. For the small water storage structures component of the Project, all subprojects under this component will be classified category C. Neither EIAs nor IEEs (or EIRs) will be required but the subprojects' contents, locations, surrounding environments, and other subproject features will be reviewed by the PMO with the assistance of a qualified environmental specialist to ensure that impacts, if any, will be within the acceptable levels. Mitigation measures, where needed, will be incorporated into the subproject engineering design. The PMO will submit a simple environmental review recommendation (in English) for each subproject<sup>4</sup> to ADB for record, 2 weeks before contract award or implementation agreement approval, as appropriate.

9. The PMO will submit a summary of the EIR in English for nine subprojects on rehabilitation and upgrading of irrigation schemes, and eight subprojects on soil conservation

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<sup>4</sup> Defined as a package of small water structures needed to address the requirements of a village or group of villages.

and protection of water resources to ADB for endorsement on a no-objection basis 4 weeks before contract award.

10. For the 43 noncore subprojects involving construction of small reservoirs for rural water supply and irrigation, either EIRs or EIAs will be conducted, depending on environmental categorization as noted above (para 6).

- (i) EIRs will be prepared following ADB's guidelines on the preparation of IEEs. The PMO (assisted by the environmental consultant) will review the findings, depth of assessment, and mitigation and management plans, as well as report quality. If it is satisfied that these meet the relevant ADB requirements, and is also supported by the subproject report of the independent dam safety review panel, an SIEE for each subproject will be prepared (in English), and submitted to ADB for review 6 weeks before subproject implementation and contract award. In cases of identified significant impacts or where a subproject category might be changed to category A, ADB will notify the PMO of its concerns and requirements within 3 weeks of the SIEE submission. If there are particular issues raised or identified in the process of preparing the EIR and technical assessment of dam safety, (e.g., subprojects, while small in scale, are located in or near environmentally or socially sensitive areas, or concerns of dam safety are raised), the subprojects would be upgraded to category A, and all the procedures and requirements needed for category A subprojects will be triggered.
- (ii) EIAs will be prepared in accordance with ADB policies and guidelines. The SEIA in English will be submitted to ADB for review and approval 5 months before subproject implementation. Each SEIA needs to be posted on the ADB website for 120 days, as well as in the local language, and there needs to be a second public consultation after the SEIA has been posted. ADB will review and comment on the SEIA within 2 weeks of its submission, and approve it after all comments from ADB and the public are appropriately taken into consideration.

11. Submission of English translations of EIRs and EIAs for noncore subprojects will not be a standard requirement. However, (i) ADB will reserve the right to require English translation of EIAs or EIRs, if any noncore subproject is deemed highly sensitive by ADB; and (ii) a copy of the Chinese language of EIAs and EIRs will be submitted to ADB for record, together with the English language version of the SEIA, summary environmental impact report, or SIEE.

12. ADB's East Asia Department will review and approve the SEIA and/or SIEE in consultation with the Regional and Sustainable Development Department. To mitigate any potential adverse impacts, identified environmental measures will be incorporated into the subproject design. The Guizhou EPB and its subordinate offices at the municipal, county, and township levels will monitor environmental mitigation measures as detailed in the EMPs for various components. The PMO will also be provided additional expertise for regular environmental supervision, monitoring, and reporting during project implementation, and a composite SIEE for all category B subprojects. IEEs prepared at the end of each 6-month period will be prepared (in English) and submitted as part of the required 6-month environmental reports.

## **5. Environmental Criteria for Subproject Selection**

13. To implement environmental considerations across all subprojects, the following environmental criteria have been discussed and agreed with the Guiyang municipal government: (i) all subprojects shall avoid areas with defined or known environmental sensitivities; (ii) subprojects requiring environmental assessment must follow the procedures outlined in this report; (iii) reservoir, small water storage, and irrigation subprojects shall avoid apparent pollution sources to minimize the risk of water contamination, and ensure

safety of water supply; and (iv) subprojects shall be selected to maximize environmental benefits and minimize adverse environmental impacts.

14. The underlying limestone geology of the entire Guiyang region is fractured and tilted, and reservoir leakage is typically found in the karst formation. Consequently, environmental assessments for reservoir subprojects must include a review of the engineering and construction techniques such as grout curtains, etc., to avoid or minimize reservoir leakage, raising water tables, and water logging. In addition, reservoir subprojects will consider ecological water demand with appropriate project design in the allocation of water resources, and allow a minimum 10% ecological or in-stream water. Necessary mitigation measures will be considered to minimize downstream impacts due to the imbalance of ecological water caused by the subprojects.

15. Besides site screening and initial site investigation, one of the effective measures to meet the criteria described above is to identify and conduct an analysis of alternatives. Where possible and appropriate, noncore subprojects, multiple/alternative sites, designs, and/or scales shall be identified and evaluated during subproject identification and evaluation, to allow the selection of optimal or least-impact alternatives. PMO staff, assisted by qualified consultant environmental specialists and institutions working closely with the project planners and engineers throughout the project identification and preparation stages, will provide the needed input to ensure that environmental considerations will be included in the decision-making process.

#### **B. Staffing Requirements and Budget**

16. Within the PMO, a Social, Environmental, and Resettlement Management Division has been established under the Project, and an engineer with environmental management background will be assigned to coordinate and manage the environmental performance of the project implementation. His or her responsibilities will be to ensure compliance with project regulations, review reports, supervise, and coordinate EMP implementation; and recruit and guide external independent monitoring.

17. The PMO and ADB have agreed that an environmental management regulation for project construction will provide the legal basis for the overall environmental management of the Project. The environmental management regulation for project construction will be developed by the Social, Environmental, and Resettlement Management Division of the PMO. It will address the common environmental management and mitigation requirements and issues of all subprojects, which will include, but not be limited to, a summary of (i) the mitigation measures presented in the EIA/EIR, (ii) the project EMP, (iii) the applicable PRC environmental regulation and standards presented in the EMP, and (iv) the requirements for incorporation of environmental considerations into subproject construction tendering documents and contracts.

18. To ensure EMP implementation, the PMO will adopt the environmental supervision engineer mechanism to supervise the contractors' environmental performance and with government counterpart financing, employ a third-party or external environmental monitor to monitor the key environmental parameters in the affected areas regularly.

19. A competent environmental specialist (national consultant, 18 person-months) with rich experience in environmental policy and related ADB requirements, will be recruited during project implementation to assist the PMO to (i) conduct environmental screening of reservoir subprojects, (ii) review EIRs prepared by the local certified agency for all noncore subprojects involving the construction of reservoirs, (iii) prepare SEIA and/or SIEE and/or summary environmental impact report in English for each noncore subproject, (iv) provide guidance to the PMO and subproject implementing agencies to ensure the effective implementation of EMPs for all components or subprojects funded under the Project, and (v) provide training.

## SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

Country/Project Title: People's Republic of China/Guiyang Integrated Water Resources Management (Sector) Project
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Lending/Financing  
Modality:

Sector

Department/  
Division:

East Asia Department/  
Agriculture, Environment, and Natural Resources  
Division

### I. POVERTY ANALYSIS AND STRATEGY

#### A. Link to the National Poverty Reduction Strategy and Country Partnership Strategy

The Project is a key part of the Guiyang municipal government's efforts to reduce poverty during the 11th Five-Year Plan, including completing the provision of domestic water to all urban and rural households (including all ethnic minority households), and increasing irrigated agriculture area per household. Integrated improvements in water resources infrastructure and management will reduce non-income poverty caused by lack of reliable water and increase incomes from agriculture and industry, raising the productivity of labor, water, and land resources, while strengthening capacity to assure environmental water flows.

#### B. Poverty Analysis

**Targeting Classification:** General intervention

##### 1. Key Issues

Guizhou Province is one of the poorest provinces in the People's Republic of China (PRC), with the second lowest rural income, and the lowest level of urban income of any province. The Project will provide water supply to enhance industrial and agricultural production activities in some of the poorest and most underserved rural and urban areas of Guiyang Municipality. About 25% of the rural population lives below the poverty line (CNY1,200 per capita per year). The proposed Project would cover 71 towns/townships out of the total 77 towns/townships in the Guiyang Municipality, including 18 "poverty" towns/townships designated by Guizhou Province, five of which are designated class A "poverty" towns/townships with average annual income of less than CNY785 per person.

Guiyang's steep limestone terrain means that rainfall rapidly runs off into deeply entrenched rivers or infiltrates the ground. For many months of the year, there is little rain. Most springs and streams only flow intermittently. Urban groundwater is already overexploited and polluted, and rural groundwater resources are mostly limited, unreliable, or inaccessible. Water is not easily available for use unless intercepted, stored, and delivered to where it is needed.

In Guiyang Municipality, about 430,000 people, primarily in rural areas, lack satisfactory domestic water supplies, with the burden of water collection falling mainly on women. Irrigated land is very limited, and lack of reliable irrigation limits potential for changing to more profitable cropping patterns. Future industrial investment and employment opportunities in cities and towns depend on the availability of improved water supplies.

##### 2. Design Features

Data on poverty and ethnic minorities will be considered in the prioritization of subprojects. Analysis of proposed changes in water tariffs includes recommendations about appropriate adjustments in the minimum livelihood program payments to support affordability of water for poor households. Community management of tertiary irrigation development and small water tank construction will encourage special consideration for households constrained by poverty and limited labor resources. Improvements in water supply and irrigation management will help to secure reliable, accountable delivery of services, including arrangements for communication and participation in decision making.

### II. SOCIAL ANALYSIS AND STRATEGY

#### A. Findings of Social Analysis

Guizhou Province is one of the poorest provinces in the PRC, with the second lowest rural income and the lowest level of urban income of any province. In 2008, about 4.6% of the municipality's urban population and about 3.9% of the municipality's rural population lived under the municipality's absolute poverty line for urban and rural areas, respectively, and received conditional support from the Government. The rural population considered being income-vulnerable and living at less than CNY1,200 per person per year was estimated at 25%. The Project covers 71 towns and townships out of the total 77 towns and townships in the Guiyang Municipality, including 18 "poverty" towns/townships designated by Guizhou Province, five of which are designated class A "poverty" towns/townships with an average annual income of less than CNY785 per person. The Project has specific provisions to target women and ethnic minorities, considered particularly vulnerable. In Guiyang Municipality, about 430,000 people, primarily in rural areas, lack satisfactory domestic water supplies, with the burden of water collection falling mainly on women. The Project will provide rural households with opportunities to improve their agricultural income by increasing the surface of irrigated land, allowing them to change from low-yield crops and subsistence farming to higher-value crops. The Project will also reduce non-income poverty by providing reliable domestic water supply to households

## B. Consultation and Participation

1. Provide a summary of the consultation and participation process during the project preparation.

Primary stakeholders include rural and urban households using domestic water, irrigators, and water-using enterprises, as well as those affected by land acquisition and resettlement. Secondary stakeholders include village councils, and government units at township level and above, particularly water resources bureaus. The Project supports integrated water resources management (IWRM), which emphasizes involvement of stakeholders in improving governance and management of water resources.

Two rounds of public consultation roundtables were held during the preparation of feasibility studies reports (FSRs) for each subproject. For each subproject with irrigation, a further consultation will be held with irrigator representatives to participate in the preliminary and detailed design, form a water users association (WUA), and prepare for implementation of operation and maintenance where the WUA will have primary responsibility for irrigation management. Public consultation meetings and stakeholder panels will provide forums for participation in multipurpose reservoir management and river sub-basin planning. Where appropriate, community-managed modalities will be used for implementation of irrigation canal system (particularly tertiary canals) and small tank construction. The project preparatory technical assistance (TA)<sup>a</sup> conducted urban and rural household surveys and interviews, including key informant interviews and female and male focus group discussions.

2. What level of consultation and participation (C&P) is envisaged during the project implementation and monitoring?

Information sharing     Consultation     Collaborative decision making     Empowerment

3. Was a C&P plan prepared?  Yes     No

If a C&P plan was prepared, describe key features and resources provided to implement the plan (including budget, consultant input, etc.). If no, explain why.

The Project will support capacity development for public consultation and participatory planning targeting the project management office (PMO) and local communities in the subproject area. A participatory strategy for noncore subprojects has been developed (Supplementary Appendix K).

## C. Gender and Development

### 1. Key Issues

The Project focuses on improving water supply for domestic use and for irrigated agriculture (where women are playing an increasingly larger role because of higher male-out migration to the urban area). During the TA, interviews held with female and male focus groups confirmed priority needs for water, and showed interest and support from women and men in greater participation in water management. Public consultation roundtables included women, and showed the importance of a proactive approach to disseminating information, inviting local leaders, and selecting convenient locations. The Women's Federation will take part in project implementation through its involvement in the project leading group at the municipal and district/county levels, and ensure women's effective participation in the participatory consultation at the village levels. It will contribute to define implementation modalities for small water tanks using lessons from its Mother Water Tanks Project.<sup>b</sup>

2. **Key Actions.** Measures included in the design to promote gender equality and women's empowerment—access to and use of relevant services, resources, assets, or opportunities and participation in decision-making process:

Gender plan     Other actions/measures     No action/measure

Summarize key design features of the gender plan or other gender-related actions/measures, including performance targets, monitorable indicators, resource allocation, and implementation arrangements.

