

TECHNICAL ASSISTANCE COMPLETION REPORT

Division: ECAE

TA No. and Name TA 3963-PRC: Study of Carrying Capacity of Water Resources			Amount Approved: US\$600,000	
			Revised Amount:	
Executing Agency: Ministry of Water Resources	Source of Funding: JSF		TA Amount Undisbursed USD 38,768.77	TA Amount Utilized USD 561,231.23
Date			Completion Date	
Approval	Signing	Fielding of Consultants	Original	Actual
04 November 2002	31 December 2002	12 October 2003	31 March 2004	29 August 2005
			Closing Date	
			Original	Actual
			31 March 2004	31 October 2005
Description				
<p>The total available water resources (surface plus groundwater) of the People's Republic of China (PRC) is estimated at about 2800 billion m³ per annum that translates into an availability of 2400 m³ per capita. The per capita water resources availability had decreased to 2220 m³/person in 2000 and is expected to decrease further to 1700 m³/person by 2030, when the population is forecast to peak at 1.6 billion. Continuing population and rapid economic growth of about 9% per annum in the last fifteen years in the PRC has increased water use and competition among potential water uses, while aquifers are becoming depleted, water pollution is rising, and the ecosystem and environment are degrading. Total water usage had increased from 530 billion m³ in 1993 to 563 billion m³ in 2000 for the different sectors. While agriculture and other rural uses is the dominant water user accounting for 69%, industry (21%) and urban domestic (10%) uses have been increasing rapidly.¹</p> <p>PRC still needs to develop capacity, to accurately estimate the amount and quality of water that is needed to protect the rapidly deteriorating existing ecosystem and environment within and along the rivers, assess water demands by various users/sectors to allow sustained economic growth, and develop appropriate conditions to allocate water, monitor use and resolve conflicts among the water users. Such planning capacity will, in turn, allow the determination of the maximum amount of water that can be used for other purposes, such as economic and domestic uses (viz. carrying capacity of the rivers). The appropriate methodology to determine the carrying capacity of rivers is considered as a crucial basis to determine appropriate and sustainable allocation and use of water in the river basins. The TA was to help PRC develop such capacity on a pilot basis for the Haihe river basin, which is representative of the conditions in the North/Northeast Region of PRC. The basin is characterized by very high demands for water and low water availability (355 m³/person/year), below the internationally accepted definition of water scarcity of 1000 m³/person.</p>				
Objectives and Scope				
<p>The objective of the TA was to develop within PRC's water sector agencies, capacity (methodology, supporting tools, and human resources) to determine the quantity and quality of river flow needed to maintain the ecology and environment of the basin, thereby allowing the river basin agency to monitor the consumption of water against the river's carrying capacity. The outputs of the TA were to include: (i) a methodology for estimating the environmental water demand and water demand-supply tradeoffs; (ii) a provisional river basin plan for the Haihe River Basin, and; (iii) enhanced knowledge and skills in planning for integrated water resources management. The implementation arrangements were adequate and included the establishment of a Technical Panel comprising technical experts from various government agencies, universities, established domestic and international experts to provide peer review and guidance, as required, and the need for stakeholder participation. The terms of reference (TOR) were clear and detailed.</p>				
Evaluation of Inputs				
<p>TA formulation was clearly understood by the consultant and the Ministry of Water Resources (MWR), the Executing Agency (EA), resulting in good agreement on the objectives of the study. The assignment of efforts corresponded reasonably well to the needs. The consultant's performance was satisfactory.² The TA utilized 12 person-months (pm) of international consultants' inputs compared to 11 pm as initially allocated, an additional 1 pm from the team leader, because of the delay in executing the international training. The domestic consultants inputs were 44 pm as initially envisaged, although a larger input was needed from the domestic economist relative to the effort allocated to that position. An international study tour to Hydro-Quebec, Canada, organized with the assistance of the international consultant provided useful training on integrated basin management to the TA counterpart staff. ADB performed satisfactorily in supervising TA implementation, undertaking adequate reviews and providing timely feedback and guidance to the consultant and the EA. The EA provided adequate support and also performed satisfactorily. Three workshops were held to review the study at different stages of advancement</p>				

¹ Integrated Water Resources Planning, National Development and Reform Commission (NDRC) and Ministry of Water Resources (MWR), 2004.

