ADB

Report and Recommendation of the President to the Board of Directors

Project Number: 47070-002
November 2015

Proposed Loan
People's Republic of China: Hunan Dongjiang Lake Integrated Environmental Protection and Management Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 3 November 2015)

Currency unit – yuan (CNY)
CNY1.00 = $0.1578
$1.00 = CNY6.3353

ABBREVIATIONS

ADB	–	Asian Development Bank
EIA	–	environmental impact assessment
EMP	–	environmental management plan
HPG	–	Hunan Provincial Government
IWRM	–	integrated water resources management
LIBOR	–	London interbank offered rate
O&M	–	operation and maintenance
PAM	–	project administration manual
PRC	–	People's Republic of China
ZCG	–	Zixing City Government
ZIFC	–	Zixing City Urban and Rural Environmental Protection Investment and Financing Center

WEIGHTS AND MEASUREMENTS

ha	–	hectare
km	–	kilometer
km^2	–	square kilometer
m^3	–	cubic meter

NOTE

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

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PROJECT AT A GLANCE

1. Basic Data

Project Number: 47070-002

Project Name	Hunan Dongjiang Lake Integrated Environmental Protection and Management Project	**Department /Division**	EARD/EAER
Country	China, People's Republic of	**Executing Agency**	Zixing City Government
Borrower	People's Republic of China		

2. Sector

	Sector	Subsector(s)	ADB Financing ($ million)
✓	**Agriculture, natural resources and rural development**	Forestry	18.40
		Land-based natural resources management	10.59
		Rural flood protection	8.11
		Rural solid waste management	7.98
		Rural water supply services	16.82
		Water-based natural resources management	30.00
	Water and other urban infrastructure and services	Urban sewerage	18.10
		Urban water supply	20.00
		Total	**130.00**

3. Strategic Agenda

Strategic Agenda	Subcomponents
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive
Environmentally sustainable growth (ESG)	Eco-efficiency Natural resources conservation Urban environmental improvement

Climate Change Information

Adaptation ($ million)	10.00
Climate Change impact on the Project	Low

4. Drivers of Change

Drivers of Change	Components
Knowledge solutions (KNS)	Pilot-testing innovation and learning

Gender Equity and Mainstreaming

Effective gender mainstreaming (EGM)	✓

5. Poverty Targeting

Project directly targets poverty	No

Location Impact

Rural	Medium
Urban	Medium

6. Risk Categorization: Complex

7. Safeguard Categorization

Environment: A **Involuntary Resettlement:** A **Indigenous Peoples:** B

8. Financing

Modality and Sources	Amount ($ million)
ADB	**130.00**
Sovereign Project loan: Ordinary capital resources	130.00
Cofinancing	**0.00**
None	0.00
Counterpart	**132.03**
Government	109.57
Others	22.46
Total	**262.03**

9. Effective Development Cooperation

Use of country procurement systems	Yes
Use of country public financial management systems	Yes

Source: Asian Development Bank

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of China (PRC) for the Hunan Dongjiang Lake Integrated Environmental Protection and Management Project.[1]

2. The proposed project will be implemented in the Dongjiang Lake basin in Zixing City, Chenzhou Municipality, Hunan Province. The project will introduce an integrated approach to address constraints in lake environmental protection and livelihood development.[2]

II. THE PROJECT

A. Rationale

3. One of the greatest challenges facing water management in the PRC relates to freshwater lakes, as many of them are severely polluted. Since the mid-1990s, the Government of the PRC has made substantial efforts to address the problem, with emphasis on three lakes—Chao, Dianchi, and Tai lakes—but the water quality of these lakes has not improved significantly. The government realized the importance of pollution prevention in lakes by drawing lessons from the rehabilitation of polluted lakes, including the Chao, Dianchi, and Tai lakes, which were rehabilitated at very high cost. Experience has shown that it is very difficult and ineffective to restore water quality in large lakes once they are polluted.

4. Located in south Hunan Province, Dongjiang Lake is a reservoir formed after the construction of Dongjiang Dam in 1986 on the Leishui River, a tributary of the Xiang River. Dongjiang Lake is a multipurpose reservoir for hydropower, flood control, water supply, and irrigation. It has a surface area of 160 square kilometers (km^2) and a total storage capacity of about 8.12 billion cubic meters (m^3). The catchment area of the Dongjiang Lake is 4,719 km^2.

5. The government's priority is to protect the water resources of Dongjiang Lake from pollution. Dongjiang Lake has been selected as one of five river basins for nationwide pilot testing of the government's eco-compensation policy framework, to which the Asian Development Bank (ADB) has provided continuous support since 2009. Dongjiang Lake was prioritized for support in the National Plan for Relatively Good-Quality Lake Ecological and Environmental Protection, 2013–2020, jointly released by the Ministry of Environmental Protection, the Ministry of Finance, and the National Development and Reform Commission.

