



# Technical Assistance Report

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Project Number: 40687  
September 2008

## People's Republic of China: River Basin Water Resources Allocation and Management Policy (Cofinanced by the Multi-Donor Trust Fund for the Water Financing Partnership Facility)

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 31 August 2008)

|               |   |            |
|---------------|---|------------|
| Currency Unit | – | yuan (CNY) |
| CNY1.00       | = | \$0.14609  |
| \$1.00        | = | CNY6.84520 |

## ABBREVIATIONS

|                |   |  |
|----------------|---|--|
| ADB            | – | Asian Development Bank                     |
| DFID           | – | Department for International Development   |
| DMC            | – | developing member country                  |
| IWRM           | – | integrated water resource management       |
| m <sup>3</sup> | – | cubic meter                                |
| MWR            | – | Ministry of Water Resources                |
| NARBO          | – | Network of Asian River Basin Organizations |
| PRC            | – | People's Republic of China                 |
| TA             | – | technical assistance                       |

## TECHNICAL ASSISTANCE CLASSIFICATION

|                       |   |  |
|-----------------------|---|--|
| <b>Targeting</b>      | – | General intervention   |
| <b>Classification</b> |   |  |
| <b>Sector</b>         | – | Agriculture and natural resources  |
| <b>Subsector</b>      | – | Water resource management  |
| <b>Themes</b>         | – | Environmental sustainability, capacity development                                   |
| <b>Subthemes</b>      | – | Natural resource conservation, institutional development, organizational development |

## NOTE

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

|                         |   |
|-------------------------|---|
| <b>Vice-President</b>   | C. Lawrence Greenwood Jr., Operations Group 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>      | Y. Zhou, Water Resources Management Specialist, EARD                      |
| <b>Team member</b>      | X. Peng, Principal Counsel, Office of the General Counsel                 |

## I. INTRODUCTION

1. During the Country Programming Mission conducted in December 2007, the Government of the People's Republic of China (PRC) requested the Asian Development Bank (ADB) to provide technical assistance (TA) to help the Government develop a comprehensive framework for a river basin water resources allocation and management policy.<sup>1</sup> This was included in the 2008 pipeline as a firm TA project. In March 2008, an ADB mission visited the PRC and reached an understanding with the Government on the TA impact, outcome, outputs, cost estimates, financing plan, implementation arrangements, and consultants' terms of reference. The TA design and monitoring framework is in Appendix 1.

## II. ISSUES

2. The total available water resources in the PRC are estimated at about 2,841 billion cubic meters (m<sup>3</sup>) per annum. Water availability per capita decreased from 2,250 m<sup>3</sup> in 2000 to 2,150 m<sup>3</sup> in 2006; this is expected to decrease further to 1,870 m<sup>3</sup> by 2030 when the population is forecast to be 1.52 billion. Continuing population growth and rapid economic development have increased water use per capita and competition among potential water uses while aquifers are becoming depleted, water pollution is rising, and the ecosystem and environment are being degraded.

3. Total water usage increased from 553.0 billion m<sup>3</sup> in 2000 to 579.5 billion m<sup>3</sup> in 2006—agricultural and other rural uses account for 63.2%, industrial use 23.2%, urban use 12.0%, and environmental and other uses 1.6%. Along with the need to meet increasing water demand, adequate flows need to be maintained in rivers to protect the environment and ecosystem. Given the rising urban and industrial demand for water, the share of irrigation water use is likely to decrease further. However, because of the political and social importance of food security in the PRC, ensuring that there is enough water for agriculture remains a government priority. Thus, more attention needs to be given to improving the efficiency of agricultural water use.

4. Large annual and inter-annual variations plus continuous dry and wet years make water resources development complex in the PRC. There is also a mismatch between water resources, and population and arable land. The north accounts for 45% of the PRC's population and 65% of its arable land but only 19% of its water resources. On the other hand, the south comprises 55% of the PRC's population and 35% of its arable land but 81% of its water resources. Water scarcity, either temporal or geographical, leads to intense political pressures. Furthermore, water demands are often conflicting, and river basin institutions lack the necessary tools to meet administrative challenges.

