People’s Republic of China: Managing the Water Resources of Boyang Lake
(Cofinanced by the Climate Change Fund)
CURRENCY EQUIVALENTS
(as of 18 August 2011)

Currency Unit – yuan (CNY)
CNY1.00 = $0.1566
$1.00 = CNY6.3872

ABBREVIATIONS

ADB – Asian Development Bank
PDRC – Provincial Development and Reform Commission
PRC – People’s Republic of China
TA – technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Type – Policy and advisory technical assistance (PATA)
Targeting classification – General intervention
Sector (subsector) – Agriculture and natural resources (water-based natural resources management)
Themes (subthemes) – Environmental sustainability (natural resources conservation); economic growth (knowledge, science, and technological capacities); capacity development (institutional development)
Climate change – Climate change adaptation
Location impact – Rural (medium), urban (medium), and national (medium)

NOTE

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

| Vice-President | B. N. Lohani, Vice-President-in-Charge, Operations 2 |
| Director General | K. Gerhaeusser, East Asia Department (EARD) |
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| | Q. Zhang, Principal Water Resources Specialist, EARD |

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I. INTRODUCTION

1. During an Asian Development Bank (ADB) country program mission to the People’s Republic of China (PRC) in December 2010, the government asked ADB to provide a policy and advisory technical assistance (TA) to improve management and protection of the water resources of Boyang Lake.¹ The TA is in the PRC’s COBP 2011–2013. The TA is consistent with the focus of ADB’s country partnership strategy for the PRC and ADB’s Strategy 2020,² which supports the strengthening of institutional capacity to protect the environment, mitigate climate change effects, and promote environmentally sustainable and inclusive economic growth. During an ADB mission on 12–16 April 2011 to prepare the TA report, the government concurred with the impact, outcome, outputs, implementation arrangements, cost, financing arrangements, and terms of reference for consultants. The TA design and monitoring framework is in Appendix 1.³

II. ISSUES

2. The limited availability and declining quality of water have become constraints to economic growth in the PRC. The government’s no. 1 document of 2011⁴ focuses on reforms and development in water conservancy. It emphasizes the importance of implementing the government’s Comprehensive National Water Resource Plan issued in December 2010. The size and strategic ecological importance of Boyang Lake make it key to these efforts. It is the country’s largest freshwater lake. With a watershed area of 162,200 square kilometers in Jiangxi province, it discharges 145 billion cubic meters of fresh water into the Yangtze River each year, or about 15.6% of total runoff. The regular flow and quality of the waters of Boyang Lake affect economic development, livelihoods, and health not only in Jiangxi but also in the vast downstream region of the PRC through which the Yangtze flows. Boyang Lake is also an important habitat for migratory birds and is listed under the Ramsar Convention as an internationally important wetland. Keeping the lake’s ecosystem healthy is critical to the protection of the global environment and global biodiversity. On 12 December 2009, the State Council of the PRC approved the plan, Ecological Economic Zone Planning for Boyang Lake, as a national strategy. This TA will support this planning effort, which is also a priority under Jiangxi province’s Twelfth Five Year Plan, by developing a strategic framework to protect the water resources and ecosystem of Boyang Lake.

3. Growing pollution. Water quality and water flow in Boyang face several man-made and natural threats. The discharge of wastewater from cities and industries into the lake and its major tributaries have deteriorated water quality and caused eutrophication. Although some urban areas and industrial parks have established solid waste collection stations and wastewater treatment plants, many urban areas still have no solid waste and wastewater treatment facilities. Monitoring data show that water quality in the lake and its tributaries has been deteriorating since early 2000s. Major pollutants include phosphorus, nitrates and nitrites, hydrocarbons, and fecal coliform bacteria.

