



Technical Assistance Report

Project Number: 38594
December 2006

People's Republic of China: Strengthening Water Resources Management in Guiyang

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 1 December 2006)

Currency Unit	–	yuan (CNY)
CNY1.00	=	\$0.128
\$1.00	=	CNY7.828

ABBREVIATIONS

ADB	–	Asian Development Bank
GIWRMSP	–	Guiyang Integrated Water Resources Management Sector Project
IWRM	–	integrated water resources management
PMO	–	project management office
PRC	–	People's Republic of China
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	General intervention
Sector	–	Agriculture and natural resources
Subsector	–	Water resource management
Themes	–	Capacity development
Subthemes	–	Institutional development; client relations, network and partnership development

NOTE

In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. During the 2005 Country Programming Mission, the Government of the People's Republic of China (PRC) requested technical assistance (TA) from the Asian Development Bank (ADB) for the design and implementation of integrated water resources management (IWRM) reforms in Guiyang Municipality, Guizhou Province. The proposed TA would complement the Guiyang Integrated Water Resources Management Sector Project (GIWRMSP), a firm project for 2007. The TA, as proposed, is expected to play a crucial role in expediting IWRM reforms in Guiyang Municipality in order to enhance the enabling institutional environment.

2. During the Fact-finding Mission for the TA, which coincided with that for the GIWRMSP loan, an understanding was reached with the Guiyang municipal government on the impact, outcome, outputs, cost and financing, and implementation arrangements of the TA.¹ The design and monitoring framework for the TA is in Appendix 1.

II. ISSUES

3. Guiyang Municipality is the capital of Guizhou Province, in the southwest of the PRC. It lies on the mountainous ridge of the watershed boundary between the Yangtze River basin to the north and the Pearl River basin to the south. The annual average precipitation is quite high, but uneven distribution and large losses through evaporation make water storage and capture particularly difficult. Much of the water drains into rivers as quick surface flows through the many short creeks and streams that run deep in the valleys, or as fast-flowing deep aquifers (groundwater rivers) through the limestone layers (karst areas). Water availability varies widely between seasons and from one year to the next.

4. Guiyang has a population of 3.5 million, 2.2 million of this are urban. As with most large cities in the PRC, the local economy is developing rapidly with structural and social changes. There is significant migration from rural to urban population centers, seriously stretching the urban water supply capacity such that water pressure has weakened, water has had to be rationed, and there is not enough water for irrigation in dry periods. Guiyang forecasts an annual water shortfall of 420 million cubic meters by 2010 and 642 million cubic meters by 2020. In the surrounding rural areas, the shortage of water for drinking and irrigation is also seen as a critical constraint on improving rural incomes and living standards. Farmers face difficulties growing their crops during the dry months from February to April, and, because of the short growing season, cannot further diversify their cropping systems. Moreover, the majority of the rural population in smaller villages is not connected to a public water supply system and must depend on local springs and streams.

5. The project preparatory TA for GIWRMSP identified these specific water sector management issues: (i) there is no formal process of stakeholder consultations and involvement; (ii) separate suburban water supply companies exist close to one another; (iii) local townships, villages, and individual households manage their water supplies themselves and do so inefficiently, thereby losing the potential benefits from physical and management integration; and (iv) water and agriculture departments and local water users lack the coordination needed for better designed irrigation systems and optimized cropping patterns.

¹ The TA first appeared in *ADB Business Opportunities* on 17 August 2006.

6. As in other provinces and municipalities, bureaus in Guiyang are subordinate to provincial departments and ultimately to central line ministries and agencies. The water resources bureau coordinates water resources management at the municipal and lower levels, particularly water resources planning, water allocation, water conservation, flood control, and rural water supplies. The urban construction and urban management bureaus manage urban water supply, drainage, and wastewater treatment for the municipality. The provincial and municipal environmental protection bureaus have important regulatory and enforcement roles in environmental protection and pollution control. The provincial and municipal development reform commissions are authorized by the National Development and Reform Commission to participate in the approval of investment projects and, in most cases, to administer changes in water tariff levels. Other ministries and provincial, municipal, and lower government offices (notably in agriculture, finance, health, civil affairs, land, trade and industry, and forestry) are also involved in water sector issues.