6. Dongjiang Lake is a strategic water source for supporting resource-saving and environment-friendly social development in Hunan Province. Maintaining healthy environmental services in Dongjiang Lake is vital to achieving sustainable development of the Xiang River basin, one of the major regions of the government's Yangtze River Economic Belt Initiative. The Xiang River basin is home to about 40 million people and accounts for over 70% of Hunan Province's total gross domestic production. In addition to supplying water to Chenzhou Municipality and Zixing City, Dongjiang Lake serves as a backup water source for Hunan Province's major cities of Changsha, Xiangtan, and Zhuzhou in the Xiang River basin to improve the water security of 13 million people in these cities. The lake's large storage capacity greatly improves flood and drought management for the downstream cities and navigation of the downstream Xiang River.

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[1] The design and monitoring framework is in Appendix 1.

[2] The Asian Development Bank (ADB) provided project preparatory technical assistance for the Hunan Dongjiang Lake Environmental Protection and Integrated Utilization Project (TA 8638-PRC).

7. Hunan Provincial Government (HPG) and local governments have prioritized environmental protection of Dongjiang Lake. Protection zones have been established in the Dongjiang Lake basin in accordance with the provincial-approved Dongjiang Lake Basin Water Environmental Protection Regulation (2002). The regulation imposes controls on the development of the basin and restricts various activities in different protection zones that may cause adverse impact on the water environment. Since 2002, HPG and local governments have invested nearly CNY1 billion in protection of the lake, including closure of mines, removal of cage fishing, ship renovation and improvement, and job training for nonfarming opportunities. Continued efforts by HPG, local governments, and local people help maintain the good water quality of the lake to meet national standards for drinking water sources.

8. However, heavy agricultural activities and growing urbanization in the lake basin have posed greater risks of water pollution in the lake. The water quality of Dongjiang Lake has been deteriorating since the 1990s as a result of agricultural nonpoint source pollution, inadequate wastewater treatment facilities, lack of solid waste management, and significant soil erosion around the lake. The trophic state index for Dongjiang Lake was 25.8 in 1991 and 29.5 in 2010.[3] Although the 2010 trophic state index is acceptable for drinking purposes, the value in 2010 was significantly higher than in 1991. A review of 15 monitoring stations from 1991 to 2010 has shown that Dongjiang Lake is generally in the oligotrophic to mesotrophic conditions. However, among the 15 locations, water quality in 12 locations was poorer in 2010 than in 1991. Water quality fluctuations are random and without a significant seasonal pattern or synchronization, so the pollution challenges are not likely from a single source.

9. **Point and nonpoint source pollution.** Agriculture is the major source of pollution in the lake catchment, accounting for about 48% of the total pollutants. Other sources include domestic wastewater (25%), industry (14%), water transportation (9%), and tourism (4%). Every year, the pollutants discharged into the Dongjiang Lake area contain 9,038 tons of chemical oxygen demand, 1,741 tons of ammonia, and 363 tons of total phosphorus. Only a few townships have wastewater treatment facilities, and the wastewater from most townships and villages scattered around the lake is directly discharged to the streams that drain to the lake.

10. Solid waste collection and treatment facilities for townships and villages have yet to be established in the basin. As the population increases, garbage production also rises. Only a few villages have household trash collectors or collection bins in designated locations. Furthermore, public collection tanks are often not emptied on time and overflow of rubbish is common. Consequently, garbage is discarded on roadsides and open spaces around houses. This not only has an adverse visual impact on the surrounding environment, but also seriously threatens the health of local villagers. Because of the lack of transfer and disposal, rubbish has been stacked on unused land. Some villages burn their rubbish, causing significant adverse impacts to the surrounding environment and the living conditions of local residents.

11. **Inadequate water supply facilities.** A large number of residents, particularly rural communities in Zixing City, do not have access to piped water supply, although they are close to the lake. They use water drawn from various sources without proper treatment. This is not only a burden for the residents, but also exposes them to health risks and, in turn, affects the lake water quality. The existing water treatment plants in the towns of Zixing City use surrounding small-scale water reservoirs and mountain springs or rivers as water sources, but these are subject to seasonal changes and weak self-purification capacity during drought. The villages beyond the service area of existing water supply plants are served by small-scale temporary

[3] The trophic state index is a measure of how much nutrient, such as nitrogen and phosphorus, is in a lake or other body of water. A lake can be put into one of three possible classes: oligotrophic, mesotrophic, or eutrophic.

water supplies, which have lower safety standards. Most rural residents drink well water or stream water of poor sanitary quality, especially during rainy seasons when wells are often flooded, seriously polluted, and of extremely turbid water quality. Furthermore, some rural villages are located within high-fluorine and high-arsenic areas.

12. **Low flood protection level.** With the large flood storage capacity of Dongjiang Lake, the downstream of the lake has been protected from major floods. However, the flood protection of the upstream and surrounding areas of the lake is low, with capacity only against flood recurrence of about 2 years. The rivers have been frequently impacted by floods over the years, resulting in river blockage and bank erosion that reduce flood discharge capacity. Most of the rivers do not have bank protection, which results in erosion of neighboring farmland during floods and causes sedimentation in the rivers. Frequent floods have brought extreme impacts on the lives and production of the riparian villagers. Farmers particularly suffer from loss of properties, farmlands, or even life. For example, a severe flood in July 2006 caused 142 casualties, 2,563 collapsed houses, and 200 hectares (ha) of damaged farmland.