4. Poor monitoring. A lack of proper monitoring stations, staff skills, and resources has made management of water resources and ecosystem in Jiangxi difficult. The province has 150 national and provincial water quality monitoring stations on rivers and 25 on lakes. Water quality monitoring stations are not always coinciding with water flow monitoring stations because of lack of coordination among various departments, which makes water quality projections and pollution control modeling difficult. Because monitoring stations are not online, no early warning system exists for water pollution emergencies. Monitoring information is maintained by the Jiangxi provincial department of environment but is not easily accessible by outsiders. The Jiangxi provincial department of agriculture

¹ The original title was Water Resources Ecosystem Protection of Yangtze River and Boyang Lake.
³ The TA first appeared in the business opportunities section of ADB’s website on 9 June 2011.
⁴ This document is the first government document issued in each year to prioritize governmental policies and strategies for the coming year.
is responsible for monitoring irrigation water quality, nonpoint source pollution, wastewater and solid waste management in rural areas, and biodiversity of lakes and reservoirs but rural monitoring is not carried out regularly and data is also difficult for other departments to access. Although most industrial and urban wastewater treatment plants in the province self-monitor regularly and the resulting data can be viewed online, this area of water resource and quality management still faces many problems, including (i) too few monitoring stations, compared with the large number of rivers and lakes and the existing and expected industrial and urban wastewater treatment plants; (ii) inefficient and infrequent monitoring, which must be done manually; (iii) a lack of monitoring capacity at city and county levels; and (iv) inadequate planning for industrial park wastewater treatment plants.

5. **Declining water levels.** Unusual changes in the water levels of Boyang Lake since 2004 have caused uncertainty in water resource management. Water levels have dropped to record lows during dry seasons and the wetland areas have been shrinking. This has changed land and vegetation cover, affected human settlements, threatened biodiversity, and damaged the habitats of migratory birds. These changes may be due to extreme weather events. A Ramsar report in 2010\(^5\) noted that Boyang Lake had undergone several cycles of drying and flooding during the history of human settlement in response to medium-term climate cycles. Research in 2007 showed that a cycle could last 11, 22, or 30 years and would have strong temporary impacts on the wetland ecosystem and the watershed landscape. The effects of this climatic variability and how they relate to land and water management across the watershed require further investigation. This heightens the need to improve the inefficient water resources management framework in Jiangxi province, which suffers from weak capacity in strategic planning and implementation and poor coordination among the provincial departments of environmental protection, construction, agriculture, and forestry.

6. Jiangxi, two-thirds of which is hilly or mountainous, is an impoverished province. The provincial gross domestic product per capita was CNY17,300 in 2009, one-third less than the national average. About 5% of the population still lives below the national rural poverty income line of CNY1,196 a year. The protection of the water resources of Boyang Lake will support the province’s economic growth, protect its ecosystem, and improve quality of life and livelihoods, especially for poor rural households. It will also safeguard the water security of cities downstream on the Yangtze River.

7. ADB has been supporting water resources management and biodiversity protection in the PRC for 2 decades through lending and TA. This has included assistance for forest ecosystem rehabilitation in Jiangxi province, reducing flood damages and economic losses in Hunan and the Yellow River Basin, and improving water quality improvement and wetland protection in the Hai River Estuary, Jiaozhou Bay, and Jiangsu Yancheng. To strengthen the government’s capacity to manage water resources, ADB has been supporting integrated water resource management strategies in Qingdao, Guiyang, and Chao Lake.\(^6\) This assistance has established the concept and practices of

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integrated water resource management in project provinces and policies on payment for ecological services are being developed. It has also introduced knowledge on how to adapt to climate change.

8. The establishment through the TA of a water resource management framework and improvement of the provincial government’s ability to manage the water resources of Boyang Lake will ensure the sustainability of ongoing ADB investment projects in forest ecosystem rehabilitation and urban infrastructure improvement in the province. The knowledge gained from the TA will benefit watershed management of other lakes in the PRC, such as Tai Lake and Dongting Lake, and in other developing countries.

III. THE TECHNICAL ASSISTANCE

9. The TA will help the Jiangxi provincial government (i) prepare a strategic framework to improve the management of the water resources of Boyang Lake and mainstream climate change risk management in water resource management policies and practices, and (ii) improve its institutional capacity in water resource management and climate change risk management. By doing so, the TA aims to address following challenges in the management of water resources of Boyang Lake: (i) the increasing discharge of pollutants into the lake and its tributaries, (ii) an underdeveloped water quality monitoring network and database, (iii) the risks posed to water resources management by climate change, and (iv) a weak institutional framework for water resources management in Jiangxi province.