5. Water resources play a central role in maintaining human health and welfare, environmental integrity, and economic growth. The challenge is not only how to manage a declining resource but also how to respond to the scarcity resulting from the geographic and temporal mismatch between supply and demand. Continuous drought and scarcity of water resources have caused over-exploitation of land and water resources in some regions resulting in serious environmental and ecological problems. Key indicators of these problems include (i) land subsidence caused by excessive groundwater extraction, (ii) disappearance of wetlands, (iii) drying of riverbeds and estuaries, (iv) serious sedimentation, (v) seawater intrusion, and (vi) depletion and pollution of surface water and groundwater.

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<sup>1</sup> The TA first appeared in the business opportunities section of ADB's website on 7 April 2008.

6. Restoration of the environment is difficult once it has been damaged. Overuse of water in rivers and failure to maintain adequate environmental flows in the river systems have dried up some rivers including the Yellow River. Based on estimates from the Ministry of Water Resources (MWR), water usage for economic development in recent years caused a shortage of about 15.5 billion m<sup>3</sup> for the minimum environmental flows in the Yellow River basin, Hai River basin, and Huai River basin (or about 17% of the environmental water requirements).

7. ADB has been increasingly involved in water resources management in the PRC and has assisted the Government in planning water resources on a holistic river basin approach—integrating environmental, social, and economic considerations in regional planning through analysis of different scenarios. ADB, through strategic options for the water sector,<sup>2</sup> assisted MWR to (i) define a strategic planning process, and (ii) identify and evaluate strategic options for addressing the main issues and constraints in the water sector for effective water resources management. Many of the study's recommendations were incorporated in the revised National Water Law, 2002. ADB also assisted the Government in setting out principles and procedures for integrated river basin management including watershed management in the Yellow River.<sup>3</sup> It helped the Government evaluate the effectiveness of its policy framework and investment program for water pollution control during the 9<sup>th</sup> and 10<sup>th</sup> Five-Year Plan period (1996–2005) in Huai River and Taihu Lake basins; and recommended legal, policy, and institutional reforms as well as investment directions for river basin-based water pollution control and prevention.<sup>4</sup>

8. ADB assisted MWR to (i) improve its capacity to determine the quantity and quality of river flows needed to maintain the ecology and environment of Hai River basin allowing the river basin agency to monitor water consumption against the river's carrying capacity,<sup>5</sup> and (ii) formulate strategies on soil and water conservation and flood management.<sup>6</sup> Other donors such as the World Bank and the United Kingdom's Department for International Development (DFID) are also active in supporting the PRC reform in water resources management. DFID has an ongoing project<sup>7</sup> with MWR which is pilot testing water resources allocation in the Shiyang and Daling river basins in Gansu Province.

9. Despite progress made in reforming its legal and policy frameworks, the PRC still needs to develop its capacity to adopt integrated water resource management (IWRM) to (i) protect the rapidly deteriorating ecosystem and environment within and along rivers; (ii) assess water demands by various users to allocate water properly and enable sustained economic growth; (iii) develop the necessary frameworks to allocate water, monitor use, and resolve conflicts among water users; and (iv) improve governance on water resources management. Based on analysis of these issues, measures will be formulated to establish modern water resources management systems in line with a water rights regime and an integrated river basin management which will improve the Government's efficiency and introduce market mechanisms for allocation of water resources.

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<sup>2</sup> ADB. 1997. *Technical Assistance to the People's Republic of China for Strategic Options for the Water Sector*. Manila (TA 2817-PRC).

<sup>3</sup> ADB. 2001. *Technical Assistance to the People's Republic of China for Strategic Planning Study for the Preparation of the Yellow River Law*. Manila (TA 3708-PRC).

<sup>4</sup> ADB. 2004. *Technical Assistance to the People's Republic of China for the Evaluation of Environmental Policy and Investment for Water Pollution Control in the Huai River Basin and the Taihu Lake Basin*. Manila (TA 4447-PRC).

<sup>5</sup> ADB. 2002. *Technical Assistance to the People's Republic of China for the Study of the Carrying Capacity of Water Resources*. Manila (TA 3963-PRC).

<sup>6</sup> ADB. 2000. *Technical Assistance to the People's Republic of China for Preparing the National Strategies for Soil and Water Conservation*. Manila (TA 3548-PRC); and ADB. 2004. *Technical Assistance to the People's Republic of China for the Flood Management Strategy Study*. Manila (TA 4327-PRC).