The Project will support the establishment of a Social, Environment, and Resettlement Management Division within PMO, with gender action plan expertise. After an extensive consultation with the All-China Women's Federation in Guiyang Municipality, the Project will adopt a target approach (30%) to women's participation in public consultations for noncore subprojects; women's membership/leadership within WUAs/water users group; women's access to training opportunities provided under the loans as well as employment opportunities in public works to be created by the Project. Gender-design features and related indicators/targets are included in the project-specific gender action plan (Appendix 13).

III. SOCIAL SAFEGUARD ISSUES AND OTHER SOCIAL RISKS			
Issue	Significant/Limited/ No Impact	Strategy to Address Issue	Plan or Other Measures Included in Design
<b>Involuntary Resettlement</b>	<b>Significant</b>	Some subprojects, especially reservoirs, will require resettlement, along with some land acquisition for canals and pipelines. One full and three short resettlement plans (RPs) were prepared for core subprojects, along with a resettlement framework with procedures for other subprojects. RPs will be prepared for all subprojects with resettlement impacts.	<input checked="" type="checkbox"/> Full Plan <input checked="" type="checkbox"/> Short Plan <input checked="" type="checkbox"/> Resettlement Framework <input type="checkbox"/> No Action
<b>Indigenous Peoples</b>	<b>Significant</b>	The municipality includes about 15% ethnic minority populations. An ethnic minorities development framework, and four ethnic minorities development plans (EMDPs) were prepared under the TA. EMDPs will be required for all subprojects with significant impacts on ethnic minority people, to ensure their full participation in benefits and mitigation of negative impacts.	<input checked="" type="checkbox"/> Plan <input type="checkbox"/> Other Action <input checked="" type="checkbox"/> Indigenous Peoples Framework <input type="checkbox"/> No Action
<b>Labor</b> <input checked="" type="checkbox"/> Employment opportunities <input type="checkbox"/> Labor retrenchment <input type="checkbox"/> Core labor standards	<b>Limited</b>	Additional jobs will be created during construction works. Labor opportunities will be provided to local communities. The PMO and implementing agencies (IAs) will ensure that contractors will hire local labor, in particular ethnic minorities and women, for skilled and unskilled work as much as possible.	<input type="checkbox"/> Plan <input type="checkbox"/> Other Action <input checked="" type="checkbox"/> No Action
<b>Affordability</b>	<b>Limited</b>	TA surveys and consultations showed willingness to pay for improved water services. The TA prepared recommendations for mitigating impacts of water tariff changes on affordability for poor households. Project implementation—particularly community-managed construction, operation, and maintenance—will promote special arrangements to assist the poor rural households with access to rural water supply (including water tanks),	<input type="checkbox"/> Action <input checked="" type="checkbox"/> No Action

<b>III. SOCIAL SAFEGUARD ISSUES AND OTHER SOCIAL RISKS</b>			
<b>Issues</b>	<b>Significant/Limited/ No Impact</b>	<b>Strategy to Address Issue</b>	<b>Plan or Other Measures Included in Design</b>
		irrigation, and soil conservation.	
<b>Other Risks and/or Vulnerabilities</b> <input checked="" type="checkbox"/> HIV/AIDS <input type="checkbox"/> Human trafficking <input checked="" type="checkbox"/> Others (Communicable Diseases)	Limited	The Project will support an integrated approach to the prevention of health-related risks in the project area, by facilitating partnership between the PMO and the Guiyang Center of Disease Control and Prevention. Project-related impacts on communicable disease transmission, including HIV/AIDS, pose risks for construction laborers and subproject area communities. Preventive measures have been built into the project design, targeting both the campsites and corridors of influence along the subproject areas.	<input type="checkbox"/> Plan <input type="checkbox"/> Other Action <input checked="" type="checkbox"/> No Action
<b>IV. MONITORING AND EVALUATION</b>			
Are social indicators included in the design and monitoring framework to facilitate monitoring of social development activities and/or social impacts during project implementation? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

<sup>a</sup> ADB. 2005. *Technical Assistance to the People's Republic of China for Preparing the Guiyang Integrated Water Resources Management*. Manila.

<sup>b</sup> China Women's Development Foundation. 2001. *Love of the Earth, Mother's Water Tank*. Beijing PRC.  
Source: Asian Development Bank.

## GENDER ACTION PLAN

Project implementation will respond to the opportunities and risks associated with gender roles of women and men in managing water resources, including household water use, irrigated farming, decision-making in processes and structures, and other activities. Gender analysis was done as part of project preparation to understand social conditions and identify ways in which the Project might have different impacts on women and men. Specific measures to promote gender equality in project implementation, and access to project opportunities and benefits include the following:

Small-Scale Reservoirs (Multipurpose)	Irrigation System Rehabilitation	Soil and Water Conservation	Small Water Storage Structures
1. Establishment of a Social, Environment, and Resettlement Management Division at the PMO to cover social development (GAP, participatory, and community-driven development) and social safeguards aspects related to project design and implementation.			
2. Training of PMO and IAs at project onset on social development (GAP, participatory, and community-driven development).			
3. Inclusion of the All-China Women's Federation in the PLG at the PMO (municipal) and IA (district/county) levels.			
4. Ethnic minorities' and women's involvement in the planning of subprojects and their proposals, priorities, and options on future arrangements for distributing water and funding O&M to be fully developed in the FSRs, and subsequent planning.			
5. Adoption of a 30% quota for women's participation in public consultations for noncore subprojects.			
6. Adoption of a 30% quota for women's access to the Training Program on Community Empowerment for IWRM to be imparted to local communities by a team led by the PMO, and composed of government line agencies and relevant research institutes/NGOs.			
7. Employment of female community facilitators (at least 1 per village) to support public consultation and development of WUGs/WUAs.			10. All China's Women's Federation to work with the PMO/local governments (at municipal and district/county level) to facilitate community-managed O&M of water supply and sanitation systems.
8. Ensuring availability to women of information for all public consultations at convenient times and locations, taking into consideration women's involvement in fieldwork and household chores.			11. Adoption of a 30% quota targeting poor rural women and female heads of households.
9. Adoption of a 30% quota target for women's membership and leadership in WUGs (at the relevant tertiary canal/village group/natural village level) and WUAs.			12. Implementation modalities for small water tanks to apply lessons from the Mother Tanks Project implemented by the All-China Women's Federation.
13. Adoption of a 30% target for women's access to employment opportunities to be created by the Project in civil works.			
14. Collection, analysis, and reporting of gender equity data as a routine part of all project activities, including beneficiaries and affected persons; on participation in meetings, training, and other activities; and on representation in decision-making processes and structures.			