A. Impact and Outcome

10. After completion of the TA, the Jiangxi government will implement a strategic policy framework to reduce the amount of pollution discharged into Boyang Lake and the Gan, Fu, Xin, Rao, and Xiu rivers. The expected impact will be improved management of water resources in Jiangxi province. The water quality will be maintained at or above class III standard at 90% of the monitoring stations on the five rivers and Boyang Lake by 2020, compared with 80% in 2010. The outcome of the TA will be an improved strategic framework for water resource management for Boyang Lake. Government officials will increase their knowledge and skills for managing the water resources and protecting the ecosystem of Boyang Lake.

B. Methodology and Key Activities

11. The TA will (i) collect secondary data and related reports to assess the strengths and weaknesses of the existing institutional framework and capacity and the implementation strategies and policies related to the management of the water resources of Boyang Lake and its main tributaries, (ii) conduct stakeholder participatory consultations and desk reviews to identify areas for improvement in the management of these water resources, (iii) carry out analyses or modeling based on historical data to prepare water pollution control measures and climate change risk management strategies, (iv) undertake training workshops and study tours to improve institutional capacity for water resource management, and (v) prepare reports and a knowledge product to showcase the establishment of water resource management and land use strategies for a lake catchment and the integration of climate change risk management and adaptation measures into lake watershed management. Key activities to be carried out under the TA are described below.

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8The related reports may include but will not be limited to: National Development and Reform Commission. 2009. Poyang Lake Ecological Economic Policy. Beijing.
12. **Output 1: Strategic policies on water resource and climate change risk management for Boyang Lake.** The TA will (i) assess the strengths and weaknesses of the existing institutional framework, institutional capacity, and land use strategies and policies in protected watersheds, and of activities related to management of the water resources of Boyang Lake and its main tributaries; (ii) examine major water resource and ecosystem protection studies and investment projects related to Boyang Lake to ensure the integrity of the TA results with the existing and future projects; (iii) identify policies, strategies, and opportunities for improving water resource and ecosystem management for Boyang Lake, including an institutional framework, and climate change risk management and eco-compensation measurements; (iv) analyze and propose land use zoning requirements and livelihood improvement measures for selected protected watersheds; (v) draft short- and medium-term policies and strategies to improve water resource management for Boyang Lake; (vi) conduct stakeholder consultations to discuss the draft policy strategic policies; and (vii) present a draft policy framework at the final workshop.

13. **Output 2: Policies and strategies on urbanization and industrialization in Boyang Lake Watershed.** The TA will (i) evaluate the process and potential issues of the industrialization and urbanization of Boyang Lake catchment; (ii) assess the carrying capacity of Boyang Lake, water resources availability and impacts of urbanization and industrialization on water resources in Boyang Lake watershed, and the associated constraints on urban and industrial development in Boyang watershed; (iii) based on the assessment results of the second item, propose sustainable development modes of industrialization and urbanization for Boyang Lake, such as an ecological city cluster, or an environment-friendly industrial system; (iv) prepare a policy framework for industrialization and urbanization for Boyang watershed considering water resource constraints; and (v) present the draft and final policy framework in workshops to collect feedback on the policy framework.

14. **Output 3: Pollution control and water quality management measures for Boyang Lake catchment.** The TA will (i) identify the shortcomings of the current water pollution control strategies, the water quality monitoring network, and the water quality database, and measures for improvements; (ii) carry out sensitivity analyses or modeling to identify the impact of climate change on water resource management and prepare climate change risk management strategies for watershed management; (iii) develop water pollution control measures and recommendations for water resource management in the Boyang Lake watershed; (iv) prepare an improved water quality monitoring network and data sharing strategy, including investment needs; (v) draft a strategic framework for water pollution control and ecosystem management measures; and (vi) present the draft framework to stakeholders at the final workshop.

15. **Output 4: Improved knowledge and skills for provincial officials through training in managing lake and watershed and climate change risks.** The TA will (i) conduct a needs assessment and prepare training courses for water resource protection and climate change risk management; (ii) conduct training courses to improve provincial officials’ knowledge and skills of watershed management and climate change risks management; (iii) conduct domestic training tours for the exchange of knowledge and experience in water resource and ecosystem management with other provinces; (iv) organize two overseas training tours on watershed management for selected provincial officials; (v) prepare a final TA report, with subreports on the results of the TA substudies; (vi) prepare a knowledge product on water resource management for Boyang Lake; and (vii) publish and disseminate the knowledge product in a workshop and on the government and ADB websites.