<sup>7</sup> DFID. 2005. *Water Resources Demand Management Assistance Project (2005–2010)*. London.

10. The PRC has 20% of the world's population but just 7% of its freshwater. This translates into fierce competition for water in a context where there is no coherent framework for governing water rights and allocation. Balancing urban, rural, industrial, and environmental water use with rational water resources allocation principles and the policy framework is a great challenge for the PRC water resources management. The Government has pilot tested water resources allocation programs in several provinces in northern river basins. These programs generated some good results for easing water conflicts between supply and demand, thereby, improving the environmental situation. However, there is a lack of systematic studies, methodologies, principles, and policy frameworks for adequate river basin water resources allocation. A river basin water allocation system must be developed urgently to improve water resources management. The TA will address this crucial element to improve the PRC water resources management. An effective water allocation system will promote river basin and water security, peace, stability, and prosperity at local and national levels. The proposed TA will have an indirect impact on poverty reduction through improved sector governance, and a water allocation system to ensure that the poor have adequate access to water.

### **III. THE TECHNICAL ASSISTANCE**

11. The TA is in line with the agriculture and natural resources development goals of the country partnership strategy<sup>8</sup> to (i) support environmental improvement; (ii) reverse natural resources degradation; (iii) address water resource depletion and livelihood improvement for people residing in threatened and sensitive areas; and (iv) promote river basin and ecosystem management, and the efficient use of natural resources. The TA will also help introduce new knowledge, innovative practices, and stronger governance for river basin water resources allocation and management.

#### **A. Impact and Outcome**

12. The impact of the TA will be improved and sustainable water resources management in the PRC. The outcome of the TA will be adoption and use of appropriate framework on river basin water resources allocation throughout the PRC. The primary objective of a water allocation system is to maximize the benefits (social, environmental, and economic) of water to society. This will be achieved by (i) distributing water equitably among regions and users, and setting priorities during water scarcity; (ii) establishing rules for sharing limited water resources and maintaining environmental quality for sustainable development; (iii) protecting the long-term reliability of the resource from over-exploitation; and (iv) adapting to changes in local conditions by accommodating new users while protecting existing users.

#### **B. Methodology and Key Activities**

13. The TA will take into account the relevant findings of previous ADB-funded TA projects and studies as well as relevant work from other donors. The outputs of the TA will be (i) a report on case studies of international and domestic practices and lessons on water resources allocation (including pilot programs), and a policy note on best practices and policy recommendations to strengthen water resources allocation policy; (ii) categorization of the water allocation systems based on characteristics of river systems; and (iii) principles and a guiding framework for river basin water resources allocation in the PRC. MWR is presently updating the water resource master plans of the PRC's seven major river basins, and this process highlighted the need for a systematic and sound methodology and framework for water resources allocation. The TA will help MWR in its current work for the finalization of the seven

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<sup>8</sup> ADB. 2008. *People's Republic of China: Country Partnership Strategy 2008–2010*. Manila.

river basin master plans. MWR also plans to complete within the next 5 years the detailed water resources allocation plans for the seven major river basins and other smaller river basins where water shortage is severe or where water conflicts occur frequently. MWR has expressed its strong commitment in applying the TA outputs and implementing the recommendations in the development of the water resources allocation plans through consultations with the key stakeholders in the river basins. In addition, ADB and other donors will help implement the TA recommendations through pilot programs in some selected small river basins using trust funds such as the Water Financing Partnership Facility which is administered by ADB.

14. Key activities under the TA include (i) a review and assessment of international and domestic practices in river basin water resources allocation in selected countries and river basins including completed and ongoing pilot programs in the PRC; (ii) a comparison of various methodologies and models of water resources allocation, and documentation of best practices in a summary report; (iii) preparation of a policy note on best practices and policy recommendations; (iv) MWR staff's study visits and on-the-job training in river basins with best practices in water resources allocation; (v) an assessment and categorization of river systems with similar characteristics (i.e., development of an inventory of the river systems); and (vi) a definition of the principles for river basin water resources allocation, and preparation and finalization of a guiding framework for better implementation of river basin water resources allocation in the PRC.