7. The responsibilities for the management of the Guiyang water sector are highly fragmented—both vertically, between provincial, municipal, and district and county levels, and horizontally, between functional departments at each level of government. This fragmentation creates problems in water resources management, although in the system of functional supervision in the PRC, issues caused by vertical fragmentation are more easily resolved, through such means as directions and instructions from higher administration. The problems arising from horizontal fragmentation are generally more difficult to deal with and have major institutional and technical implications including: (i) overlaps in monitoring and lack of data sharing, (ii) less than comprehensive water resources planning, (iii) separation between pollution control planning and water resources planning, and (iv) unintegrated function zoning without harmonization of quantity and discharge licensing.

8. The municipal government, recognizing the need for management reforms to meet future development challenges, is committed to implementing the principles of IWRM. An interagency project leading group has been formed to steer the proposed GIWRMSP in the first phase of implementation of the Guiyang Integrated Water Resources Master Plan, which was approved by the government on 3 July 2006. The master plan is an important step for IWRM in Guiyang and covers all aspects of infrastructure needs while recognizing deficiencies in current water sector management, including its fragmentation and the inadequate attention given to water demand management. But the master plan is focused mainly on structural interventions. Nonstructural measures for institutional reform and demand management also need to be made part of the master plan.

9. Guiyang still lacks integrated institutionalized planning of water resources. The following challenges to the implementation of IWRM remain: (i) local stakeholders are hardly involved in the design, implementation, and operation of water projects; (ii) there is significant duplication of water quality monitoring between water management agencies, which also lack coordination and have conflicting responsibilities; (iii) information sharing between water management agencies is limited; (iv) the public is generally unaware of the need for water demand management, and is not provided with incentives to conserve water; (v) economic instruments are inconsistently used, and water permits, for instance, are not applied at all to rural water use by farmers; and (vi) the sector has to contend with a variety of technical issues including conflicting water uses and environment function zoning.

10. These challenges will be addressed in part by the GIWRMSP. However, more focused initiatives are needed to develop institutional capacity for IWRM. IWRM reforms will provide a basis for improved water sector management in Guiyang by rationalizing institutional

arrangements, improving interagency communications, promoting participation, and increasing public awareness. The participatory nature of IWRM will improve the transparency of water sector management and make water conflicts less likely. Stakeholder analysis and participatory approaches will also allow better understanding of the potential social impact of water allocation decisions, and, hence, better management of potentially adverse social impact. Efforts will be made through IWRM to coordinate and optimize water supply and demand management activities.

11. The proposed TA will develop solutions based on IWRM principles, starting with the analysis of a watershed catchment or sub-catchment area lying wholly within Guiyang so that the municipal government can use its influence to achieve the intended aims and objectives. Depending on the results of the initiatives to introduce IWRM in local areas, ways and means of replicating the approach elsewhere in the PRC and even at higher administrative levels will be sought.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

12. The TA will make it possible to implement institutional reforms and IWRM principles for water sector management in districts and counties in Guiyang. The reforms will be replicated in other areas and, if appropriate, at higher administrative levels. The TA is expected to contribute to the success of the GIWRMSP by enabling a sustainable balance between water supply and demand in Guiyang.

B. Methodology and Key Activities

13. The TA will be implemented in two phases. In phase 1, to be conducted over a period of 5 months, the consultants will undertake a comprehensive institutional assessment and develop a detailed proposal for institutional reforms based on IWRM principles. Specifically, the consultants will: (i) review the master plan and examine the applicability of IWRM reforms carried out elsewhere in the PRC to Guiyang and its master plan; (ii) on the basis of an analysis of a single river catchment area, document current institutional arrangements for water sector management in urban and rural areas, and undertake system, stakeholder, and participatory problem tree analyses to fully understand the constraints on the implementation of IWRM in the townships, counties, and municipalities; (iii) on the basis of these analyses, prepare a comprehensive strategy and a detailed set of proposals for the progressive implementation of IWRM principles in the selected area; (iv) prepare a training plan for key officials of Guiyang Municipality who will be involved in the implementation of IWRM; (v) prepare an IWRM plan for implementation over a wider area in 3 to 5 years and propose specific modifications in the master plan; (vi) prepare proposals for the monitoring of IWRM implementation, issues resolution, and stakeholder participation during the implementation of the IWRM plan; (vii) identify consultants and the expertise needed to implement and monitor IWRM actions in phase 2; and (viii) assist the government in organizing the first workshop to discuss the proposals and implementation of the IWRM plan in the presence of ADB, invited national experts, and local stakeholders. The findings of phase 1 will be presented at a participatory workshop and contained in a comprehensive report to the municipal and local governments and ADB.