**C. Cost and Financing**

16. The total cost of the TA is estimated at $1,500,000. Of this total, $200,000 will be financed on a grant basis by ADB’s Technical Assistance Special Fund (TASF-other sources) and $800,000 by
the Climate Change Fund. The government will finance the equivalent of the remaining $500,000 through in-kind contribution, which will include (i) counterpart staff remuneration and travel expenses; (ii) logistic support in arranging workshops, a conference, and study tours; (iii) local transport to project sites; and (iv) a fully functional office space for consultants, with free water supply, utilities, free access to internet, and photocopying. The cost estimates and financing plan are in Appendix 2.

D. Implementation Arrangements

17. The Jiangxi provincial government will establish a TA lead group to be chaired by a deputy director general in charge of planning. The group will comprise high-level officials from the Provincial Development and Reform Commission, which will be the executing agency, and the provincial departments of agriculture, construction, environmental protection, land resources, finance, and water resources. It will provide policy and strategy guidance during the TA implementation. A TA implementing office will be established in the planning division of the Provincial Development and Reform Commission to administer the day-to-day TA activities.

18. The TA is tentatively scheduled for implementation from November 2011 to April 2013. The TA activities will be undertaken by a consulting firm. It is estimated that 57 person-months of consulting services will be required, comprising 17 person-months of and 40 person-months of national. The outline terms of reference for consulting services are in Appendix 3. The consultants will include an international watershed management specialist and team leader, an international climate change specialist, an international environmental economist, a national water resource management specialist, a national social development specialist, a national water pollution control and monitoring specialist, a national land use management specialist, a national geographic information system specialist, and a national institutional development specialist. Resource persons may be invited to participate in training or a national conference.

19. The consulting firm will be recruited following ADB’s Guidelines for the Use of Consultants (2010, as amended from time to time), using quality- and cost-based selection criteria, with a quality–cost ratio of 80:20, and simplified technical proposal procedures. Equipment will be purchased following ADB’s Procurement Guidelines (2010, as amended from time to time), and will be turned over to the executing agency upon TA completion. The proceeds of the TA will be disbursed following ADB’s Technical Assistance Disbursement Handbook (2010, as amended from time to time). An advance payment facility may be set up for training, survey, or mapping that may be implemented by the executing agency.

20. The TA findings and outputs, including the knowledge product, will be presented during a national workshop and posted on the ADB and Jiangxi provincial government websites to be shared with national and international stakeholders.

IV. THE PRESIDENT’S DECISION

21. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of $1,000,000 on a grant basis to the People’s Republic of China for Managing the Water Resources of Boyang Lake, and hereby reports this action to the Board.

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*Established by ADB. The Climate Change Steering Committee approved $800,000 to finance the TA on 14 July 2011.*
## DESIGN AND MONITORING FRAMEWORK

<table>
<thead>
<tr>
<th>Design Summary</th>
<th>Performance Targets and Indicators with Baselines</th>
<th>Data Sources and Reporting Mechanisms</th>
<th>Assumptions and Risks</th>
</tr>
</thead>
</table>
| **Impact**    | Improved management of water resources in Jiangxi province | By 2017, water quality at 90% of monitoring stations on Boyang Lake, and Gan, Fu, Xin, Rao, and Xiu rivers meet class III water quality standard, compared with 80% in 2010 | Jiangxi provincial government annual water quality monitoring reports | Assumptions
Jiangxi provincial government adopts the strategic policy developed under the TA.
Jiangxi provincial government allocates appropriate budget and resources for the long-term implementation of the strategic policy. |
| **Outcome**   | An improved strategic framework for water resource management for Boyang Lake | By end of 2012, the Jiangxi provincial government endorses the proposed strategic framework for water resource and ecosystem management for Boyang Lake. | Executing agency’s comments on the strategic framework during the final review workshop | Assumptions
Stakeholders are committed to implementing the strategic framework.
Water quality data are shared and used by stakeholders.
Jiangxi provincial officials apply knowledge and skills acquired from the TA to water resource management for Boyang Lake. |
| **Outputs**   | 1. Strategic policies on water resource and climate change risk management for Boyang Lake | Land use zoning criteria submitted by month 5
Climate change risk management strategy submitted by month 8
Draft strategies submitted by month 9
Strategic policy finalized in month 12 | Stakeholders’ comments on the draft policy, as documented in minutes of consultation meetings and workshops | Assumptions
Stakeholders participate in the preparation process of the policy framework.
Government provides counterpart resources in a timely manner.
Background information and data are complete. |
|               | 2. Policies and strategies on urbanization and industrialization in Boyang Lake watershed | Assessment report on issues and opportunities submitted by month 3
Draft policies and strategies on urbanization and industrialization | Stakeholders’ comments on the draft institutional framework, as documented in minutes of consultation meetings and workshops | Risks
Provincial departments do not coordinate with each other. |
### Design Summary