15. The TA will attach importance to case studies to learn best practices worldwide. During implementation, extensive consultations with international and domestic water resources experts and practitioners will be conducted. International and domestic workshops will be held to bring together the key stakeholders in relevant ministries, provinces, and river basin organizations to exchange best practices and discuss the TA recommendations. International knowledge centers such as the Network of Asian River Basin Organizations (NARBO) will be engaged to share and disseminate TA results among ADB's developing member countries (DMCs).

### **C. Cost and Financing**

16. The total cost of the TA is estimated at \$950,000 equivalent, of which ADB will finance \$500,000 from its TA funding program. The Multi-Donor Trust Fund<sup>9</sup> for the Water Financing Partnership Facility will provide cofinancing of \$250,000 equivalent on a grant basis<sup>10</sup> which will be administered by ADB. The remaining \$200,000 equivalent will be provided by the Government to cover in-kind counterpart costs and services including the provision of necessary data, office space, counterpart staff, local transportation, and other administrative support. The detailed cost estimates and financing plan is in Appendix 2.

### **D. Implementation Arrangements**

17. MWR will be the Executing Agency for the TA. MWR is responsible for the overall administration of water resources throughout the PRC. It has shown strong capacity for implementing externally assisted projects. The TA management office will be established in

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<sup>9</sup> The contributors: the governments of Australia, Austria, and Norway. Administered by ADB.

<sup>10</sup> The facility will help (i) summarize experiences in several selected international and domestic river basins with best practices in water resources allocation; (ii) recommend policies and guidelines to develop a thorough framework on river basin water resources allocation in the PRC; (iii) prepare a policy note on good practices and recommendations as a knowledge product for the PRC as well as ADB's other DMCs; share information, lessons, and good practices through the international knowledge centers of NARBO; and (iv) conduct an international seminar with participation from other DMCs.

MWR to facilitate daily coordination and administration of TA activities and for liaising with ADB. MWR will assign (i) an experienced full-time staff member to serve as TA task manager, and (ii) counterpart staff who will work closely with TA consultants. MWR will also provide office space, access to internet, telephone and facsimile, and logistical support for TA implementation using counterpart funds.

18. A TA technical panel will be set up to review and guide the work of TA consultants. The panel will consist of international and national experts from various agencies in relevant sectors. It will collaborate with the counterpart team to arrange panel meetings (at inception, midterm, and final phases) during TA implementation.

19. The TA will be conducted over 12 months from November 2008 to October 2009. A total of 55 person-months of consulting services will be required comprising 16 person-months of international and 39 person-months of national consultants. Required expertise includes water resources planning and management, environmental management, natural resources economics, institutional and policy analyses, and hydrology. The consultant will submit an inception report within 4 weeks from TA commencement, and an interim report 6 months after the TA begins. A draft final report will be submitted 11 months after TA commencement, and a final report at TA conclusion. The inception, interim, and draft final reports will be reviewed by the Government and ADB; and comments will be provided to the consultant. All reports are to be written in English and translated into Chinese. The outline terms of reference for consultants are in Appendix 3.

20. The TA will be carried out by a team of consultants engaged through a firm. The consultant will be engaged by ADB in accordance with its *Guidelines on the Use of Consultants* (2007, as amended from time to time) using quality- and cost-based selection criteria (with a quality/cost weighing rate of 80:20) and simplified technical proposal procedures. Office equipment provided under the TA for the consultant will be procured in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time) and will be handed over to MWR upon TA completion. Disbursement will be undertaken in line with ADB's *Guidelines for Disbursement of Technical Assistance Grants*.<sup>11</sup> Advance payment procedures will be adopted to facilitate timely implementation of activities related to training, seminars, and conferences. MWR has implemented several ADB-funded TA projects with similar arrangements and has adequate capacity in managing such funds. ADB will regularly review and supervise by fielding missions at critical stages of TA implementation, particularly at inception, midterm, and final stages; and through continued support from both headquarters and the resident mission.

21. Efforts will be made to disseminate TA results within and outside the PRC including sharing of best practices through NARBO, international and domestic seminars, and wide media coverage. More importantly, a policy note on good practices and recommendations will be prepared as a knowledge product for the PRC as well as for ADB's other DMCs.