13. **Soil erosion and ecosystem.** Limited livelihood and employment opportunities and lack of arable land result in the conversion of slopes for farming by local communities. In the areas around Dongjiang Lake, soil erosion is intensifying and occurrence of natural disasters is increasing. Soil erosion in the project area covers 1,087 km^2 and average annual soil erosion reaches 4 million tons, causing river siltation in some sections of the rivers and even forming sand deltas at some river estuaries to Dongjiang Lake. The 55,000 ha of national and provincial public forest around the lake area greatly contribute to water and soil conservation. However, fires and pest disasters often occur because of the low quality of the forest, and the eco-efficiency of the forest is relatively low. The lake areas are abundant with bamboo resources, and can be a major source of income for local residents while protecting the environment.

14. **Inadequate institutional coordination and capacity.** Dongjiang Lake basin covers Zixing City and the counties of Guidong, Rucheng, and Yizhang in Chenzhou Municipality. The Dongjiang Lake environmental protection bureau was established under the Chenzhou Municipal Government in 2003 to coordinate environmental protection in the basin. However, the bureau does not have (i) adequate tools and capacity for coordinating and monitoring environmental protection activities in the entire basin, or (ii) an ecological and environmental monitoring and management information system. It needs to be empowered with adequate human and financial resources to assume responsibility for environmental management of the entire lake basin.

15. **Strategic fit.** The project is consistent with the government's goal of building a harmonious and prosperous society through regionally balanced and environmentally sustainable growth. The project supports the government's Yangtze River Economic Belt Initiative to construct an ecological ecosystem corridor along the river by improving watershed management, water pollution control and prevention, and ecological rehabilitation.[4] It conforms to the strategic priorities of ADB's Midterm Review of Strategy 2020,[5] and the Water Operational Plan, 2011–2020 to increase coverage and improve services for water supply and sanitation, and promote integrated water resources management (IWRM).[6]

[4] State Council of the People's Republic of China. 2014. *Guide on Promoting the Development of the Yangtze Economic Belt*. http://www.gov.cn/zhengce/content/2014-09/25/content_9092.htm.
[5] ADB. 2014. *Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and Pacific.* Manila.
[6] ADB. 2011. *Water Operational Plan, 2011–2020.* Manila.

16. **Lessons.** The project design has incorporated lessons from previous ADB-financed projects and policy-oriented studies on IWRM, environmental and ecosystem improvement, wetland and lake management, and urban–rural integration in the PRC. Major lessons include (i) an integrated approach of structural and nonstructural measures to water resources management; (ii) wide community participation and increased public awareness for environmental improvement; (iii) linking environmental protection with livelihood opportunities; (iv) coordinated management of urban–rural planning, and management of resources and services to facilitate integration and linkage to infrastructure; (v) an institutional and cost recovery mechanism for effective operation and maintenance (O&M) of the facilities; and (vi) eco-compensation as an effective tool for maintaining environmental services.

B. Impact and Outcome

17. The impact will be the achievement of sustainable economic development of the Xiang River basin in Hunan Province. The outcome will be the achievement of integrated environmental protection in Dongjiang Lake basin.

C. Outputs

18. The project will have five outputs: (i) improved pollution control, (ii) establishment of an urban–rural water supply system, (iii) a rehabilitated river course, (iv) establishment of integrated ecosystem rehabilitation and management, and (v) strengthened environmental and project management capacity.

19. Output 1 will include (i) construction of six township wastewater treatment plants with a total capacity of 2,000 m^3/day, and associated sewage collection pipes of 38.1 kilometers (km); (ii) construction of 2,856 small-scale wastewater treatment facilities for rural villages in 10 townships, and associated sewer pipes of about 330 km; (iii) procurement of solid waste collection and compaction equipment, and seven transfer facilities; and (iv) development of nonpoint source pollution management, including soil test and green fertilizer application, and green pest control measures application in 5,690 ha of farmland.

20. Output 2 will include (i) construction of the Yangdongxia water supply plant, with total water treatment capacity of 20,000 m^3/day for the water supply of 128,688 residents in five townships, associated water delivery and supply pipelines with a total length of about 700 km, and pressure regulating stations; (ii) construction of Chukou water supply plant, with capacity of 620 m^3/day for supply to 3,200 residents, and associated water delivery and supply pipelines of about 35 km; and (iii) procurement of O&M equipment.

21. Output 3 will improve the flood protection standard and reduce the soil erosion of five major rivers of Guangqiao, Lianping, Qingyao, Tian'eshan, and Xingning that flow into the lake, including block clearance and dredging of 653,692 m^3 (14.7 km), green embankment of 13.7 km, and landscaping along the riverbanks.

22. Output 4 will include (i) establishing aquatic facilities and management; (ii) constructing three wetlands for about 167 ha, and management facilities; (iii) conducting soil erosion control, including 1,000 ha of reforestation and revegetation, natural enhancement and management of 13,666 ha of public forest, constructing 590 km of fire breaks, and procuring firefighting facilities; (iv) improving 2,595 ha of bamboo forest; (v) conducting alternative livelihood training for 30,000 rural residents; and (vi) carrying out an eco-compensation pilot scheme.