#### Performance Targets and Indicators with Baselines
- Submitted by month 7
- Policies and strategies finalized by month 9

#### Data Sources and Reporting Mechanisms
- Stakeholders’ comments on the management and control measures, as documented in minutes of consultation meetings and workshops
- Jiangxi provincial government plan on water quality database improvement

#### Assumptions and Risks
- Trained officials leave government posts.

### 3. Pollution control and water quality management measures for Boyang Lake catchment
- Assessment report on water quality monitoring database submitted by month 3
- Water quality database structure submitted by month 6
- Action plan for climate change risk management for watershed management submitted by month 9

### 4. Improved knowledge and skills for provincial officials through training in managing lake and watershed and climate change risks
- Three training workshops conducted by month 10
- Two international study tours conducted by month 8
- A knowledge product on water resource protection and climate change risk management strategies for Boyang Lake prepared by month 13

### Activities with Milestones

#### 1. Strategic policies on water resource and climate change risk management for Boyang Lake
1.1. Assess policies, strategies, and opportunities for Boyang Lake water resource and ecosystem management, such as eco-compensation, by month 2
1.2. Analyze and propose land use zoning requirements and livelihood improvement measures for protected watershed by month 5
1.3. Draft an outline of policy and a draft policy on water resource management for Boyang Lake by month 9
1.4. Conduct consultations during inception and interim workshops to discuss the draft policy outline and draft policy by month 10
1.5. Present a draft policy framework at the final workshop by month 11

#### 2. Policies and strategies on urbanization and industrialization in Boyang Lake watershed
2.1. Review issues and constraints of urbanization and industrialization in Boyang Lake watershed by month 3

### Inputs

**ADB:** $1,000,000

(TASF-other sources, $200,000; Climate Change Fund: $800,000)

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<th>Item</th>
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<td>Miscellaneous support</td>
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<td>Contract negotiations</td>
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<td>Contingencies</td>
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</table>

**Government:** $500,000
2.2. Prepare a draft policy and strategies on urbanization and industrialization in Boyang Lake watershed by month 7
2.3. Conduct stakeholder consultations on the urbanization and industrialization strategies by month 8
2.4. Present the draft strategies at the final workshop by month 11

3. Pollution control and water quality management measures for Boyang Lake catchment
3.1. Identify shortcomings in current water pollution control strategies and water quality database, and measures to improve the weaknesses by month 3
3.2. Develop climate change risk management strategies for water resource protection by month 9
3.3. Prepare an improved water quality monitoring network and data sharing strategy by month 9
3.4. Draft a framework of water pollution control and ecosystem management measures by month 10
3.5. Present the draft framework to stakeholders at the final workshop by month 11

4. Improved knowledge and skills for provincial officials through training in managing lake and watershed climate change risks
4.1. Conduct a needs assessment and prepare training courses for water resource protection and climate change risk management by month 4
4.2. Conduct two overseas training tours on watershed management by month 8
4.3. Conduct domestic training tours by month 10
4.4. Conduct training courses on watershed management by month 9
4.5. Prepare a final TA report, with subreports on the results of the above TA studies by month 12
4.6. Prepare a knowledge product on water resource management for Boyang Lake by month 13