² Details of the evaluation are given in the performance evaluation report of the consulting firm.

by several PRC and international experts in different fields and generally positive comments were received. The EA was satisfied with the inputs.

More time allowed for the study could have helped in two ways: more data collection to enhance the reliability of the basin modeling and planning; and a second case study in a different climatic region to add proof of replicability. A position of simulation specialist would have been beneficial, to help evaluating the simulation tools, and training PRC specialists in basin modeling in particular. Given the innovative nature of the TA, more international input would have allowed more technology transfer, especially in water quality, ecological analysis, and modeling.

Evaluation of Outputs

All reports required by the TOR were produced and accepted. The TA produced its intended outputs, which generally conformed to the TOR. The outputs comprised (i) a functional methodology for estimating trade-offs between socio-economic development and environmental health. The approach consists of the integration of methodologies for determination of ecological flow, evaluation of water quality and environmental condition of the basin, the interaction between environment and economic development, and the trade-off between them, which allows the basin manager to select a rational level of development. The methodology produced useful results that were demonstrated in a successful case study. The methods and results were accepted in three workshops with generally positive comments; (ii) an installed basin model and GIS database. An integrated database has been created in GIS format. This includes all data made available on the water resources and environment of the pilot basin; (iii) a demonstration preliminary basin plan; and (iii) a small number of trained counterparts from the EA. Counterpart staff were trained on basin modeling, methodologies for ecological flow and water quality evaluation, and have actively participated in analysis of economic projections, water demands, and development of scenarios. This team should be capable of conducting similar studies and providing support to other teams in MWR or the river basin commission in these fields. The EA was satisfied with the outputs.

Overall Assessment and Rating

The TA design was appropriate, and the TA outputs are highly relevant. The TA produced a useful methodology, and the counterpart team have gained experience in the modelling tools and analysis methods needed for carrying capacity and basin planning studies through on-the-job training. The TA is successful, as it achieved its objectives and fully delivered its intended outputs.

Major Lessons Learned

The TA was partly a research undertaking. As such, it would be better if the modeling aspect of the study could be done with non-proprietary models. This would give flexibility to the user to make required modifications when the need arises such as the availability of more data, or the need to include more parameters. It would have been desirable and more efficient to involve a basin modeling specialist, to also be assigned a major role in training; there should have been more technical seminars involving more international experts, to discuss the technical approach; data collection should have been a separate and important component of the study, as this aspect affects the reliability of basin modeling and planning. Data collection in PRC requires more attention because of the complexity of the issues and the number of agencies that collect and keep information.

Recommendations and Follow-Up Actions

The study has succeeded in producing a useful methodology to determine and monitor the environmental health of a river basin from a water resources utilization perspective. The methodology, however, would need additional tests to further confirm its replicability by application to another river basin of completely different characteristics. ADB could support this effort through the following: (i) strengthening the training component by a program of training a number of specialists in modeling, ecological analysis, and integrated water resources management to continue work in disseminating the results; (ii) one or two case studies where the methods can be applied in river basins of different climatic and water resources characteristics to verify the replicability of the methods in different regions of the PRC; and (iii) the formation of a team within the EA trained to provide support and guidance to river basin commissions and other organizations interested in applying the concept of carrying capacity and integrated basin planning. The second phase would include the institutional set-up and the training component for the team. This is essential for keeping and reinforcing the capability that was developed under the TA, since the number of people trained so far is small, and it would be more effective to keep them together in an appropriate institutional structure. ADB could discuss with the government on the need to continue and expand assistance on a second phase of the study that builds on the work already done under the TA.

Prepared by Binsar Tambunan

Designation

Head, PAU/Senior Project Specialist