23. Output 5 will support the (i) establishment of environmental, fishery, and forest firefighting monitoring centers; (ii) establishment of the Dongjiang Lake ecological and environmental protection research center; (iii) development of the Dongjiang Lake environmental monitoring and management information system; (iv) provision of project implementation consulting services, training, workshops, and study tours; and (v) establishment of a project monitoring and evaluation system.

24. **Innovation and special features.** The project is expected to scale up and/or demonstrate the following good practices in the PRC: (i) IWRM and comprehensive monitoring, (ii) environmental protection linked with livelihood improvement, and (iii) eco-compensation. In addition, during project preparation, policy dialogue was conducted and recommendations provided for revising the Dongjiang Lake Basin Water Environmental Protection Regulation.[7]

(i) **Integrated water resources management.** Under the IWRM framework, the project attempts to coordinate and integrate the structural and nonstructural measures in a manner that ensures their consistency and results in synergies where the total impact is greater than the sum of the individual actions. To meet the water quality targets as requested in the national good water quality lake program, pollutants discharged into the lake have to be reduced. The project will take a holistic approach to tackling these challenges by preventing different types of pollution sources, and land degradation and soil erosion, with a comprehensive environmental monitoring system to support integrated lake management.

(ii) **Linking environmental protection with livelihood opportunities.** The project will not only maintain environmental and ecological services to the local residents and the downstream Changsha–Zhuzhou–Xiangtan city cluster, but also improve local farmers' income by directly supporting livelihood opportunities, such as bamboo forest development, fish stocking, and technical and vocational education and training in alternative livelihood activities for 30,000 rural residents around the lake. Without such benefits, the willingness of local farmers to comply with environmental regulations around the lake would not be fully effective.

(iii) **Eco-compensation.** Dongjiang Lake performs crucial watershed functions for Hunan Province. An eco-compensation pilot scheme will be tested under the project to compensate those responsible for the collection and treatment of solid waste and sewage, and engagement of greener agricultural production, by setting up an eco-compensation fund to be raised from tourist entry fees. HPG and Zixing City Government (ZCG) also agreed to explore more eco-compensation schemes for better protection of Dongjiang Lake during project implementation.

D. Investment and Financing Plans

25. The project is estimated to cost $262.03 million (Table 1). Detailed cost estimates by expenditure category and by financier are in the project administration manual (PAM).[8]

[7] The regulation is being revised by the local governments and will be submitted to Hunan People's Congress for approval in about 2 years. Most of the recommendations were accepted by the Zixing City Government.

[8] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

Table 1: Project Investment Plan
($ million)

Item			Amount[a]
A.	**Base Cost**[b]		
	1.	Improved pollution control	47.47
	2.	Establishment of urban–rural water supply system	46.16
	3.	Rehabilitated river course	14.34
	4.	Establishment of integrated ecosystem rehabilitation and management	88.60
	5.	Strengthened environmental and project management capacity	24.83
		Subtotal (A)	**221.40**
B.	**Contingencies**[c]		**36.09**
C.	**Financing Charges During Implementation**[d]		**4.54**
		Total (A+B+C)	**262.03**

[a] Includes taxes and duties of $16.81 million to be financed from government resources and the Asian Development Bank (ADB) loan resources.
[b] In May 2015 prices.
[c] Physical contingencies computed at 10%. Price contingencies computed at 1.4% from 2016 onward on foreign exchange costs, and 3.0% for 2016 onward on local currency costs.
[d] Includes interest and commitment charges. Interest during construction for the ADB loan has been computed at the 5-year US dollar fixed swap rate plus a spread of 0.5% and a maturity premium of 0.2%. Commitment charges for the ADB loan are 0.15% per year to be charged on the undisbursed loan amount.
Source: Asian Development Bank estimates.

26. The government has requested a loan of $130 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including a grace period of 5 years, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility,[9] a commitment charge of 0.15% per year (the interest and other charges during construction to be capitalized in the loan), and such other terms and conditions set forth in the loan and project agreements.

27. The financing plan is in Table 2. The ADB loan will finance 49.6% of the project cost, including civil works, goods, consulting services, training, and taxes and duties for eligible ADB-financed expenditures.[10] Farmer beneficiaries will contribute their share of cash for buying materials from the suppliers for the nonpoint source pollution, and green and organic fertilizers components; and their share of labor for ecosystem management with community participation.

Table 2: Financing Plan

Source	**Amount** ($ million)	**Share of Total** (%)
Asian Development Bank		
Ordinary capital resources (loan)	130.00	49.6
Zixing City Government (from its budgetary resources)	109.57	41.8
Farmer beneficiaries	22.46	8.6
Total	**262.03**	**100.0**

Source: Asian Development Bank estimates.