FSR = feasibility study report, GAP = gender action plan, IA = implementing agency, IWRM = integrated water resources management, NGO = nongovernment organization, O&M = operation and maintenance, PLG = project leading group, PMO = project management office, WUA = water users association, WUG = water users group.

Source: Asian Development Bank.

## SUMMARY RESETTLEMENT PLAN AND FRAMEWORK

### A. Background

1. The Project has been prepared as a sector loan with a structural component consisting of five subproject types: (i) urban water supply, (ii) township and rural water supply, (iii) irrigation system rehabilitation, (iv) soil and water conservation, and (v) small water storage tanks. Six core subprojects have been selected for appraisal and early implementation during the project preparations. Of the core subprojects, the Yudongxia reservoir subproject will involve a relatively large amount of land acquisition and resettlement. A full resettlement plan has been prepared and approved by the Asian Development Bank (ADB); a detailed resettlement plan was prepared and will be the basis for implementation. Jinlong reservoir subproject, Liaojiuzhai reservoir subproject, and the Wudang irrigation rehabilitation subproject will involve relatively small amounts of land acquisition and resettlement, so three short resettlement plans have been prepared and approved by ADB. These three core subproject resettlement plans may need to be updated based on detailed design, disclosed to affected persons, and resubmitted to ADB prior to commencement of land acquisition and civil works. For the other two core subprojects, resettlement plans are not required since no involuntary resettlement is involved.

2. Regarding noncore subprojects, about six to eight full resettlement plans and 40 to 42 short resettlement plans will be prepared in accordance with the resettlement framework for ADB approval prior to the commencement of civil works for each subproject. These resettlement plans should be prepared based on subproject design and resettlement impact surveys.

### B. Resettlement Impacts

3. To avoid or minimize land acquisition and resettlement, there was close consultation with the local officials, village committees, and affected persons during project planning and resettlement plan preparation. The core subprojects will affect 23 villages of eight townships/streets in Wudang District, Xiuwen County, Xifeng County of Guiyang Prefecture, and Longli County of Qiannan Prefecture. A total of 1,751 persons (including 2 enterprises with 26 employees) will be affected directly by land acquisition, of which 200 persons need their houses to be relocated. The core subprojects will permanently acquire 2,412.5 mu of land, of which 1,118 mu (46%) is classified cultivated land. In addition, 432.7 mu of land will be occupied temporarily during the construction phase, which affects another 292 persons. There will be demolition of 29,403 square meters (m<sup>2</sup>) of residential housing and 5,897 m<sup>2</sup> of nonresidential housing, including the two tourism enterprises. The impact details for the core subprojects are summarized in Table A14.1. For the noncore subprojects, preliminary studies estimate that 10,450 mu of land will be acquired, of which 4,800 mu is cultivated land that affects the livelihoods of 4,524 people, including about 1,000 persons that need their houses to be relocated.

**Table A14.1: Summary of Land Acquisition and Resettlement Impacts of Core Subprojects**

Subproject Name	Affected Areas	Affected Townships/Villages	Permanent Land Acquisition (mu)	Temporary Land Acquisition (mu)	Households/Enterprises (m <sup>2</sup> )	Permanently Affected Persons
Yudongxia Subproject	Wudang District Longli County	5/11	1,986.8	119.1	29,402.9/5,897.1	1,458
Jinlong Subproject	Xiuwan County	1/5	384.9	275.3	0	61
Liaojiuzhai Subproject	Xifeng County	1/1	39.6	16.3	0	185
Wudang Irrigation Rehabilitation Subproject	Shuitian town, Wudang District	1/6	1.2	22.0	0	47
<b>Total</b>		<b>8/23</b>	<b>2,412.5</b>	<b>432.7</b>	<b>29,402.9/5,897.1</b>	<b>1,751</b>

m<sup>2</sup> = square meter.

Sources: Resettlement plans and Yudongxia resettlement outlines.

### C. Policy and Legal Framework

4. For people unavoidably affected, the resettlement objective is to achieve equal or better income and living standards in accordance with the People's Republic of China (PRC) laws and regulations and ADB's *Involuntary Resettlement Policy*.<sup>1</sup> Key PRC laws and regulations include the Land Administrative Law of the PRC, 2004; the Decision on Reinforcing Reform in Land Administration by the State Council (State Council [2004] No. 28); Ministry of Land Resources (MLR) Guidelines on Improving Land Acquisition and Relocation Regulations (MLR Document No. 238) and Land Acquisition and Resettlement Regulation for Construction of Large and Medium-sized Water Conservancy Projects (State Council [2006] No. 471);<sup>2</sup> Regulations on the Compensation for Land Acquisition and Resettlement with regard to the Construction of Large and Medium-sized Water Conservancy and Hydroelectric Projects (National Government [2006] No. 17); Current Land Use Classification (GB/T21010-2007); and Specifications on Land Requisition and Resettlement Design for Construction of Water Resources and Hydropower Project (SL290-2003). Meanwhile, Guizhou Province and Guiyang Municipality also issued related documents. All these documents have provided essential guidelines for resettlement plan preparation. All persons affected by the Project will be eligible for compensation and assistance. The cut-off date for eligibility for compensation and assistance is the date of each subproject approval by local government, which will be announced immediately to all affected persons.

5. Based on consultations with local governments and affected persons, and general practices in the project counties/cities, a set of resettlement principles was adopted by the project implementing agencies (IAs). These include the following: (i) avoid or minimize resettlement, wherever feasible; (ii) the compensation and titles gained by the affected persons shall at least enable them to maintain the same living standards as "without project" or even better; (iii) affected persons should derive some direct benefits from the Project; (iv) all affected people regardless of the legal titles shall be entitled to receive compensation and demolition assistance; (v) the resettlement compensation shall ensure all affected persons to at least maintain the living standards as before; (vi) if the remaining land after land acquisition fails to safeguard the livelihood of the affected persons, compensation in forms of cash or land replacement, plus other necessary profit-earning activities, shall be

<sup>1</sup> ADB. 1995. *Involuntary Resettlement Policy*. Manila.

<sup>2</sup> The reservoir capacity is beyond 10 million cubic meters (m<sup>3</sup>).

provided for the affected persons; (vii) the affected persons shall have good understanding of the qualification, means and standards of compensation, livelihood and restoration plan, as well as project construction arrangement etc., and participate in the implementation of the resettlement plan; (viii) no land acquisition shall proceed before the affected persons are satisfied with schemes for compensation and resettlement; (ix) the compensation and resettlement operations shall be monitored by the Executing Agency and an independent organization; (x) vulnerable groups (including women) shall receive special assistance and treatment so that they can live better; and (xi) the resettlement budget shall be enough to cover all aspects that are caused by the project construction and operation.