14. In phase 2, to be conducted over 17 months, consultants will support the implementation of the proposed institutional reforms, review initial experiences, and document lessons. Specifically, the consultants will: (i) work with township, county, and municipal stakeholders in introducing institutional reforms and implementing the IWRM plan prepared in phase 1; (ii) document issues that arise and their resolution; (iii) deliver the training plan for key officials involved in the implementation of IWRM; (iv) review the original IWRM strategy and plan, and suggest appropriate modifications (including modifications in implementation arrangements and monitoring); (v) assist the municipal government in organizing the phase 2 workshops; (vi) work with provincial officials to determine the legal and institutional changes needed for IWRM activities that require higher approvals; and (vii) consider how the results of the TA can be replicated in other parts of Guiyang, Guizhou Province, and the rest of the PRC, and make suitable recommendations. The findings of phase 2 will be presented at the third participatory workshop and incorporated into the draft and final reports of the TA.

C. Cost and Financing

15. The total cost of the TA is estimated at \$750,000 equivalent. ADB will finance \$600,000 on a grant basis through its TA funding program. ADB financing will cover consulting services, international and some local travel, reports and communications, workshops, training and study tours, administration and support costs, and contingencies. The Government will finance the remaining \$150,000 equivalent to cover the remuneration of counterpart staff, some local transport costs, the provision of office accommodation, and other logistical support costs. The detailed cost estimates are given in Appendix 2.

D. Implementation Arrangements

16. The municipal government, the Executing Agency for the TA, has set up a project management office (PMO) under an interagency project leading group chaired by the vice mayor to support the consultants and government counterpart staff in the timely implementation of the TA. The PMO will also be responsible for the design and implementation of the proposed GIWRMSP. The PMO will ensure interdepartmental coordination and the TA team's access to reports, information, and data needed for the effective conduct of the TA. It will coordinate as well with ADB during TA implementation.

17. The TA will be implemented over a period of about 24 months, from March 2007 to February 2009. It will be divided in 2 phases of 5 and 17 months, respectively. There will be a 2-month break in between the 2 phases to allow ADB, the municipal government and local governments to consider the phase 1 report and proposed IWRM plan, including the training plan for key officials of the Guiyang Municipality who will be involved in the implementation of IWRM. The TA will require 12 person-months of international and 40 person-months of national consulting services. The individual consultants will be hired by ADB according to the *Guidelines on the Use of Consultants* (April 2006, as amended from time to time). The terms of reference for the consultants are in Appendix 3.

18. The team leader will be a national consultant and will be based in Guiyang. The international water resources management specialist, who will have considerable institutional development experience, will participate on two separate occasions in phase 1 and on six separate occasions in phase 2, for 1.5 person-months each time. The timing of this specialist's

inputs will coincide with the workshops and preparation of reports. The national specialists identified for phase 2 will also take part in the phase 2 workshops.

19. The TA reports will comprise: (i) an inception report, within 1 month of the consultants' mobilization, describing the work plan, the selection of the pilot catchment or subcatchment area, and unresolved issues; (ii) an interim report, 3 months after mobilization, with an account of progress made, preliminary results of analyses, issues that have arisen, and proposals for the resolution of the issues; (iii) a phase 1 report and IWRM plan, 5 months after mobilization, with the results of the analyses undertaken and detailed proposals for IWRM implementation, including a training plan for key officials who will be involved in the implementation of IWRM; (iv) TA implementation progress reports, to be prepared and submitted each quarter during phase 2, with updates on the progress of IWRM plan implementation, issues that have arisen, and proposals for the resolution of these issues; (v) a draft final report, to be prepared and submitted 15 months after the start of phase 2, with the full results of the TA, lessons learned, and an action plan for further steps in the implementation of IWRM; and (vi) a final report, incorporating feedback from stakeholders on the contents of the draft final report, to be submitted at the end of the TA (17 months after the start of phase 2).

20. The training plan to strengthen capacity for the implementation of IWRM will be formulated in phase 1 and delivered in phase 2 of the TA. The training plan may include regional study tours for key officials of Guiyang Municipality to see how IWRM is practiced elsewhere. It may also include study tours in the PRC to cities where water authorities have been established for a better understanding and appreciation of the institutional arrangements adopted to integrate the responsibilities of water management authorities. It will include training seminars delivered by the consultants. It will also include an international workshop with invited international and national IWRM experts to present the principles of IWRM and their experiences from other cities and countries.