[9] The interest includes a maturity premium of 20 basis points. This is based on the above loan terms and the government's choice of repayment option and dates.
[10] The amount of taxes and duties to be financed in the project has been determined based on the principles that (i) the amount is within the reasonable threshold, (ii) the amount does not represent an excessive share of the project, (iii) the taxes and duties apply only with respect to ADB-financed expenditures, and (iv) the financing of taxes and duties is material and relevant to the success of the project.

E. Implementation Arrangements

28. ZCG will be the executing agency of the project. The implementing agency will be the Zixing City Urban and Rural Environmental Protection Investment and Financing Center (ZIFC). ZCG and ZIFC will engage a procurement agent to assist in procurement. The implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 8).

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	January 2016–December 2020		
Estimated completion date	31 December 2020 (loan closing date: 30 June 2021)		
Management			
(i) Oversight body	Zixing City Government (ZCG), through a leading group Mayor of ZCG (chair)		
(ii) Executing agency	ZCG		
(iii) Key implementing agency	Zixing City Urban and Rural Environmental Protection Investment and Financing Center		
(iv) Implementation units	Seven project implementation units in the ZCG bureaus of agriculture; environmental protection; forestry; housing, urban, and rural development; urban management (sanitation center); and water resources; and the Dongjiang reservoir administration bureau		
Procurement	National competitive bidding	39 contracts	$145.15 million
	Community participation	various	$36.80 million
Consulting services	Quality- and cost-based selection	162 person-months	$2.10 million
Retroactive financing and/or advance contracting[a]	Advance contracting and retroactive financing will be used for civil works and materials and equipment for subprojects of (i) wastewater treatment plants and sewer networks, (ii) village wastewater treatment facilities, (iii) solid waste transfer stations and associate facilities, and (iv) forest.		
Disbursement	The loan proceeds will be disbursed in accordance with the Asian Development Bank (ADB) *Loan Disbursement Handbook* (2015, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

[a] Approval of advance contracting does not commit ADB to finance the project. The amount to be retroactively financed does not exceed 20% of the ADB loan and will be incurred before loan effectiveness, but not earlier than 12 months before the signing of the related legal agreement.

Source: Asian Development Bank.

III. DUE DILIGENCE

A. Technical

29. The project was prepared by licensed domestic design institutes taking into account consultant recommendations during project preparation, in accordance with relevant PRC guidelines and regulations. The technical feasibility was confirmed to be adequate after detailed examination of the project's compatibility with local conditions, including current and projected climate variables, availability of water sources, proximity to the residents, and available land for project facilities. Alternative technical options identified the most suitable sites for the facilities, and the different forms of river embankments and wetlands to suit the local environment. The processes selected for the urban and rural water supply, and wastewater and sludge treatment, are appropriate for the technical capacity of the local implementing agency. Capacity building to ensure adequate skills for project implementation and O&M will be financed under the project.

B. Economic and Financial

30. The economic internal rate of return was estimated by comparing with- and without-project scenarios. The project's economic costs reflect (i) the capital cost for construction,

including physical contingencies, land acquisition, resettlement, and environmental monitoring costs; and (ii) annual O&M costs. The economic benefits for the project were derived from the willingness to pay of beneficiaries for water supply, wastewater treatment, and solid waste collection; avoided flood and forest fire damage; water treatment and resource cost savings from wetland protection; reduced soil erosion; and increased quantity and quality of fruit, forest, and fishery products. The overall economic internal rate of return was estimated at 14.5%; and the net present value is CNY156.75 million, indicating the economic viability of the project.

31. The financial sustainability assessment for the project indicates that ZCG has sufficient funds to finance the counterpart contributions, debt service, and O&M costs. Average annual counterpart funding accounts for 0.5%–2.4% of ZCG's total projected revenue during implementation. The sum of counterpart funds, debt service, and O&M costs is 1.2%–3.2% of the total projected revenues during 2016–2040. The financial evaluation indicated that the financial internal rate of return for Yangdongxia water supply was 3.14%, higher than the weighted average cost of capital of 2.45%; while the financial internal rate of return for Chukou water supply was 5.24%, higher than the weighted average cost of capital of 1.70%. Sensitivity analysis shows that the Yangdongxia water supply is sensitive to revenue decrease. Financial evaluation of the township wastewater treatment plants determined that full O&M cost recovery is not possible at reasonable tariff assumptions, given their small scale. ZCG will provide subsidies needed to partly cover O&M expenses for township wastewater treatment facilities.

C. Governance

32. The procurement capacity assessment indicated that (i) ZCG and ZIFC have the necessary technical and human resources to undertake procurement of consulting services, goods, and works; and (ii) monitoring and internal controls regarding procurement are generally in place. The financial management assessment indicated that (i) both ZCG and ZIFC have adequate and qualified staff for operating and administering the project account, and (ii) its internal control and audit will be strengthened through capacity building and close monitoring during project implementation. The financial management risk has been assessed as moderate on a pre-mitigation basis mainly because of unfamiliarity with ADB's financial management policies and procedures. To address these risks, the key mitigating measures include provision of training and consulting services. With mitigating measures, these financial management arrangements are deemed adequate.

33. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with HPG, ZCG, and the government. The specific policy requirements and supplementary measures are described in the PAM (footnote 8).

D. Poverty and Social

34. The project will directly benefit 78,325 households, of which 10.8% are low-income (CNY10,000/year and below).[11] The project has good opportunities for socially inclusive benefits, which will provide farmers around the lake with adequate awareness and incentives to protect the lake environment. The project design focuses on ways to balance environmental and social objectives, and thereby maintain the ecological quality of the lake, while maintaining good incomes for people with livelihoods around the lake. A social development action plan has been prepared to ensure actions are taken to consult with and mobilize local communities to shift

[11] These include 58,425 households with new or improved sanitation, 42,188 households with new or improved water supply, 10,273 households with reduced flood risks, and 26,650 households with rehabilitated bamboo forest. The sum is larger than the total beneficiary households because some households benefit from several activities.

away from detrimental activities and behaviors. This will be supported by livelihood training programs and public awareness campaigns for sanitation and environmental protection. A community consultation and participation plan has been prepared for project implementation to engage local communities' active participation in the implementation of several project outputs.

35. **Gender.** ADB has classified the project as effective gender mainstreaming. Good opportunities exist for women to participate in project design, implementation, construction employment, and project activities, particularly in livelihood training, wetland construction and management, bamboo upgrading, and public awareness programs. Women will also benefit from the wastewater treatment, solid waste management, and water supply components, which will greatly improve their living conditions. A gender action plan has been prepared. ZCG and ZIFC will require social and gender awareness training and support during implementation, and the project implementation consultants for social and gender issues will be provided.

E. Safeguards

36. **Environment (category A).** The environmental impact assessment (EIA) report, including an environmental management plan (EMP), follows ADB's Safeguard Policy Statement (2009). The EIA is consistent with the domestic EIAs. The draft EIA report was publicly disclosed on the ADB website on 27 April 2015. The project is expected to achieve environmental benefits, including improved long-term security of the high water quality in Dongjiang Lake; improved wetland habitats; soil erosion control; and improved institutional and community management of water, wetland, and forestry resources. Anticipated construction impacts are from dredging and embankment of the rivers; construction-related air, dust, noise, vibration, and erosion impacts; and occupational and community health and safety. Potential operational risks include cumulative nutrient loading in Dongjiang Lake and the rivers resulting from the discharge of treated effluent; inadequate maintenance of the treatment plants, pipelines, and constructed wetlands; and air and noise emissions from the treatment plants. The risk of cumulative and/or induced impacts has been assessed. Mitigation measures are described in the EMP. These include the timing of dredging, on-site sediment sampling, control of sediment dispersion, and maintenance of project facilities. The EIA concludes that effective implementation of the EMP, together with the training, will result in residual impacts within the limits of the PRC standards defined in the EMP. The initial climate risk rating during the project concept stage was medium, but the climate risk vulnerability assessment found the risk to be low. Adaptation measures were included in the project design.

37. **Involuntary resettlement (category A).** A total of 189.06 ha of land will be occupied permanently, including 12.28 ha of collective land and 176.77 ha of state-owned land. Some 65.29 ha of land will be occupied temporarily. The project will demolish 1,539.1 square meters of housing. Land acquisition and resettlement will affect 573 people, of whom 284 will lose more than 10% of their productive assets and/or be physically displaced. Seven households need to be relocated. Livelihood measures and training, such as bamboo forest and training on tea processing, tourist services, computer operation, and cooking, will be provided to households with significant land losses. ZCG, with the assistance of consultants, prepared a resettlement plan in line with ADB's Safeguard Policy Statement and the government's related laws and regulations. ZCG and ZIFC have good experience and capacity to manage resettlement impacts. The draft resettlement plan was disclosed on the ADB website on 2 July 2015.

38. **Ethnic minorities (category B).** Yao people in four villages will benefit from several project activities, including bamboo forest, wastewater treatment, solid waste management, river rehabilitation, wetland development, and livelihood training. A draft ethnic minority development

plan has been prepared in line with ADB's Safeguard Policy Statement and related laws and regulations of the PRC and Hunan Province. Actions to be taken include community consultation and mobilization to ensure Yao people can participate in project design, construction, and benefits in a manner that supports culturally appropriate village development. The draft ethnic minority development plan was disclosed on the ADB website on 2 July 2015.

F. Risks and Mitigating Measures

39. The project has potential environmental, institutional, and financial risks. The overall risk is assessed as medium. The project provides adequate measures to mitigate these risks, and the integrated benefits and impacts are expected to outweigh the costs. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[12]

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
The local government fails to adopt an integrated approach to the Dongjiang Lake's environmental protection.	The project will help strengthen and empower the local government and relevant agencies to carry out environmental monitoring and protection in a coordinated and holistic manner.
Infrastructure assets are poorly operated and maintained because of lack of capacity and/or budget.	Zixing City Government will ensure adequate staff resources and annual operation and maintenance budget in accordance with loan covenants. The project includes capacity development and training for the operation and maintenance of the facilities supported by the project.

Source: Asian Development Bank.