6. Compensation for land acquisition, residential housing, and nonresidential housing (enterprise demolition) will be paid to all users regardless of whether titled or not. For land acquisition, compensation includes land compensation, resettlement subsidy, and compensation for ground attachment and young crops. The land compensation will be paid to the affected village and/or affected persons and the resettlement subsidy and other compensation for individual asset loss will be paid to the affected persons. For small businesses and housing demolition, compensation will be paid directly to owners in cash according to the appraised value of the land and fixed property assets. Income losses resulting from reduced production/sales and wages caused by the Project will be assessed and compensated in cash.

#### **D. Resettlement and Rehabilitation**

7. The plans for livelihood rehabilitation and physical relocation have been included in each resettlement plan to ensure their livelihoods and living standards are fully restored. According to the economic characteristics of affected villages, different schemes for income restoration will be carried out. People can choose the options according to their requirements. Since the resettlement impacts of Jinlong and Liaojiuzhai subprojects are small, the affected villages and affected persons will be directly compensated in cash. Regarding the villages seriously affected by the Yudongxia subproject, additional strategies and measures (including adjustments to agriculture crops structure to more cash crops, land consolidation, and developing tourism) will be considered and incorporated into the detailed resettlement plan. This will include assistance measures such as provision of employment for project construction, provision of skills training, and employment information will be provided to all affected persons, including 50% women. In addition, the persons who are affected by the Yudongxia subproject, a medium-size water conservancy project, are entitled to post-stage development support with CNY600 per capita per year during the 20 years following project completion. Through these measures, all affected persons can maintain or acquire more stable incomes to restore and enhance their living standards.

8. Regarding housing demolition, the affected owners will receive compensation at replacement cost for the lost structures and attachments without consideration of depreciation. The affected households can rebuild their houses by themselves with a free house plot provided by the village. Local government will approve the new housing sites and provide local infrastructure prior to house construction. The affected persons can salvage the structural materials and a moving subsidy will also be provided.

9. In addition, special attention will be paid to vulnerable groups for their resettlement and rehabilitation. The vulnerable groups will receive additional assistance from the Project: (i) setting up special supporting funds in each subproject; (ii) providing potential employment opportunities to seriously affected vulnerable groups, especially women; and (iii) providing labor support to the vulnerable group in house reconstruction and farming activities.

## **E. Resettlement Cost and Fund Management**

10. The cost estimate for land acquisition and resettlement of core subprojects is CNY116.3 million in 2008 prices, including contingencies and land taxes. For the noncore subprojects, the initial estimate for land acquisition and resettlement cost is CNY302 million. Detailed measurement surveys will be conducted in each village and enterprise; and the compensation contracts will be negotiated and signed with village committees, households, and enterprises. On this basis, the final costs will be adjusted. The land acquisition and resettlement costs are included as part of the total project cost and will be funded by Guiyang municipal government or county/district governments. According to the compensation policies and standards defined in the resettlement plans, the payment and usage of compensation funds will be carried out under the supervision of the internal monitoring agencies, with regular audit and external monitoring agency reviews.

## **F. Information Disclosure, Participation, and Grievance**

11. For the core subprojects, the people affected have been informed about the key elements of land acquisition and resettlement through consultation during the planning stage and distribution of resettlement information. On various occasions during meetings, interviews, focus group discussions, public consultation workshops, and community consultation meetings, local representatives have participated in the planning and concerns have been integrated into the resettlement plans. Once the project feasibility was approved, the resettlement plans were finalized and disclosed to local officials; the resettlement information booklets had earlier been provided to the 17 affected villages and affected households. The core subproject resettlement plans have been posted on the ADB website and the noncore subproject resettlement plan will also be uploaded upon ADB approval. The relevant IAs will establish project resettlement units for supervising implementation, continuing public consultation, monitoring progress, and responding to grievances. The grievance redress procedures are well established and explained in the resettlement plans.

## **G. Implementation Arrangements and Schedule**

12. The Guiyang project management office (PMO) will assume the overall responsibility for implementing resettlement. The Social, Environment, and Resettlement Management Division of the PMO will coordinate the planning, implementation, and reporting of land acquisition and resettlement progress. For the core subprojects, the IAs are Guiyang Zhushui Water Resources Development Company for Yudongxia subproject, Xifeng Water Resources Bureau for Liaojiuzhai subproject, Xiuwen Water Resources Bureau for Jinlong subproject, and Wudang Water Resources Bureau for Wudang Irrigation subproject. The subproject resettlement offices that are set up under each subproject IA will take primary responsibility for the resettlement consultation, implementation, and timely delivery of entitlements.

13. The resettlement implementation schedule for the four core subprojects was prepared based on the feasibility study and construction timetable. The actual implementation schedule needs to be revised based on the subsequent approval process. For core subprojects, preliminary civil works will commence by early 2010, but most livelihood rehabilitation and house relocation does not have to be completed until reservoir inundation in 2011 or 2012. So even for the seriously affected villages, there is still adequate time for social preparation and detailed implementation planning. The PMO and IAs have agreed to a set of supervision milestones with ADB to ensure timely and effective implementation of resettlement activities.

14. The noncore subprojects will be assessed to determine the resettlement categorization. For the subprojects that affect less than 200 people (category B), a short resettlement plan should be prepared; subprojects affecting more than 200 people

(category A) will require a full resettlement plan. Subproject resettlement plans will be prepared based on preliminary designs and impact surveys, in accordance with the resettlement framework (Supplementary Appendix I). Resettlement plans will be reviewed by the local government and then by the PMO, with the assistance of a national resettlement expert. If the resettlement plan passes the review, the resettlement plan will be translated and submitted to ADB for approval. If quality improvements are needed, the resettlement expert will specify requirements to be addressed by the IAs. Once revisions are made, the resettlement plan will be rechecked and then sent to ADB for approval. Only then can civil works commence for each subproject.

#### **H. Monitoring and Evaluation**

15. Internal and external monitoring of resettlement implementation will be conducted. Internal supervision and monitoring will be done by each IA to ensure compliance with the provisions of the resettlement plan. The IAs will report to the PMO and the PMO will prepare a summary of progress to be included in the quarterly progress report sent to ADB. The PMO will also engage an independent agency for resettlement monitoring and evaluation. There will be semiannual monitoring for category A subprojects and annual monitoring for others. Once resettlement activities are completed, annual evaluations will then be conducted twice (i.e., for 2 years) or longer if rehabilitation is not deemed to be completed satisfactorily. External monitoring reports will be forwarded directly to both the PMO and ADB for review, comments, and follow-up actions.