21. Three participatory workshops will be held. The first workshop will be conducted near the end of phase 1 to discuss the IWRM plan, the training plan, and the proposed approach for their implementation. The second workshop will be conducted in the early part of phase 2 to present IWRM principles and experiences of invited international and national experts. The second workshop will be one of the main components of the training plan. The third workshop will be conducted near the end of phase 2 to reinforce IWRM concepts, review the implementation experience and consider the issues raised during the process, draw conclusions and lessons from the study, and discuss how these can be applied both locally and elsewhere in the PRC. All three workshops will be attended by a broad range of stakeholder representatives, including ADB.

IV. THE PRESIDENT'S DECISION

22. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$600,000 on a grant basis to the Government of the People's Republic of China for Strengthening Water Resources Management in Guiyang, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact</p> <p>Sustainable balance between water supply and demand in Guiyang</p>	<p>Water resources continue to meet development needs</p> <p>There are no water conflicts</p> <p>Water efficiency statistics in Guiyang are shown to be in the upper quartile of PRC performance</p>	<p>Guiyang municipal statistics</p> <p>Stakeholder feedback and local water station reporting</p> <p>Guiyang municipal and PRC national statistics</p>	<p>Assumption</p> <ul style="list-style-type: none"> Government continues to endorse IWRM principles <p>Risks</p> <ul style="list-style-type: none"> Higher government authorities do not comply with proposed institutional reforms The resources needed for demand management activities are not adequate
<p>Outcome</p> <p>Implementation of institutional reforms and IWRM principles for water sector management</p>	<p>Reforms rationalizing water sector management are accepted</p> <p>Master plan is revised by mid-2009</p>	<p>Dialogue with government during review missions</p> <p>Approved revised master plan</p> <p>ADB review missions</p>	<p>Assumptions</p> <ul style="list-style-type: none"> Government has the resources and capacity to roll out the experience gained during the TA Stakeholder participation is forthcoming A higher official (perhaps a mayor or governor) has the interest and involvement to champion the institutional reforms
<p>Outputs (Phase 1)</p> <p>Completed systems and stakeholder analyses of selected river catchment area</p> <p>Agreed institutional reform proposals, IWRM plan and training plan</p> <p>Outputs (Phase 2)</p> <p>Strategy for stakeholder participation</p> <p>Master plan revisions and improvements based on IWRM concepts and principles</p> <p>Establishment of effective water and agricultural liaison arrangements</p> <p>Urban IWRM-based reforms and actions</p>	<p>Stakeholders, including water users, and government approve analyses by the end of June 2007</p> <p>Stakeholders endorse, and government and ADB approve, the proposals and plans by the end of September 2007</p> <p>Participatory structures are fully operational in pilot townships</p> <p>Municipal government approves revisions by February 2009</p> <p>There is documentary evidence of joint work and cooperation by February 2009</p> <p>Reform implementation milestones are achieved</p>	<p>Inception report, progress reports, interim report, and phase 1 report, PMO feedback to ADB, feedback from first workshop, and ADB review mission</p> <p>Stakeholder feedback, ADB review mission</p> <p>Review of master plan (once updated)</p> <p>ADB review missions, feedback from final workshop, progress reports, draft and final reports</p>	<p>Assumptions</p> <ul style="list-style-type: none"> Information is made available, when needed, to the TA consultants Government facilitates the required meetings and consultations <p>Risks</p> <ul style="list-style-type: none"> Government does not support the reforms proposed in phase 1 Government decisions are delayed There is lack of ownership and support from pilot local governments