#### **IV. THE PRESIDENT'S DECISION**

22. The President, acting under the authority delegated by the Board, has approved (i) ADB administering a portion of the technical assistance not exceeding the equivalent of \$250,000 to be financed on a grant basis by the Multi-Donor Trust Fund for the Water Financing Partnership Facility; and (ii) ADB providing the balance not exceeding the equivalent of \$500,000 on a grant basis to the Government of the People's Republic of China for the River Basin Water Resources Allocation and Management Policy, and hereby, reports this action to the Board.

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<sup>11</sup> ADB. 1992. *Guidelines for Disbursement of Technical Assistance Grants*. Manila.

## DESIGN AND MONITORING FRAMEWORK

| <b>Design Summary</b>   | <b>Performance Targets and/or Indicators</b>  | <b>Data Sources and/or Reporting Mechanisms</b>   | <b>Assumptions and Risks</b>  |
|---|---|---|---|
| <p><b>Impact</b><br/>Improved and sustainable water resources management in the People's Republic of China (PRC)</p>  | <p>Water consumption per unit of industrial added value reduced to 30% (of 2005 level) by 2010</p> <p>Irrigation efficiency increased from 0.45 (2005 level) to 0.5 by 2010 and 0.54 by 2015</p> <p>Average water losses of the urban water supply systems in the PRC reduced from current level of about 20% to less than 15% by 2010, and water-saving equipment widely used by 2010</p> <p>Redirected ecological flow increased by about 30% by 2015</p> | <p>Water Resources Bulletin of the Government</p> <p>Government's evaluation on the implementation of 11<sup>th</sup> and 12<sup>th</sup> five-year water resources plans</p> <p>Publications of the Ministries of Water Resources (MWR), environment protection, and housing and urban-rural development</p> | <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• Government continues to promote integrated water resource management</li> <li>• Strict enforcement of environment protection measures</li> </ul>   |
| <p><b>Outcome</b><br/>Adoption and use of appropriate framework on river basin water resources allocation throughout the PRC</p>  | <p>An appropriate framework on river basin water resources allocation adopted by MWR by 2010 and in use in river basins from 2010 onwards</p>   | <p>Technical assistance (TA) completion report</p> <p>MWR decrees and publications</p>  | <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• Effective interagency coordination</li> <li>• Enforced implementation of related regulations</li> </ul>  |
| <p><b>Outputs</b></p> <ol style="list-style-type: none"> <li>1. A report on case studies of international and domestic practices and lessons on water resources allocation (including pilot programs), and a policy note on best practices and policy recommendations</li> <li>2. Categorization of the water allocation systems based on characteristics of river systems</li> <li>3. Principles and a guiding framework for river basin water resources allocation</li> </ol> | <p>The report completed by the consultant and reviewed by MWR by month 5 of TA implementation</p> <p>The policy note completed by the consultant by month 6, and disseminated by MWR</p> <p>An inventory for classifying water allocation systems of rivers in the PRC by month 8</p> <p>Applicable guiding framework developed by the consultant for MWR by October 2009</p>   | <p>TA completion report</p> <p>TA progress reports</p> <p>Workshops</p> <p>TA review missions</p>   | <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• MWR will use the principles and policy framework developed under the TA</li> <li>• Adequate stakeholder participation</li> </ul> <p><b>Risk</b></p> <ul style="list-style-type: none"> <li>• Methodology and water allocation system may be complicated</li> </ul> |
| <p><b>Activities with Milestones</b></p> <ol style="list-style-type: none"> <li>1.1 Review and assess international and domestic practices in river basin water resources allocation in selected countries and river basins by month 3.</li> <li>1.2 Compare various models of water resources allocation and document best practices in a summary report by month 5 of TA implementation.</li> </ol>   |   |   |   |