<table>
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<th>Item</th>
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<td>Logistic support and data provision</td>
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ADB = Asian Development Bank, TA = technical assistance, TASF = Technical Assistance Special Fund
Source: Asian Development Bank
## COST ESTIMATES AND FINANCING PLAN

($'000)

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<td>ii. National consultants</td>
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<td>b. International and local travel</td>
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<td>c. Reports and communications</td>
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<td>2. Equipment&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>3. Training, seminars, and conferences</td>
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<td>b. Overseas training</td>
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<td>4. Surveys and mapping</td>
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<td>5. Miscellaneous administration and support costs&lt;sup&gt;c&lt;/sup&gt;</td>
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<td><strong>Total</strong></td>
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<sup>a</sup> Financed by the Technical Assistance Special Fund (TASF-other sources, $200,000) and the Climate Change Fund ($800,000).

<sup>b</sup> Including a computer and an overhead projector, which will be turned over to the executing agency upon completion of the technical assistance.

<sup>c</sup> Including a translator of 12 person-months for oral and document translation, publication, and dissemination.

Source: Asian Development Bank estimates.
OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The consulting services for the technical assistance (TA) for Managing the Water Resources of Boyang Lake will be required from December 2011 to December 2012. A consulting firm will be engaged by the Asian Development Bank (ADB) in compliance with ADB’s Guidelines on the Use of Consultants (2010, as amended from time to time) and using quality- and cost-based selection criteria, with a quality–cost ratio of 80:20, and simplified technical proposal procedures.

A. Required Expertise

2. The TA will require a consulting firm to provide a team of international and national consultants to deliver a total of 57 person-months of consulting services. The international consultants will comprise (i) a watershed management specialist and team leader (8 person-months), (ii) an environmental economist (4 person-months), and (iii) a climate change adaptation specialist (5 person-months). The national consultants will include (iv) a water resource management specialist and deputy team leader (11 person-months), (v) a social development specialist (7 person-months), (vi) a land use management specialist (6 person-months), (vii) a wetland management specialist (5 person-months), (viii) a geographic information system specialist (5 person-months), and (ix) an urban development specialist (6 person-months).

3. Team leader. The team leader will have at least a master’s degree related to environmental engineering, environmental science, or watershed management, and at least 15 years of work experience in water resources management and water pollution control. A postgraduate degree would be desirable. The team leader will also have field experience as a team leader for managing projects financed by international organizations in developing countries. The team leader will (i) prepare a detailed work plan and tasks for the consultant team, (ii) supervise and control the quality of the team’s outputs, (iii) ensure the timely delivery of the outputs, and (iv) prepare and deliver progress and final reports, and a knowledge product, with the inputs from the team members and the assistance of the deputy team leader.

4. Deputy team leader. The deputy team leader will have a master’s degree related to water resources management, environmental science, or environmental engineering. A postgraduate degree is desirable. The deputy team leader will also have at least 15 years of work experience in water pollution control, water quality monitoring, watershed management, or lake and river ecosystem management. The deputy team leader will have work experience on projects financed by international organizations.

5. Remaining team members. The other team members will each have a bachelor’s or master’s degrees and work experience related to their respective assignments in environmental economics, climate change adaptation, limnology, urban and industry development, land use zoning and management, water pollution control and monitoring, geographic information system, poverty reduction and social development, stakeholder consultation, and capacity development. The team leader will be responsible for the preparation of detailed task assignments and deliverables for each consultant during the inception stage. Table A3 indicates the distribution of the consultant team consultants’ responsibilities by the TA outputs.
Table A3: Responsibilities of Firm Consultants by Outputs

<table>
<thead>
<tr>
<th>Consultant</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Output 3</th>
<th>Output 4</th>
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<tbody>
<tr>
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<td>Environmental economist</td>
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<td>Climate change adaptation</td>
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<td>Water pollution control specialist and/or deputy team leader</td>
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<td>Urban development specialist</td>
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<td>Land use management specialist</td>
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<td>Social development specialist</td>
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<tr>
<td>Wetland management specialist</td>
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<td>Geographic information system specialist</td>
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*a The outputs will be: output 1: Strategic policies on water resource and climate change risk management for Boyang Lake, output 2: Policies and strategies on urbanization and industrialization in Boyang Lake watershed, output 3: Pollution control and water quality management measures for Boyang Lake catchment, and output 4: Improved knowledge and skills for provincial officials through training in managing the lake and watershed and climate change risks.