## ECONOMIC AND FINANCIAL ANALYSES

### A. Analysis of the Project

#### 1. Rationale for Public Intervention

1. Sector analysis shows that Guiyang Municipality is short of water supply for its residential uses and industrial development, despite the fact that the average rainfall exceeds 1,096 millimeters per annum. Guiyang Municipality lies on the mountainous watershed that separates the Yangtze River Basin to the north from the Pearl River Basin to the south, which makes it difficult for the rainwater to be captured and utilized. While there are adequate natural water resources in Guiyang Municipality, significant problems relate to (i) the capture of sufficient quantities of water and its distribution to users, (ii) the efficiency of water distribution and use, and (iii) increasing concerns over water quality. On the other hand, Guiyang, like any other major cities in the People's Republic of China (PRC), is experiencing rapid urbanization and industrialization. The demand for water use is increasing rapidly.

2. The rationale for public intervention rests on evidence of market and nonmarket failure. Principal market failures involve natural monopolies, an incomplete assignment of property rights in rural land, externalities, and the public-goods nature of information. Natural monopoly service provision and pollution externalities exist in Guiyang Municipality, and are endemic in the water resources sector in most countries. There appear to be no economically-viable alternative sources of supply of the envisioned scale for the proposed reservoirs. These facilities are, therefore, natural monopolies. Moreover, rapid economic development is placing additional stress on the water environment and water resources, with continuing government intervention necessary to ensure development of adequate water resources, equitable allocation of water, and its proper management.

3. The failure to control overland flows and soil erosion in Guiyang Municipality has a negative impact on downslope landowners because of sedimentation and the increased erosive force of flows as they descend. Sediment delivered to surface waters degrades the quality of those waters, diminishes the storage capacity of reservoirs, and reduces the ecological values and downstream use values of the resources.

4. The limited property rights granted to farmers weaken their incentive to invest in on-farm water resources management. Farmers are allocated farmland by their village for a 30-year period. They cannot sell the land and they lose it if they fail to work on it. This restricted property right creates a disincentive to invest adequately in erosion control measures and to maintain irrigation works since the full benefits from the investments cannot be realized in the form of appreciated land values. Even if farmers are motivated to improve crop and water management, limited access to information poses a major barrier to action. Both irrigation improvements and soil erosion control measures include an element of capacity development and training in soil and water management. Farmers do not have the capacity to acquire this information independently but, once it is acquired in an area, the demonstration effect can lead to rapid dissemination. Implementation of the proposed Project is based on the principles of integrated water resources management (IWRM), which will help overcome property rights and information availability constraints.

5. Private sector participation could conceivably address certain cases of market failure. For example, reservoir operation could be contracted to the private sector, arrangements could be made with a local bank to encourage microcredit, and some project activities could be delivered using service contracts. However, these measures would not address the market failures identified, and government involvement in the development and management of the Guiyang Municipality water sector is concluded to be both justified and necessary.

## 2. Goals of the Master Plan

6. The Guiyang Municipal Government (GMG) has formulated the Guiyang Integrated Water Resources (IWRM) Master Plan (2006–2020, the Master Plan), which covers all aspects of infrastructure needs while recognizing some of the deficiencies of current water sector management arrangements, including fragmented institutional arrangements and inadequate attention to water demand management. The overall goal of the Master Plan is to facilitate economic growth in Guiyang Municipality by ensuring that (i) there is sufficient water supply to meet the demand, and (ii) the water is of satisfactory quality. The Master Plan describes the failure of existing water resources to support sustainable development of Guiyang Municipality, and establishes goals to improve the security and safety of supply, and achieve optimal allocation and efficient utilization of water resources through integrated resources planning. These goals support the achievement of the Government's broader goals of sustainable economic development, rural development, and poverty alleviation, as stated in the 11th Five-Year Plan for National Economic and Social Development (2006–2010). The water management goals are supported by an analysis of imbalances between water demand and water supply capacity. Identified capacity problems include insufficient quantities of water, uneven geographic and seasonal distribution of water resources, impairment caused by poor water quality, and losses caused by poor infrastructure maintenance and mismanagement. Proposed demand and supply management measures include a mix of structural and nonstructural approaches.

7. The overall goal and objectives of the Master Plan are fully compatible with ADB's Water Policy<sup>1</sup> and its poverty reduction aims. Poverty reduction will be achieved by facilitating economic growth generally, and more specifically, through rural development activities which will address the widening gap in wealth between urban and rural areas. Indicators to measure achievement of the goals are described in the project design and monitoring framework (Appendix 1), and have been verified as being readily measurable using existing government information resources.

## 3. Design of the Master Plan and ADB's Role

8. While the Master Plan has some shortcomings from the perspective of IWRM, they do not invalidate the Master Plan but present an opportunity for its strengthening. Key shortcomings include the following:

- (i) The Master Plan is largely based on municipal jurisdictions rather than watersheds, reflecting institutional constraints related to the jurisdictional authority of GMG.
- (ii) The analysis of water management options in the Master Plan presents structural measures without an assessment of alternatives. The assessment of alternatives only occurs at the stage of the preliminary engineering design where it is documented in the feasibility study reports.
- (iii) Some time-bound goals are established in the Master Plan but specific management measures are not identified.

9. The Project will help implement a subset of the measures identified in the Master Plan. These are mainly structural measures focusing on urban and rural water supply capacity (supply management), irrigation water use efficiency (demand management), and protection of source water quality through erosion control. In addition, capacity development activities to be conducted under the Project will promote the use of IWRM; support the introduction of related institutional reforms; and establish participatory approaches for the

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<sup>1</sup> ADB. 2001. *Water for All: the Water Policy for the ADB*. Manila.

design and management of water projects, water allocations, and ultimately, water sector planning.

## **B. Analysis of Individual Subprojects**

### **1. Introduction**

10. To appraise the financial and economic impact and feasibility of the Project's activities and outputs, financial and economic analyses were carried out on the six core subprojects. An overview of the general approach for the economic analysis is presented below and results are presented for each of the core subprojects. The six core subprojects represent the range of physical, social, and economic conditions that characterize the 65 candidate subprojects. The detailed economic analysis based on key areas of economic analysis of sector loans<sup>2</sup> is presented in Supplementary Appendix C. Economic and financial analyses of the six core subprojects are based on Asian Development Bank (ADB) guidelines for the economic analysis and financial governance and management of projects.<sup>3</sup>

### **2. Assumptions**

11. Financial prices used in the analysis were identified through review of the updated cost estimates of the provincial design institute, including estimates of unit costs and quantities. To assess each subproject's contribution to the PRC economy, it is necessary to convert financial values to their economic equivalents. Economic valuations exclude transfers from one part of the economy to another (i.e., taxes, duties, and subsidies) and attempt to facilitate the comparison of project benefits and real opportunity costs to the economy by translating all prices to a common, undistorted base. Assumptions used in the economic analysis include:

- (i) evaluation in real terms using 2009 prices and a domestic price numeraire;
- (ii) an exchange rate of CNY6.85 per dollar;<sup>4</sup>
- (iii) physical contingencies computed at 5%;
- (iv) identification and valuation of major economic benefits using willingness-to-pay and net farm income approaches;
- (v) estimation of costs and benefits on a with- and without-project basis;
- (vi) economic costs exclude price contingencies, duties, and taxes but include physical contingencies; and
- (vii) shadow pricing based on domestic market price conversion factors and a shadow exchange rate factor for tradable items.