<p>Activities with Milestones (Phase 1)</p> <ol style="list-style-type: none"> 1. Review master plan, examine ongoing IWRM reforms in the PRC, and consider appropriate lessons (by 30 April 2007). 2. Document institutional arrangements in selected river catchment, review institutional training needs analysis, and undertake systems, stakeholder, and participatory problem tree analyses (by 31 May 2007). 3. Prepare a comprehensive strategy and detailed proposals for the implementation of IWRM principles (by 31 July 2007). 4. Prepare a training plan for key officials of Guiyang Municipality who will be involved in the implementation of IWRM (by 31 July 2007). 5. Prepare an IWRM plan for a wider area and propose specific modifications in the master plan (by 31 July 2007). 6. Propose means of monitoring IWRM actions, issues resolution, and stakeholder participation (by 31 July 2007). 7. Identify expertise required to implement and monitor IWRM actions, and training needs in phase 2 (by 31 July 2007). 8. Assist the municipal government with the first IWRM workshop on the IWRM plan and its proposed implementation approach (by 31 July 2007). <p>Activities with Milestones (Phase 2)</p> <ol style="list-style-type: none"> 1. Assist the municipal government in organizing the second IWRM workshop on the principles and practice of IWRM experiences (by 30 November 2007). 2. Review the original IWRM strategy and plan, and suggest appropriate modifications (by 31 May 2008). 3. Complete training activities and study tours for key officials of Guiyang Municipality who will be involved in the implementation of IWRM (by 31 October 2008). 4. Assist the municipal government in organizing the third IWRM workshop to present outputs, discuss implementation results, and lessons (by 31 December 2008). 5. Continue to advise and assist in introducing institutional reforms and implementing the IWRM plan prepared in phase 1 (by 28 February 2009). 6. Document issues that arise and their resolution (by 28 February 2009). 7. Work with provincial officials to determine the legal and institutional changes needed for IWRM activities that require higher approvals (by 28 February 2009). 8. Consider how the results of the TA can be replicated in other parts of Guiyang, Guizhou Province, and the PRC, and make suitable proposals (by 28 February 2009). 	<p>Inputs</p> <p>ADB \$600,000</p> <ul style="list-style-type: none"> • Consultant services, 52 person-months: \$360,000 • International and local travel: \$35,000 • Reports, translation, and communications: \$20,000 • Workshops: \$45,000 • Training and Study Tours: \$80,000 • Administrative support: \$20,000 • Contingencies: \$40,000 <p>Government \$150,000</p> <ul style="list-style-type: none"> • Office accommodation and transport: \$60,000 • Counterpart staff costs: \$50,000 • Workshops: \$20,000 • Miscellaneous local expenses: \$20,000
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ADB = Asian Development Bank, IWRM = integrated water resources management, PMO = project management office, PRC = People's Republic of China, TA = technical assistance.

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COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Total Cost
A. Asian Development Bank (ADB) Financing^a	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants	240.0
ii. National Consultants	120.0
b. International and Local Travel	35.0
c. Reports, Translation, and Communications	20.0
2. Workshops	45.0
3. Training and Study Tours	80.0
4. Miscellaneous Administration and Support Costs	20.0
5. Contingencies	40.0
Subtotal (A)	600.0
B. Government Financing	
1. Office Accommodation and Transport	60.0
2. Remuneration and Per Diem of Counterpart Staff	50.0
3. Others ^b	40.0
Subtotal (B)	150.0
Total	750.0

^a Financed by ADB's technical assistance funding program.

^b Includes local costs of workshops (\$20,000), and other miscellaneous local expenses (\$20,000).

Source: ADB estimates.

TERMS OF REFERENCE FOR CONSULTANTS

A. General Approach

1. The technical assistance (TA) will involve the investigation of institutional reforms and capacity strengthening for related actions necessary to promote integrated water resources management (IWRM) in townships, counties, and municipalities. To this end, one local river catchment or subcatchment area lying wholly within Guiyang will be selected for detailed analysis and the implementation of pilot reforms based on IWRM principles, and institutional constraints on IWRM in the municipal government will be studied. In addition, the IWRM experience of the People's Republic of China (PRC) and other countries relevant to the situation in Guiyang will be documented and used in drafting IWRM-based reform proposals for the townships, counties, and municipalities.

2. The TA will be implemented in two phases. In the first phase, over 5 months, consultants will prepare detailed institutional reform proposals and an IWRM plan for implementation, and present these to Asian Development Bank (ADB), the municipal government, and local governments for consideration. After a 2-month break and approval of the proposals, the second phase will be conducted over 17 months, and consultants will support the trial implementation of the reforms, review their initial experiences, and document the lessons. Necessary adjustments in arrangements will be recommended in the light of experience. During the TA, three workshops will be held with international and national experts invited to impart IWRM principles, relate experiences from other cities and countries, and review the TA proposals and conclusions.

3. The TA will be implemented over a period of about 24 months, from March 2007 to February 2009. It will require 52 person-months of consulting services (12 person-months of international and 40 person-months national) as follows: (i) a project management specialist and economist/team leader (national) for 20 person-months, (ii) a water resources management specialist (international) for 12 person-months, and (iii) unallocated consulting inputs (national) for 20 person-months. The analysis done by the national team leader and international water resources management specialist in phase 1 will determine the specific requirements and specialties for the unallocated inputs; these are likely to include national expertise in institutional development and public awareness, community participation, agriculture and rural development, water tariffs and financial management, and water demand and economics.