| <b>Activities with Milestones</b>  | <b>Inputs</b>  |
|--|--|
| <p>1.3 Prepare a policy note on best practices and policy recommendations by month 6.</p> <p>1.4 MWR staff in-depth operational participation in river basins with best practices in water resources allocation to understand the historical background and gain firsthand experience during months 7–10.</p> <p>2.1 Assess river systems and their development status in the PRC by month 7.</p> <p>2.2 Evaluate water conflicts and issues in allocation, and assess the necessity and major factors for allocation by month 7.</p> <p>2.3 Classify the PRC river systems (develop an inventory) with similar characteristics for water resources allocation by month 8.</p> <p>3.1 Define the general principles, mechanisms, and models for river basin water resources allocation—referring to different river systems—by month 10.</p> <p>3.2 Propose framework guidelines for river basin water resources allocation, draft by month 11, and finalize by end of TA implementation.</p> <p>4.1 Conduct international seminar in months 5–6 and domestic workshop in month 11.</p> <p>4.2 Conduct international technical panel meetings based on needs (in conjunction with an international seminar) at the end of months 1, 8, and 11.</p> | <p><b>Asian Development Bank Financing: \$500,000</b></p> <ul style="list-style-type: none"> <li>• Consulting services, 10 person-months of international and 27 person-months of national experts: \$294,000</li> <li>• International and local travels: \$20,000</li> <li>• Reports, communications, and translations: \$15,000</li> <li>• Workshops and panel discussions: \$30,000</li> <li>• Study tours to river basins with best practices: \$40,000</li> <li>• Equipment: \$5,000</li> <li>• Data surveys: \$36,000</li> <li>• Miscellaneous administration and support costs: \$10,000</li> <li>• Contingencies: \$50,000</li> </ul> <p><b>Multi-Donor Trust Fund for the Water Financing Partnership Facility: \$250,000</b></p> <ul style="list-style-type: none"> <li>• Consulting services, 6 person-months of international and 12 person-months of national experts: \$161,000</li> <li>• International and local travels: \$10,000</li> <li>• Reports, communications, and translations: \$7,000</li> <li>• Workshops and panel discussions: \$40,000</li> <li>• Miscellaneous administration and support costs: \$7,000</li> <li>• Contingencies: \$25,000</li> </ul> <p><b>Government Financing: \$200,000</b></p> <ul style="list-style-type: none"> <li>• Office accommodation and transport: \$50,000</li> <li>• Remuneration and per diem of counterpart staff: \$50,000</li> <li>• Workshops, panel discussions, and dissemination: \$60,000</li> <li>• Other administrative support costs: \$40,000</li> </ul> |

**DETAILED COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

| Item  | Total Cost   |
|---|--------------|
| <b>A. Asian Development Bank (ADB) Financing<sup>a</sup></b>                              |              |
| 1. Consultants and Other Experts  |              |
| a. Remuneration and Per Diem  |              |
| i. International Consultants  | 180.0        |
| ii. National Consultants  | 114.0        |
| b. International and Local Travels  | 20.0         |
| c. Reports, Communications, and Translations  | 15.0         |
| 2. Workshops and Panel Discussions <sup>b</sup>   | 30.0         |
| 3. Study Tours to River Basins with Best Practices <sup>c</sup>                           | 40.0         |
| 4. Equipment <sup>d</sup>   | 5.0          |
| 5. Data Surveys   | 36.0         |
| 6. Miscellaneous Administration and Support Costs   | 10.0         |
| 7. Contingencies  | 50.0         |
| <b>Subtotal (A)</b>   | <b>500.0</b> |
| <b>B. Multi-Donor Trust Fund for the Water Financing Partnership Facility<sup>e</sup></b> |              |
| 1. Consultants and Other Experts  |              |
| a. Remuneration and Per Diem  |              |
| i. International Consultants  | 108.0        |
| ii. National Consultants  | 53.0         |
| b. International and Local Travels  | 10.0         |
| c. Reports, Communications, and Translations  | 7.0          |
| 2. Workshops and Panel Discussions <sup>b</sup>   | 40.0         |
| 3. Miscellaneous Administration and Support Costs   | 7.0          |
| 4. Contingencies  | 25.0         |
| <b>Subtotal (B)</b>   | <b>250.0</b> |
| <b>C. Government Financing</b>  |              |
| 1. Office Accommodation and Transport   | 50.0         |
| 2. Remuneration and Per Diem of Counterpart Staff   | 50.0         |
| 3. Workshops, Panel Discussions, and Dissemination  | 60.0         |
| 4. Other Administrative Support Costs   | 40.0         |
| <b>Subtotal (C)</b>   | <b>200.0</b> |
| <b>Total (A+B+C)</b>  | <b>950.0</b> |

<sup>a</sup> Financed by ADB's technical assistance funding program.

<sup>b</sup> Include one international seminar, one domestic workshop, and 2–3 technical panel meetings.

<sup>c</sup> Include study tours for about five Executing Agency staff to river basins with best practices in water resources allocation.