B. Major Consultant Firm Activities

1. Strategic Policies on Water Resource and Climate Change Risk Management for Boyang Lake

6. The team leader and deputy team leader will assess the status of water use, water quality, and the ecosystem management of Boyang Lake and identify causes of problems. The two consultants, with the inputs from other consultants, will assess the strengths and weaknesses of current policies and strategies on managing the lake’s watershed, including but not be limited to those related to water pollution control, ecosystem protection, land use management, water uses, industrial development, the Jiangxi provincial government’s Twelfth Five-Year Plan, and the institutional aspect of Boyang Lake management. The team leader will organize a consultation workshop during the inception stage to collect stakeholders’ views on the issues and opportunities for improving the management of Boyang Lake. The consultant team may draw lessons on ADB’s technical support and lending activities related to watershed management and wetland protection in PRC and other developing countries. The consultant team will also review other reference materials related to water resource management of Boyang Lake and its major tributaries to learn from projects funded by other donors.
7. The consultant team will identify opportunities to improve the strategies for managing Boyang Lake, and resources required to implement the strategies. It will assess the possibility of introducing the payment for ecological services approach or eco-compensation to Boyang Lake management and the mechanism for doing so. The consultant team will assess the current land use policies, as they affect watershed protection, and land use zoning practices. It will propose land use zoning criteria based on the goals of watershed protection and livelihood improvement. It will select two protected watersheds and demonstrate the application of the land use zoning criteria and land use control activities in the two selected watersheds.

8. The consultant team will assess the strengths and weaknesses of the current institutional framework for managing the water resources, water quality, and ecosystem of Boyang Lake and explore opportunities to streamline institutional functions, improve coordination among agencies, strengthen the roles and responsibilities of agencies, and improve the capacity for effective watershed management for Boyang Lake. The consultant team will prepare a draft report on the institutional framework for the management of Boyang Lake’s water resources and ecosystem and present it in a stakeholder workshop.

9. The consultant team will assess issues and opportunities in social development in the two protected watersheds and develop strategies to improve livelihoods in the protected watershed, which will be included in the strategic policy on water resource management and ecosystem protection for Boyang Lake.

10. The consultant team will prepare a draft strategic policy on water resource management and ecosystem protection for Boyang Lake and its watershed. The strategic policy should include but not be limited to a short-term and a long-term strategy on water uses, point- and nonpoint sources pollution control and monitoring, ecosystem management, land use management in protected watershed areas, institutional framework, capacity development, investment opportunities, budget estimates, and an implementation plan.

11. The consultant team will prepare maps showing (i) existing and future water pollution sources that would affect water resource and ecosystem protection in the watershed of Boyang Lake, (ii) current and planned wastewater treatment plants and solid waste treatment sites, (iii) current and planned water quality and river flow monitoring stations, (iv) sensitive wetland and ecological systems, (v) water pollution hotspots and soil erosion areas, (vi) land use zones, and (vii) other development sites or facilities related to water resource management. The maps will be used to supplement the preparation of the strategic policy.

12. The consultant team will present the draft strategies in an interim workshop and collect comments to refine the strategies.

2. Policies and Strategies on Industrialization and Urbanization in Boyang Lake Watershed

13. The urban development specialist and the land use management specialist, in consultation with the team leader and deputy team leader, will (i) evaluate the process and potential issues of the industrialization and urbanization of Boyang Lake catchment; (ii) assess the carrying capacity of Boyang Lake, water resources availability and impacts of urbanization and industrialization on water resources in Boyang Lake watershed, and the associated constraints on urban and industrial development in Boyang Lake watershed; (iii) based on the assessment results of the second item, propose sustainable development modes of industrialization and urbanization for Boyang Lake, such as an ecological city cluster, or an
environmental friendly industrial system; (iv) prepare a policy framework for industrialization and urbanization for Boyang watershed considering water resource constraints; (v) present the draft and final policy framework in workshops to collect feedback on the policy framework.