IV. ASSURANCES

40. The government, HPG, and ZCG have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents. The government, HPG, and ZCG have agreed with ADB on certain covenants for the project, which are set forth in the loan and project agreements.

V. RECOMMENDATION

41. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and, acting in the absence of the President, under the provisions of Article 35.1 of the Articles of Agreement of ADB, I recommend that the Board approve the loan of $130,000,000 to the People's Republic of China for the Hunan Dongjiang Lake Integrated Environmental Protection and Management Project, from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Stephen P. Groff
Vice-President

3 November 2015

[12] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned with:

Sustainable economic development of the Xiang River basin in Hunan Province achieved.
(Xiang River Basin Scientific Development Master Plan, 2011–2020)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Integrated environmental protection in Dongjiang Lake basin achieved	By end 2021: a. Public satisfaction with environmental and municipal services (water supply, sanitation, and waste) in the project area increased to 80% (2014 baseline: 72%) b. Wastewater collection and treatment in the project area increased to 80% (2014 baseline: 5%) c. Pollution loads to Dongjiang Lake reduced by Chemical oxygen demand: 1,389 tons Total phosphorus: 100 tons Total nitrogen: 227 tons Garbage: 80,000 tons (2014 baseline: not applicable) d. About 131,888 people serviced with new or improved water supply (2014 baseline: not applicable) e. About 24,600 *mu* of farmland protected by improved flood capacity (2014 baseline: not applicable)	a. Project management office's survey b. ZCG's statistic yearbook c. ZCG environmental protection bureau's monitoring report d. Project progress and completion reports e. ZCG water resources bureau's monitoring report	The local government fails to adopt an integrated and coordinated approach to the Dongjiang Lake's environmental protection.
Outputs 1. Pollution control improved	By early 2021 (2014 baseline: 0): 1a. Six township WWTPs with capacity of 2,000 m^3/day and 330 km of associated sewer pipes, and 2,856 small rural wastewater treatment facilities operational 1b. Sewer connection to households in the project area increased from 850 to 33,573 1c. Collection and treatment of solid waste increased from 130 tons/day to 212 tons/day 1d. Green fertilizers and pest control measures applied in 5,690 ha of farmland 1e. 40% of 327 permanent operation jobs and 25% of 450 construction jobs allocated for women	1a–e. Project progress and completion reports, and loan review missions	Infrastructure assets are poorly operated and maintained as a result of lack of capacity and/or budget. Rural village communities failed to connect to wastewater treatment facilities, and incentives are lacking for solid waste collection.
2. Urban–rural water supply system established	2a. Yangdongxia WSP with capacity of 20,000 m^3/day operational 2b. About 700 km of water delivery and supply pipelines installed 2c. Chukou WSP with capacity of 620 m^3/day operational 2d. About 35 km of water delivery and supply pipelines installed	2a–e. Project progress and completion reports, and loan review missions	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	2e. 40% of 327 permanent operation jobs and 25% of 450 construction jobs allocated for women		
3. River course rehabilitated	3a. About 653,692 m^3 (14.7 km) of river blockage cleared and/or dredged in the five major rivers 3b. 13.7 km green embankment constructed in the needed sections of the five major rivers 3c. Flood control capacity in the five major rivers increased from once in 5 years to once in 10 years 3d. 25% of 300 temporary construction jobs allocated for women	3a–d. Project progress and completion reports, and loan review missions	
4. Integrated ecosystem rehabilitation and management established	4a. Fish stocking and releasing facilities constructed 4b. About 167 ha of three new wetland areas established 4c. 1,000 ha of reforestation and revegetation conducted for reduced soil erosion, and 590 km of fire-break forest belt constructed 4d. Production efficiency in about 2,595 ha of bamboo forest improved through community participation, of which 40% are women 4e. Alternative livelihood training conducted for 30,000 rural residents, of which 40% are women 4f. 40% of 960 permanent operation jobs and 25% of 2,010 construction jobs allocated for women	4a–f. Project progress and completion reports, and loan review missions	
5. Environmental and project management capacity strengthened	5a. An environmental monitoring center established and operational for effective environmental monitoring 5b. An ecological and environmental protection research center set up 5c. About 5,400 staff-days training provided for project staff, of which 40% are women; and their capacity improved 5d. A project monitoring and evaluation system operational	5a–d. Project progress and completion reports, and loan review missions	

Key Activities with Milestones

1. Pollution control improved

1.1 Construct six WWTPs and 38.1 km of sewer pipes in six townships (Q1 2016–Q4 2017)
1.2 Construct 2,856 rural wastewater treatment facilities and 330 km of sewer pipes in 10 townships (Q1 2016–Q4 2017)
1.3 Construct seven solid waste transfer stations and procure associated solid waste compressing equipment (Q1 2016–Q4 2017)
1.4 Procure 60,516 units of solid waste collection equipment, and transfer vehicles (Q1 2016–Q4 2017)
1.5 Test soil and apply green fertilizers (site-specific formulated and organic fertilizers) in 3,406 ha of farmland in 13 pilot villages (Q1 2016–Q4 2019)
1.6 Procure green pest control devices and biological pesticide, and apply these new technologies in 2,284 ha of farmland in 19 villages (Q1 2016–Q4 2019)