### **3. Least Cost Analysis**

12. A least-cost analysis of the core subprojects was completed, based largely on technical evaluations and investment cost comparisons (Supplementary Appendix C). The proposed Project compares favorably to the alternatives that involved similar technologies, and provided similar levels of benefit. Noncore subprojects will also be subjected to least-cost analysis. Selection criteria for candidate noncore subprojects are designed to ensure compatibility with economic and social objectives of the Master Plan, the financial and economic viability of the subproject, optimization of project benefits, and the minimization or mitigation of adverse social and environmental impacts (Appendix 8).

<sup>2</sup> ADB. 2005. *Assessing Aid for a Sector Development Plan: Economic Analysis for a Sector Loan*, ERD Technical Note 14. Manila.

<sup>3</sup> ADB. 1997. *Guidelines for the Economic Analysis of Projects*. Manila; and ADB. 1999. *Handbook for the Economic Analysis of Water Supply Projects*. Manila.

<sup>4</sup> This was the exchange rate during the loan appraisal mission.

#### 4. Benefits Analysis

13. **Water supply benefits.** The quantification of urban and rural domestic water supply improvements is based on the user's willingness to pay (WTP). In the case of urban water supplies, the estimate of WTP is a measure of consumers' surplus based on an estimated urban demand for tap water. The estimated WTP is CNY4.1 per cubic meter (m<sup>3</sup>) for domestic demand and CNY6.5/m<sup>3</sup> for total demand.<sup>5</sup> Rural domestic water demand includes both household uses and livestock watering. An opportunity cost method based on the value of household time spent obtaining water is used to estimate WTP for this type of water. Rural labor is based on local wage rates, and the time spent fetching water was estimated using rural household survey data.<sup>6</sup> The estimated value for water is about CNY12/m<sup>3</sup>. Once subprojects are fully developed, the total value of annual water supply benefits are expected to reach about CNY144 million.

14. **Irrigation benefits.** The direct impacts of subprojects involving irrigation works and adoption of improvements in crop production methods include improved reliability of water supply and increased area that can be irrigated. The benefits of these subprojects include higher farm incomes, reduced economic risks, increased food security, improved long-term sustainability of crop production, improved health status, and increased household capacity to accumulate capital. This evaluation was based on modeling of crop production with and without the Project. Crop production data were obtained from a survey of 300 rural households in the irrigation subproject areas. A conversion of crop systems and patterns was assumed to occur with completion of the Project. Investment costs include a budget allocation of 0.5% of the base investment cost to finance extension services to support this conversion. Estimates of average net increases in crop income are in Table A15.1.

**Table A15.1: Estimates of Average Net Increases in Crop Income**

<b>Subproject</b>	<b>Increase in Net Crop Income (CNY per mu)</b>	<b>Increase in Revenue from Crop Production (%)</b>
Jinlong Reservoir	561	82
Liaojiuzhai Reservoir	438	82
Wudang Irrigation System	258	19
Xifeng Small Water Storage	488	86

CNY = Chinese yuan.

Source: Asian Development Bank estimates.

15. **Soil and water conservation benefits.** Soil and water conservation measures proposed in the Master Plan cover a total area of 800 square kilometers (km<sup>2</sup>). Measures include farmland restructuring, terracing, water control structures, and permanent vegetative cover (afforestation, grasses, and fruit trees). The Huaxi water and soil conservation core subproject covers about 15 km<sup>2</sup> of land in the Nanming River watershed upstream of the Huaxi and Songbai reservoirs. These are multipurpose reservoirs used for urban water supply (Guiyang municipality and satellite towns), hydropower, and irrigation. Benefits from these measures include increased farm incomes, improved food security, increased household capacity to accumulate capital, reduced risk of illness from water-borne disease, improved aesthetic quality of surface waters, reduced loss of reservoir storage capacity, and improved water quality at downstream sources of supply for urban tap water. However, many of the off-site benefits will have a cumulative effect, e.g., changes in downstream water quality will not occur until a large part of the watershed is treated so that pollutant loadings fall below critical thresholds.

<sup>5</sup> The analysis of urban water demand is provided in Supplementary Appendix C.

<sup>6</sup> The rural household survey is described in Supplementary Appendix C.

16. While off-site benefits and indirect on-site benefits were identified, only changes in farm incomes were estimated. This was based on the modeling of crop production with and without the Project. Crop production data for the analysis were obtained from a survey of 60 rural households in the subproject area. After accounting for lands treated with permanent vegetative cover, 10,400 mu of land are available for sustainable crop production with the core subproject. Without the Project, a relatively small portion of these lands are cropped on a subsistence basis, with cropping on a plot lasting only until the topsoil is lost to erosion. The average net crop income on these lands with the Project is CNY281 per mu.

## 5. Financial Analysis

17. **Financial analysis of core subprojects.** Financial internal rates of return (FIRRs) were not calculated for the Liaojiuzhai small-scale reservoir subproject, the Xifeng small water storage subproject, or the Huaxi soil and water conservation subproject since these are not revenue generating. For all of the other core subprojects, base case FIRRs exceed the weighted average cost of capital and are shown to be robust in the sensitivity analysis (Table A15.2).

**Table A15.2: Sensitivity Analysis**

Core Subproject	FIRR (%)		
	FIRR 30-Year	FIRR 20-Year	WACC
Yudongxia Urban Water Supply, Reservoir	3.9	1.9	2.4
Yudongxia Urban Water Supply, Water Treatment Plant	11.9	7.1	2.2
Jinlong Small-Scale Reservoir	2.4	1.8	2.1
Wudang Irrigation System Rehabilitation	4.3	3.7	2.2

FIRR = financial internal rate of return. WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

18. With the exception of Wudang irrigation system rehabilitation subproject, all of the revenue generating subprojects can achieve average rates of return to equity of 4% or more. The urban retail water supply company (WSC) receiving wholesale water from Jinlong reservoir also achieves comparable or higher rates of return. The Wudang irrigation system rehabilitation subproject achieves an average rate of return of 2%, which is compatible with the state government policy for irrigation projects that are not expected to earn any profit.