B. Detailed Scope of Work

4. **Team Leader/Project Management Specialist/Economist** (20 person-months, national). The team leader will be a specialist in project management or economics, or both, with experience in water resources management and demonstrable international exposure to or knowledge of the practical application of IWRM principles and techniques. This consultant should preferably have dealt with water resources issues in southwest PRC and can use the English language at work. The team leader will be responsible for overall coordination of the TA assignment, and will have primary responsibility for preparing work programs, coordinating with the municipality and ADB, preparing reports and submitting them on time, organizing workshops, and facilitating stakeholder consultations. The main duties of the team leader are as follows:

- (i) Holding stakeholder discussions, reviewing past reports and related documents on local IWRM initiatives in Guiyang and Guizhou, and documenting opportunities and

- constraints; identifying gaps and barriers to developing an effective IWRM program for Guiyang and Guizhou Province.
- (ii) Initiating key discussions with the municipal government on:
 - (a) the selection of a suitable river catchment area for detailed investigation during the TA;
 - (b) specific issues to be addressed; and
 - (c) the consultants' work program and methodology.
 - (iii) Preparing a detailed work program for phase 1 of the TA, including arrangements for balanced participation by stakeholders (including women, indigenous peoples, and the poor), and including this program in the inception report.
 - (iv) Organizing and leading participatory problem tree analysis to fully understand the constraints on IWRM implementation in the townships, counties, and municipalities. The analysis should cover:
 - (a) institutional arrangements;
 - (b) water resources planning (including issues of economic viability and least-cost solutions);
 - (c) water allocation and shortages;
 - (d) water pricing (its effectiveness and impact on the poor);
 - (e) water user participation;
 - (f) water saving and improved economy in water use (by households and in irrigation and industry), and reduction of losses in urban water networks;
 - (g) prevention of water pollution; and
 - (h) public awareness.
 - (v) With the international water resources management specialist, and on the basis of the problem analysis, preparing a comprehensive strategy and detailed reform proposals for the progressive implementation of IWRM principles in townships, counties, and municipalities.
 - (vi) Preparing and coordinating delivery of a training plan for key officials of Guiyang Municipality who will be involved in the implementation of IWRM.
 - (vii) Estimating the resource requirements for implementation and identifying specific resource constraints.
 - (viii) Discussing with stakeholders, considering, and proposing means for monitoring IWRM implementation, issues resolution, and stakeholder participation during implementation.
 - (ix) Coordinating with township, county, and municipal stakeholders; advising and organizing support from the consulting team in introducing institutional reforms and implementing the IWRM plan; identifying specific requirements; and preparing detailed individual terms of reference for consultant inputs to be provided in phase 2.
 - (x) Documenting issues that arise during the initial implementation of the IWRM plan, and their resolution; highlighting unresolved problems according to agreed procedures.
 - (xi) On the basis of the implementation experience and in conjunction with other team members, reviewing the original IWRM strategy and planning and suggesting appropriate modifications.
 - (xii) Working with provincial officials to determine the legal and institutional changes needed for IWRM activities that require higher approvals.
 - (xiii) With other team members, considering how the results of the work can be replicated in other parts of Guiyang, Guizhou Province, and elsewhere in the PRC, and making suitable proposals.

5. **Water Resources Management Specialist** (12 person-months, international). The water resources management specialist will be able to demonstrate broad knowledge and familiarity with the practical application of IWRM principles in a number of international settings, and will have considerable institutional development experience and extensive work experience in developing countries, including the PRC. Specific skills and experience required include the analysis of catchment-based water systems, the development of catchment plans using participatory approaches, and the analysis and resolution of cross-sector issues, such as the interdependencies between agricultural reforms and water resources management. The water resources management specialist will act as the lead IWRM expert in the TA, drawing on and offering relevant international IWRM experience to solve water resources management problems identified in the study. The main specific duties of the water resources management specialist will be as follows:

- (i) Advising on the suitability criteria and selection of the pilot river catchment to be targeted for detailed study.
- (ii) Supporting the team leader in the analysis of previous studies, and in stakeholder consultations (including preparation of and participation in the workshops).
- (iii) Assisting the team leader in preparing work programs and reports, and in coordinating with the municipal government and with ADB.
- (iv) Conducting a detailed water resources systems analysis of the chosen catchment by defining the system, identifying its boundaries, identifying the functions, assessing water demand and supply in-depth and with temporal and special variations, looking at upstream and downstream issues and cross-border effects, and analyzing inter-sectoral trade-offs, cross-coordination, and interaction between potential projects.
- (v) Supporting the team leader in problem tree analysis.
- (vi) Supporting the team leader in preparation of the training plan for key officials in phase 1 and delivery of its various technical aspects in phase 2.
- (vii) With the team leader, preparing a broad IWRM plan for implementation over 3 to 5 years, and detailed IWRM actions for implementation in the first 17 months, specifying milestones and results to be achieved. This plan will indicate actions and responsibilities of township, county, and municipal governments. In undertaking this work, the water resources management specialist will be expected to draw on international experience in addressing similar problems.
- (viii) Advising the team leader on monitoring arrangements for IWRM strategy and plan implementation, including milestones, performance measures, and reporting systems; advising on the requirements for the unallocated consultant inputs to be provided in phase 2; and assisting with the preparation of detailed terms of reference.
- (ix) Providing specific support for the implementation of IWRM-based water resources management in phase 2, drawing on personal and international experience as required.
- (x) Assisting in the review of the original IWRM strategy and plan, and suggesting appropriate modifications.
- (xi) Working with provincial officials to determine the legal and institutional changes needed for IWRM activities that require higher approvals.
- (xii) Advising on how the work can be replicated in other parts of Guiyang, Guizhou Province, and the PRC, and make suitable proposals.

6. **Unallocated Inputs** (20 person-months, national). Other consultants will be hired in phase 2 to assist with the implementation of the institutional reforms and IWRM plan. The specific consulting inputs will be discussed at the first workshop, and detailed individual terms of reference

will be provided in the phase 1 report. Detailed analysis will be needed to precisely determine the requirements. However, at this point it is anticipated that the consultants will be:

- (i) Working with township, county, and municipal stakeholders in introducing institutional reforms and implementing the IWRM plan prepared in phase 1.
- (ii) Documenting issues that arise and their resolution.
- (iii) Reviewing the original IWRM strategy and plan, and suggesting appropriate modifications (including modifications in implementation arrangements and monitoring).
- (iv) Delivering components of the training plan for key officials involved in the implementation of IWRM.
- (v) Participating in workshops on IWRM principles and practice, and to discuss initial IWRM plan implementation results and lessons in the presence of ADB, invited international and national experts, and local stakeholders.
- (vi) Working with provincial officials to determine the legal and institutional changes needed for IWRM activities that require higher approvals.
- (vii) Considering how the work done under the TA and its results can be replicated in other parts of the municipality, Guizhou Province, and elsewhere in the PRC, and making suitable recommendations.

C. Reporting and Dissemination of Results

7. The consultants will be expected to prepare reports on institutional reform proposals, an IWRM plan for implementation, and a final report analyzing experiences gained in the process and incorporating lessons learned. The draft final and final reports will be written in a “toolkit” format to allow the TA work to be applied in other parts of Guizhou Province and the country. The following reporting schedule is envisaged:

- (i) **Inception report**, within 1 month of the consultants’ mobilization, describing the work plan and the selection of the pilot catchment or sub-catchment area, and identifying any unresolved issues.
- (ii) **Interim progress report**, 3 months after mobilization, giving an account of progress, preliminary results of analyses, and issues that have arisen and proposals for their resolution.
- (iii) **Phase 1 report and IWRM plan**, 5 months after mobilization, including the results of the analyses and detailed proposals for IWRM implementation, including a training plan for key officials to be involved in IWRM implementation, as well as feedback from the municipal government, ADB, and other stakeholders regarding the proposals presented at the first workshop. The acceptance of this report will signal the start of phase 2 of the implementation of the IWRM plan.
- (iv) **Implementation progress reports**, at the end of every 3 months in phase 2 (four reports in all), giving updates on IWRM plan implementation progress, issues that have arisen, and proposals for their resolution.
- (v) **Draft final report**, 15 months after the start of phase 2, documenting in full the results of the TA, the lessons learned, and an action plan for further steps in the implementation of IWRM.
- (vi) **Final report**, 17 months after the start of phase 2, incorporating feedback from stakeholders on the contents of the draft final report.