Key Activities with Milestones

2. Urban–rural water supply system established

2.1 Construct the Chukou WSP with capacity of 620 m^3/day (Q1 2016–Q4 2017)
2.2 Construct 7.8 km of conveyance pipelines, 4.0 km of water main distribution pipelines, and 23.0 km of household connection distribution pipelines in Chukou Town (Q1 2016–Q4 2017)
2.3 Construct the Yangdongxia WSP with capacity of 20,000 m^3/day (Q1 2016–Q4 2019)
2.4 Construct 13.8 km of conveyance pipelines, 157.8 km of water main distribution pipelines, 228.0 km of water branch distribution pipelines, and 300.0 km of household connection distribution pipelines in five townships (Q1 2016–Q4 2019)

3. River course rehabilitated

3.1 Clear and/or dredge about 653,692 m^3 (14.7 km) of river blockages in the five major rivers of Guangqiao, Lianping, Qingyao, Tian'eshan, and Xingning (Q1 2016–Q4 2017)
3.2 Construct 13.7 km of green embankment in needed sections of the five major rivers (Q1 2016–Q4 2017)
3.3 Plant riverbank trees for greening (Q1 2016–Q4 2018)

4. Integrated ecosystem rehabilitation and management established

4.1 Procure fish resource monitoring equipment (Q12016–Q4 2016)
4.2 Build about 3,000 square meters of fish proliferation platform with access road (Q1 2016–Q4 2017)
4.3 Build and upgrade 20 ha of fish-breeding pond, and procure associated equipment (Q1 2016–Q4 2017)
4.4 Construct the 40 ha Xingning River wetland with 7.5 km of access road and 1.5 ha of artificial wetland for river water quality improvement (Q1 2016–Q4 2017)
4.5 Construct the 26.7 ha Huangcao lakeside wetland (Q1 2016–Q4 2017)
4.6 Construct the 100 ha Hangxi River wetland with 5 km of internal plank road and 10 pavilions (Q1 2016–Q4 2017)
4.7 Construct 590 km of fire-prevention forest belt (Q1 2016–Q4 2018)
4.8 Conduct 1,000 ha of reforestation in rocky area (Q1 2016–Q4 2020)
4.9 Enhance 13,666 ha of forest management to increase the forest density (Q1 2016–Q4 2020)
4.10 Procure forest firefighting equipment and facilities, and pest control equipment and biological pesticide (Q1 2016–Q4 2020)
4.11 Improve the production efficiency in 2,595 ha of low-efficient bamboo forest (Q1 2016–Q4 2020)
4.12 Conduct alternative livelihood training for farmers (Q1 2016–Q4 2020)
4.13 Carry out eco-compensation pilot scheme (Q1 2017–Q4 2020)
4.14 Conduct fish release (Q1 2017–Q4 2020)

5. Environmental and project management capacity strengthened

5.1 Establish a project monitoring and evaluation system (Q1 2016–Q4 2016)
5.2 Establish environmental, fishery, and forest firefighting monitoring centers (Q1 2016–Q4 2017)
5.3 Set up the Dongjiang Lake ecological and environmental protection research center (Q1 2016–Q4 2017)
5.4 Establish the Dongjiang Lake environmental monitoring and management information system (Q1 2016–Q4 2018)
5.5 Recruit and manage project implementation consulting services (Q1 2016–Q4 2020)
5.6 Conduct training, workshops, and study tours (Q1 2016–Q4 2020)

Project Management Activities

Technical design and procurement planning and management (Q3 2015–Q4 2019)
Carry out key activities of the gender action plan and the social development action plan (Q1 2016–Q4 2020)
Conduct and monitor activities of the resettlement plan (including land acquisition), the ethnic minority development plan, and the environmental management plan (Q1 2016–Q2 2021)
Conduct midterm and annual project reviews (Q3 2016–Q4 2020)

Inputs

Asian Development Bank loan:	$130,000,000
Zixing City Government:	$109,570,000
Farmer beneficiaries:	$ 22,460,000

Assumptions for Partner Financing

Not applicable.

ha = hectare, km = kilometer, m^3 = cubic meter, *mu* = a Chinese unit of land measurement (1 *mu* = 1/15 ha), Q = quarter, WSP = water supply plant, WWTP = wastewater treatment plant, ZCG = Zixing City Government.

[a] Hunan Provincial Government. 2013. *Xiang River Basin Scientific Development Master Plan (2011–2020)*. Changsha.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://adb.org/Documents/RRPs/?id=47070-002-3

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Multisector (Agriculture, Natural Resources, and Rural Development; and Water and Other Urban Infrastructure and Services)
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Financial Analysis
8. Economic Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Gender Action Plan
12. Environmental Impact Assessment
13. Resettlement Plan
14. Ethnic Minority Development Plan
15. Risk Assessment and Risk Management Plan

Supplementary Documents

16. Procurement Capacity and Risk Assessment
17. Financial Management Assessment