19. Standard targets for financial performance include a minimum debt-service coverage ratio of 1:0, a maximum debt-equity ratio of 70:30, and a minimum current ratio of 1:0. Financial performance ratios for subproject operating authorities generally meet these targets with the exception of Jinlong reservoir subproject, which has a debt-service coverage ratio below 1:0 for most of the period of ADB debt servicing, and will require assistance to overcome cash flow difficulties. This is strictly a cash flow problem since other ratios, including profitability, are acceptable and can be overcome by water tariff increase in Xiuwen county as discussed in paras. 20-22.

20. **Water tariff analysis.** A tariff increase for Xiuwen County is required to finance a new water treatment plant as well as purchase wholesale water from the Jinlong reservoir. Water supply tariffs in Xiuwen County are relatively low by PRC standards, and are below the long run incremental cost of expanding water supply capacity. The water tariff has been increased by 20% from 2005 to 2006. Once the WSC begins receiving water from the project facilities, a tariff increase of 108% will be required. Xiuwen county government has given a written assurance to GMG to raise tariffs to required level, and failing this, to provide subsidies to sustain the subproject facilities. The water tariff increase is expected to

accelerate in 2010 as economy-wide inflation pressure is reduced as a result of the global financial crisis.

21. In rural areas, the current method of charging for irrigation water by area of land irrigated is accepted as being inefficient in water use and provides little incentive on water users to economize. GMG will seek to promote the measurement of water consumption by individuals and groups of users, and apply tariffs that encourage water conservation and provide for basic cost recovery of at least the operation, maintenance, and management costs of irrigation systems in accordance with national policies. The proposed tariffs for irrigation water for the operating authorities of the Jinlong reservoir and Wudang irrigation system rehabilitation subprojects are consistent with the Government's policy. The proposed irrigation charges are CNY0.45 per m<sup>3</sup> for Wudang subproject, CNY0.60 per m<sup>3</sup> for Jinlong subproject, and CNY0.70 per m<sup>3</sup> for Liaojiuzhai subproject. The current charge is CNY0.10 per m<sup>3</sup>. The GMG and county governments, while reluctant to raise irrigation water tariffs because of the potential negative impacts on farmers' income, recognize the problem that low irrigation costs discourage water savings. The GMG and county governments respond to the problem by more stringent local water management and sufficient subsidies for local water management operations.

22. Assessment of WTP for urban and rural domestic water supplies and of net income from improved crop production indicates that beneficiaries would accept the proposed tariff increases. The WTP is estimated at CNY4 per m<sup>3</sup> for domestic use. Expenditure shares are calculated before accounting for the water bill waiver for registered poor households and in all cases, with-Project water supply costs constitute less than 5% of household expenditure.

## 6. Economic Analysis

23. A base case economic internal rate of return (EIRR) was determined for each core subproject. All core subprojects, except the Liaojiuzhai reservoir, have EIRR values of 12% or more, and are considered economically viable. The EIRR for the Liaojiuzhai subproject equals 10%, and is considered economically viable considering nonquantifiable benefits that are not enumerated, including water allocated to ecological uses and as yet undeveloped rural domestic water supply. EIRRs for the core subprojects are shown in Table A15.3.

**Table A15.3: EIRR for the Core Subprojects**

Subproject	%
Urban Water Supply, Yudongxia	20.8
Small-Scale Reservoir, Jinglong	18.6
Small-Scale Reservoir, Liaojiuzhai	10.0
Irrigation System Rehabilitation, Wudang	22.7
Small Water Storage, Xifeng	12.1
Water and Soil Conservation Huaxi	18.9

EIRR = economic internal rate of return

Source: Asian Development Bank estimates.

24. Sensitivity analysis indicates that the economic performance is very robust of four subprojects (Table A15.4), including Yudongxia reservoir and water treatment plant, Jinlong small-scale reservoir, Wudang irrigation system rehabilitation, and Huaxi soil and water conservation. The economic performance of other subprojects is sensitive to relatively small increases in costs or reductions in the value of benefits. Overall, the core subprojects are shown to be beneficial. These results support the sector loan, but indicate that individual noncore subprojects must be carefully scrutinized to assure that they are sufficiently beneficial.

**Table A15.4: Estimated EIRRs and Switching Point Values**  
(%)

Item	Midsize Reservoir Yudongxia	Small-Scale Reservoir Jinglong	Small-Scale Reservoir Liaojiuzhai	Irrigation System Rehab. Wudang	Small Water Storage Xifeng	Water and Soil Conservation Huaxi
Base case EIRR	20.8	18.6	10.0	22.7	12.1	18.9
Eliminate PPP adjustment	na	18.6	10.0	22.8	12.1	18.9
Delay water sales growth 1 year	na	18.56	na	na	na	na
(i) Delay water tariff increase 1 year	na	18.54	na	na	na	na
Switching value tests <sup>a</sup>						
(ii) Investment cost, % change	na	na	na	197	101	178
(iii) O&M costs, % change	na	na	na	1,357	121	2,008
(iv) Willingness to pay for water, % change <sup>b</sup>	na	na	na	na	99	na
(v) Net crop income, % change	na	na	na	33	97	56

EIRR = economic internal rate of return, na = not applicable, O&M = operation and maintenance, PPP = public-private partnership.

<sup>a</sup> Indicate the percent change required to yield in EIRR value of 12% (10% in the case of Jinlong and Liajiuzhai reservoirs).

<sup>b</sup> Applies to urban and rural domestic water supplies.

Source: Asian Development Bank estimates.

## 7. Distributional and Poverty Impact

25. Poor rural households will be the primary recipients of project benefits from irrigation and rural domestic water supply. Poverty is comparatively widespread across the rural population, and the subprojects are located in areas where water supplies are inadequate or unreliable so that benefiting populations are more likely to be impoverished because of lack of water. Under existing conditions, there is too much uncertainty about the availability of water for cash crop production. This means that farmers prefer to plant subsistence crops since this lowers the risk of food shortage when drought occurs. With the irrigation subprojects in place, the risk of drought is greatly diminished, and cash crop production will be more viable.

26. In rural subprojects, beneficiary farmers contribute to the Project through labor input or payment of user charges. The benefits they receive will outweigh the costs as indicated by subproject EIRR values. Project preparatory technical assistance estimates indicate that the proportion of the rural population experiencing absolute poverty in the core subproject service areas will reduce from 35% to 21%, and the proportion experiencing relative poverty will fall from 59% to 45%.<sup>7</sup>

27. The urban water supply costs are recovered from water supply customers through the water tariff. Domestic customers receive a modest cross-subsidy from non-domestic customers because of the tariff structure, so that there will be a reallocation of project investment costs from the domestic water supply customer to other customers. Poor domestic customers of Xiuwen WSC receive an additional subsidy because urban WSCs waive the water bill for registered poverty households.

<sup>7</sup> The annual per capita income threshold is assumed to be CNY720 for absolute poverty and CNY1,200 for relative poverty.