<sup>d</sup> Procurement of minor equipment such as computer and copy machine to support desk research to be approved by ADB. At technical assistance completion, equipment will become the property of the Executing Agency.

<sup>e</sup> The contributors: the governments of Australia, Austria, and Norway. Administered by ADB.

Source: ADB estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The impact of the technical assistance (TA) will be improved and sustainable water resources management in the People's Republic of China (PRC). The outcome will be adoption and use of appropriate framework on river basin water resources allocation throughout the PRC. Key activities under the TA include (i) a review and assessment of international and domestic practices in river basin water resources allocation in selected countries and river basins including completed and ongoing pilot programs in the PRC; (ii) a comparison of various methodologies and models of water resources allocation, and documentation of best practices in a summary report; (iii) preparation of a policy note on best practices and policy recommendations; (iv) the Ministry of Water Resources (MWR) staff's study visits and on-the-job training in river basins with best practices in water resources allocation; (v) an assessment and categorization of river systems with similar characteristics (i.e., development of an inventory of the river systems); and (vi) a definition of the principles for river basin water resources allocation, and preparation and finalization of a guiding framework for better implementation of river basin water resources allocation in the PRC.

2. The following areas for assessing water allocation system may be taken into consideration: (i) hydrology, water resource availability, and reliability; (ii) current regulating capacity and approaches to assess reservoir storage impact and other operational considerations; (iii) in-stream flow requirements such as habitat preservation, recreation, aesthetics, and conservation which are becoming increasingly important factors in water management decisions; (iv) current water use and factors impact demands; (v) joint use of surface water and groundwater; (vi) trade-offs between humans and nature, development and protection, and among various users; (vii) scarcity and drought management, particularly in arid regions, to establish methodologies responding to periods of water scarcity; (viii) administrative systems and the role and jurisdiction of these institutions; and (ix) water rights and legal system, and the rules governing the sharing of limited stream-flow and storage among users to determine who has the right to use the water and in what priority.

3. The TA will be conducted over 12 months from November 2008 to October 2009. A total of 55 person-months of consulting services will be required comprising 16 person-months of international and 39 person-months of national consultants. The TA will be carried out by a team of consultants engaged by the Asian Development Bank (ADB) through a firm in accordance with ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time) using quality- and cost-based selection criteria (with a quality/cost weighing rates of 80:20) and simplified technical proposal procedures.

4. Required expertise includes water resources planning and management, environmental management, natural resources economics, institutional and policy analysis, and hydrology. The consultants should have demonstrated extensive experiences in water resources allocation, particularly experiences in the PRC or in other countries with similar conditions. Detailed terms of reference for each expert are defined below.

### A. International Consultants

#### 1. Water Resources Planning Specialist/Team Leader (9 person-months)

5. The specialist will

- (i) work as a team leader to coordinate with international and national consultants;

- (ii) liaise with the Executing Agency and other relevant government agencies for detailed implementation of the TA;
- (iii) review and assess international practices in river basin water resources allocation in developed and developing countries, and prepare a report to document best practices on water resources allocation;
- (iv) review government policies and strategies for water resources allocation and the processes to formulate the water resources allocation design;
- (v) evaluate water development situation and classify the river systems of water resources allocation in the PRC;
- (vi) prepare a policy note on best practices and policy recommendations;
- (vii) define the principles and propose framework guidelines for river basin water resources allocation;
- (viii) supervise training activities and contribute to workshops, seminars, and reports; and
- (ix) prepare inception, interim, and final reports of the TA in coordination with other consultants.

**2. Water Resources Economist (3.5 person-months)**

6. The economist will

- (i) review international research on the economic aspect of water resources allocation;
- (ii) recommend methodologies and associated modeling tools for estimating economic effects;
- (iii) assist in categorizing water resources allocation in the PRC;
- (iv) propose the principles and policies concerning economic efficiency of water use; and
- (v) contribute to workshops, seminars, and reports.

**3. Environment Management Specialist (3.5 person-months)**

7. The specialist will

- (i) review and evaluate the ecological flow consideration in water resources allocation;
- (ii) propose the methodology to determine ecological flow in different water status regions;
- (iii) propose an ecological standard for different rivers of the PRC;
- (iv) propose the principles and policies concerning ecological flow to guarantee healthy ecology;
- (v) assist in developing framework guidelines on water resources allocation; and
- (vi) contribute to workshops, seminars, and reports.