3. **Pollution Control and Water Quality Management Measures for Boyang Lake Catchment**

14. The consultant team will assess the current water quality and quantity problems, the effectiveness of existing water pollution control measures and the water quality monitoring system, and the completeness of the water quality database. It will identify major pollution sources, including industrial, municipal, agricultural, and other nonpoint sources, as well as future pollution trends based on land use and industrial development policies in the Boyang Lake watershed. It will propose strategies to improve the water pollution monitoring system, the structure of the water quality database, and water pollution control measures.

15. The consultant team will review and analyze extreme weather events in recent years and their impacts on river and lake water flows, water quality, wetland ecosystems, and human settlements. It will analyze the impacts of climatic variations on upstream watersheds on the water volume and water quality of Boyang Lake and its major tributaries and on human settlements, and prepare adaptation measures to mitigate these impacts. The analysis may include a rainfall and runoff variability analysis, vulnerability mapping of the watershed and human settlements during drought or floods, sensitivity analysis of water quality under various water availability scenarios, and assessment of potential incidences of algal blooms under different water level scenarios. The adaption measures may include the preparation of strategies—e.g., development of an early warning system for water pollution control, ecosystem protection, and evacuation under extreme weather conditions.

16. The consultant team will organize a training workshop to improve institutional capacity for water resource management of Boyang Lake. It will prepare an action plan to manage climate change impacts on the water resources and wetland systems of Boyang Lake and its tributaries.

17. The consultant team will conduct a stakeholder consultation workshop to collect comments and recommendations on the proposed strategies. It will incorporate the comments and recommendations in the final strategies on water pollution control and ecosystem management. The final strategies shall include but not be limited to short-term and long-term strategies on water pollution control in Jiangxi province, land use strategies in protected watersheds of Boyang Lake, a wastewater collection and treatment plan for Jiangxi province, a plan to establish a water quality database and pollution monitoring strategies in Jiangxi province, climate change risk management measures for Boyang Lake watershed management, and a capacity development plan for water resource management for Boyang Lake. The strategies will also include an estimate of budget and resources required and an implementation plan.

4. **Improved Knowledge and Skills for Provincial Officials through Training in Managing Lake and Watershed Climate Change Risks**

18. The consultant team will conduct a needs assessment and prepare training materials for water resource management and wetland ecosystem protection for Jiangxi province.
19. The consultant team will organize training courses on watershed management for provincial government officials. Training will include best practices on water pollution control and monitoring, climate change risk management, payment for eco-services, institutional development, and wetlands management.

20. The consultant team will select successful appropriate lake rehabilitation cases in the People’s Republic of China and organize two or three domestic training tours for Jiangxi provincial officials to learn from these cases effective strategies in lake protection and watershed management. The Jiangxi provincial government will assist in coordinating with host agencies.

21. The consultant team will organize two overseas training tours on watershed management for selected Jiangxi provincial officials.

22. The consultant team will organize a national conference, with the executing agency’s logistic support, to present the TA study results. The consultant team will help the executing agency invite national experts to exchange knowledge on lake and watershed management.

23. The consultant team will draft an outline of a knowledge product publication for discussion during interim review and prepare the knowledge product based on the TA results. The knowledge product will compile the TA results into a case study to showcase the development of the strategic framework for water resource management for Boyang Lake. The knowledge product will describe the issues and challenges of water resource management for Boyang Lake, the institutional framework needed for the water resources management, and strategic policies such as water pollution control, water quality monitoring, land use management, payment for services of ecosystem, and the integration of climate change risk management in water resource management.

24. The knowledge product will be prepared in both English and Chinese language version in a CD-ROM and in hard copies. The knowledge product will be published for dissemination and will be posted on both the government’s and ADB’s websites.

5. **Review Workshops and Deliverables**

25. The consultant firm will organize an inception, an interim, and a final workshop for the executing agency, ADB, and stakeholders to review the consultant team’s outputs. Consultation workshops can be conducted to coincide with the review workshops, as appropriate. The consultant firm will submit to the executing agency and ADB an electronic copy and a hard copy of the inception (month 2), interim (month 7), final reports (month 12), and of each subreport. The draft knowledge product will be submitted in month 11 and the final product in month 13. The delivery schedule is tentative and will be confirmed in the consultant firm’s workplan to be prepared in month one.