**B. National Consultants**

**1. Water Resources Planning Specialist/Co-team Leader (12 person-months)**

8. The specialist/co-team leader will

- (i) work as a co-team leader to coordinate with international and national consultants;
- (ii) liaise with the Executing Agency and other relevant government agencies for detailed implementation of the TA;

- (iii) assist the team leader in reviewing international practices in river basin water resources allocation in developed and developing countries, and prepare a report to document best practices on water resources allocation;
- (iv) review current practices in river basin water resources allocation in the PRC and prepare a report to document lessons;
- (v) review government policies and strategies for water resources allocation and the processes to formulate the water resources allocation design;
- (vi) assist the team leader in preparing a policy note on best practices and policy recommendations;
- (vii) evaluate water development situation and classify the river systems of water resources allocation in the PRC;
- (viii) define the principles and propose framework guidelines for river basin water resources allocation;
- (ix) contribute to workshops, seminars, and reports; and
- (x) prepare inception, interim, and final reports of the TA in coordination with other consultants.

## **2. Water Resources Economist (7 person-months)**

### 9. The economist will

- (i) collect and evaluate relevant socioeconomic data focusing on domestic, municipal, and industrial water use;
- (ii) analyze economic efficiency of water use in different regions;
- (iii) analyze the marginal value of water in different uses;
- (iv) propose the criteria from point of economic efficiency for categorizing water resources allocation;
- (v) combine the international experiences with advance water resources allocation principles and framework guidelines; and
- (vi) contribute to surveys, workshops, seminars, and reports.

## **3. Environment Management Specialist (5 person-months)**

### 10. The specialist will

- (i) review reports on environmental demand estimation, water use, norms, standards, regulations, and laws in the PRC;
- (ii) prepare an inventory of the environmental situation and problems in the PRC;
- (iii) carry out survey on the water resources allocation mechanism concerning the environment;
- (iv) develop environment index for regional categorization of water resources allocation in the PRC;
- (v) determine water resources allocation principles concerning the water environment;
- (vi) assist in developing framework guidelines on water resources allocation; and
- (vii) contribute to surveys, workshops, seminar, and reports.

## **4. Institutions Specialist (5 person-months)**

### 11. The specialist will

- (i) assess the present institutional and framework guidelines relating to water resources allocation in the PRC;

- (ii) review the institutional and framework guidelines on water resources allocation from other countries with high water efficiency;
- (iii) assist in defining principles and developing framework guidelines on water resources allocation; and
- (iv) contribute to surveys, workshops, seminars, and reports.

**5. Ecosystem Management Specialist (5 person-months)**

12. The specialist will

- (i) review domestic and international researches on ecological demand in water resources allocation;
- (ii) initially assess the ecosystem situation of different river systems in the PRC;
- (iii) prepare an inventory of the ecological problems and causes in the PRC;
- (iv) develop the index concerning water resources allocation categorization in the PRC;
- (v) assist in proposing the principles and framework guidelines for water resources allocation concerning ecology conservation; and
- (vi) contribute to surveys, workshops, seminars, and reports.

**6. Hydrologist (5 person-months)**

13. The hydrologist will

- (i) analyze the effects of hydrological regime changes on water resources allocation;
- (ii) analyze the hydrological situation of different regions and examine the effects of water use and climate change on hydrological regime;
- (iii) develop hydrological index for classifying the river systems for water resources allocation;
- (iv) assist in developing framework guidelines on water resources allocation; and
- (v) contribute to workshops, seminars, and reports.

**C. Reporting Requirements**

14. The consultant will produce (i) an inception report within 4 weeks from TA commencement, (ii) an interim report 6 months after the TA begins, (iii) a draft final report 11 months after TA commencement, and (iv) a final report at TA conclusion. A report on case studies of international and domestic practices and lessons on water resources allocation will be completed by month 5, and a policy note on best practices and policy recommendations will be prepared by month 6 after TA commencement.

15. The inception, interim, draft policy note, and draft final reports will be reviewed by the Government and ADB; and comments will be provided to the consultant. All reports are to be written in English and translated into Chinese. Five copies of each report are to be submitted to ADB, and 15 copies are to be submitted to MWR.